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GROUND WATER INFLOW
MODEL FOR THE PROPOSED
CRANDON MINE

Submitted To

Exxon Minerals Company
Rhinelander, Wisconsin

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University of Wisconsin, LRC
Stevens Point, Wisconsin

By

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December 1982

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	3
3.0	MINE INFLOW MODEL	4
3.1	CRANDON MODEL DATABASE	4
3.1.1	Summary	4
3.1.2	Database Error Checking and Quality Control .	5
3.1.3	Finite Difference Model Regions and Grids ...	6
3.1.3.1	Summary	6
3.1.3.2	Overburden Aquifer Submodel Region . and Grid	7
3.1.3.3	Orebody Submodel Region and Grid ...	10
3.1.3.4	Grid Connection	13
3.1.4	Boundary Conditions	13
3.1.4.1	Summary	13
3.1.4.2	Overburden Aquifer Internal Boundaries	15
3.1.4.3	Orebody External Boundaries	15
3.1.4.4	Orebody Internal Boundaries	15
3.1.5	Model Hydraulic Parameters	15
3.1.5.1	Summary	16
3.1.5.2	Overburden Aquifer Parameters	16
3.1.5.2.1	Overburden Aquifer Permeability	16
3.1.5.2.2	Overburden Aquifer Recharge	16
3.1.5.2.3	Overburden Aquifer Storage	17

3.2	MINE INFLOW MODEL DESIGN	17
3.2.1	Background	17
3.2.2	Model Design Features	18
3.2.2.1	Summary	18
3.2.2.2	Impact Analysis	18
3.2.2.3	Variable Gridding	19
3.2.2.4	Interactive Program Design	19
3.2.2.5	Approximations to System Non-Linearities	20
3.2.2.6	Linkage Between Overburden and Orebody	22
3.2.2.7	Mining Plan Implementation and Discretization	24
3.2.2.8	Correction for Orebody Flow Convergence	27
3.2.2.9	Transmissivity Determination in Orebody	28
3.2.2.10	Resistive Layer Vertical Permeability	33
3.2.2.11	Calculation of Mine Inflow	34
3.2.2.12	Water Balances	34
3.2.2.13	Pre-Dewatering Capabilities	35
3.3	MODEL INPUT AND OUTPUT	36
3.3.1	Summary	36
3.3.2	Data File Input	36
3.3.3	Interactive Input	38
3.3.4	Model File Output	38
3.3.5	Interactive Model Output	39
3.4	CALIBRATION METHODOLOGY	40
3.4.1	Summary	40

3.4.2	Orebody and Overburden Aquifer Pumping Tests	41
3.4.3	Overburden and Orebody Connectivity	41
3.4.4	Analytical Pumping Test Analysis	42
3.4.5	Mine Inflow Model Calibration	48
3.4.6	Sensitivity Based on Calibration	57
4.0	PREDICTIVE MODELING OF MINE INFLOW AND RELATED HYDROLOGIC EFFECTS	59
4.1	SUMMARY	59
4.2	UNMITIGATED INFLOW SIMULATION	59
4.3	CONTROLLED MINE INFLOW SIMULATION/SELECTIVE GROUTING OF KLOHN LEONOFF TARGET AREAS	70
4.4	CONTROLLED MINE INFLOW SIMULATION/SELECTIVE GROUTING OF KLOHN LEONOFF TARGETS AND ADDITIONAL AREAS	76
5.0	MINE INFLOW SENSITIVITY ANALYSIS	80
5.1	OVERBURDEN AQUIFER CONSIDERATIONS	81
5.2	RESISTIVE LAYER AND OREBODY PARAMETER CONSIDERATIONS	81
5.2.1	Resistive Layer Permeabilities And Areas	82
5.2.2	Orebody Permeabilities	82
5.2.3	Orebody Storage Coefficient	84
5.3	CONSIDERATION OF AQUIFER STRATIFICATION	84
5.4	SUMMARY	87
6.0	CONCLUSIONS	88
6.1	UNMITIGATED INFLOW PREDICTIONS	88
6.2	MINE WATER CONTROL PLANS	88
6.3	MODEL SENSITIVITY ANALYSIS	89
7.0	REFERENCES	90
8.0	APPENDICES	91

Table of Contents

- A. FILE "REVORE" USED AS INPUT TO DESCRIBE OREBODY RELATIVE PERMEABILITY DISTRIBUTION FOR PRE-PROCESSOR PROGRAM.
- B. FILE "RESIST" USED AS INPUT TO PRE-PROCESSOR PROGRAM TO DESCRIBE RESISTIVE LAYER RELATIVE PERMEABILITY DISTRIBUTION.
- C. PRE-PROCESSOR PROGRAM USED TO GENERATE OREBODY NODE CARDS FOR INPUT TO CALIBRATION AND SIMULATION (FILE "PREP").
- D. PROCEDURE FILE "EXXPRC" USED TO CONTROL CALIBRATION EXECUTION FOR BOTH THE 211 AND 213 PUMP TESTS.
- E. CALIBRATED OREBODY NODE CARD FILE USED FOR BOTH CALIBRATION AND UNMITIGATED INFLOW SIMULATION.
- F. FILE "EXTBDY" USED TO DESCRIBE EXTERIOR BOUNDARY CONSTANT HEAD NODES FOR OVERBURDEN AQUIFER MODEL.
- G. FILE "RECHRG" USED TO DEFINE OVERBURDEN AQUIFER RECHARGE AREAS DIFFERENT THAN GLOBAL RECHARGE OF 220 MM/YEAR (0.01478 GPD/FT^2) IN GPD/FT^2 .
- H. FILE "PERMEA" USED TO DEFINE OVERBURDEN AQUIFER PERMEABILITY HETEROGENEITY FOR NODES DIFFERENT THAN $1.22\text{E-}4 \text{ M/SEC}$ (259 GPD/FT^2) (FIGURES IN GPD/FT^2).
- I. FILE "BOTOM" USED TO DEFINE OVERBURDEN AQUIFER BOTTOM ELEVATION IN FEET.
- J. FILE "POTEN" USED TO DEFINE OVERBURDEN AQUIFER POTENTIOMETRIC SURFACE ELEVATION IN FEET.
- K. FILE "THICK" USED TO DEFINE SATURATED THICKNESS OF OVERBURDEN AQUIFER IN FEET.
- L. FORTRAN SOURCE CODE FILE "EX211B" USED FOR 211 PUMP TEST CALIBRATION.
- M. FORTRAN SOURCE CODE FILE "EXX213B" USED FOR 213 PUMP TEST CALIBRATION.
- N. PROCEDURE FILE "EXXBSM" USED TO CONTROL SIMULATION EXECUTION.
- O. FILE "NMINE" WHICH DEFINES WHEN MINE NODES BECOME ACTIVE.
- P. FORTRAN SOURCE FILE "EXXSIM5" USED FOR MINE PLAN SIMULATIONS.
- Q. PARTIAL UNMITIGATED SIMULATION OF MINE PLAN.

LIST OF TABLES

<u>TABLE NO.</u>	<u>TITLE</u>
3.1	Input Data Files
3.2	Mine Inflow Model Output Files
3.3	Calibrated Mine Inflow Model Parameters for Pumping Tests 211 and 213

LIST OF FIGURES

<u>FIGURE NO.</u>	<u>TITLE</u>
3.1	Representation of Finite Difference Grid of Overburden Aquifer Model for Improved Orebody Area Detail.
3.2	Overburden Aquifer Boundary Conditions and Heterogeneities.
3.3	Definition of Orebody Finite Difference Grid Network.
3.4	Representation of Finite Difference Grids in Common Between Overburden Aquifer and Orebody Submodels.
3.5	Resistive Layer Characterization and Example Computations of the Vertical Transmissive Property.
3.6	Model Feedback Conceptualization.
3.7	Finite Difference Grid Overlaying Typical Mine Plan Level (A) and Position of Observation Wells (B).
3.8	Cross-section Transmissivity Representation for Orebody.
3.9	Typical Relative Permeability Distribution in Plan (A) and Cross-Section (B) with Superposition of Finite Difference Grid.
3.10	Vector Volume Representation for Three-Dimensional Flow in Orebody.
3.11	Relationship of T_I , T_J , and R Vector Volumes to Orebody Relative Permeability Groups.

LIST OF FIGURES (CONTINUED)

<u>FIGURE NO.</u>	<u>TITLE</u>
3.12	Conceptualization of Permeable Zones of Orebody and Image Well Layouts Considered for Aquifer Test Analysis.
3.13	Basic Type Curves Used for Well Test Analysis.
3.14	Example Well Test Analysis for Observation Well 210 Response During Pumping of Well 213.
3.15	Triangulation Analysis Showing Location of Apparent Source of Water Recharging Orebody During Pumping of Well 213.
3.16	Cross-Section Showing Location of Observation Wells Used in Pumping Tests 211 and 213.
3.17	Calibrated Orebody Drawdowns for Pumping Test 213.
3.18	Calibrated Overburden Aquifer Drawdowns for Pumping Test 213.
3.19	Calibrated Orebody Drawdowns for Pumping Test 211.
3.20	Calibrated Overburden Aquifer Drawdowns for Pumping Test 211.
3.21	Integrated Cross-Section Drawdown of 213 Pumping Test at 7 Days.
4.1	Estimated Unmitigated Mine Inflows.
4.2	Conceptualization of Vertical Flow Through Resistive Layer.
4.3	Unmitigated Drawdown Impacts at Steady-State in Overburden Aquifer.

LIST OF FIGURES (CONTINUED)

<u>FIGURE NO.</u>	<u>TITLE</u>
4.4	Unmitigated Drawdown Distribution in Overburden Aquifer Above Resistive Layer for Steady-State Conditions (in Meters).
4.5	Unmitigated Flow Density at Resistive Layer for Steady-State Conditions.
4.6	Unmitigated Flow Density at 230 Meter Level for Steady-State Conditions.
4.7	Unmitigated Mine Inflow Distribution at Steady-State Categorized by Overburden Aquifer Flow Direction.
4.8	Reduction in Ground Water Flow to Swamp and Hemlock Creeks Due to Mine Induced Drawdowns Under Unmitigated Conditions.
4.9	Controlled Mine Inflow Rates When Klohn Leonoff Target Areas Are Grouted to 10^{-5} CM/SEC.
4.10	Klohn Leonoff Control Plan Flow Density Distribution at Resistive Layer for Steady-State Conditions.
4.11	Klohn Leonoff Control Plan Drawdown Above Overburden Aquifer at Steady-State (in Meters).
4.12	Controlled Mine Inflow When Additional Grouting is Performed on Eastern Areas and the Grout Effectiveness is Increased to 2.4×10^{-6} CM/SEC (0.05 GPD/FT ²).
4.13	Alternate Control Plan Flow Density at Resistive Layer for Steady-State Conditions.

LIST OF FIGURES (CONCLUDED)

FIGURE NO.TITLE

4.14

Alternate Control Plan Overburden Aquifer Drawdown Distribution Above Resistive Layer for Steady-State Conditions (in Meters).

4.15

Alternative Control Plan Drawdown Impact at Steady-State (Meters).

1.0 EXECUTIVE SUMMARY

A digital computer ground water model has been assembled that can predict water-level declines and water inflow rates for the proposed Crandon Mine of Exxon Minerals Company. This model is a finite-difference formulation consisting of two submodels including a three-dimensional (3-D) orebody model linked to a two-dimensional (2-D) flow model of the overlying glacial overburden aquifer.

The model was assembled and calibrated from pumping test data gathered from orebody and overburden test wells. The database has been updated from the previous study by Thomas A. Prickett & Associates (8) to include improved and more complete data from Exxon Minerals, Golder Associates (3), and D'Appolonia (2).

After calibration the mine model was used to predict mine water inflow rates and resulting effects on the overlying glacial overburden aquifer. The results of the predictive runs performed are an expected steady-state unmitigated mine inflow of approximately $0.1180 \text{ M}^3/\text{SEC}$ (1870 GPM) causing measurable (1 M or 3.3 Feet) overburden aquifer water-level declines to distances of up to 1829 M (1.14 miles) south of the orebody and up to 1219 M (0.76 miles) to the northwest and northeast. Drawdown effects to the north are reduced considerably, to a radial limit of approximately 610 M (0.38 miles) due to localized areas of low permeability in the glacial overburden deposits.

An additional model simulation indicated that methods involving permeability reduction (to $K=1.0 \times 10^{-5}$ CM/SEC) by subcrop grouting of high inflow target areas in the glacial overburden materials above the orebody, as proposed by Klohn Leonoff (4), are ineffective in reducing mine inflow. As a result, water level declines in the overburden glacial aquifer would be essentially the same as those indicated for the unmitigated mine inflow.

An alternative mine water inflow control scheme was simulated in which the highly permeable Siliceous Gossans at the eastern extremity of the orebody, as well as the central high inflow target areas, were grouted at the subcrop to a resultant permeability of $K=2.4 \times 10^{-6}$ CM/SEC. The resultant steady-state inflow to the mine for this simulation was estimated to be about 0.105 M³/SEC (1664 GPM). This insensitivity to inflow reduction for the simulated grouting schemes is caused by the large area of moderately permeable bedrock and the thickness of saturated overlying sands to the southwest of the simulated grouting target areas.

From the available data it appears that overburden aquifer mine inflow comes primarily from the materials south of the mine area. As a result future studies on mine inflow reduction or ground water interrelation schemes should be focused on these southern areas where inflow potential is greatest.

2.0 INTRODUCTION

Exxon Minerals Company retained Thomas A. Prickett and Associates to perform several tasks relating to the mine inflow assessment for the proposed Crandon Project. This study is aimed at providing Exxon with a better understanding of the mine inflows that might occur at the Crandon site and the feasibility of techniques which might be employed to control the mine inflow. The objectives of this study are:

- 1) Update the model developed from the previous mine inflow study (8) to include updated site geohydrologic data.
- 2) Evaluate mine inflow model parameter sensitivities.
- 3) Predict the inflow potential of ground water to the mine.
- 4) Simulate the inflow for proposed mine water control plans.

The remainder of this report is sub-divided into sections which describe the mine inflow model and its database (including pumping test results and calibration methodology), mine inflow simulation both for unmitigated and controlled mine water inflow scenarios, sensitivity analyses, and conclusions.

While this report is meant to stand alone, the reader will find it helpful to refer to the previous mine water inflow report by Thomas A. Prickett and Associates (8) for background information.

3.0 MINE INFLOW MODEL

3.1 CRANDON MODEL DATABASE

3.1.1 Summary

A major portion of the study involved the generation of a database for the modeling effort. Several maps were digitized in creating the database. These maps included the Golder potentiometric surface (3) (used as the initial condition for the 2-D ground water model heads), D'Appolonia (2) supplied 2-D aquifer saturated thickness maps and aquifer bottom elevation maps, as well as relative permeability and relative resistance maps for the subcrop and orebody supplied by Exxon. Exxon also supplied maps and tabular data which were based on more detailed examination of borehole data in the mine area to better define the pre-mining potentiometric surface conceptual overburden aquifer bottom (essentially impermeable), and the conceptual saturated overburden thickness. All these data were supplied at different scales and encompassed varying size areas. Computer software was developed to merge all the various datasets into data files which could be utilized by the mine inflow model.

All parameters and boundaries for the 2-D overburden aquifer model were set to be as consistent as possible with those used in the D'Appolonia study (2). An exception to this was the application of overburden aquifer storage coefficients as

described in the model parameters section of this report.

The database can be subdivided into two parts; one part representing the database assembled for the overburden aquifer which is an horizontal 2-D submodel; the other part being the submodel database describing the 3-D flow in the orebody. The combination of these two submodels and their respective databases form the composite model referred to as the mine inflow model in this study.

Hydraulic parameters for the 3-D orebody flow model were established during the calibration phase of this study and thus are not considered in the database section of this report. Boundary conditions and heterogeneities for the orebody model in the form of plan and cross-sectional maps are, however, considered here as part of the database.

3.1.2 Database Error Checking and Quality Control

Inevitably, when data maps consisting of varying scales and areal extent are digitized and merged to form a single data file which represents a pertinent program variable (e.g., saturated thickness) mistakes and errors can occur. These errors if not detected result in modeling errors. Realizing this, measures were taken to minimize this form of modeling error during the data digitization and collation period.

Data checking was performed by computer contouring and 3-D graphics of the various digitized data to spot outliers in the data base, which were subsequently corrected by examination of the original maps. This procedure was repeated until the

computer generated contour maps of the digitized data reproduced the contours from the original maps. Logic discrepancies, such as the potentiometric surface being below the bottom of the overburden aquifer or the difference between the potentiometric surface and the overburden aquifer bottom being less than the saturated thickness, were detected by computer analysis and judgement decisions made to correct these discrepancies. Due to the time and effort put forth in generating and verifying the database for this study, it is presently considered as "State of the Art" for modeling the Crandon Project hydrologic regime. Obviously, data goes through an evolution, as has occurred at the Crandon site. However, it is felt that this evolution is starting to exhibit a diminishing rate of modeling return and that a good database now exists for the modeling portrayal of the Crandon Project hydrologic impacts using the present mine inflow model formulation.

3.1.3 Finite Difference Model Regions and Grids

3.1.3.1 Summary

Two basic grid network descriptions are necessary for the mine inflow model. A variable grid network for the overburden aquifer submodel with higher node densities in the mine area is required, along with a 3-D node network to describe the orebody flow submodel. These two networks are synchronized such that the overburden aquifer flow submodel

grids coincide in plan view with the orebody grid. This results in a straightforward connection of the two submodels to form the total mine inflow model.

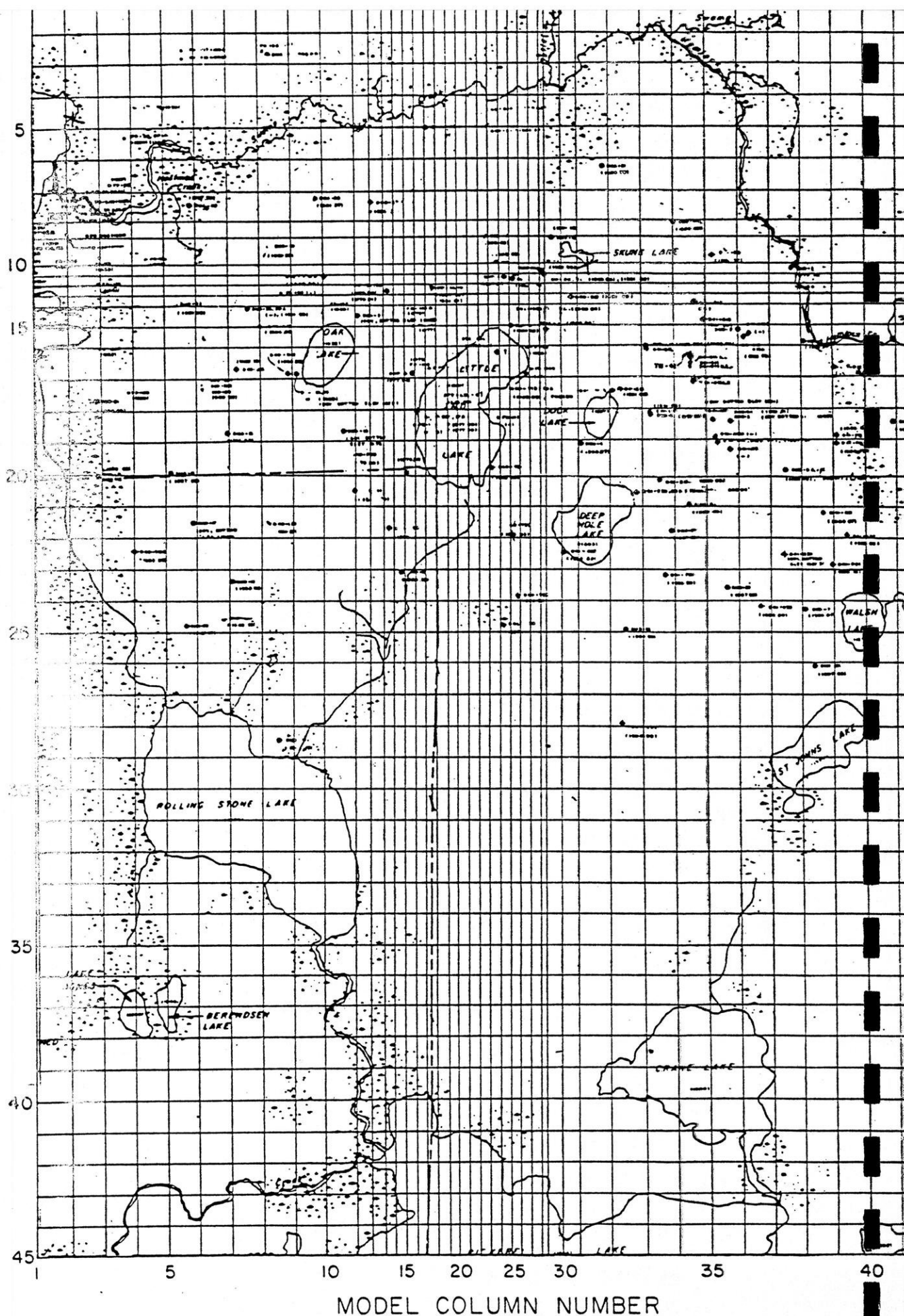
3.1.3.2 Overburden Aquifer Submodel Region and Grid Network

Figure 3.1 illustrates the grid network adopted in modeling the overburden aquifer. This region was selected to coincide as closely as possible with D'Appolonia's (2) external boundary conditions (see Figure 3.2). The term "closely" portrays the realization that this study utilized a finite difference numerical modeling method in contrast to D'Appolonia's finite element methods. The sensitivity of the model to these small changes of the location of the external boundaries is negligible as evidenced essentially by the coincidence of the impacted region predicted by the two models (2) (see Figure 4.3).

The overburden aquifer submodel region is completely defined by constant head (Von Neuman) boundary conditions as illustrated by Figure 3.2. These include Swamp Creek to the North, Hemlock Creek to the Northeast, Rolling Stone Lake and its tributaries to the West, Pickerel Lake to the South and a chain of lakes consisting of Crane, St. Johns, and Walsh to the East-Southeast.

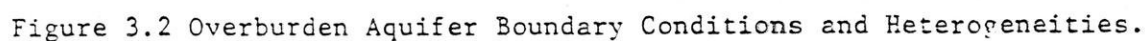
Figure 3.1 and 3.2 also shows the variable grid used in the overburden aquifer flow model. Notice the fine network definition provided directly over the orebody. A general rule that a grid interval in any horizontal direction (I or J) could not increase (or decrease) by more than a factor of two was applied to minimize modeling inaccuracies due to large

MODEL ROW NUMBER



MODEL COLUMN NUMBER

Figure 3.1 Representation of Finite Difference Grid of Overburden Aquifer Model for Improved Orebody Area Detail.



changes in the variable gridding. Grid spacings were selected such that finer detail occurred above the orebody to facilitate the connection of the two and 3-D flow models. The grid intervals ranged from 100M (328.1 feet) for the model interior to 328.1M (1000 feet) at the model extremities. This allowed for higher resolution near the orebody to better model the highly heterogeneous boundary conditions existing at the mine subcrop.

3.1.3.3 Orebody Submodel Region and Grid Network

Figure 3.3 illustrates the orebody model domain and Figure 3.4 its link with the overburden aquifer model region. The orebody model region was selected to incorporate the deposits and mining plans as supplied by Exxon.

Figure 3.3 illustrates the node network selected for the orebody flow model. The grid intervals in plan were 100 M (328.1 feet) square. This grid interval was selected as appropriate for modeling and consistent with the relative permeability and mine plan maps available from Exxon. The cross-section view grid intervals were 100 M by a variable thickness defined by the proposed mine level elevations. The network consisted of 11 levels (or layers) including a resistive subcrop layer, a typical layer between the subcrop and the 95 M level, and several other mine levels to enable modeling of the mine plan and allow for easy input of relative permeability information supplied by Exxon. Note that the vertical grid interval for the three dimensional orebody model is made variable to aid in

ROWS (J)

COLUMNS (I)

COMMON NODES

RESISTIVE LAYER

OREBODY NODES

ΔZ = LEVEL (K) - LEVEL (K+1)

ΔX = 100 M

ΔY = 100 M

Unit Thickness

0.3281 M (1 ft)

LAYERS (K)

16 = NC

12 = NL

* GLACIAL NR=5

* SUBCROP

* 95 M

* 140 M

166.5 M

* 185 M

207.5 M

* 230 M

262.5 M

* 295 M

322.5 M

* 350 M

* INDICATES LEVELS FOR WHICH PLAN VIEW MAPS ARE AVAILABLE.

• INDICATES NODES COMMON BETWEEN OREBODY AND GLACIAL MODEL

* INDICATES LEVELS FOR WHICH PLAN VIEW MAPS ARE AVAILABLE.

- INDICATES NODES COMMON BETWEEN OREBODY AND GLACIAL MODEL

Page 11

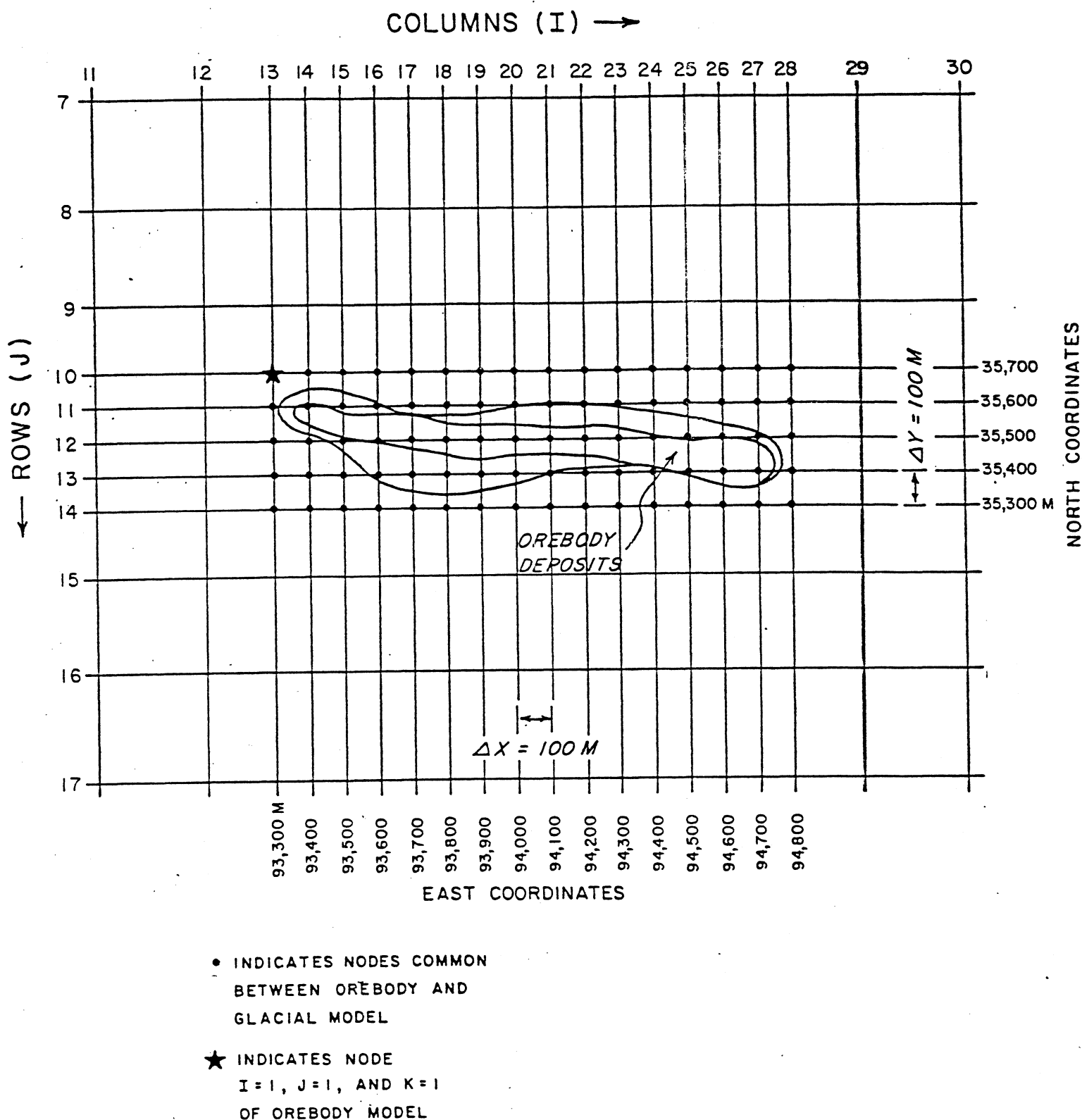


Figure 3.4 Representation of Finite Difference Grids in Common Between Overburden Aquifer and Orebody Submodels.

the data input phase of the modeling effort since maps in plan were supplied at varying vertical intervals. Figure 3.4 shows the East and North coordinates which define the orebody node network in plan. The overburden aquifer flow model nodes were coincidental with this network in the mine area.

Use of the resistive layer concept was found to be necessary due to observed interactions of the overburden aquifer and orebody during pumping tests. This particular model layer was the focus of extensive calibration effort during this study. Figure 3.5 illustrates the characterization of the resistive layer as supplied by Exxon and the method for its use in this study.

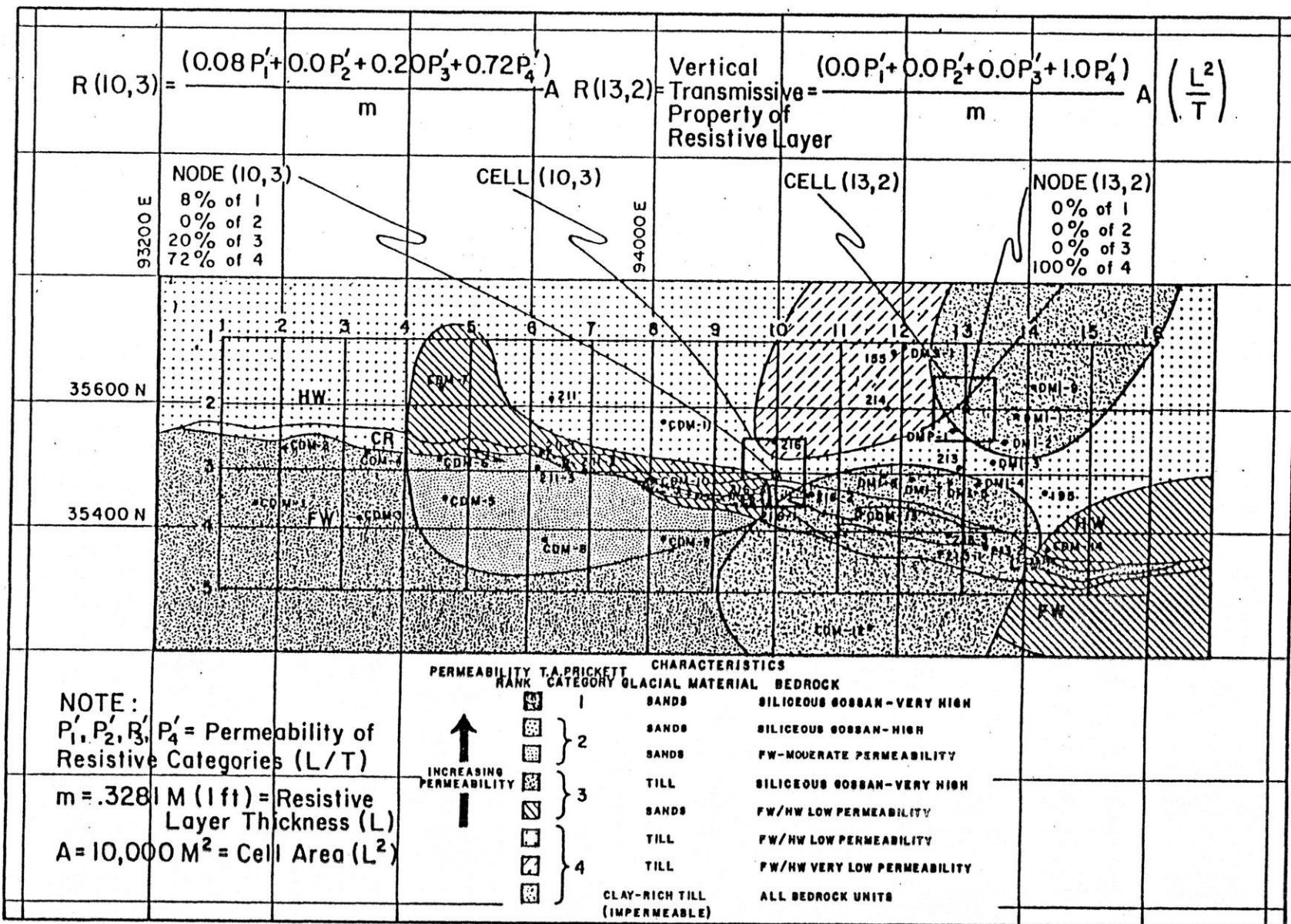
3.1.3.4 Grid Network Connection

The two submodel grid networks (overburden and orebody) were coincidental in the localized mine region (see Figure 3.4). Modeling connection was performed by superimposing the variable gridding of the overburden aquifer to match the first layer nodes for the orebody model.

3.1.4 Boundary Conditions

3.1.4.1 Summary

The external boundary conditions for the overburden aquifer have previously been described in defining the submodel region (refer to section 3.1.3.2). The orebody submodel external and internal boundary conditions as well as the overburden aquifer



submodel internal boundary conditions will be defined in this section.

3.1.4.2 Overburden Aquifer Internal Boundaries

Only two internal boundary conditions were present in the overburden aquifer model. These included the small constant head boundary condition of the tributaries to the Northeast of Rolling Stone Lake (2) and the orebody flow boundary (see Figure 3.2). No overburden aquifer pumpage modeling was required for this study.

3.1.4.3 Orebody External Boundaries

The orebody external boundaries are considered no-flow boundaries and are defined for all faces of the rectangular cube which constitutes the orebody flow domain except the upper face. The upper face is represented by a constant head external boundary condition defined by the overlying overburden aquifer heads.

3.1.4.4 Orebody Internal Boundaries

Internal boundaries for the orebody model included pumpage for the pump test calibrations. Mine plan simulation internal boundaries were represented by constant head boundaries used to effectively model mining activity nodes.

3.1.5 Model Hydraulic Parameters

3.1.5.1 Summary

Parameters emphasized for the overburden aquifer submodel were identical to those used by D'Appolonia (2). The orebody submodel parameters were the subject of extensive calibration and are presented in Figure 3.2.

3.1.5.2 Overburden Aquifer Parameters

3.1.5.2.1 Overburden Aquifer Permeability

The overburden aquifer permeability was set at 1.22×10^{-4} M/SEC (258 GPD/FT²) Local heterogeneities of 3.8×10^{-5} M/S (80.6 GPD/FT²) and 2.8×10^{-6} M/S (5.9 GPD/Square Foot) were set for regions just to the north of the orebody area. Again, these values are consistent with the site geology and the parameters assigned for the D'Appolonia study (2).

3.1.5.2.2 Overburden Aquifer Recharge

All recharge figures were taken from D'Appolonia's modeling study (2). As mine dewatering takes place and induces water level declines in the overburden aquifer, ground water recharge is diverted towards the mine.

Recharge for the overburden aquifer model was set globally to 220 MM/YR (8.7 Inches) with locally adjusted recharges of 117 MM/YR (4.6 Inches) for Oak and Little Sand Lakes, 347 MM/YR (13.7 Inches) of Deep Hole Lake, and 380 MM/YR (15.0 Inches) at Duck Lake.

Zero recharge was supplied to a small region in the locality of the small tributaries extending to the Northeast of Rolling Stone Lake. This interpretation is the same as that used in the D'Appolonia (2) study.

3.1.5.2.3 Overburden Aquifer Storage

D'Appolonia used a single representative storage coefficient throughout the study area, while this study utilized two overburden aquifer storage coefficients in modeling the two storage states for both artesian and water table conditions. This procedure was, however, only followed during the calibration phase. During simulation, a single storage coefficient was assumed between artesian and water table conditions for consistency with the D'Appolonia study (2).

3.2 MINE INFLOW MODEL DESIGN

3.2.1 Background

The basic building blocks for the Crandon mine inflow model are the source codes developed by Prickett and Lonquist (7), and thus the model developed for this study includes the basic assumptions set forth therein. These FORTRAN IV codes enable users to solve for the spatial distribution of potentials by solving, iteratively, simultaneous water balance equations for saturated flow using the alternating directions implicit finite

difference method. These algorithms represent the aquifer of interest by a set of spatially distributed nodes. Associated with each node is a set of parameters describing the resistance to flow and the storage properties of the aquifer at that particular node. In addition, flow inputs and/or outputs can be specified for each node to represent withdrawal and recharge in the water balance equations.

3.2.2 Model Design Features

3.2.2.1 Summary

The code as developed for this study allows for a broad spectrum of conditions to exist which are not possible in the original codes. For example, water table and artesian conditions in the overburden aquifer with any spatial and temporal distribution are allowed. In addition, aquifer dewatering, variable gridding, and boundary conditions are additions from the original codes. These features are outlined in the sections that follow.

3.2.2.2 Impact Analysis

The model used for this study used an impact type analysis. The impact mode examines relative changes of head due to stresses applied to the aquifer system (e.g., inflow stress above the mine area) using the initial aquifer heads as datum. Since the ground water flow equations solved by the model are quasi-linear, regional impacts can be superimposed on initial conditions to

obtain estimates of the resultant absolute head elevations if necessary. This form of impact analysis eases data input requirements since the head initial conditions are everywhere zero. This makes the model outputs directly applicable to an impact type analysis, and maximizes the number of significant decimal figures in the finite difference solution which, in many instances, can be important for numerical convergence. In addition, it is numerically easier for the finite-difference code to solve an impact type model (i.e., takes fewer iterations). This is due to the fact that flows in the water balance which drives the model are localized based on the localized aquifer stresses which create the impact. Regional flows are ignored by the impact type model and thus there are fewer flows driving the water balance. The impact mode is especially useful when the data base is weak outside the immediate area of interest.

3.2.2.3 Variable Gridding

The original Prickett-Lonnquist codes assumed uniform grid spacings. To reduce core memory requirements and computational times of the model, variable grid spacing is used. Variable grid spacing allows both the detail locally near the orebody and the overall model size to be sufficiently large enough to incorporate all external boundaries.

3.2.2.4 Interactive Program Design

Effort was put forth in developing a model which could be

used in an interactive mode. The original codes were designed for batch processing. Batch methods are cumbersome when compared to modern interactive timesharing systems. Designing the code for interactive operation is especially advantageous during the calibration process in that model parameters can be examined and changed easily. The overall impact of interactive program control on calibration is a better calibration for essentially equivalent amounts of effort.

3.2.2.5 Approximations to System Nonlinearities

The basic Prickett-Lonnquist codes solved linear system matrices by an iterative method. The Crandon site exhibits nonlinearities in the overburden aquifer due to water table conditions existing. Nonlinearities occur when parameters (e.g., transmissivities and storage) become functions of the independent variable (head or drawdown) in the governing partial differential equation for ground water movement. These system nonlinearities (e.g., water table conditions) can be better approximated by allowing the user to interactively examine intermediate results and make appropriate responses to approximate nonlinear conditions by quasi-linear techniques. These capabilities were afforded the model developed for this study. The ability to model nonlinearities was of importance for the calibration phase of this study in that these nonlinearities could have a marked effect on the flow connection between the overburden aquifer and the orebody inflow model.

Two basic overburden aquifer nonlinearities were addressed

by the mine inflow model. These included storage nonlinearities and transmissivity nonlinearities both resulting from water table conditions. Storage nonlinearities occur due to the transformation from an artesian to a water table state based on head changes in the aquifer. This nonlinearity condition can be represented mathematically by:

$$\begin{aligned} S(i,j) &= S_{art}, \text{ for } H(i,j) - BOT(i,j) \geq THICK(i,j) \\ &= S_{wt}, \text{ elsewhere} \end{aligned} \quad (EQ. 3.1)$$

where

$S(i,j)$ = storage at overburden aquifer node i,j
 S_{art} = artesian storage coefficient
 S_{wt} = water table storage coefficient
 $H(i,j)$ = the absolute overburden aquifer head at node i,j $\langle L \rangle$
 $BOT(i,j)$ = bottom of overburden aquifer at i,j $\langle L \rangle$
 $THICK(i,j)$ = available overburden saturated thickness at node i,j $\langle L \rangle$

Model transmissivity nonlinearity in the overburden occurs due to dewatering of the aquifer. This is the common nonlinear condition associated with water table conditions. This condition can be represented by:

$$\begin{aligned} TI(i,j) &= 2 * PERMI(i,j) * DELY(j) * THCK / \\ &\quad (DELX(i) + DELX(i+1)) \langle L^2 / T \rangle \\ TJ(i,j) &= 2 * PERMJ(i,j) * DELX(i) * THCK / \\ &\quad (DELY(j) + DELY(j+1)) \langle L^2 / T \rangle \end{aligned} \quad (EQ. 3.2)$$

wherein

$PERMI(i,j)$ = node permeability in the East-West (I) direction $\langle L/T \rangle$
 $PERMJ(i,j)$ = node permeability in the North-South (J) direction $\langle L/T \rangle$
 $DELX(i)$ = East-West (I) distance from the midpoint of grid lines $(i-1)$ and i to the midpoint of grid lines i and $i+1$. This is a node centered variable grid scheme. $\langle L \rangle$

DELY(j) = North-South (J) distance from the
midpoint of grid lines (j-1) and j
to the midpoint of grid lines j
and (j+1). <L>
THCK = THICK(i,j) <L>,
for $H(i,j) - BOT(i,j) \geq THICK(i,j)$
= $H(i,j) - BOT(i,j)$, elsewhere

THCK is set under the constraint $H(i,j) - BOT(i,j) \geq 0.305$ M (1.0 Foot). This constraint was required due to the possibility that complete dewatering (especially above the orebody) might occur. If this constraint is not met then the overburden aquifer head was set 0.305 M (1 Foot) above the aquifer bottom.

Nonlinearities can be approximated by user selection of small simulation time steps. The interactive user also has the capability of approximating nonlinear solutions by iteratively varying 2-D model parameters (for a given simulation time) to better approximate the overburden aquifer nonlinearities. Both of these techniques are based on quasi-linearization of the nonlinear solution.

3.2.2.6 Linkage Between Overburden And Orebody Aquifers

The mine inflow model basically consists of two linked submodels. A 2-D (Figure 3.1) flow model represents the regional flow in the overburden aquifer. In addition, a 3-D flow model (Figure 3.3) is adopted to estimate the orebody flow. These two models are linked to depict the actual flow regime. This link is performed by two model feedbacks. One feedback between the models is the overburden aquifer heads or drawdowns and the other is the vertical flow into the orebody. This system feedback is illustrated by Figure 3.6.

MINE INFLOW MODEL

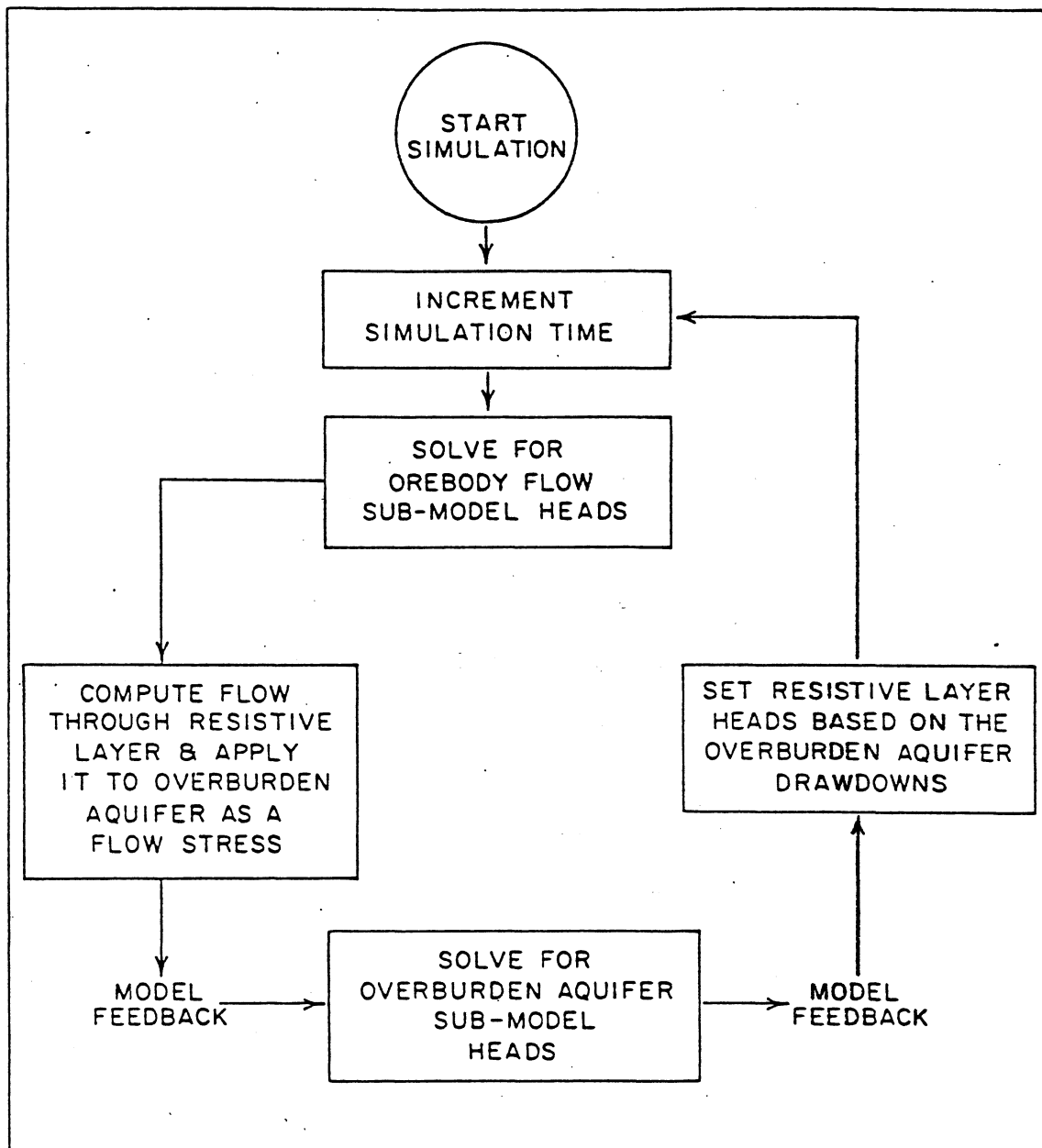


Figure 3.6 Model Feedback Conceptualization.

The orebody flow submodel is solved by setting its first layer as a constant head boundary. These constant heads are set by the overburden aquifer heads directly above the orebody. Vertical flow into the orebody is computed by the head difference across the resistive(or first) layer (Figure 3.3). These two feedbacks are required due to the two flow models being solved in a serial manner. Large simulation time steps can result in discrepancies between the two models for flow across the resistive layer and the overburden aquifer heads. These discrepancies are minimized by using small 30-day simulation time steps as was done in this study.

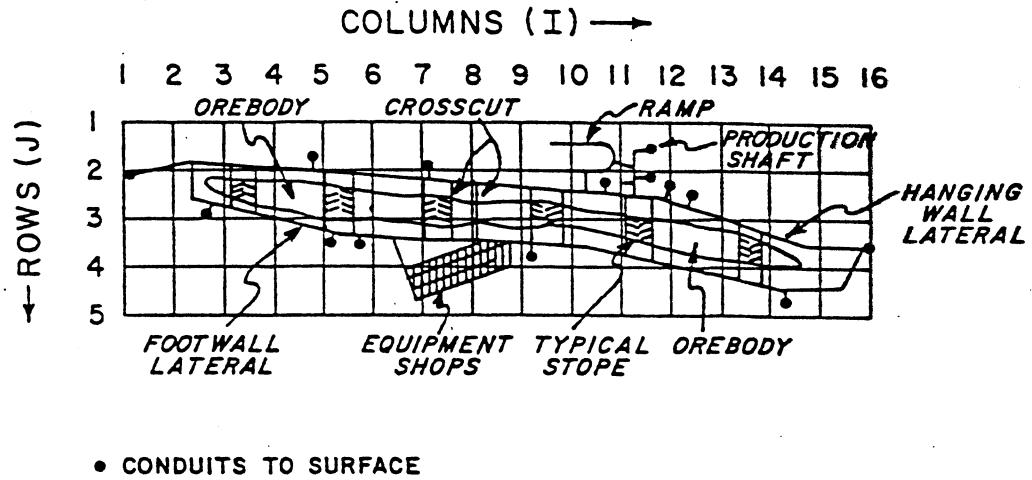
The mine inflow model assumes that 2-D flow exists in the overburden aquifer. In a strict sense this is not true. However, since the overburden aquifer is so prolific (and thus gradients are rather small, less than 0.01), in this particular case, this seems to be a valid assumption.

3.2.2.7 Mining Plan Implementation And Discretization

Figure 3.7(A) shows a typical representation of a mining plan superimposed on the orebody plan finite difference grid. It should be pointed out that the finite difference grid of the orebody model was chosen to enable prediction of mining impacts. Therefore, the orebody grid has nodes largely where there is planned mining action. Figure 3.7(B) shows that the distribution of a few of the exploration holes (as well as observation wells for the pumping tests) do not coincide with the model nodes. It

A

MINE PLAN AT TYPICAL MINE LEVEL



B

EAST-WEST CROSS SECTION

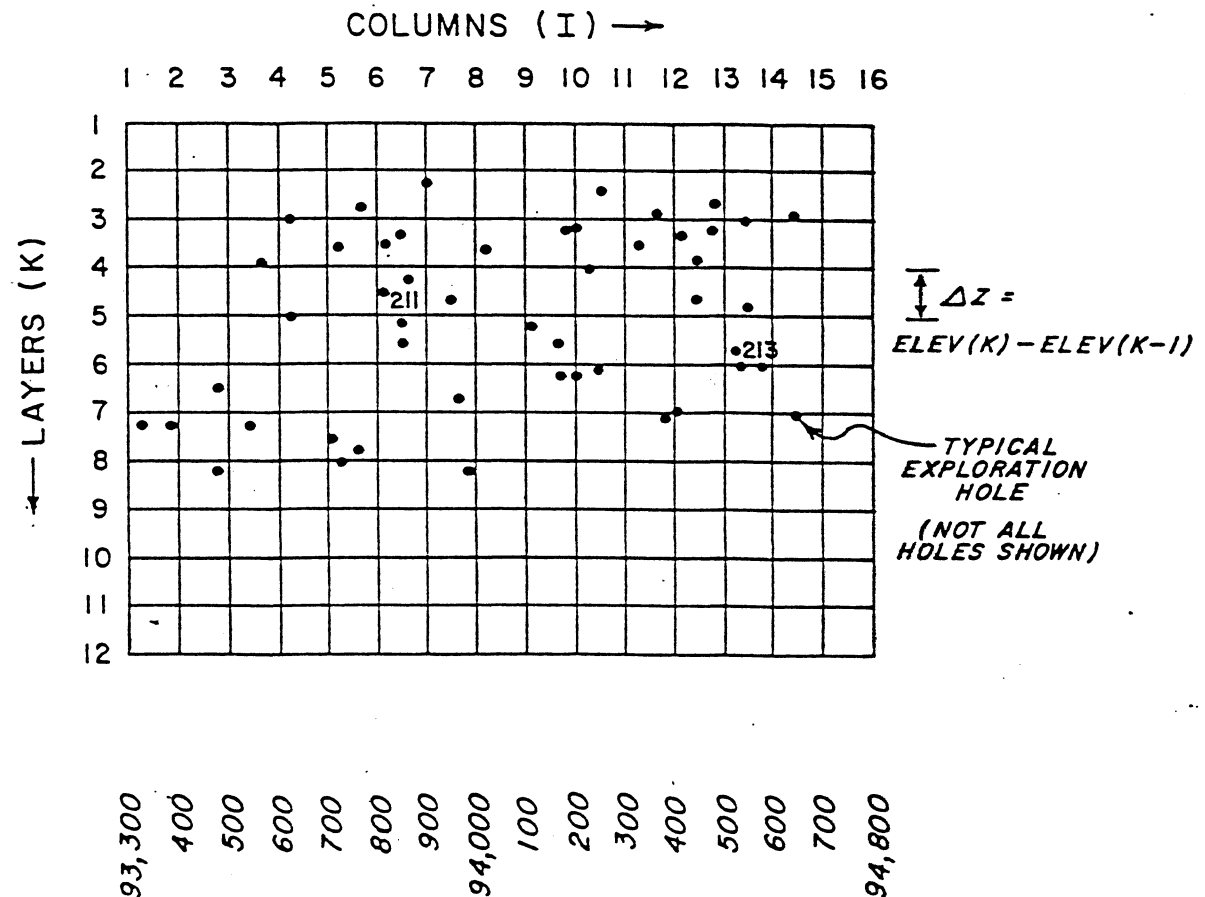


Figure 3.7 Finite Difference Grid Overlying Typical Mine Plan Level (A) and Position of Observation Wells (B).

would require a prohibitive number of nodes (and thus computer costs) to have all holes and mine plan activities fall exactly on node locations. The main emphasis given to this modeling effort was to predict the mine inflows due to mining activities. Therefore, one must be aware that some inaccuracies are inherent when comparing pumping test data with the calibrated model responses.

The mining plan used for simulation was supplied by Exxon Minerals and is based on the proposed 9100 metric tonnes per day operation. The mine inflow simulation model is capable of simulating any desired mine plan by specifying the orebody nodes and respective simulation times when these nodes become effectively open or mined. When the simulation time exceeds a particular mine node time (at which time the node becomes effective) the drawdown is set to that particular mine node's elevation. At this simulation time the node becomes a constant head node creating a gradient and thus flow to the node.

Model implementation of the mine plan then simply involves the specification of the orebody node coordinates and the simulation time at which time the node becomes effectively mined. The minimum time for all mining nodes is chosen as the origin of the mine plan simulation time. For the modeling effort in this study only orebody cross-cuts were modeled since they are the principal mechanisms by which the permeable orebody is breached in the mining plan. These

cross-cuts are discretized such that it is assumed they pass through the orebody instantaneously. An assumption is made that the time to pierce the orebody with a cross-cut is small relative to the simulation time increments used in the modeling. A cross-cut is simulated by forcing a column of orebody nodes to become constant head nodes (during simulation) with a drawdown commensurate with each particular node's elevation.

3.2.2.8 Correction for Orebody Flow Convergence

The effective transmissivity due to flow convergence near mining nodes is approximated by the Equation 3.3 which has been adopted from previous analog study results by Prickett (6).

$$TX = 1/(1+4*LN(a/4.81/RW)/PI/2) <L^2/T> \quad (EQ. 3.3)$$

wherein

$a = \sqrt{DX * DZ(k+1)}$ for vertical orebody
 transmissivity $<L>$
 or $a = \sqrt{DX * (DZ(k) + DZ(k+1))/2}$ for horizontal
 transmissivities $<L>$
 RW = effective mine radius $<L>$
 $DZ(k)$ = vertical grid interval for layer k $<L>$
 (see Figure 3.8)

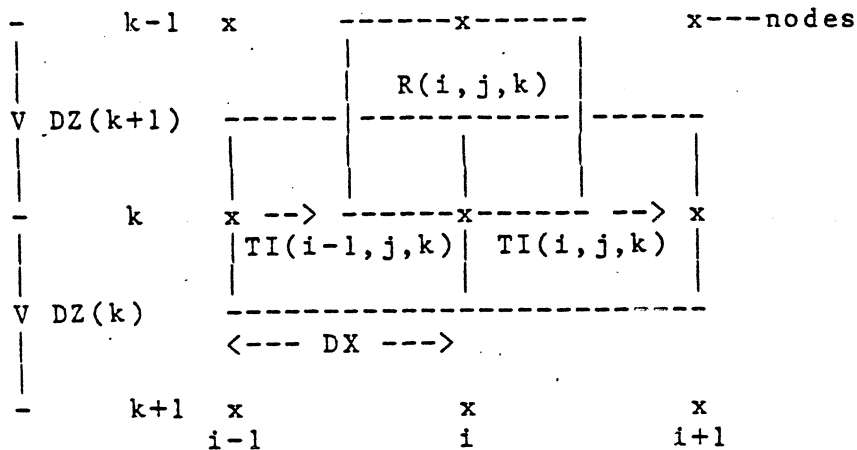


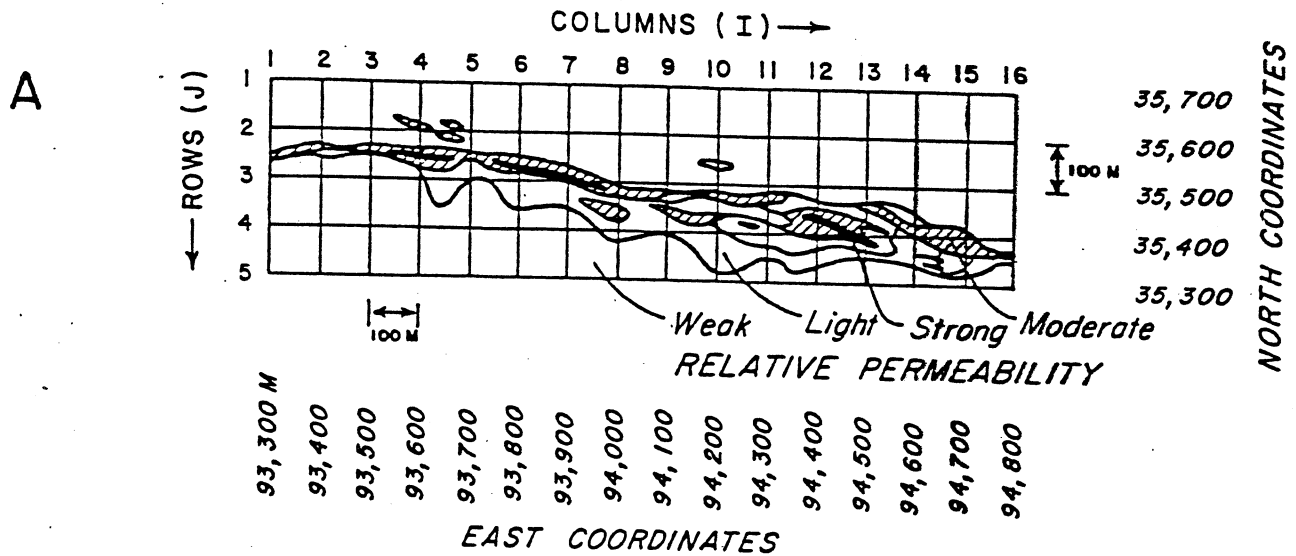
Figure 3.8 Cross-section Transmissivity Representation for Orebody.

3.2.2.9 Transmissivity Determinations in Orebody

The orebody grid network consisted of 11 layers. For each layer plan view maps of relative permeability were supplied by Exxon. Figure 3.9(A) illustrates a typical plan view map portraying the relative permeability heterogeneity of a typical layer. These data were digitized by T. A. Prickett & Associates. Figure 3.9(B) shows a typical cross-section of the orebody and the various relative permeability groups.

Figure 3.10 illustrates the vector volumes in plan view used to compute the transmissive properties of the orebody in the I, J, and K (East, South, and vertical) directions. These three transmissive properties are designated as TI, TJ, and R, respectively. These variables are defined such that when multiplied by the head difference the flow in their respective directions is obtained. Orebody relative permeability is observed to be nonuniform passing through the orebody from

EXAMPLE
PLAN VIEW OF
OREBODY (LEVEL 140M (K=4))



EXAMPLE
CROSS-SECTION VIEW OF
OREBODY (AT 94,000 EAST)

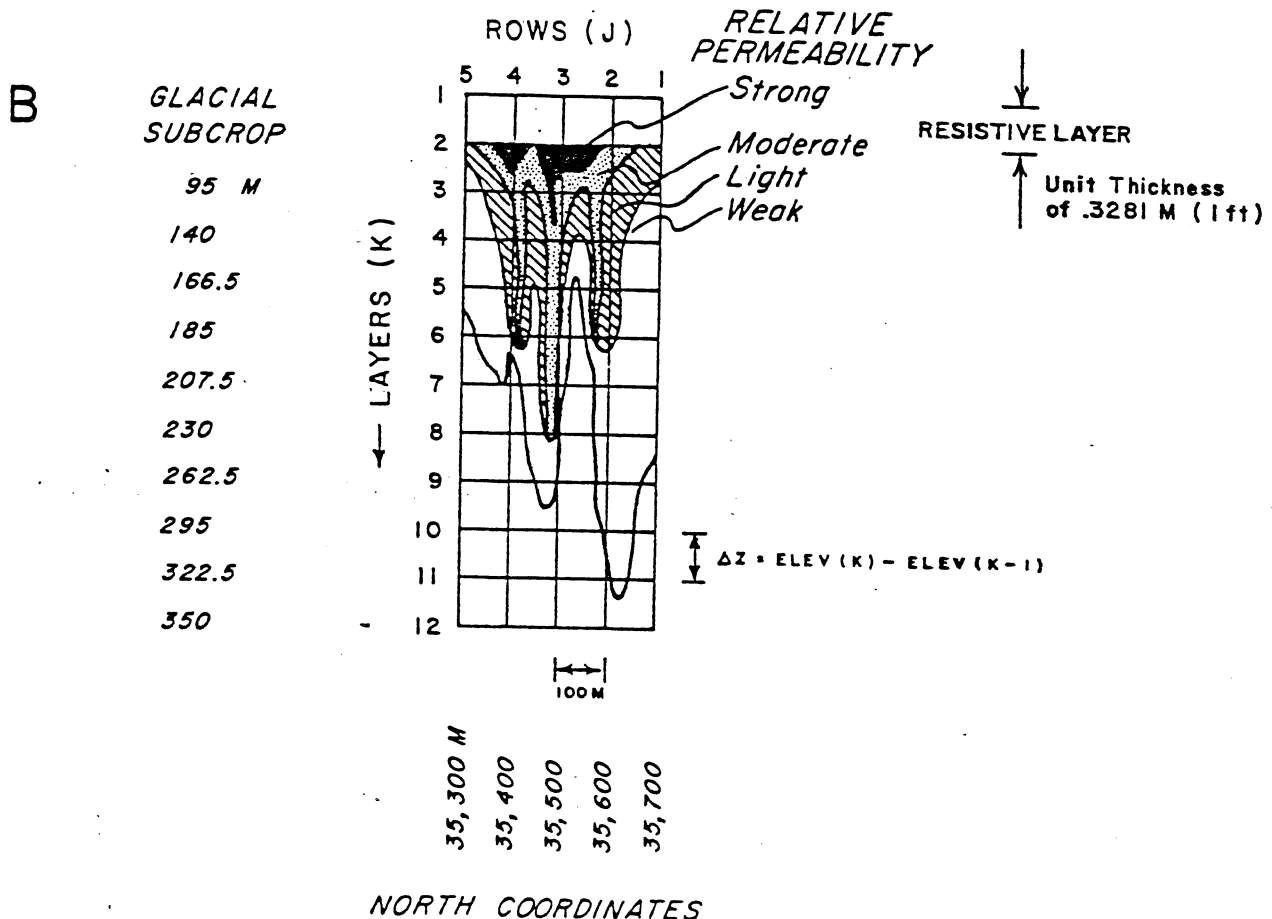


Figure 3.9 Typical Relative Permeability Distribution in Plan (A) and Cross-Section (B) with Superposition of Finite Difference Grid.

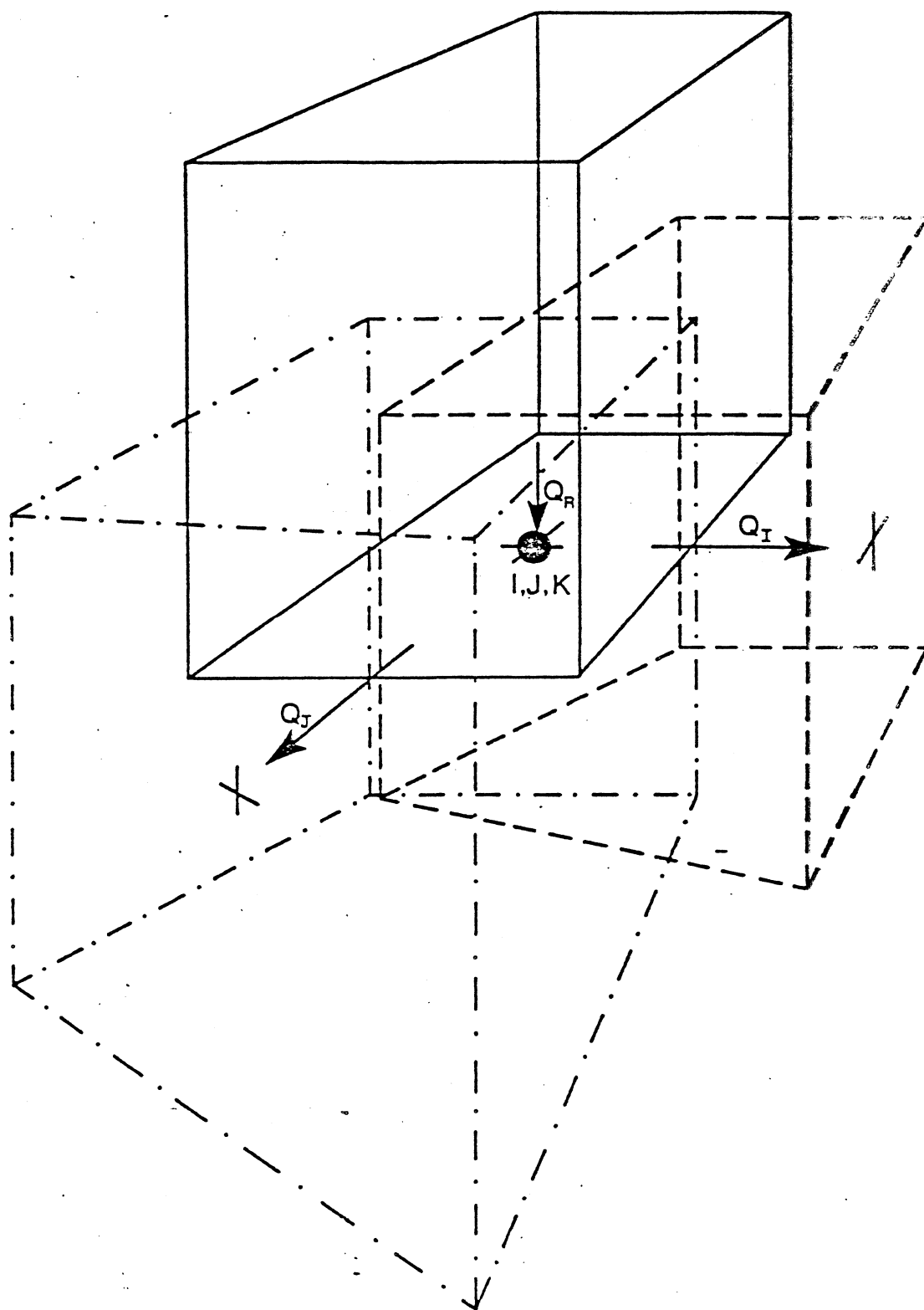


Figure 3.10 Vector Volume Representation for Three-Dimensional Flow in Orebody Page 30

North to South while uniform relative permeability is maintained going in an East to West direction. Therefore TI is represented by a parallel resistance formula in the discretization while TJ is approximated by a series resistance formula. R is approximated in the discretization by areal weighting of the relative permeability groups. Each relative permeability group (designated as weak<W>, light<L>, medium<M>, and strong<S>) was assigned a permeability ranging from low to high for weak to strong relative permeability, respectively. These permeabilities were calibrated to fit pump test data. The equations for the transmissive properties of the relative permeability zones of the orebody for node i,j,k are

$$\begin{aligned} TI &= (PW*DWI+PL*DLI+PM*DMI+PS*DSI)*DELZ/DX \\ DELZ &= (DZ(k-1)+DZ(k))/2 \\ TJ &= DX*DELZ/(DWJ/PW+DLJ/PL+DMJ/PM+DSJ/PS) \\ R &= PW*DWK+PL*DLK+PM*DMK+PS*DSK)*DX*DY/DZ(k) \end{aligned} \quad (EQ. 3.4)$$

where

PW, PL, PM, PS = Permeabilities of the weak, light, medium, and strong relative permeability groups, respectively <L/T>
 DWI, DLE, DMI, DSI = Relative permeability distances in feet used for computing TI <L>
 DWJ, DLJ, DMJ, DSJ = Relative Permeability distances in feet used for computing TJ <L>
 DWK, DLK, DMK, DSK = Area fractions of relative permeability zones

DZ(k) = Vertical grid interval for layer K <L>
 DX, DY = Plan view grid intervals of orebody <L>
 TI, TJ, R = Transmissivities for an orebody node <L²/T>

See Figure 3.11 for further definition.

All terms which have a zero permeability in the equation for TJ are dropped. If this is not done TJ would always be zero

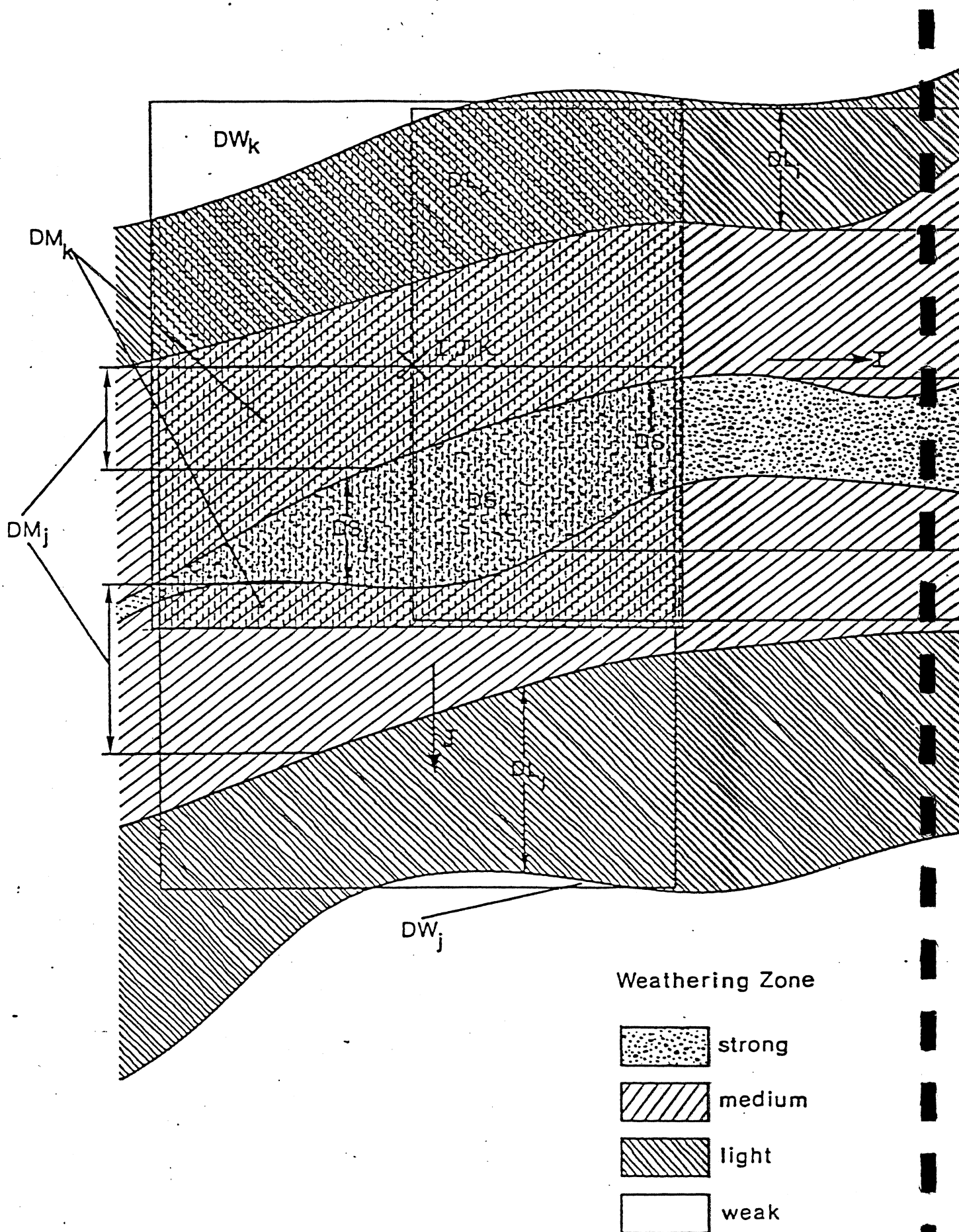


Figure 3.11 Relationship of TI, TJ, and R Vector Volumes to Orebody Relative Permeability Groups.

if any of the permeabilities (PW, PL, PM, or PS) are zero since the equation for TJ is for a series resistance case. Figure 3.11 illustrates the various relative permeability distances used by the discretization Equations 3.4. These equations are applied to each node in the orebody by a pre-processor program which generates all the orebody node card data for the 3-D model. If any of the relative zone permeabilities is changed the pre-processor can be executed to get the necessary node cards. The discretization of the orebody in plan is set at 100 Meters square to match available maps and the orebody grid network.

3.2.2.10 Resistive Layer Vertical Permeability

The vertical permeability of the resistive layer was computed by the characterization of the combination of overburden and bedrock materials as supplied by Exxon. Figure 3.5 represents this characterization and displays two example computations of the transmissive property ($R(i,j)$) of the resistive layer. The resistive layer was assumed to have a uniform thickness of 0.3 M (1 Foot). The calibrated resistive layer not only reflects natural resistance to flow at the subcrop, but also models the stratification effects which exist in the overburden aquifer. It must be emphasized that the resistive layer is considered to have the nominally described thickness described above throughout this study.

3.2.2.11 Calculations of Mine Inflow

The mine inflow was computed as the product of the head difference across the resistive layer and the transmissive property of that resistive layer. A maximum was set such that the head(or drawdown) difference never exceeds the overburden aquifer head. This corresponds to the condition at which the orebody storage capacity is depleted and thus the flow into the orebody is "raining" down through the subcrop resistive layer.

3.2.2.12 Water Balances

Several water balances are performed by the mine inflow model. These include water balances in both the orebody and overburden aquifer submodels. For each layer or level in the 3-D model a vertical water balance to establish flows due to head gradients between layers is performed. In addition, a water balance is computed for flow from (or into) storage in each layer. These water balance computations are output to the terminal so the interactive user can sense any problems as well as determine the amount of flow in the mine, at any time during the simulation. An orebody water balance measure for calibration is expressed as the percentage deviation of the sum of the flow into the pumping test layer plus the storage released from that layer from the total pumping test flow.

In the 2-D overburden aquifer model a water balance is performed around the mine area to determine flows toward the

subcrop inflow areas. Flows due to drawdown gradients toward the mine area (impacted flow) are computed for the north, south, east, and west mine area boundaries. Localized induced infiltration flow is also computed over the orebody as well as storage flow. The sum of all these flow components from the water balance is then determined by the model. The flow through the resistive layer should approximately match this sum. However, these two flows will not be exactly equal due to model feedbacks and numerical errors and are thus expressed as a water balance percentage error for the total flow through the resistive layer computed from the 3-D model.

Impacted flows for both Swamp and Hemlock Creeks are also computed at each time step for the interactive user. These are provided to enable the user to examine the mine inflow impacts to these two waterways.

The water balance information is invaluable for showing the user the progress of modeling convergence, as well as for giving quantitative information about of water flows throughout the modeled system. In addition, the water balance checks aid in detecting data or model errors which might otherwise go unrecognized.

3.2.2.13 Pre-dewatering Capability

Pre-dewatering of the mine area overburden aquifer to decrease flows through the resistive layer during mining can be simulated by the mine inflow model. Through

interactive input the user can specify if entry into the orebody model is desired. By eliminating entry into the orebody model drawdown conditions in the overburden aquifer can be changed before actual execution of the mine plan simulation. By interactive input of discharge distributions in the mine area, pre-dewatering of the overburden aquifer can be simulated. Upon the first entry into the orebody model, the mine plan simulation is initiated and the user can subsequently continue entry into the orebody model to simulate the mine plan effects. During the mine plan simulation dewatering flows are superimposed upon mine inflows and applied to the overburden aquifer heads to obtain the regional impacts and the resulting mine inflow.

3.3 MODEL INPUT AND OUTPUT

3.3.1 Summary

Input is specified both by data files and interactive user input. Several data files are required to define model inputs for the mine inflow model. Model outputs are generated both interactively and through files as well.

3.3.2 Data File Input

Several files are required to define input variables for the mine inflow model. These files are summarized in Table 3.1. Any variable changes can be performed by editing these particular

files for the nodes of interest.

TABLE 3.1 Input Data Files

<u>FILE NAME</u>	<u>DESCRIPTION</u>
NODES3	Output file from pre-processor and input to the mine inflow model. This file defines all parameters and variables for the three-dimensional orebody model..
MINPLN	File which defines the orebody nodes which are mined and the simulation time at which they become active.
POTEN	Defines the potentiometric surface of the overburden aquifer.
BOTOM	Defines the effective bottom of the overburden aquifer.
THICK	Defines the saturated thickness of the overburden aquifer.
EXTBDY	Defines the nodes necessary to describe the overburden aquifer external boundary conditions.
RECHRG	File which defines the recharge heterogeneities of the overburden aquifer.
PERMEA	Permeability heterogeneity is defined by this data file.

3.3.3 Interactive Input

Once the data files have been generated, most model parameters can be changed upon program execution by interactive input. Parameters remain at their respective default initialized values if the user enters a carriage return from the terminal after the appropriate prompt. Parameter values are echoed, after being internally set, to the computer terminal. This form of interactive input is invaluable in performing calibration as well as sensitivity analysis. Parameter changes can be performed very quickly and the sensitivity to these changes examined in a relatively short period of time.

Time steps are specified by the user to meet the simulation time and convergence requirements. The water balance can be examined by the user and the sufficiency of the convergence ascertained. The user has the option to terminate the simulation at the end of any time step. In addition, the iterative solution for each submodel can be exited by the user at any iteration increment of five.

3.3.4 Model File Output

The detailed output files are summarized in Table 3.2. The primary file outputs of the mine inflow model are the overburden aquifer and orebody drawdowns, as well as the vertical flow distribution in the orebody. Detailed drawdowns are expressed to four decimal places along with their associated simulation time and convergence measure. Detailed drawdown file

output can be used as an initial condition for subsequent simulations. In addition, contour mapping or any other form of post-processing can be performed using these output files.

TABLE 3.2 MINE INFLOW MODEL OUTPUT FILES

<u>FILE NAME</u>	<u>DESCRIPTION</u>
D2	Detailed output generated by the overburden aquifer submodel.
D3	Detailed output generated by the orebody submodel.

A post-processor was developed to generate contour plots of drawdown from the detailed output files generated by the model. Figure 4.3 (Page 64) is an example of this output. The post-processor is capable of handling any variable grid definition by spline interpolation.

The orebody model vertical flow distribution is also output to a file. These values are run through a post-processor to get contours of vertical flow density distribution for several levels of the orebody model. Figure 4.5 (Page 67) is an example of the output from the post-processor for the vertical flow density.

3.3.5 Interactive Model Output

The mine inflow model is designed to execute interactively. Detailed output is sent to computer files while pertinent information is output interactively to the user displaying how

the simulation is proceeding.

Truncated drawdown matrices are generated for user reference. In addition, the vertical flow distribution through the resistive layer is output in matrix form for the user. The storage state (i.e., artesian or water table) directly above the orebody in the overburden aquifer is also supplied. During calibration all observed and computed drawdowns are echoed to the terminal to allow the user quick inspection of the calibration progress. An example of the interactive output is given in Appendix Q which contains the unmitigated mine plan simulation.

3.4 CALIBRATION METHODOLOGY

3.4.1 Summary

The calibration of the mine inflow model proceeded as follows. The orebody model was assembled as described previously and the algorithm checked for programming consistency. The model was then calibrated by using pumping test data supplied by Camp Dresser and McKee (1). These data were used for initial analytical model calibrations and interpretations. In addition, these data were utilized in testing the validity of the finite difference numerical model to predict mine inflow based on both the measured overburden aquifer and orebody impact responses due to orebody pumping. The field pumping test results for on Wells 211 and 213 served as the primary model parameter calibration

data. When the model and field data reasonably matched, the orebody model was considered calibrated and assumed to be a model which was capable of approximating mine inflows.

3.4.2 Orebody and Overburden Aquifer Pumping Tests

Camp Dresser and McKee (1) conducted constant rate pumping tests in the orebody and overburden for the purposes of determining site hydraulic conductivities, storage coefficients, and the degree of connection between the overlying overburden aquifer and the orebody. A complete description of those tests and results are given in their report (1). Both drawdown and recovery data were examined during the analytical pumping test analysis.

3.4.3 Overburden and Orebody Connectivity

Use of a conceptual resistive layer was found to be necessary to account for observed interactions in the overburden aquifer during the pumping tests in the orebody. The resistive layer is calibrated, by varying the permeability distribution, to match pumping test results. These permeability calibration results are also influenced by the stratification of materials in the glacial material overlying the orebody. This is especially true around the orebody where vertical flow in the overburden aquifer is most pronounced.

The resistive layer concept is a result of the pumping test analysis showing that the apparent source of the constant head is above the ground surface. Evidently, there are low permeability

materials between the permeable layers of the overburden and the orebody. Various geologic maps and borehole sample data for the orebody subcrop and the clays and silts on top of the bedrock in the orebody area confirm this concept. Therefore, a model layer (resistive) between the overburden aquifer and the orebody subcrop has been included to simulate these lower permeability regions.

3.4.4 Analytical Model Pumping Test Analysis

Figure 3.12 illustrates the analytical model used in determining initial parameter values for the mine inflow model. This figure shows the image well arrangement (Walton, 9) for analysis of the test on Well 213 in the eastern section of the orebody. Based upon the geologic setting, no-flow boundaries would be expected at the 350 M mine level and the east and west extremities of the orebody. The water-bearing glacial overburden would be an expected strong source of ground water recharge. Therefore, the overburden was considered to be a constant head boundary for the purposes of analyzing the pumping tests.

The orebody is essentially vertical, and its interface with the overburden deposits makes the sensitivity of that source of recharge predominant over the positions of the barrier boundaries. Assuming these conditions, the type curve method outlined by Lohman (5) was selected as the primary means of determining, analytically, the hydraulic parameters of the deposits for the present study.

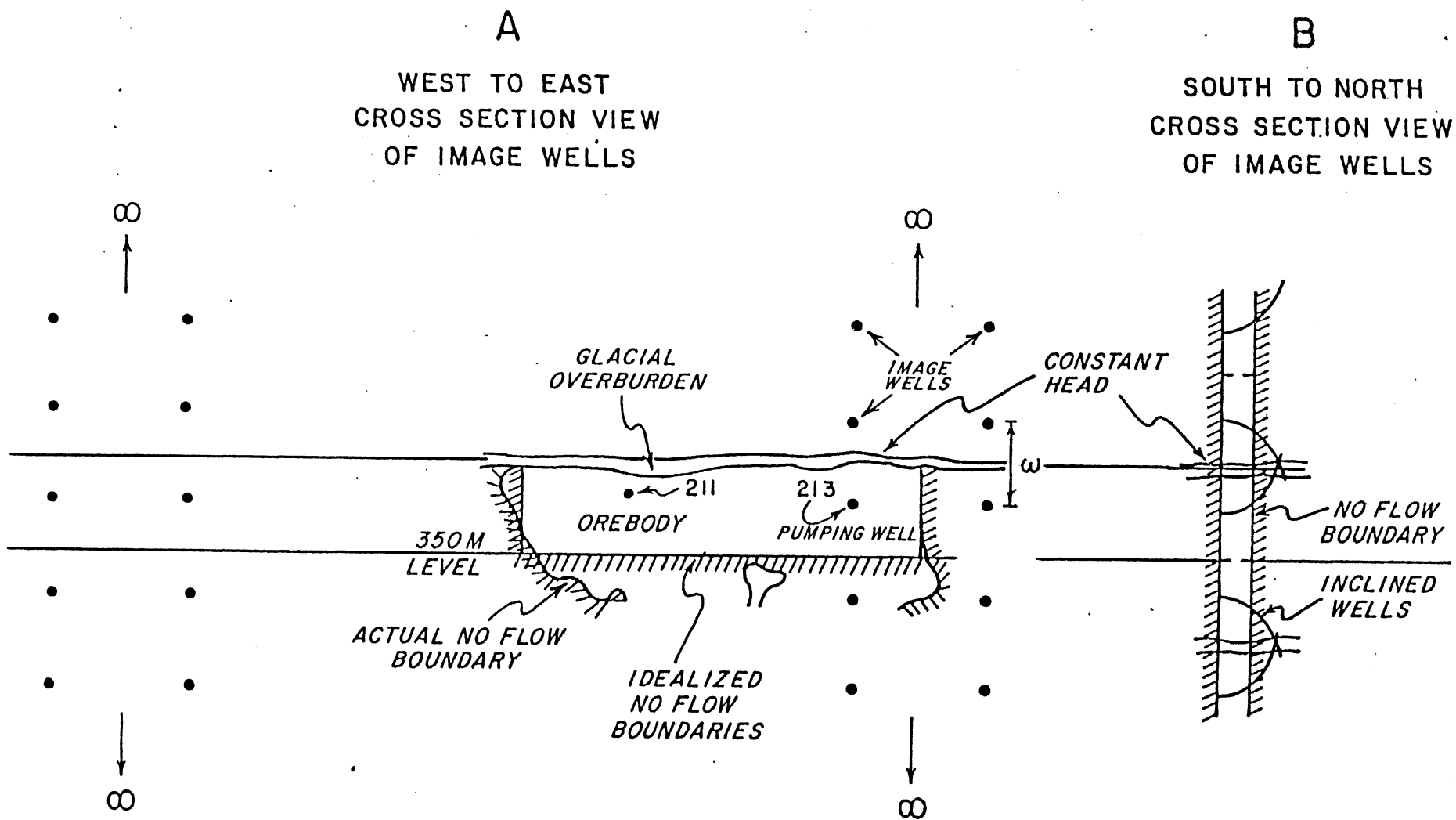
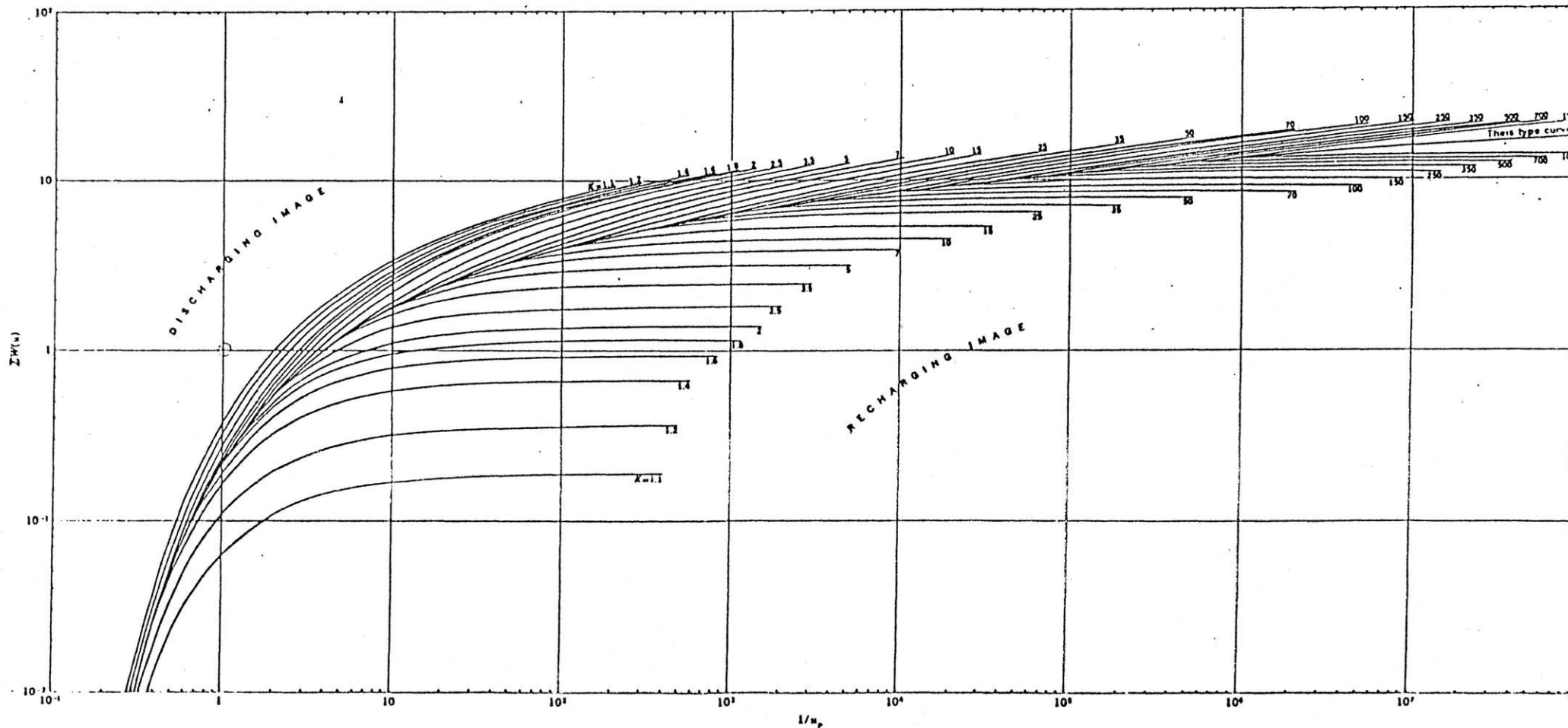


Figure 3.12 Conceptualization of Permeable Zones of Orebody and Image Well Layouts Considered for Aquifer Test Analysis.



LOGARITHMIC PLOT OF $\Sigma W(u)$ VERSUS $1/u_p$

After Stallman (1963b, Pl. 3)

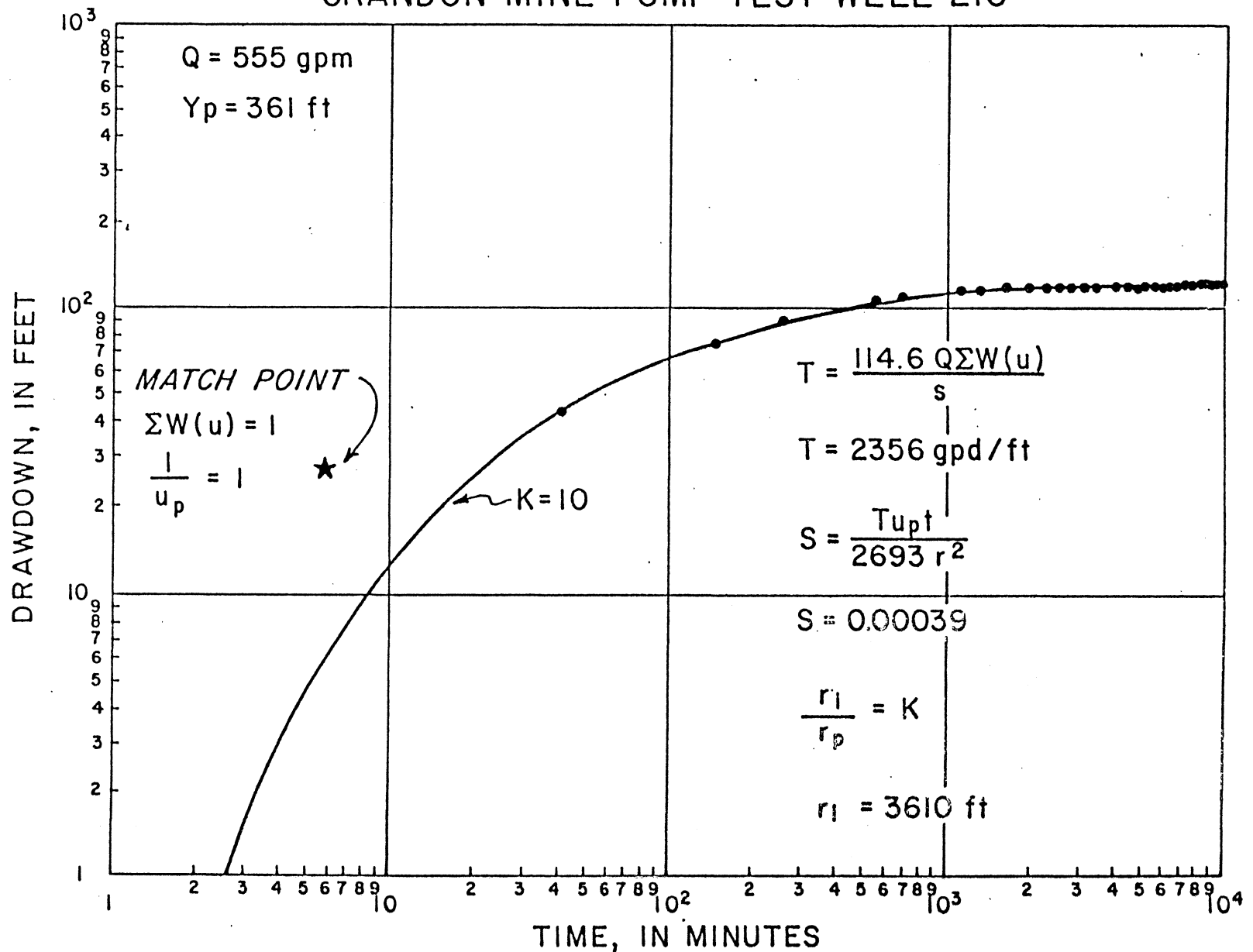
Figure 3.13 Basic Type Curves Used for Well Test Analysis.

Figure 3.13 illustrates the basic type curves. The use of type curves has been outlined previously by Lohman (5) and Walton (9). A typical analysis using these type curves is given in Figure 3.14 along with the calculated deposit parameters for that observation well. Figure 3.15 shows the results of the triangulation of the apparent analytical constant head source of water recharging the orebody from the overburden aquifer. This analysis was performed by using the observed drawdowns at observation wells and their distance from the pumped well (213). An apparent source of recharge could be generated for each observation well. The average of all the apparent sources for all observation wells yielded a single apparent source of recharge. It should be noted that water levels were close to steady state conditions near the end of the pumping test indicating that discharge essentially was balanced by overburden recharge.

Important observations from analyzing both tests on Wells 211 and 213 were:

- 1) The apparent source of recharge was sufficiently strong to balance pumpage.
- 2) This apparent source of recharge is the overburden aquifer and has a position above the ground surface.
- 3) The orebody is under artesian conditions and has relatively low transmissivities and hydraulic conductivities.
- 4) The transmissive properties of the orebody are about two times as great in the east compared with the west. This is based on the relative observed pumping test differences between 211 (to

CRANDON MINE PUMP TEST WELL 210



RECORD ZERO TIME 6 / 11 / 81 / 12.50 W210.DD3 STATIC DEPTH 37.94

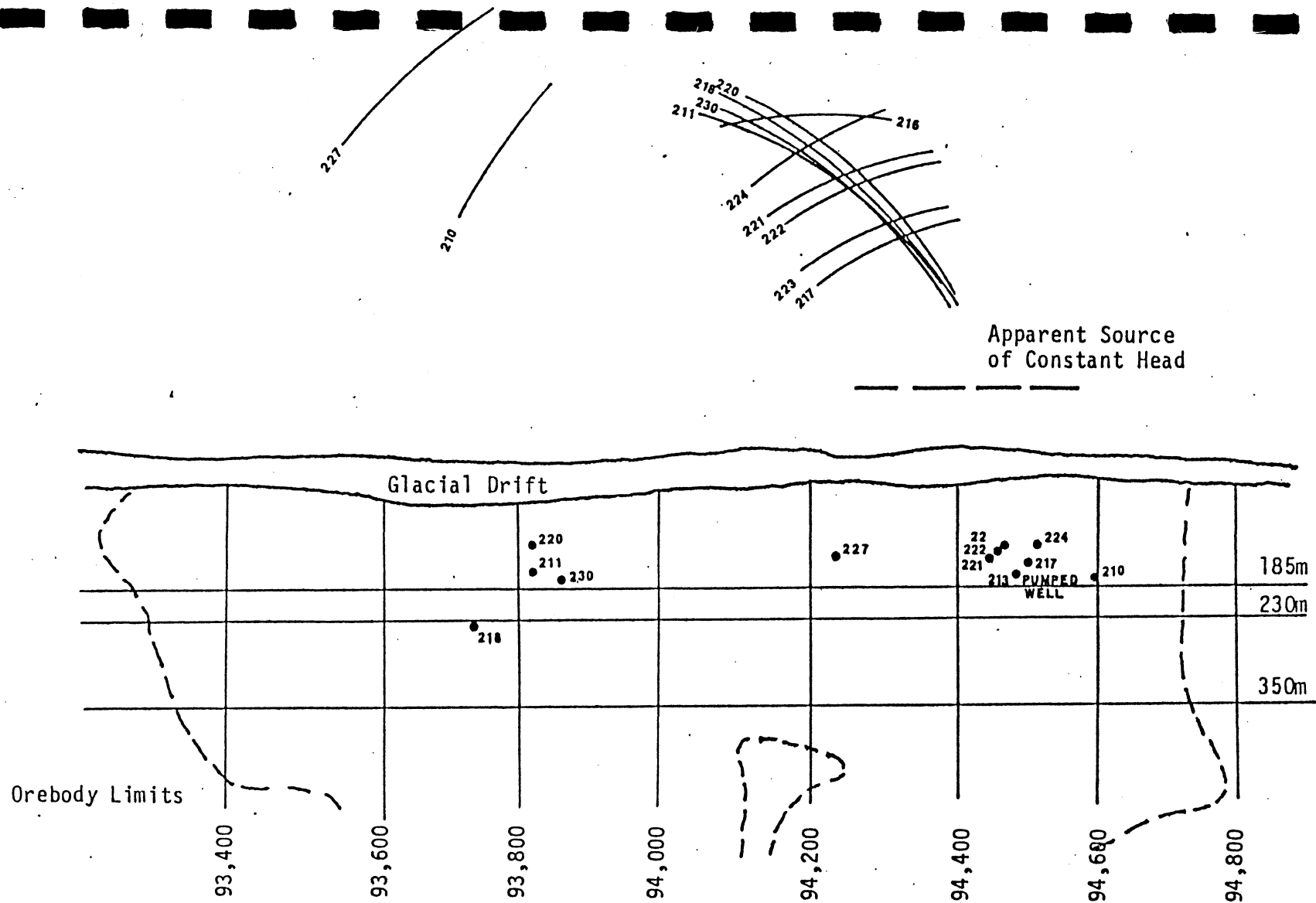


Figure 3.15 Triangulation Analysis Showing Location of Apparent Source of Water Recharging Orebody During Pumping of Well 213.

the west) and 213 (to the east).

5). Finally, the ground water recharge potential, percolating down from the overburden is greater in the western section of the orebody when compared to that estimated in the eastern section of the orebody.

Results of the analyses of the pumping tests were used as initial input for model parameters for the mine inflow model calibration as indicated in the following section.

3.4.5 Mine Inflow Model Calibration

The mine inflow model was calibrated in two steps with the pumping test response data for Wells 211 and 213 being the criteria for judging when the model was correctly predicting orebody inflow stresses. For each calibration run, the well being pumped was assigned to the appropriate nodes of the model and the model was run for the historical duration of the pumping test. Water-level (drawdown) changes measured in the field were compared with those predicted by the model. Hydraulic parameters for the model were adjusted until a reasonable match between field observation and model response was achieved.

The following eleven parameters were varied during the mine inflow model calibration process:

- a) permeability of the weak relative permeability zone
- b) the permeability of the light relative permeability zone
- c) the permeability of the moderate relative permeability zone
- d) the permeability of the strong relative permeability zone
- e) the global storage coefficient for artesian conditions of the orebody materials

- f) the artesian and water table storage coefficients of the overlying overburden materials
- g) the resistive layer permeabilities based on four zones of relative leakance assuming a unit thickness resistive layer (see Figure 3.10, Page 30)

The results of the calibration process for these parameters are given in Table 3.3.

TABLE 3.3 Calibrated Mine Inflow Model Parameters
for Pumping Tests 211 and 213

<u>PARAMETER</u>	<u>CALIBRATED VALUE (CM/SEC)</u>	<u>RANGE OF PARAMETERS EXAMINED DURING CALIBRATION</u>
Weak Relative Permeability	0.0	0.0 - 4.72E-5
Light Relative Permeability	4.72E-5	2.36E-5 - 1.41E-3
Moderate Relative Permeability	1.41E-3	7.07E-4 - 1.41E-3
Strong Relative Permeability	2.36E-3	1.18E-3 - 2.36E-3
Orebody Artesian Storage Coeff.	1E-5 (Dimensionless)	1.00E-6 - 1.00E-3
Overburden Aquifer Artesian Storage Coefficient	0.001 (Dimensionless)	1.00E-4 - 0.005
Overburden Aquifer Water Table Storage Coefficient	0.15 (Dimensionless)	0.005 - 0.25
T.A. Prickett Resistive Layer Permeability Category (see Figure 3.10)		
1	4.72E-5	2.59E-5 - 2.36E-2
2	4.72E-6	4.72E-15- 1.18E-2
3	9.43E-8	4.72E-15- 4.72E-7
4	9.43E-8	4.72E-15- 9.90E-7

Figure 3.16 is a cross-section illustrating the location of observation wells used in the calibration. Calibration results

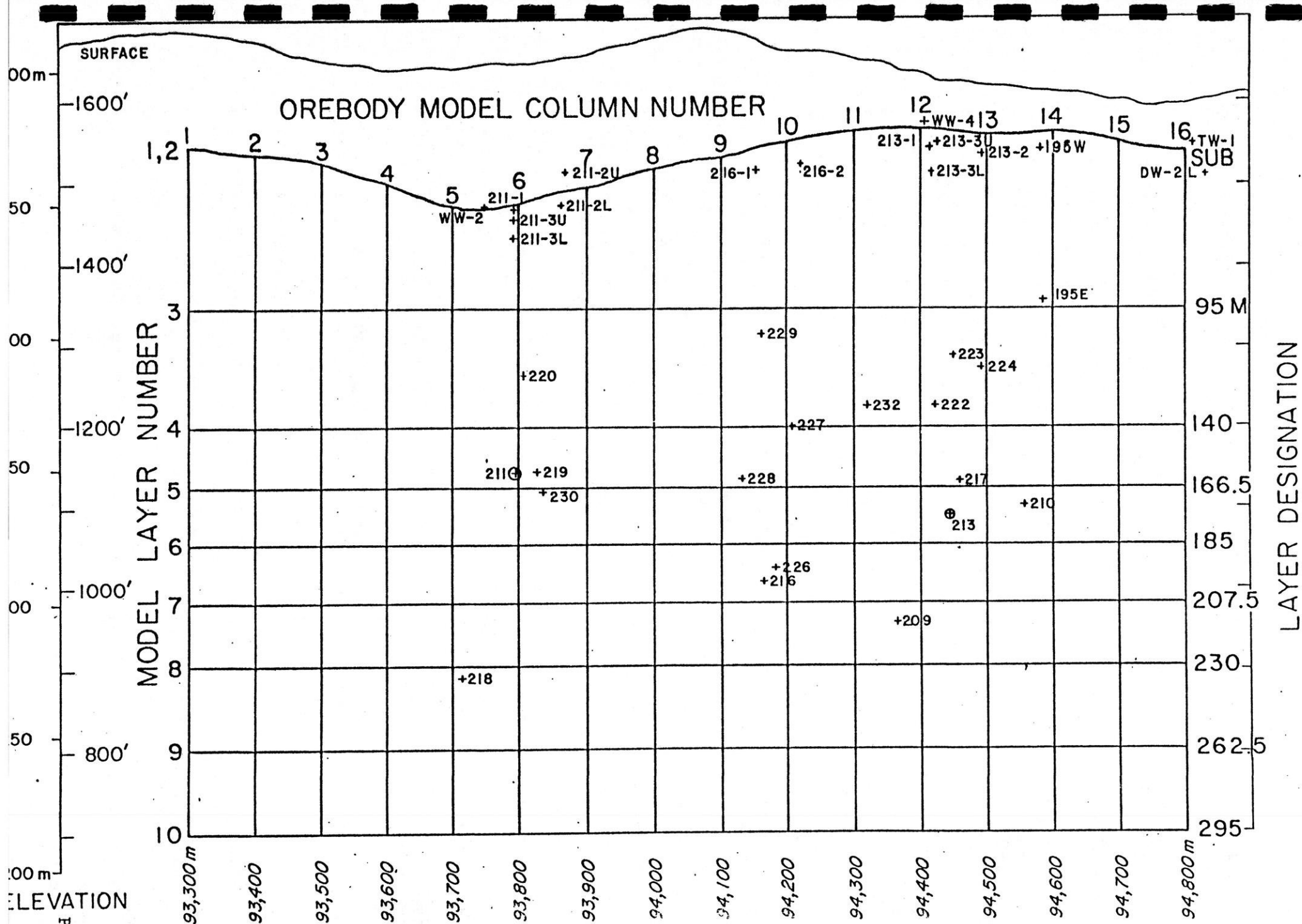
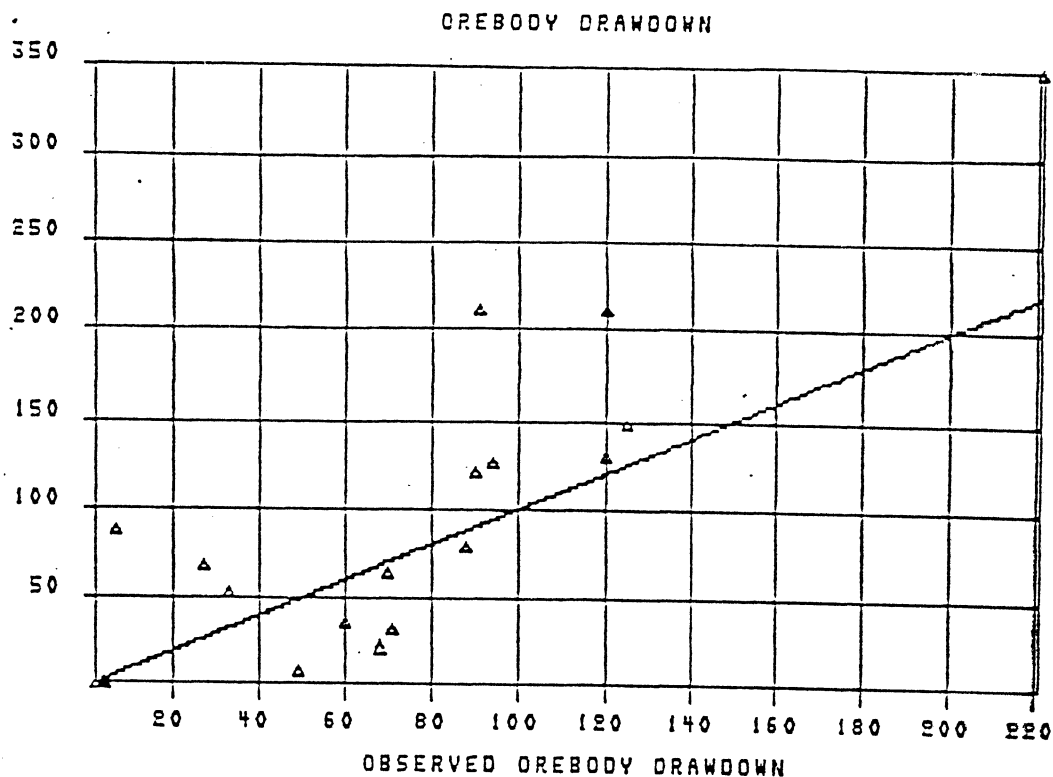


Figure 3.16 Cross-Section Showing Location of Observation Wells Used in Pumping Tests 211 and 213.

COMPUTED OREBODY DRAWDOWN



COMPUTED OREBODY DRAWDOWN

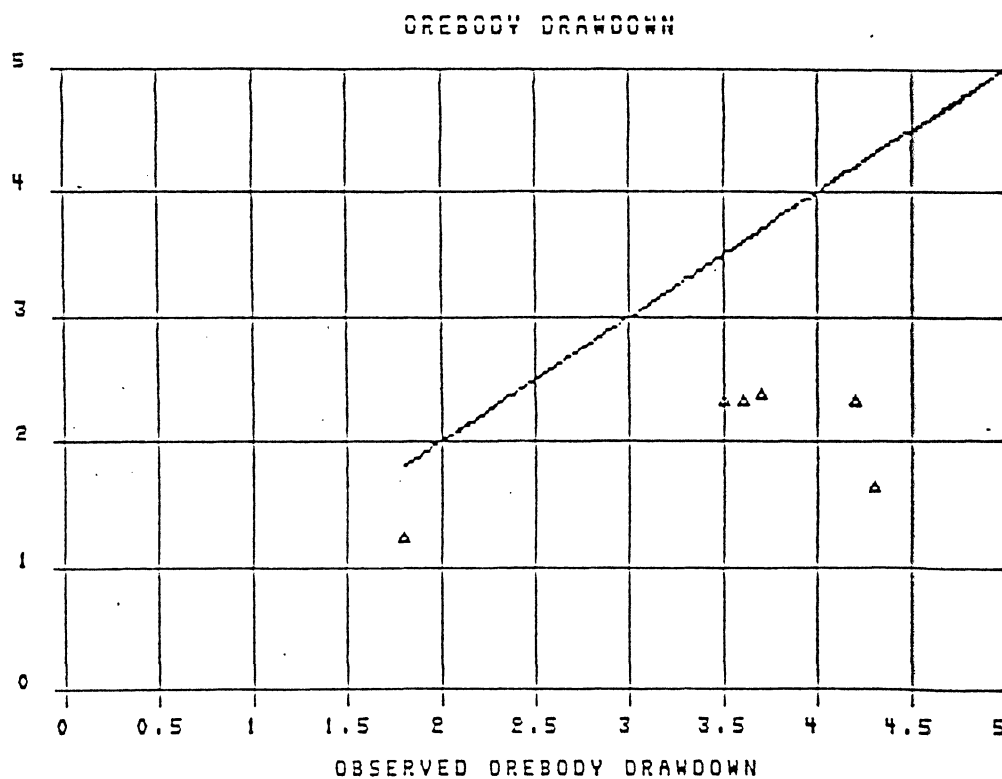
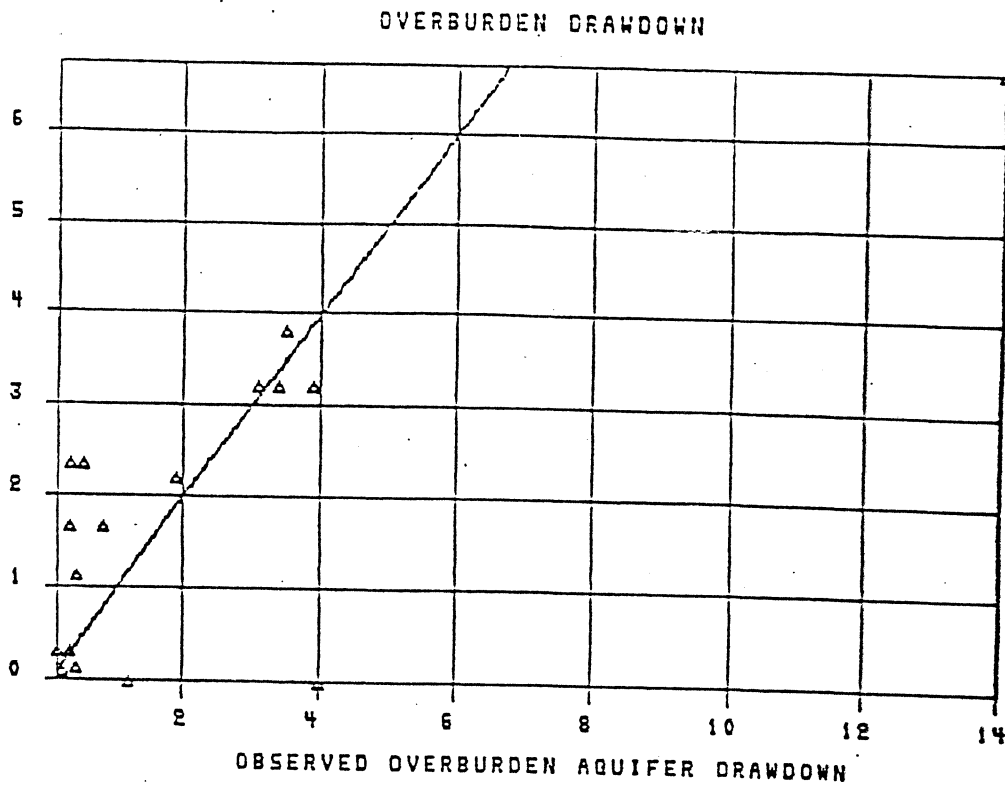


Figure 3.17 Calibrated Orebody Drawdowns for Pumping Test 213. Page 51

COMPUTED OVERBURDEN DRAWDOWN



COMPUTED OVERBURDEN DRAWDOWN

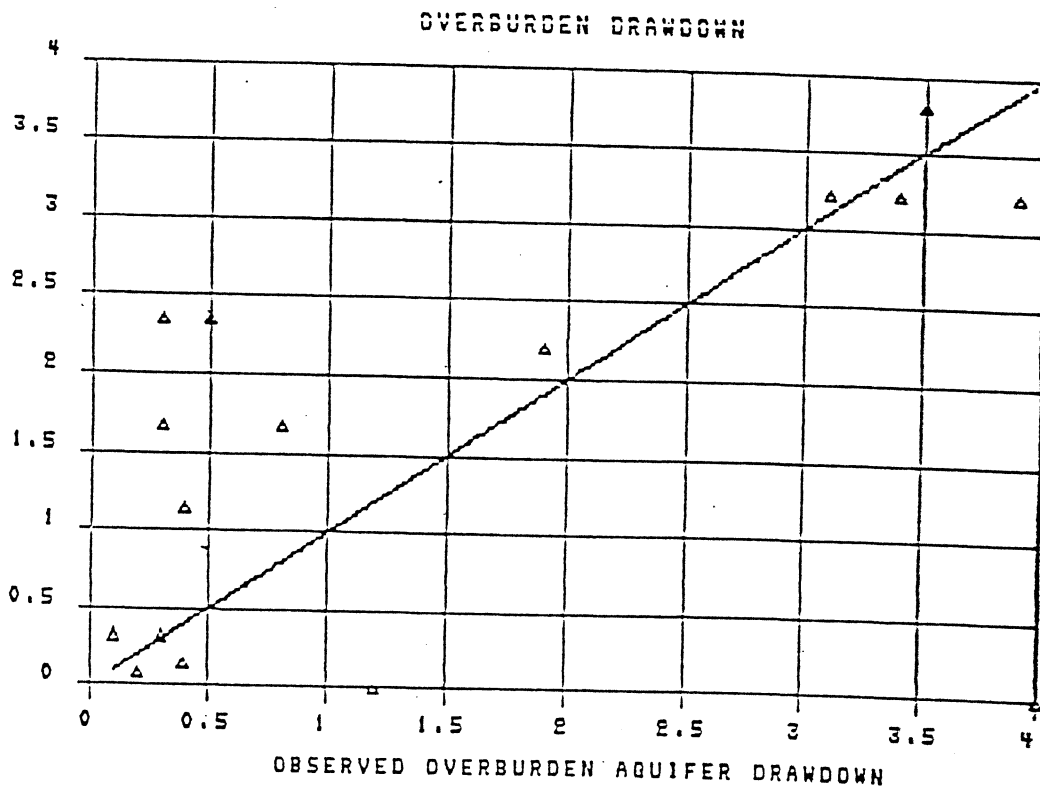


Figure 3.18 Calibrated Overburden Aquifer Drawdowns for Pumping Test 213. Page 52

from the Well 213 pumping test are given in Figure 3.17 and Figure 3.18. This is a graphic comparison representing a measure of the calibration quality for the overburden aquifer and orebody drawdowns at the end of the pumping test (seven days). Figure 3.19 and 3.20 are the same graphic comparisons for the Well 211 pumping test. Computer generation of these plots was used throughout the calibration process to give a quick graphic measure of the calibration quality for interactive user examination. Figure 3.21 is an integrated cross-section contour map of the 213 pumping test at seven days. The map was generated by summing (integrating) weighted orebody drawdowns to form a cross-sectional drawdown map. Weighting was applied by summing the transmissivities in all six directions at each node and weighting the drawdown for a given orebody model node column number and layer number by proportioning these sums. This is one type of map used for judging the general shape of calibration drawdown distributions.

There are three primary reasons why the calibration is not of better quality than that exhibited by Figures 3.17 through 3.20. First, the model was constructed for the purpose of predicting mine inflow. This results in nodes which are not coincidental with either the pumping wells nor the observation wells. The closest node is, therefore, selected as representing the location of these wells. Second, calibration parameters were manually permutated resulting in parameters which are not exactly the true optimum model parameters. Finally, the model overburden aquifer is based on a 2-D flow conceptualization. Physically,

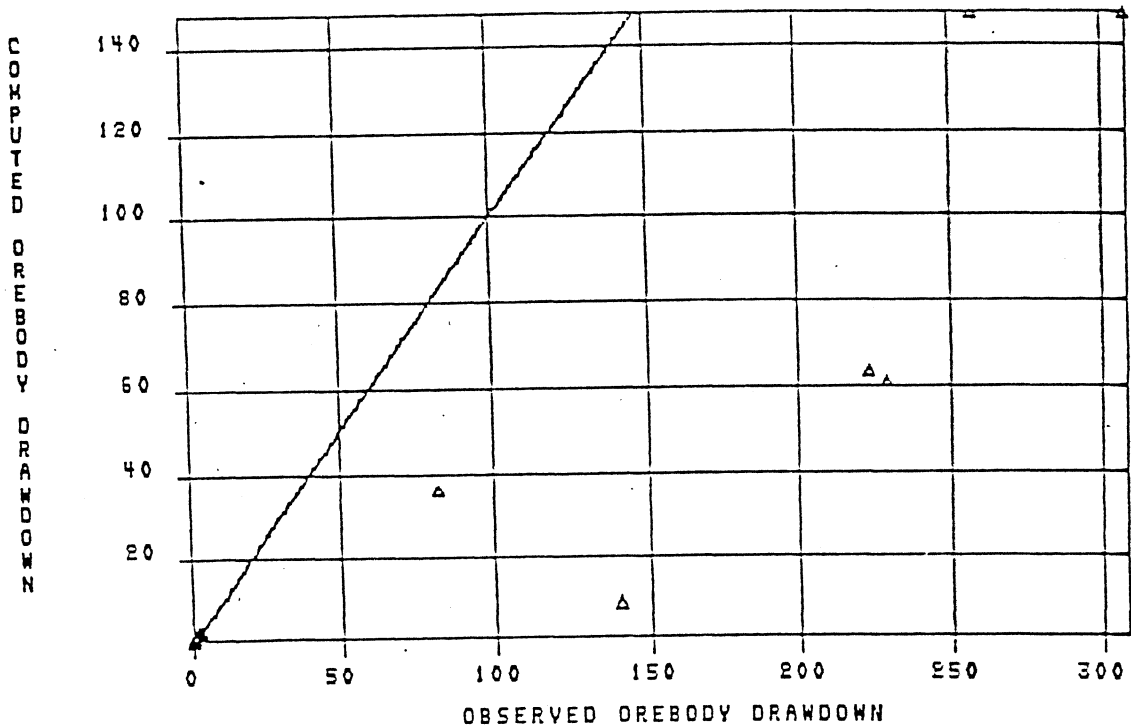
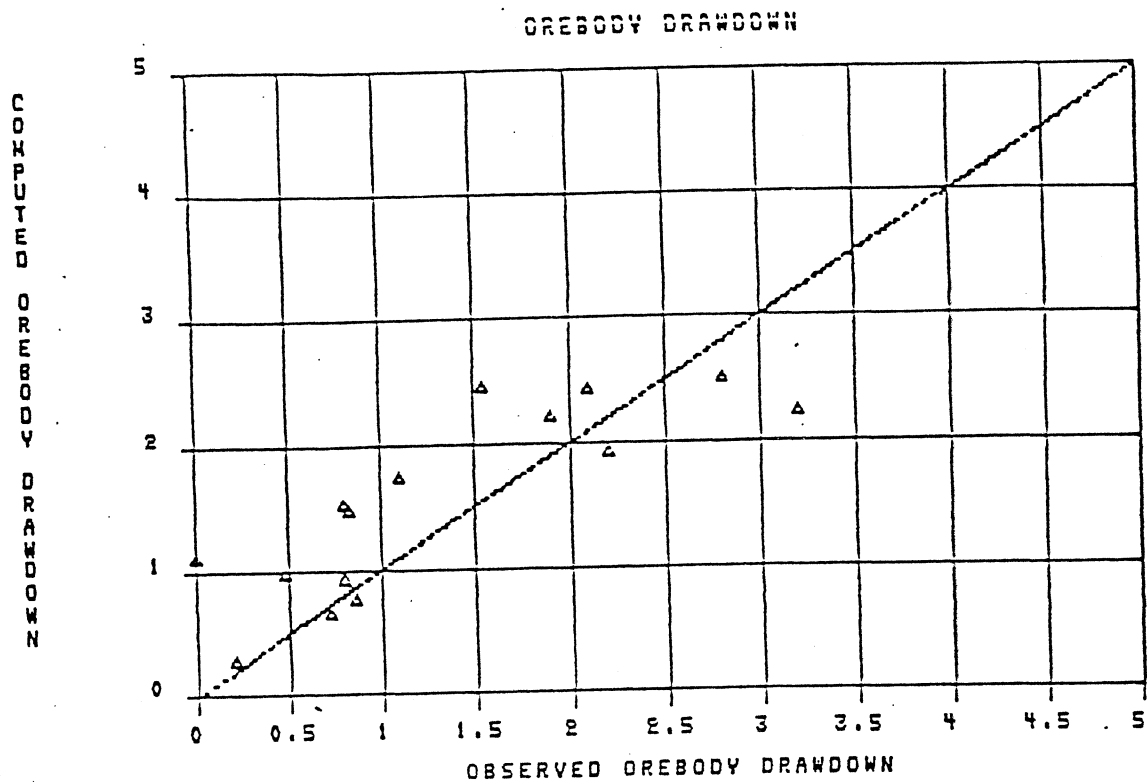


Figure 3.19 Calibrated Orebody Drawdowns for Pumping Test 211. Page 54

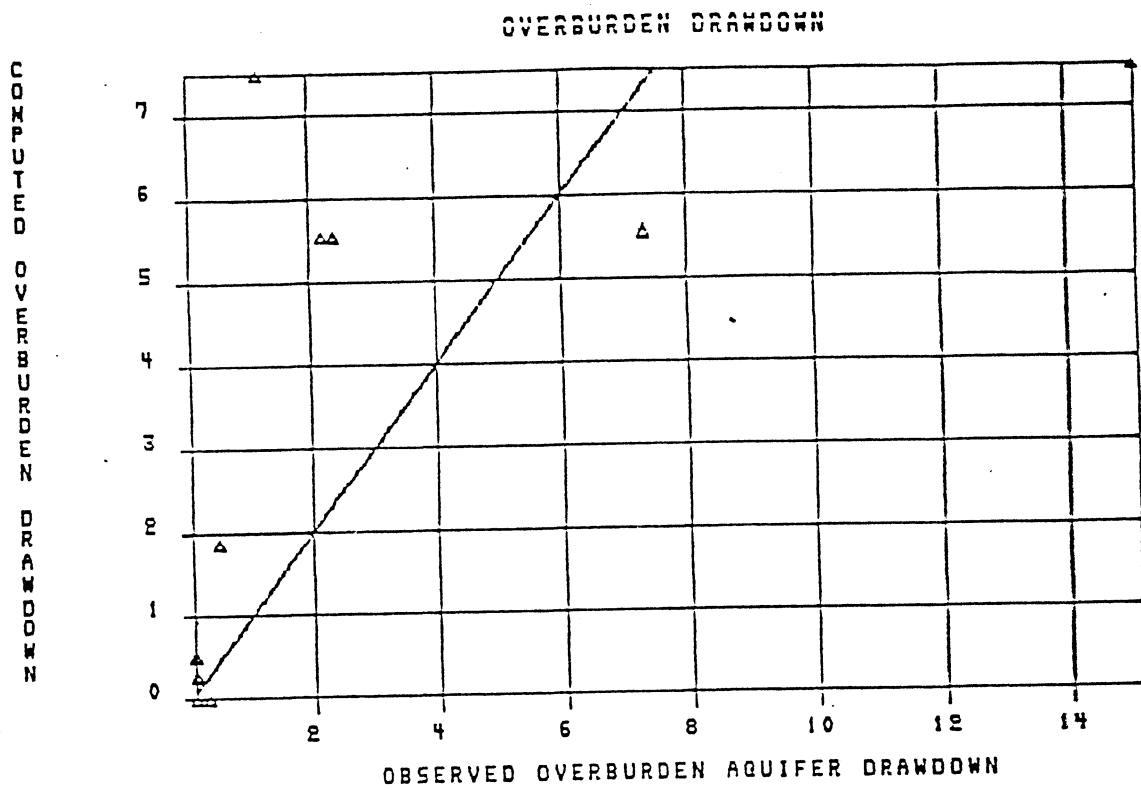
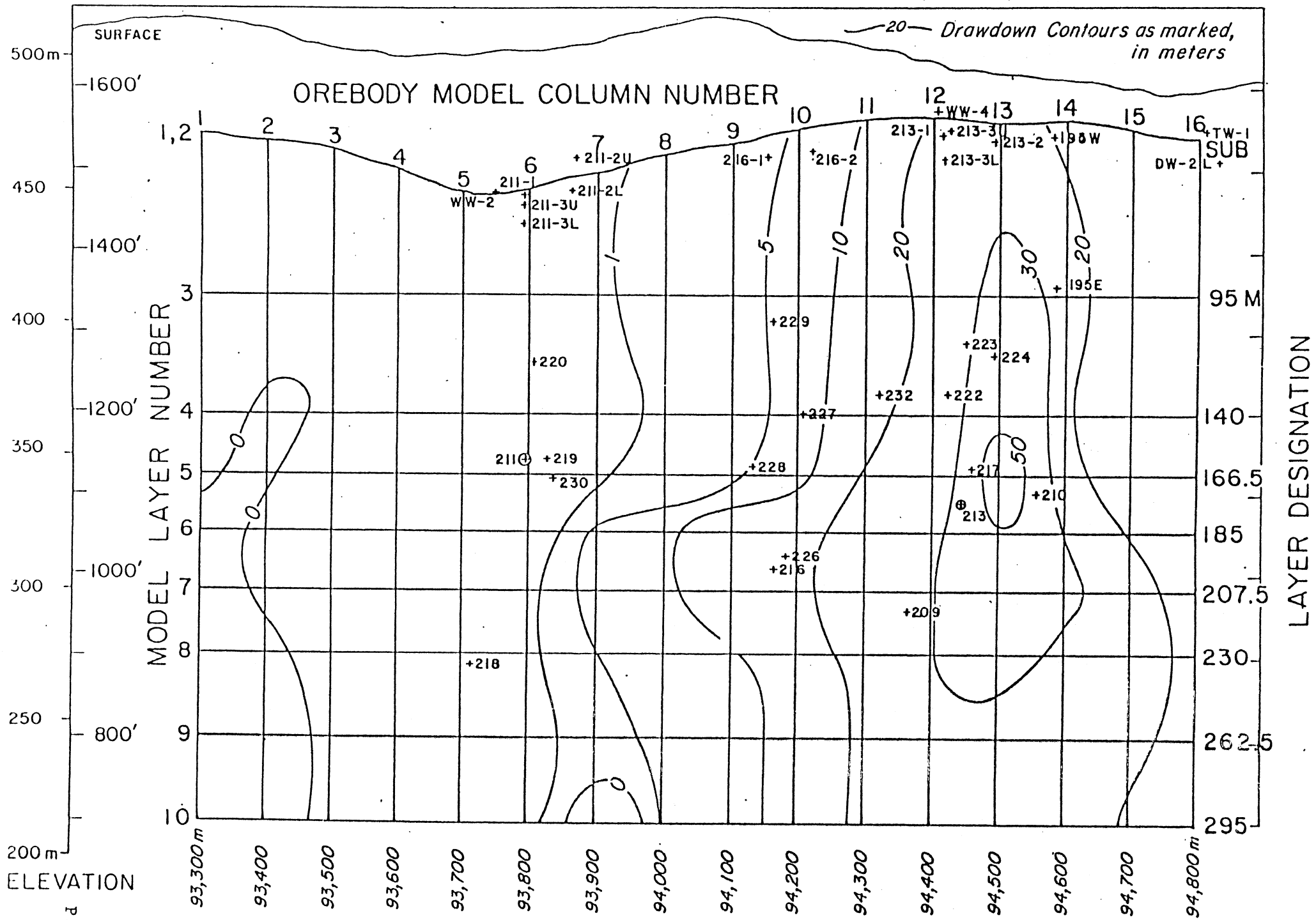


Figure 3.20 Calibrated Overburden Aquifer Drawdowns for Pumping Test 211.



vertical gradients exist in the overburden aquifer, especially above the orebody, due to some stratification.

It is important to note that small drawdowns define the spatial extent of the pumping test. Therefore, these are very important during the calibration process in that they represent a spatially integrated measure of the impact whereas very high drawdowns may reflect localized conditions near the pumping well and may not represent the total integrated flow system as well as the smaller drawdowns. Large drawdowns are also associated with large gradients thus causing an observation point which doesn't coincide with a model node to conceivably exhibit very high absolute error when compared to the model node drawdown. A higher degree of credibility was therefore subjectively applied during the calibration process to the smaller observed drawdowns. The result of this subjective weighting is reflected by the calibration plots (Figures 3.17 through 3.20) in which the lower drawdowns generally exhibit better calibration.

3.4.6 Sensitivity Based on Calibration

The calibration process lended insight into the model parameter sensitivities. Based upon parameter variations made during the calibration phase, the permeability of the resistive layer between the orebody and the overlying overburden aquifer was identified as a sensitive parameter(s) with potential to influence the mine inflow.

Although overburden aquifer parameters were not permutated,

the ability of the overburden aquifer to deliver water to the orebody is directly related to the steady-state mine inflow rate. The maintenance of high overburden heads under the stress of orebody drainage would increase mine inflow rates. Large permeabilities, greater overburden aquifer saturated thicknesses, higher storage, and greater recharge rates would tend to increase the mine inflow rate.

The permeability of the weak relative permeability bedrock region (Figure 3.9, Page 29) is an extremely sensitive parameter based on its influence on drawdowns in these regions. If these regions are given just a slight amount of permeability the result, even at large distances from the orebody, is abnormally high drawdowns in these weak relative permeability regions; in excess of anything measured during the pumping tests. Therefore, the weak relative permeability bedrock regions are assumed to have negligible permeability and were set to zero permeability in the model for both calibration and simulation.

4.0 PREDICTIVE MODELING OF MINE INFLOW AND RELATED HYDROLOGIC EFFECTS

4.1 SUMMARY

Once the model was reasonably calibrated, the hydrologic effects of the mining plan were studied. The first computer model run involved the simulation of the proposed 9100 MTPD operation and the digitized mining plan of Appendix O. This mining plan was executed with the calibrated parameters and is termed the unmitigated simulation. To reduce the mine inflows, a mitigative or inflow control scheme, based upon the study by Klohn Leonoff (4), was simulated with the same mine plan except that permeability reductions were assumed for high inflow target areas of the subcrop resistive layer. Finally, an alternative mine water inflow control scheme was included for which additional resistive layer areas were subjected to permeability reduction.

4.2 UNMITIGATED INFLOW SIMULATION

Figure 4.1 shows the estimated mine inflow rates for the unmitigated simulation. The mine workings first penetrate permeable orebody areas at the 11-month point (330 days) in the mine plan. Thereafter the mine inflow begins at a rate of about $0.04 \text{ M}^3/\text{SEC}$ (634 GPM) and steadily increases.

Starting in the 14th month (510 days), and shortly thereafter, the planned mine development rate increases. As a result, porous sections of the orebody and surrounding materials

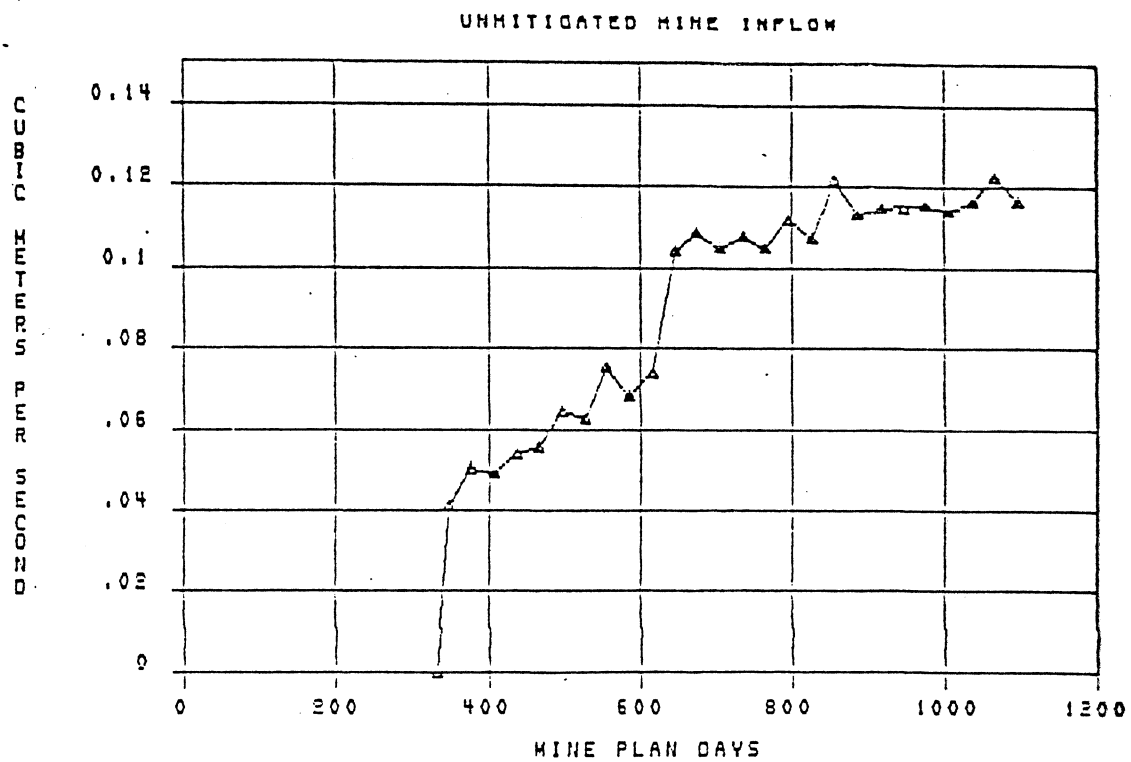


Figure 4.1 Estimated Unmitigated Mine Inflows

become exposed to a large number of drifts, cross cuts, and bulk sampling areas. The rate of water flowing into the mine, therefore, steadily increases to approximately $0.11 \text{ M}^3/\text{SEC}$ (1740 GPM) at about the 27-month (810 days) point of the mining plan. Rapidly declining overburden aquifer heads result from the mine inflow and large sections of the permeable materials above the 185 M mine level are converted to gravity flow conditions such that drainage of orebody storage occurs on the 140 M and 185 M levels. Maximum hydraulic gradients are experienced at this point in some areas across the resistive layer to the extent that water is "raining" down as illustrated conceptually in Figure 4.2.

As the hydraulic pressure above the 185 M mine level is dissipated after the 28-month point (840 days), the rate of water inflow to the mine workings is thereafter highly dependent upon the maximum rate at which water can flow through the resistive layer plus whatever water is being drained from the orebody itself. The peak rate of mine inflow is estimated to be about $0.12 \text{ M}^3/\text{SEC}$ (1900 GPM) and occurs at approximately the 29-month point (870 days) in the mining plan. The rate of glacial overburden supplied water to the mine workings then begins to decline slowly as heads in the glacial deposits also decline. By month 37 (1110 days), the mine inflow rate should decline to about $0.118 \text{ M}^3/\text{SEC}$ (1870 GPM) as the rate of glacial overburden aquifer supplied water approaches steady-state conditions.

The mine inflow rate will consist of three parts. First,

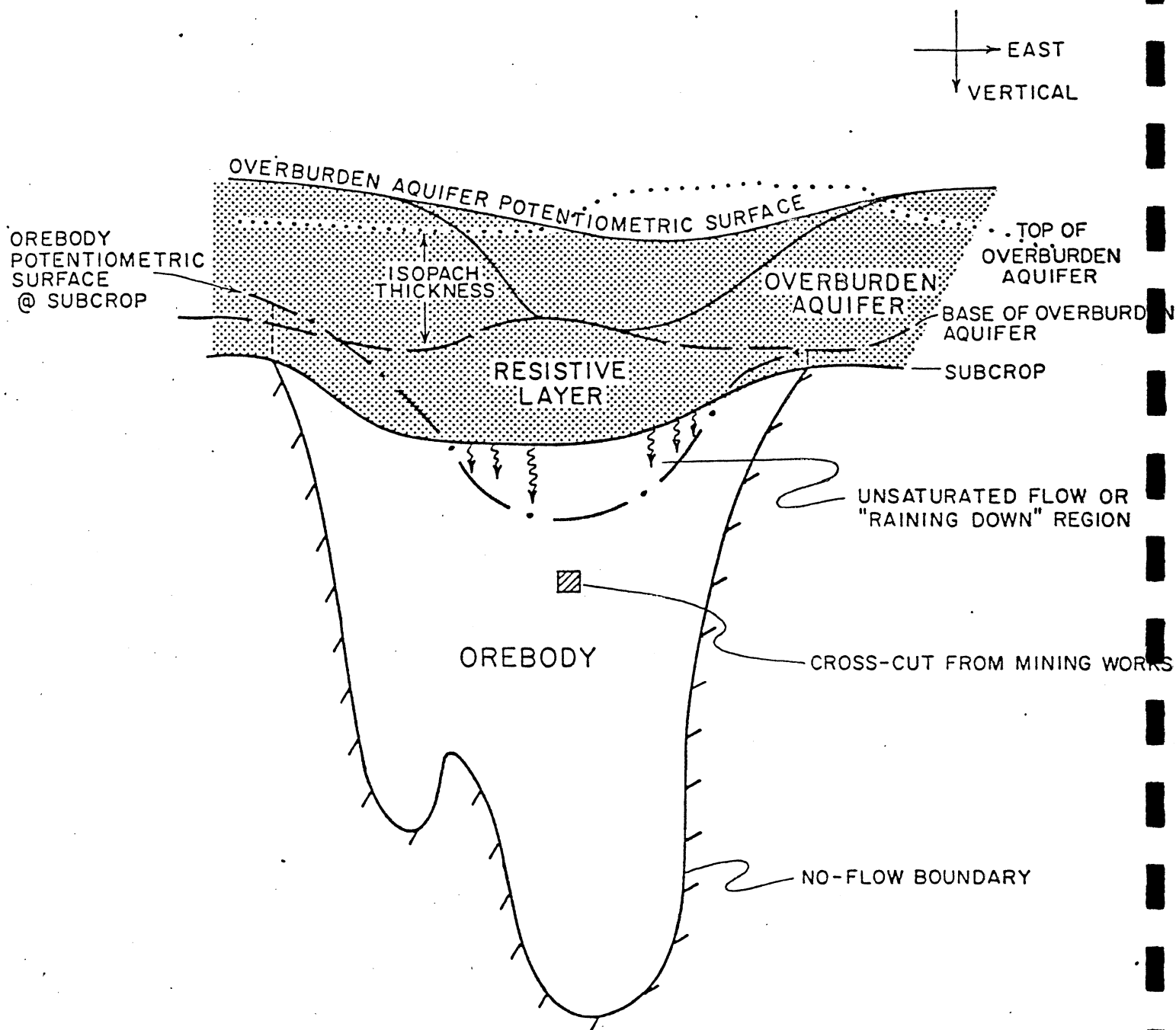


Figure 4.2 Conceptualization of Vertical Flow Through Resistive Layer.

and most important, will be that water which will continually "rain" down through the subcrop resistive layer from the glacial overburden aquifer. Second, there will be water released due to artesian pressure decline within the orebody. The third source is that water resulting from drainage of the orebody. Presently there are some data on the orebody drainage characteristics. The aforementioned flow estimates are based upon a gravity drainage coefficient of approximately 0.005. Drainage of the orebody can be a significant source of water during the early part of the mining plan when gravity drainage takes place. It should be realized, however, that this drainage component is a non-renewable source and once it is pumped out, it is gone.

The intense mining activities starting around months 21-25 (630-750 days) of the mine plan result in rapid depressurization of the orebody. However, the raining down of water from the glacial deposits, subsequently, continues. The steady-state inflow rate becomes predominantly a function of the capability of the overburden glacial aquifer to supply water, plus the minor component of orebody drainage as mining progresses to depth. Our study indicates that the inflow from the overlying glacial aquifer will not be a function of the mining plan once the orebody hydraulic pressure falls below the crown of the orebody subcrop after about month 45 (1000 days) of mining activity.

Figure 4.3 illustrates the steady-state distribution of drawdown in the overburden aquifer as a result of the mine plan dewatering for the unmitigated situation. Drawdown impacts range

MODEL ROW NUMBERS

5
10
15
20
25
30
35
40
45

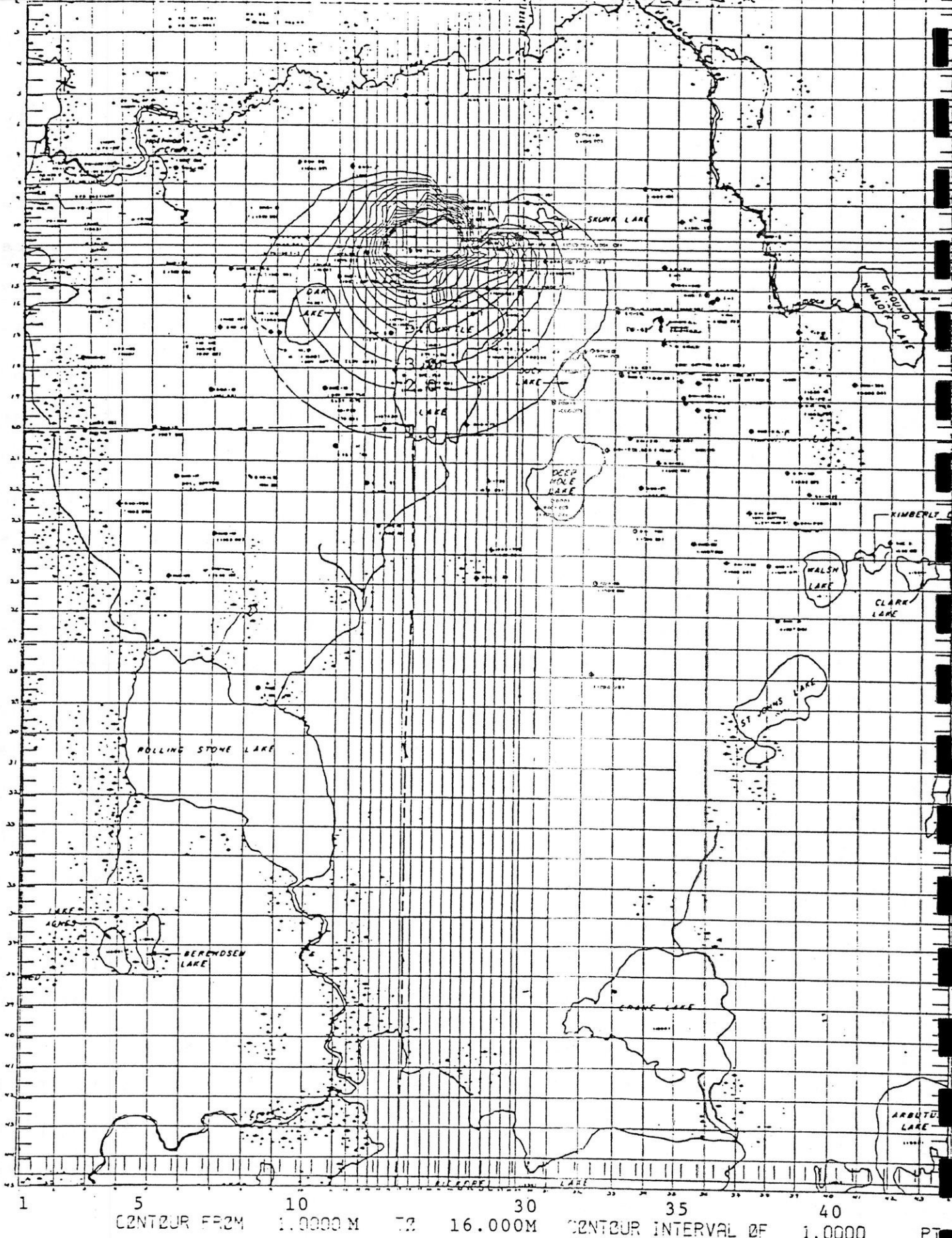


Figure 4.3 Unmitigated Drawdown Impacts at Steady-State in Overburden Aquifer.

from a maximum of 33.0 Meters (108 Feet) localized near the center of mining activities to a minimum of 1.0 Meter (3.3 Feet) in an area covering approximately the northern half of the modeled area. Details of mine induced drawdowns in the overburden aquifer directly above the mine area are shown in Figure 4.4. Generally, maximum drawdown impacts are located above the centroid of permeable resistive layer zones.

Figures 4.5 and 4.6 show the vertical inflow distribution through the resistive layer and the 230 Meter mine level, respectively, for steady-state conditions. The zones of maximum inflow coincide with permeable resistive layer areas above permeable zones of the orebody.

Figure 4.7 depicts the principal directions of ground water movement in the overburden aquifer as it flows toward the mine area. As is indicated in Figure 4.7, the majority of the mine inflow (approximately 73 %) comes from the overburden aquifer south of the mine area. The inflow is predominantly coming from this region due to the large saturated overburden aquifer thickness which exists south of the mine area.

The impacts of mine drainage result in changes in ground water baseflow to nearby streams. The total reduction in baseflow rate represents the sum of the reductions in baseflows due to mining related drawdown at the streams and the rate at which mine drainage intercepts ground water as it flows from upland areas toward the streams.

D'Appolonia (2) evaluated the total ground water baseflow reductions to Swamp Creek and Hemlock Creek $0.020 \text{ M}^3/\text{SEC}$ (0.71

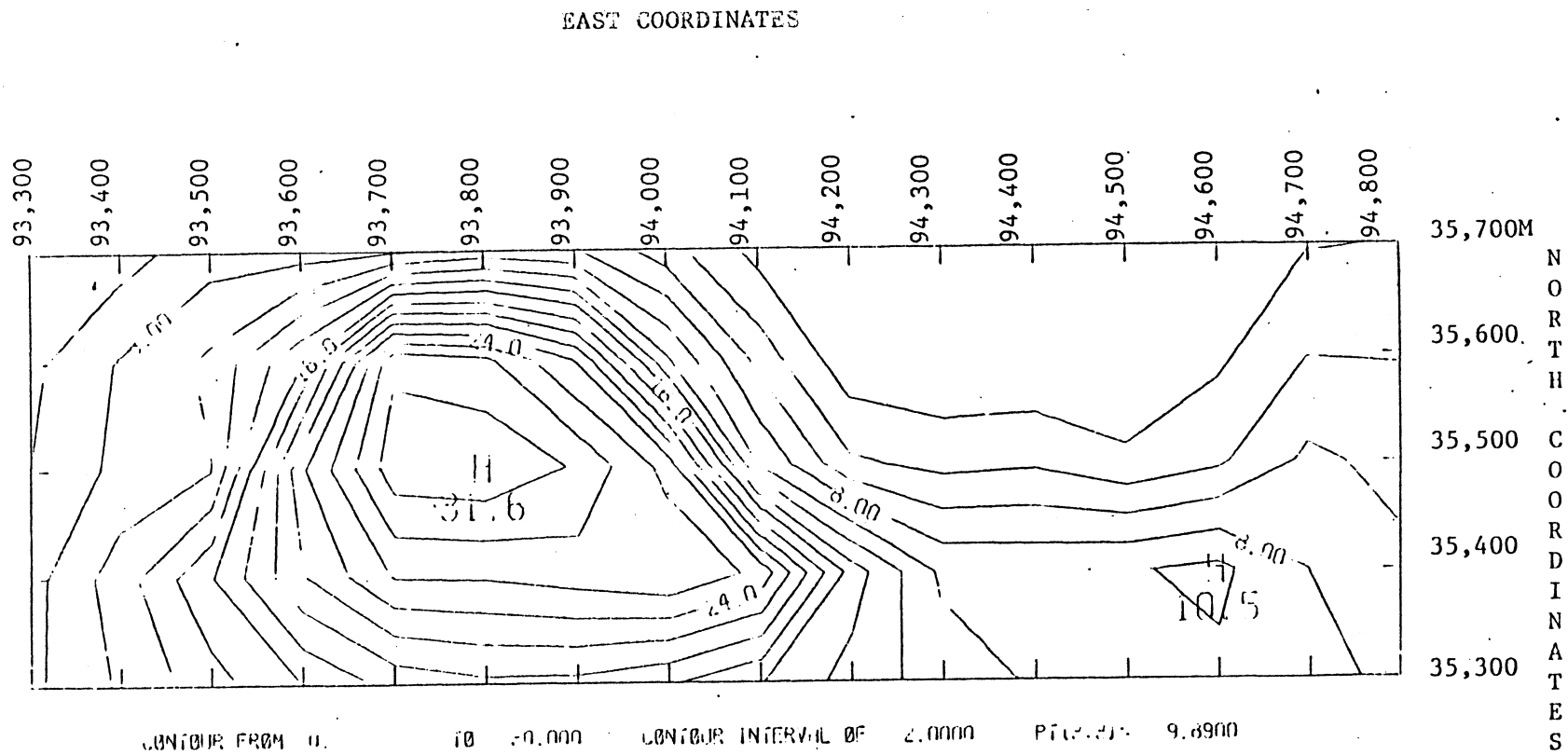
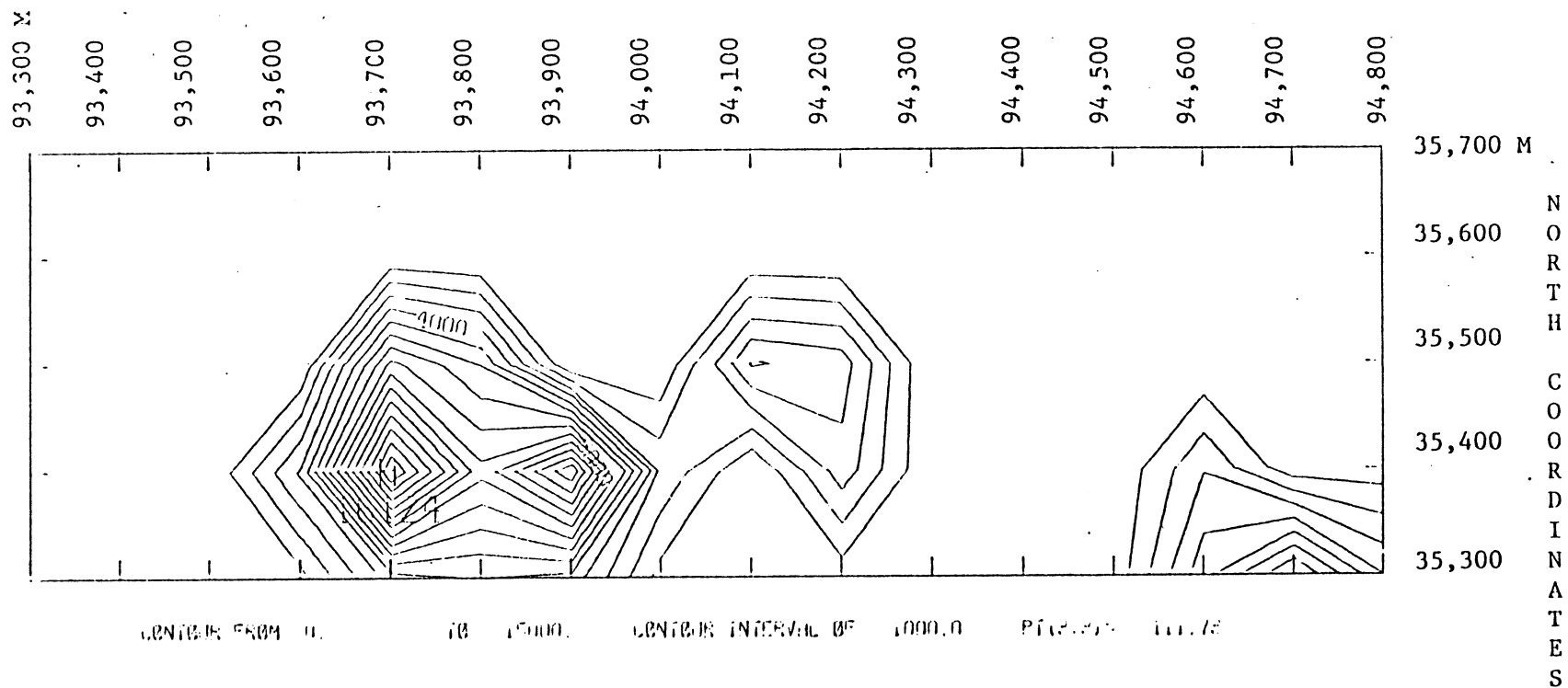


Figure 4.4 Unmitigated Drawdown Distribution in Overburden Aquifer Above Resistive Layer for Steady-State Conditions (in Meters)

EAST COORDINATES



Flow Density in $M^3/SEC/M^2 \times 10^{10}$

Figure 4.5 Unmitigated Flow Density at Resistive Layer for Steady-State Conditions.

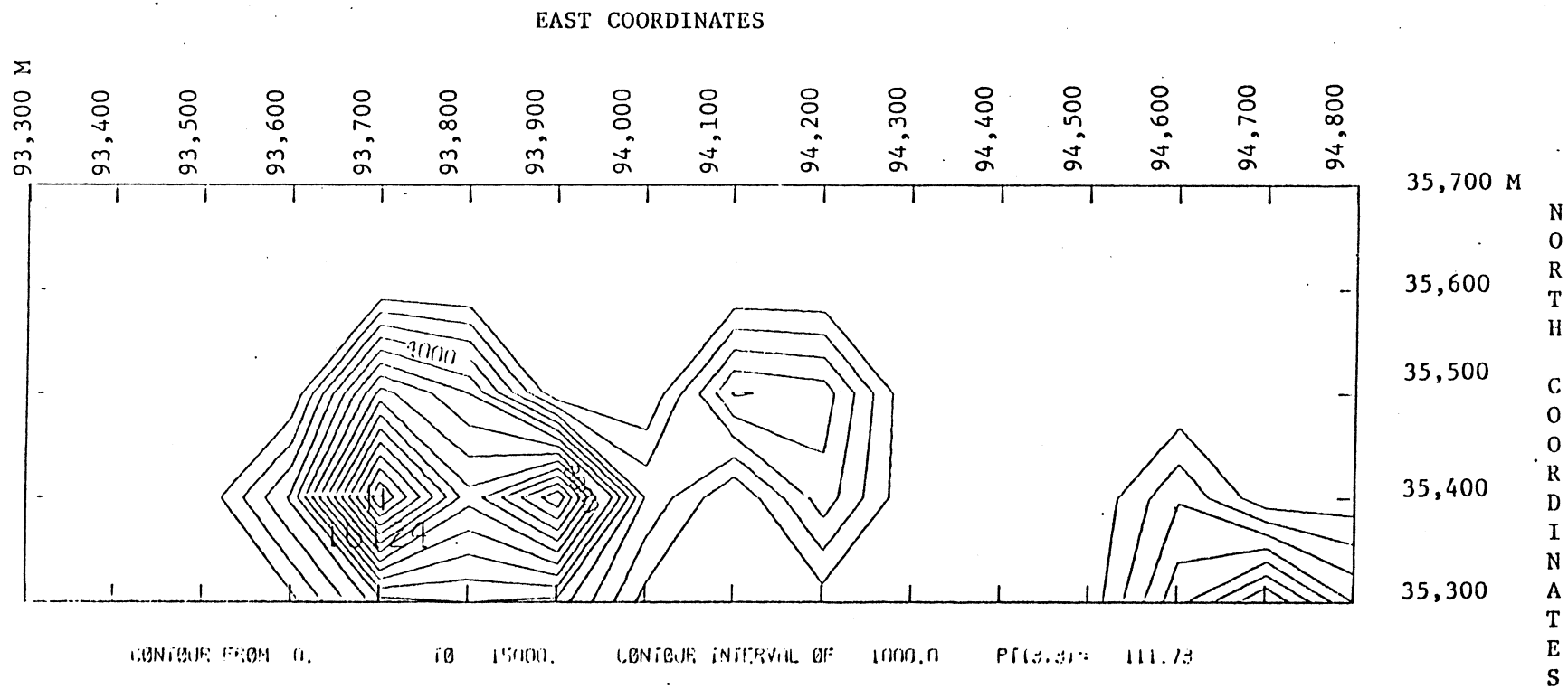


Figure 4.6 Unmitigated Flow Density at 230 Meter Level for Steady-State Condition.

STEADY-STATE UNMITIGATED MINE INFLOW CONTRIBUTIONS
 - FLOWS IN CUBIC METERS PER SEC TIMES 1000 -

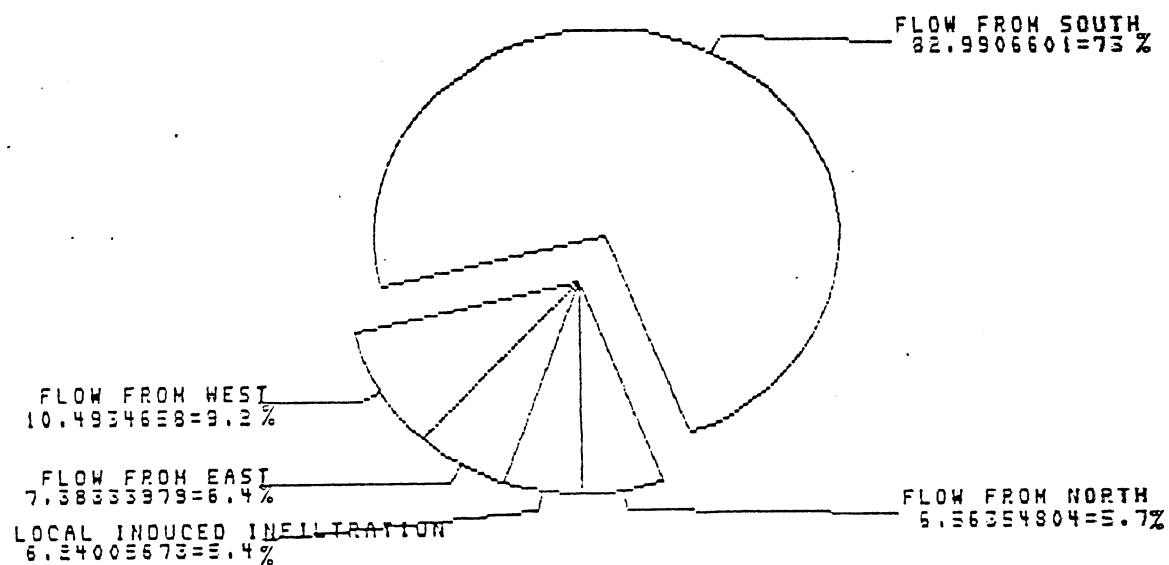


Figure 4.7 Unmitigated Mine Inflow Distribution at Steady-State
 Categorized by Overburden Aquifer Flow Direction.

Cubic Feet Per Second [CFS]) and $0.018 \text{ M}^3/\text{SEC}$ (0.64 CFS), respectively for their Case II situation (assumed mine dewatering rate of 2000 GPM).

In the report herein, Figure 4.8 illustrates how time-related flows in comparable reaches of Swamp Creek and Hemlock Creek are reduced due to mine related drawdowns only (steady-state mine dewatering rate of 1870 GPM). For steady-state conditions, drawdown impacts are thus estimated to reduce baseflow to Swamp and Hemlock Creeks by the minor amounts of $0.0024 \text{ M}^3/\text{SEC}$ (0.0848 CFS) and $0.00094 \text{ M}^3/\text{SEC}$ (0.0332 CFS), respectively.

By accounting for the difference in mine inflow rates (1870 GPM herein versus 2000 GPM for the D'Appolonia study, 2) and by subtracting the drawdown impact flows from the estimated total baseflow reductions, we can calculate the reductions in baseflow to Swamp and Hemlock Creeks due to interception to be about $0.0163 \text{ M}^3/\text{SEC}$ (0.58 CFS) and $0.0159 \text{ M}^3/\text{SEC}$ (0.57 CFS), respectively.

4.3 CONTROLLED MINE INFLOW SIMULATION/SELECTIVE GROUTING OF KLOHN LEONOFF TARGET AREAS

Klohn Leonoff (4) made a study of possible ways to reduce mine water inflow. One method involved grouting of the highly permeable areas (see Figure 3.5) in the west central portion of the resistive layer. Klohn Leonoff assumed that grouting of these areas could be made effective down to a resultant permeability of 10^{-5} to 10^{-6} CM/SEC . Based upon the Klohn

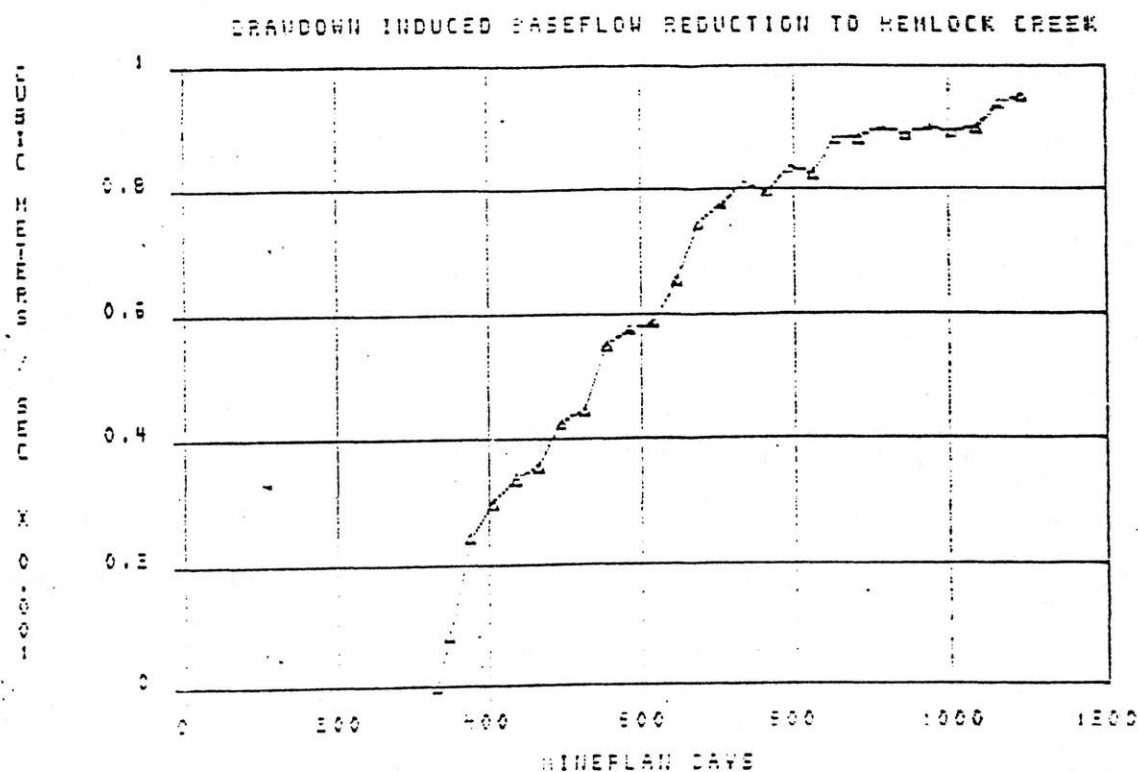
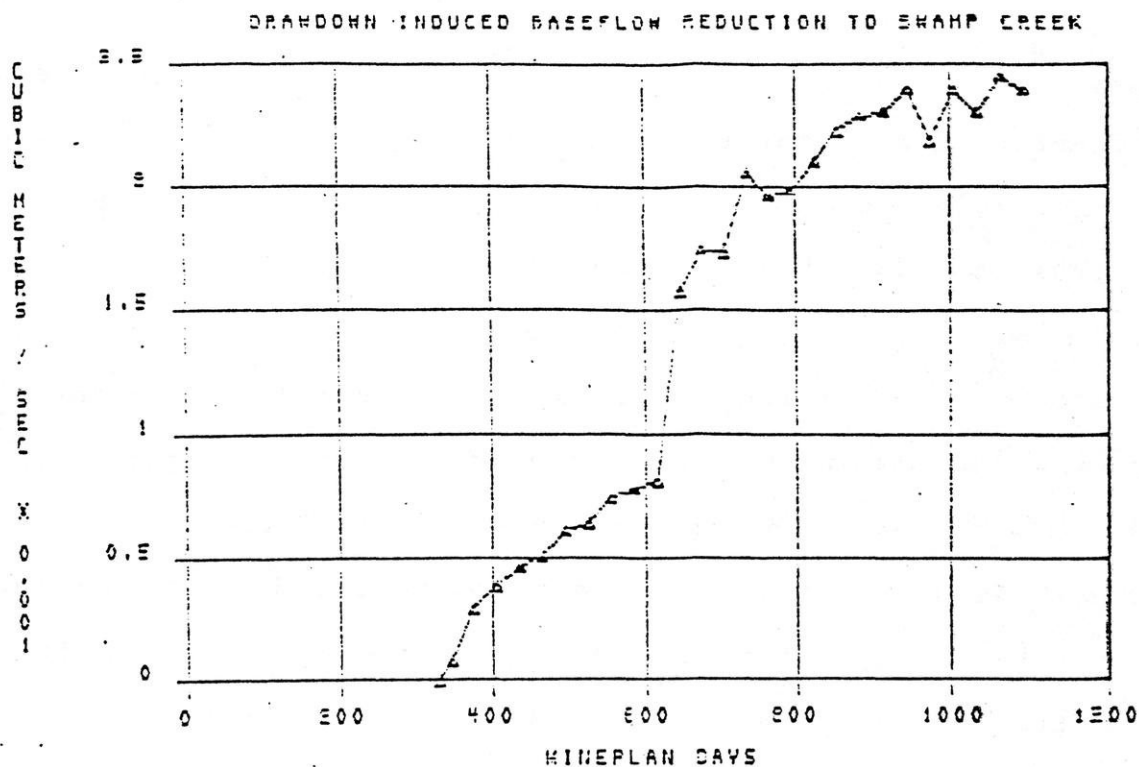


Figure 4.8 Reduction in Ground Water Flow to Swamp and Hemlock Creeks Due to Mine Induced Drawdowns Under Unmitigated Conditions.

Leonoff study, a simulation run was made to test the effectiveness of their grouting scheme.

Figure 4.9 shows a comparison of the unmitigated mine inflow versus the Klohn Leonoff control plan. Based upon the comparison in Figure 4.9, the overall effectiveness of this particular grouting plan is low. A study of the database for the present model indicates that the area of grouting targeted by Klohn Leonoff is nearly dry at steady-state conditions. Thus, whether grouting is performed or not makes little difference. The present study indicates that the bulk of the mine inflow is coming from large areas of somewhat lower permeability to the south of the targeted Klohn Leonoff area. Present evaluations employ hydrologic data not available at the time of the Klohn Leonoff (4) preliminary study.

Figure 4.10 shows the vertical inflow distribution of water entering the mine at the resistive layer for the Klohn Leonoff grouting scheme. As mentioned previously, large flows are still occurring south of their target areas.

Finally, Figure 4.11 shows the drawdown impacts in the overburden aquifer immediately above the orebody. Very little difference is noted in this figure when it is compared to Figure 4.4 (unmitigated case). Since the total inflow from the unmitigated case is nearly the same as for the Klohn Leonoff Control Plan (see Figure 4.10), the impacts elsewhere are practically identical.

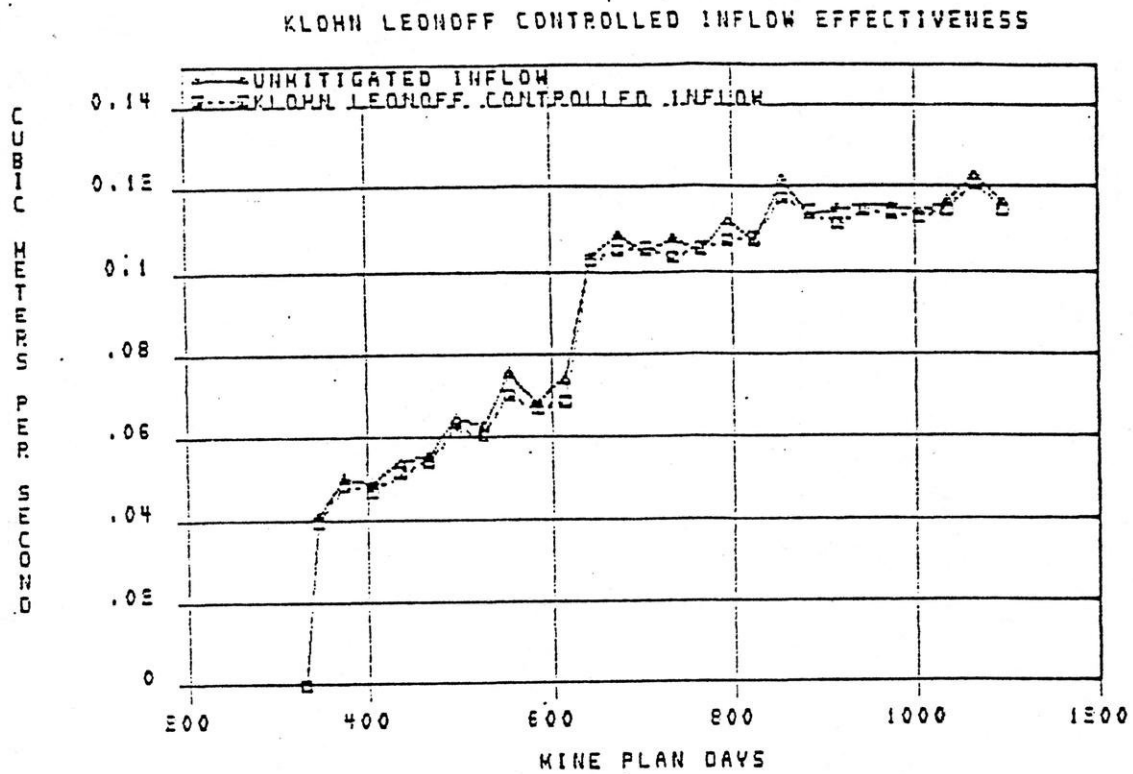


Figure 4.9 Controlled Mine Inflow Rates When Kohn Leonoff Target Areas Are Grouted to 10^{-5} CM/SEC.

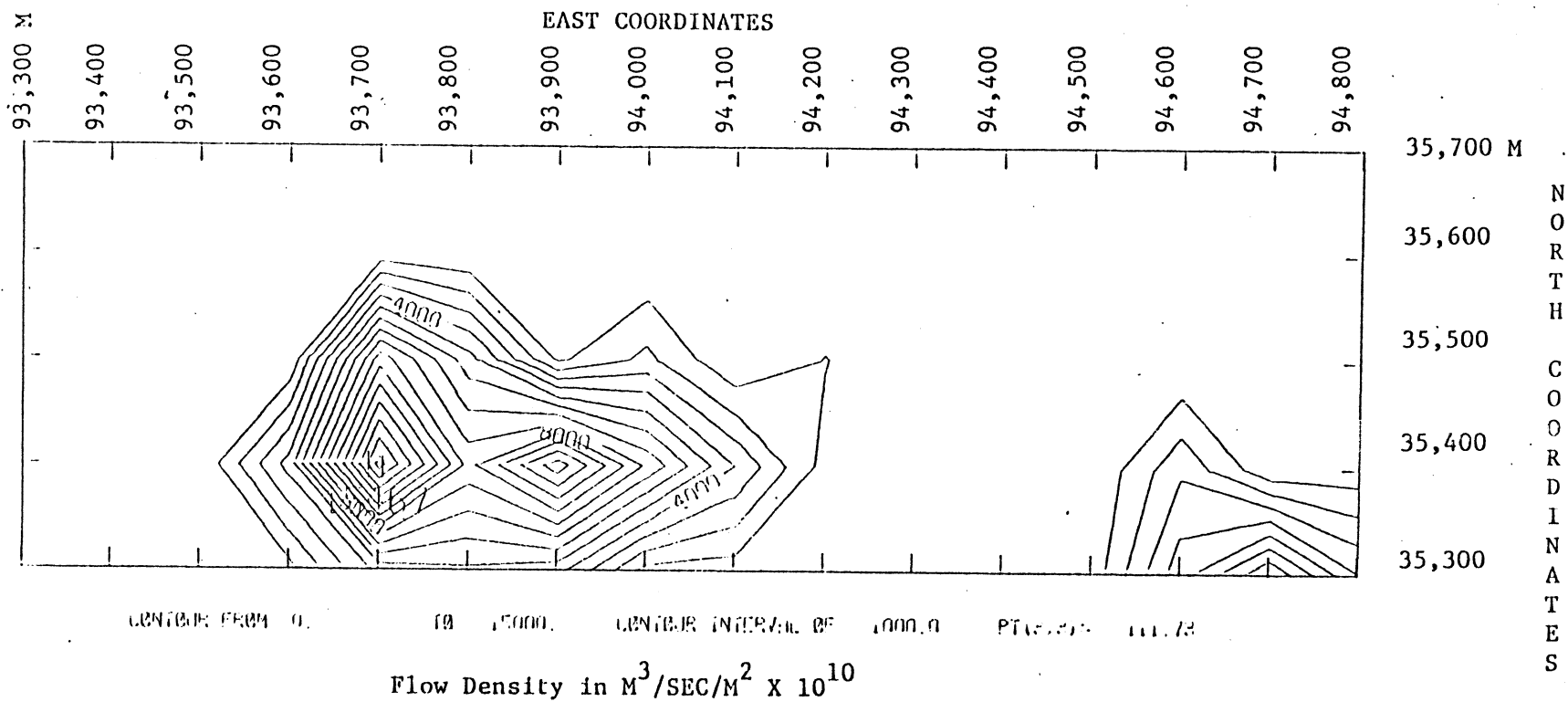


Figure 4.10 Klohn Leonoff Control Plan Flow Density Distribution at Resistive Layer for Steady-State Conditions.

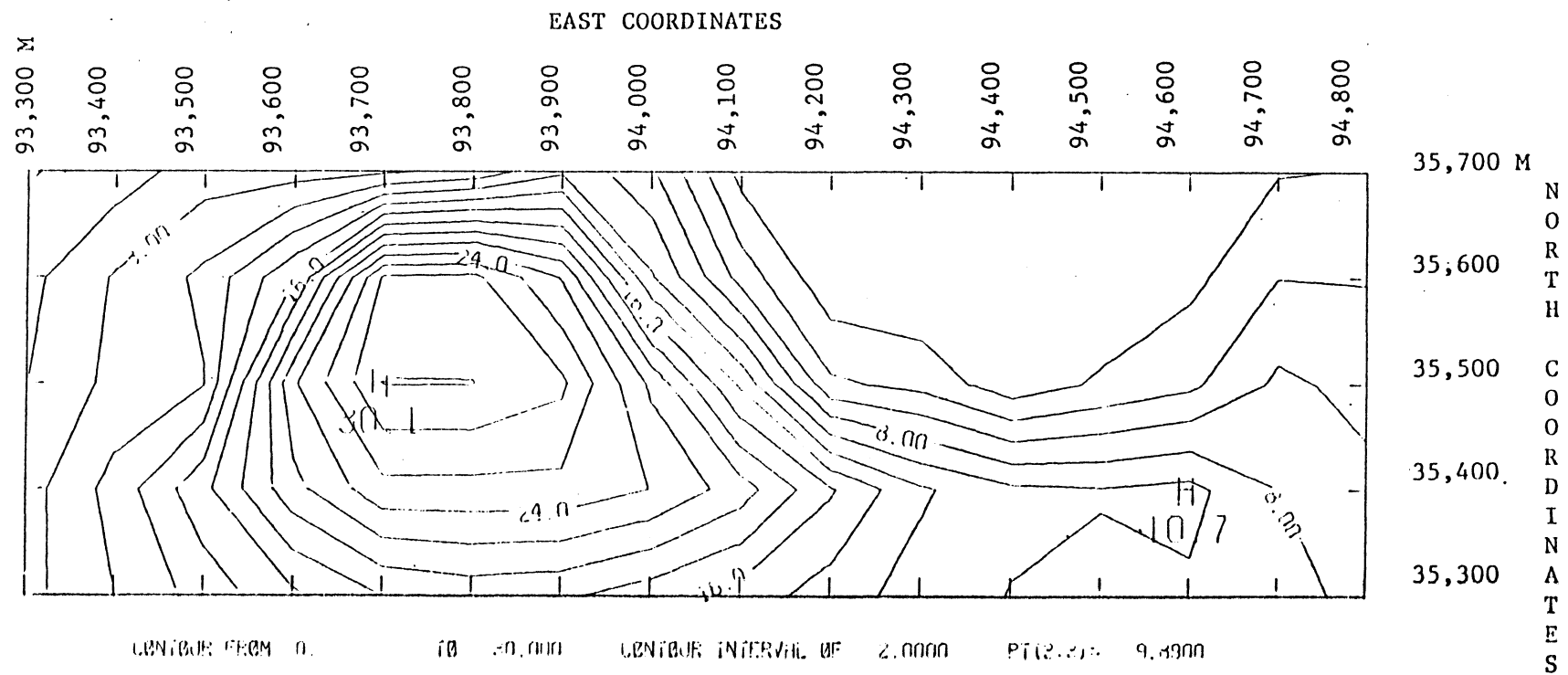


Figure 4.11 Klohn Leonoff Control Plan Drawdown Above Overburden Aquifer at Steady-State (in Meters).

4.4 CONTROLLED MINE INFLOW SIMULATION/SELECTIVE GROUTING OF KLOHN LEONOFF TARGETS AND ADDITIONAL AREAS

Based upon a study of the effectiveness of the Klohn Leonoff grouting scheme described above, an alternate scheme of grouting was formulated by Exxon. In addition to grouting the Klohn Leonoff high inflow target areas, the permeable areas in the southeastern corner of the resistive layer were to be also grouted (see Figure 3.5, Page 14). These areas plus the Klohn Leonoff target areas were assumed to be grouted to an effective permeability of 2.4×10^{-6} CM/SEC.

Figure 4.12 illustrates the effectiveness of this grouting scheme. This control plan does reduce the steady-state mine inflow by about 9% of $0.01 \text{ M}^3/\text{SEC}$ (159 GPM) but still is not very effective. Figure 4.13 indicates the steady-state condition vertical inflow density distribution at the subcrop resistive layer while Figure 4.14 shows the local overburden aquifer drawdowns. Figure 4.15 illustrates the total study area aquifer drawdown impacts.

Since the effectiveness of this alternate mine inflow control plan is not very high, the overall impacts are approximately the same as those previously described for the unmitigated mine inflow case.

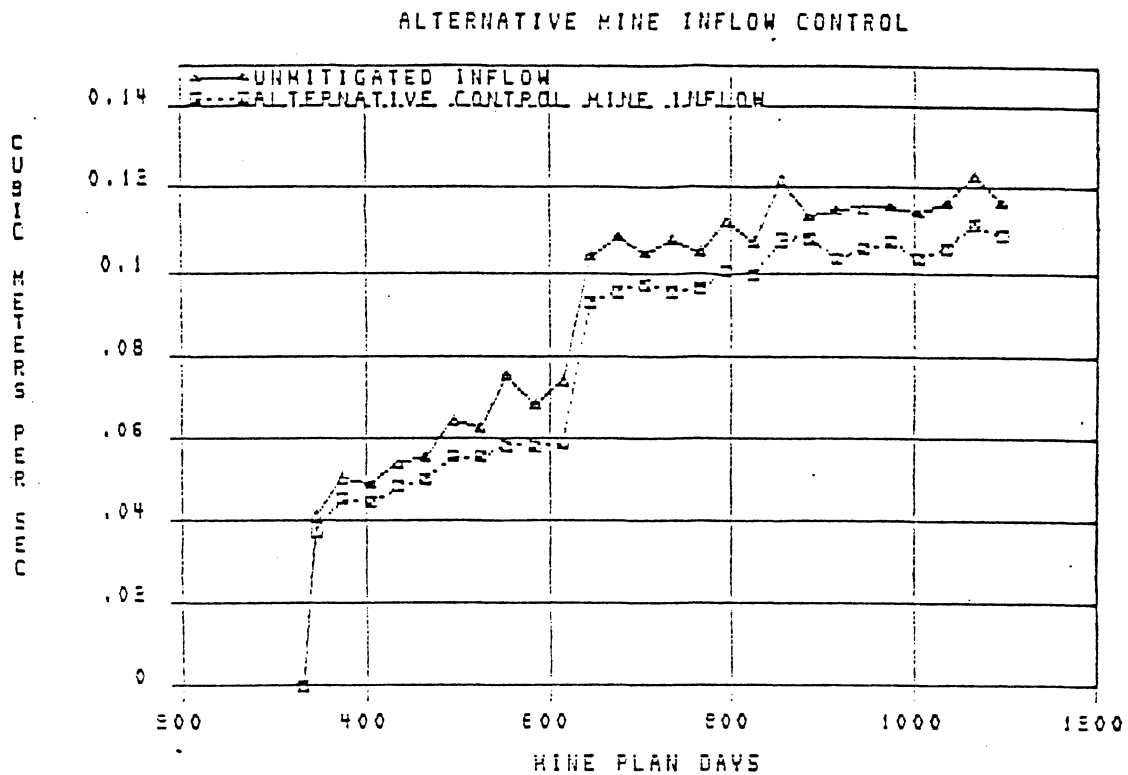
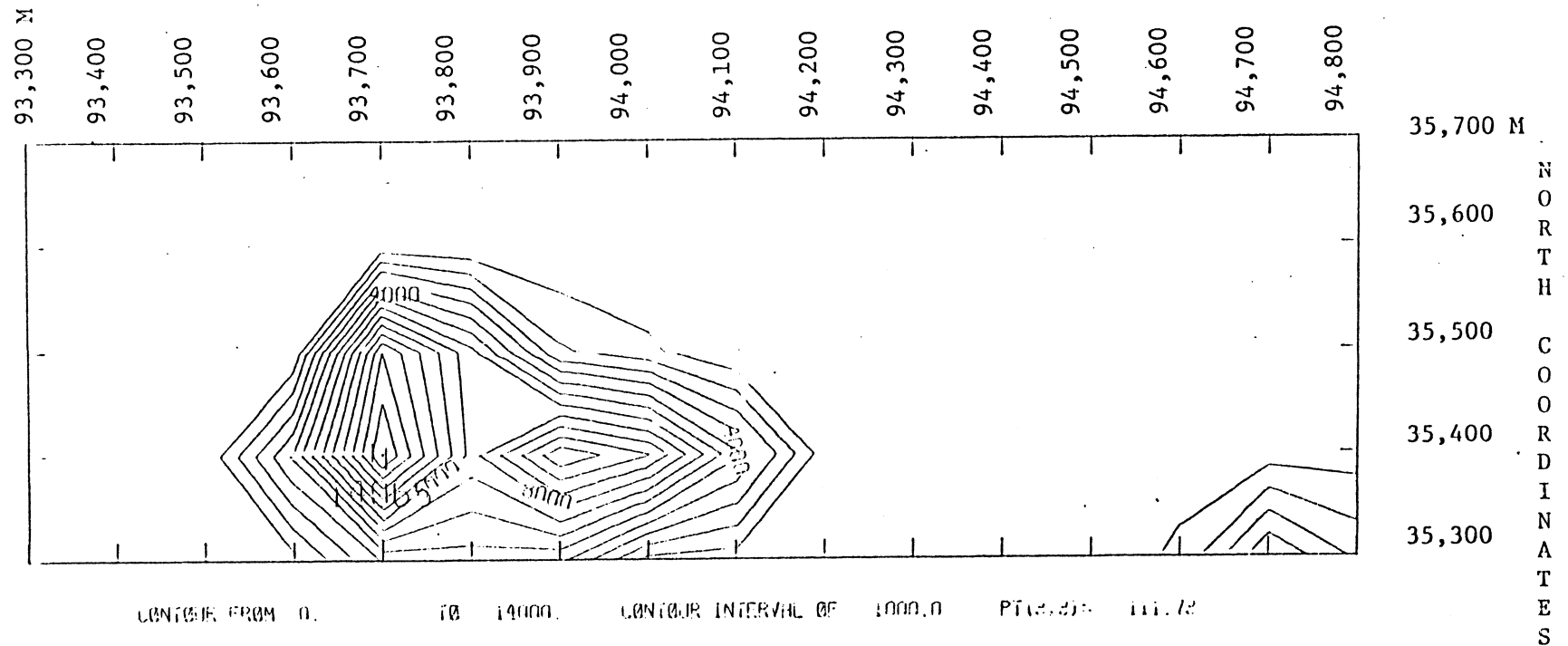


Figure 4.12 Controlled Mine Inflow When Additional Grouting is Performed on Eastern Areas and the Grout Effectiveness is Increased to 2.4×10^{-6} CM/SEC (0.05 GPD/FT²).

EAST COORDINATES



Flow Density in $M^3/SEC/M^2 \times 10^{10}$

Figure 4.13 Alternate Control Plan Flow Density at Resistive Layer for Steady-State Conditions.

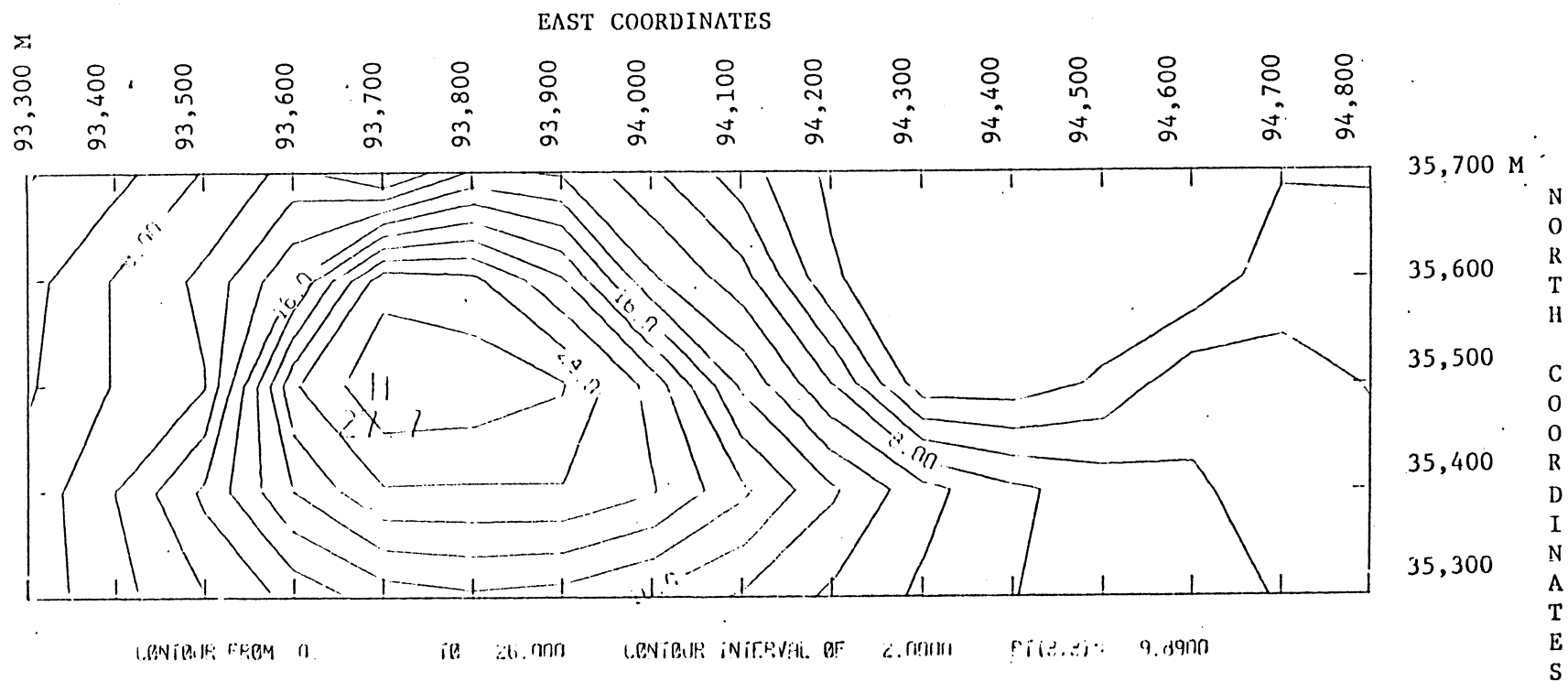


Figure 4.14 Alternate Control Plan Overburden Aquifer Drawdown Distribution Above Resistive Layer for Steady-State Conditions (in Meters).

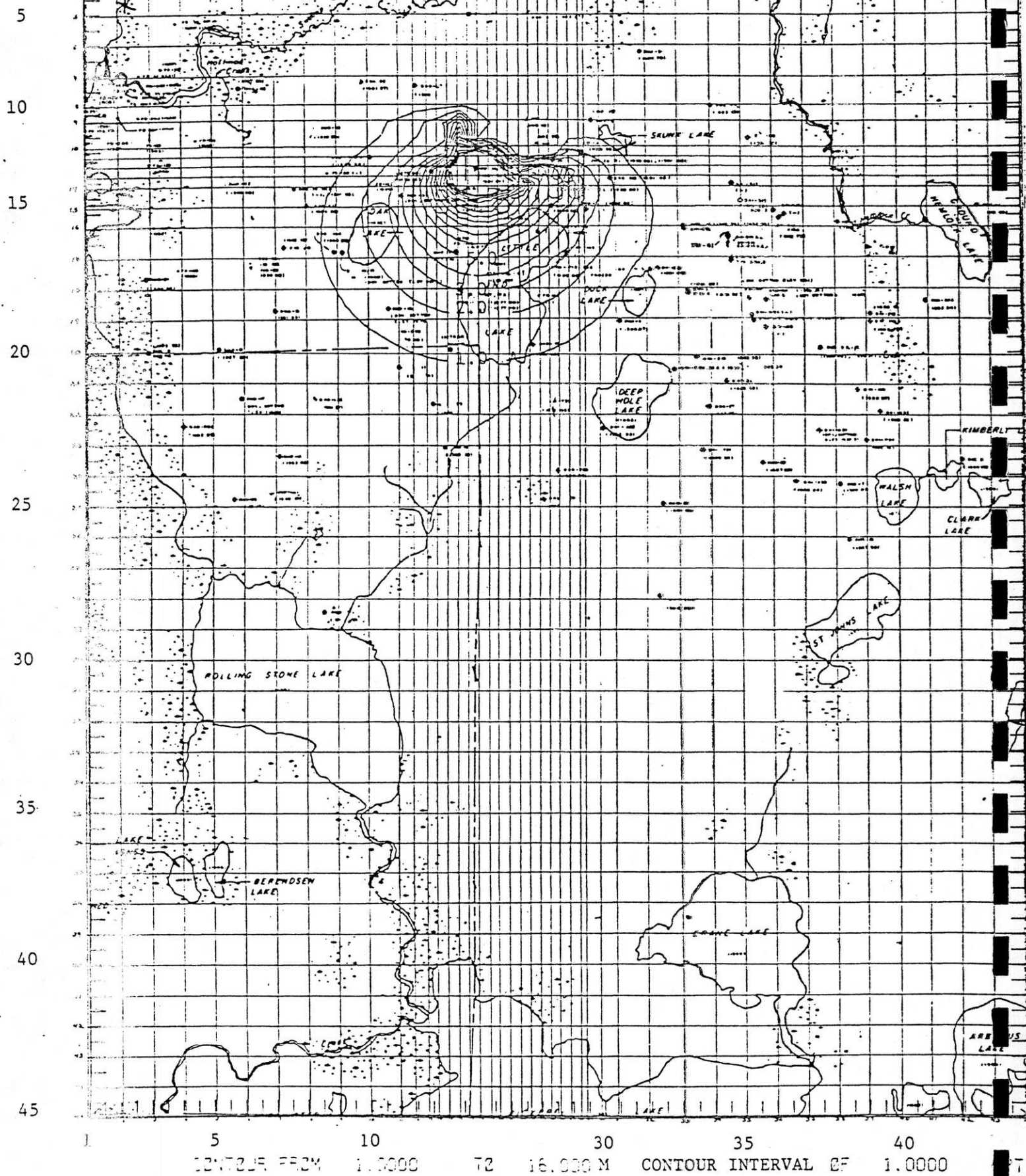


Figure 4.15 Alternative Control Plan Drawdown Impact at Steady-State (Meters).

5.0 MINE INFLOW SENSITIVITY ANALYSIS

The estimated flows into the mine are functions of all boundary conditions imposed on the model and of the parameter values chosen during the calibration process (see Section 3.0). As mentioned previously, the boundary conditions of the overburden aquifer include both external and internal boundaries as given by D'Appolonia (2). The boundary conditions on the orebody section of the model included primarily the mine plan stresses and the exterior extents for weathered zones of the orebody. The geometry, area, and characteristics of the resistive layer define the connection between the orebody and overburden aquifer.

5.1 OVERBURDEN AQUIFER CONSIDERATIONS

The sensitivity of the mine inflows to permutations in overburden aquifer properties was not performed in this study as those properties were given as calibrated values from the study by D'Appolonia (2). However, a few observations can be made about these overburden aquifer properties and their effect on mine inflow sensitivity.

The main source of water for mine inflow is the overburden aquifer. As a result, if the overburden aquifer is prolific, then the mine inflows will tend to be relatively high. Based on this observation, overburden aquifer recharge rate, thickness, and permeability are directly proportional to mine inflow. Theoretical considerations point to the overburden aquifer

permeability and thickness as being the most directly related parameters to mine inflows. Thus, the effect of doubling the permeability or thickness of the overburden aquifer would result in approximately double the mine inflow (all other factors remaining the same).

The maximum rate at which water can flow in the overburden aquifer toward the mine area is a very sensitive variable. The span between the upper and lower limits for steady-state mine inflow essentially depend on the range of this parameter.

5.2 RESISTIVE LAYER AND OREBODY PARAMETER CONSIDERATIONS

The sensitivity of the mine inflows to permutations in hydraulic parameter values for the orebody and resistive layer were considered by examining the calibration runs and utilizing the basic laws of ground water flow. Consideration was first focused on the four resistive layer permeabilities and the permeabilities of the four orebody weathered (relative permeability) zones. Storage properties are considered later in this section.

5.2.1 Resistive Layer Permeabilities And Areas

According to the calibration runs the relative order of permeability magnitudes range from the overburden aquifer having the highest followed by the orebody weathered zones, with the resistive layer permeabilities being the lowest. The resistive layer thus acts as a throttle on the water inflow rates between

the overburden aquifer and the underlying weathered zones. In this respect, mine inflow rates are sensitive to resistive layer properties. By Darcy's law the flow across the resistive layer is directly proportional to the permeability of the layer, the hydraulic gradient across the layer (difference in head between that in the overburden aquifer and that in the orebody just beneath the resistive layer all divided by the layer thickness), and the horizontal area of flow.

Within the limits of the capability of the overburden aquifer to deliver ground water to the mine area, the mine inflows are directly proportional to resistive layer area and permeability while being inversely proportional to layer thickness. For instance, if the permeability of any area of the resistive layer were doubled, that area will deliver double the flow rate to the mine (limited only by maximum hydraulic gradients). Similarly, if you double the size of any particular area is doubled, that area will be capable of delivering double the flow (all other parameters being the same) to the mine.

The result of the above discussion points out the importance of the resistive layer properties; primarily, area and permeability. In this report, comparative mine inflow rates from various sections and categories of the resistive layer can be evaluated. Effectiveness of grouting in the resistive layer can be studied by considering area and permeability reductions. These considerations indicate why the Klohn Leonoff high inflow target area grouting scheme was not very effective. Grouting the

west central high permeability area was only marginally effective since large areas of moderate permeability with substantial hydraulic gradients remained, primarily to the south.

5.2.2 Orebody Permeabilities

The permeability distributions within the orebody weathered (relative permeability) zones are less sensitive when calculating mine inflow rates compared with the sensitivity of resistive layer properties. This results from the resistive layer acting as a throttle to mine inflow. As discussed in Section 4.1, the mine inflow is independent of the mine plan some 1000 days after the initiation of mining. The permeability of the orebody materials are simply more than sufficient to depressurize the deposits beneath the resistive layer. An analogy follows: Once the valve (resistive layer) is wide open (depressurized orebody), the total inflow into the mine is independent of the orebody properties and boundary conditions. From calibration, the permeabilities of the orebody weathered zones, evidently, are greater than those of the resistive layer. The sensitivity in mine inflows to permeabilities will thus only be significant early in the mining plan when depressurizing is actually taking place (during the first 2-3 years of the mine plan).

5.2.3 Orebody Storage Coefficient

The last parameter to be considered in the sensitivity analysis is the storage coefficient (for water table conditions) of the orebody materials. It is estimated that this coefficient

is approximately 0.005. It is important to realize that water will drain from the orebody weathered zones as depressurizing and dewatering takes place. Water will thus need to be pumped out of the mine as it comes from the overburden aquifer and from the drainage of the orebody itself. The amount of water stored in the orebody above the lowest mine workings is directly proportional to the storage coefficient for water table conditions and thus is a sensitive parameter. This amount of water can be directly calculated as the volume of materials drained times the drainable storage coefficient. However, it should be realized that this amount of water is a non-renewable source of water. Once this source has been dissipated, the mine inflow will no longer be a function of this storage coefficient.

5.3 CONSIDERATION OF AQUIFER STRATIFICATION

The model used for this study is essentially composed of two parts linked by a resistive layer. The first part consists of the 2-D overburden aquifer model which is connected (by the resistive layer) to the second part, namely the 3-D orebody model. The resistive layer is the hydrologic communication link between the two models. Key assumptions here are as follows:

- 1) Water flowing in the overburden aquifer is assumed to be 2-D in the horizontal plan view.
- 2) Water flowing from the overburden aquifer model down to the orebody model is assumed to be vertical through the resistive layer.

The validity of these assumptions is reasonable for most practical applications. Of particular interest is the effect of overburden aquifer stratification on mine inflow. Stratification in the overburden aquifer causes the primary flow directions (directions in which the most flow occurs) to be laterally in the horizontal plane. As mine inflow induces water to drain from the overburden aquifer in a vertical direction, the stratification effects are not strictly accounted for in the mine inflow model. Curvature of the 2-D overburden aquifer streamlines vertically downward through the resistive layer results near the orebody. This requires water to flow across bedding planes in order to reach the resistive layer and flow into the orebody.

Actually, the model calibration phases and setting of the resistive layer properties effectively account for these 3-D flow effects. The calibrated values of the resistive layer permeabilities reflect several parameter effects collectively. For example, the chosen calibrated model vertical transmissive property of the resistive layer will actually be lower than the true situation. This is because a compensating lower permeability has been used to represent the longer (and more resistive) 3-D flow paths (streamlines). Additionally, data are insufficient to precisely define the thickness of individual stratified glacial overburden materials above the orebody. Therefore, these complicating factors are implicitly calibrated into the resistive layer parameters. In summary, the effects of aquifer stratification are included via the calibration phase of this study.

Several 2-D vertical cross-sectional models were conceptually considered for further studies of the stratification sensitivity. Due to the highly 3-D nature of the problem, the vertical cross-sectional models were deemed inadequate. To precisely model the above situation would require a full 3-D model of the overburden aquifer and resistive layer. Presently, this is not warranted with the existing database. The relative sensitivity to stratification can be examined by varying the resistive layer parameters as previously discussed.

5.4 SUMMARY

In summary, the resistive layer areas and permeabilities are very sensitive parameters in the calculation of mine inflow rates. The capability of the overburden aquifer to deliver water to the mine area is based on the aquifer parameters of recharge rate, aquifer thickness, and permeability, all of which are very sensitive.

6.0 CONCLUSIONS

6.1 UNMITIGATED INFLOW PREDICTIONS

Results of predictive simulation runs of the mine inflow model for unmitigated mine inflow based on the 9100 MTPD mine plan indicate an expected steady-state mine inflow of approximately $0.118 \text{ M}^3/\text{SEC}$ (1870 GPM). Significant mine inflows would begin at approximately 330 days into this mining plan. Measurable drawdowns (1 M or 3.3 Feet) are expected to extend radially to approximately 1829 M (1.14 Miles) to the south, 1219 M (0.76 Miles) to the northwest and northeast, and 610 M (0.38 Miles) to the north. Northerly impacts are reduced considerably due to localized areas of low permeability in the glacial overburden deposits just north of the mining area.

6.2 MINE WATER CONTROL PLANS

Mine water inflow reductions, based on permeability reductions to $1 \times 10^{-5} \text{ CM/SEC}$ of Klohn Leonoff (4) high inflow target areas, are negligible. This conclusion is based on the simulations performed in this study. Mine inflow insensitivity to simulated grouting is caused by a large area of moderately permeable bedrock and its associated high saturated thicknesses of overlying sand deposits to the southwest of the high inflow target areas. Obviously, the impacts of this control plan are essentially identical to the unmitigated mine inflow case since steady-state mine inflows have been predicted to be about the same.

An alternative mine water inflow control simulation was performed in which the highly permeable Siliceous Gossans at the eastern extremity of the orebody, as well as the central high inflow target areas, were grouted at the subcrop to a resulting permeability of 2.4×10^{-6} CM/SEC. Steady-state mine inflow for this simulation was estimated to be about 0.105 M³/SEC (1664 GPM). Little mine inflow reduction was exhibited by this extensive grouting scenario.

6.3 MODEL SENSITIVITY ANALYSIS

Sensitivity analyses indicate the resistive layer characterization areas and permeabilities are sensitive items when the sensitivity is expressed as total mine inflow rates. Mine inflow is also sensitive to the capability of the overburden aquifer to deliver water to the localized mine area. This capability is a function of the overburden aquifer recharge rate, saturated thickness, and permeability.

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8.0 APPENDICES

APPENDIX A. FILE "REVORE" USED AS INPUT TO DESCRIBE
OREBODY RELATIVE PERMEABILITY DISTRIBUTION FOR PRE-
PROCESSOR PROGRAM.

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 7 3 4 'RR' 'WW43.' 'LL52.' 'SS5.' 'TI' 'WW70.' 'LL25.' 'SS5.' 'TJ' 'WW45.' 'LL55.' 'EE'
 7 4 4 'RR' 'WW90.' 'LL10.' 'TI' 'WW75.' 'LL23.' 'MM2.' 'TJ' 'WW100.' 'EE'
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 5 3 6 'RR' 'WW70.' 'LL24.' 'MM5.' 'SS1.' 'TI' 'WW74.' 'LL19.' 'MM2.' 'SS5.' 'TJ' 'WW99.' 'LL1.' 'EE'
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 7 4 6 'RR' 'WW99.' 'LL1.' 'TI' 'WW87.' 'LL13.' 'TJ' 'WW100.' 'EE'
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 8 2 6 'RR' 'WW100.' 'TI' 'WW100.' 'TJ' 'WW99.' 'LL1.' 'EE'
 8 3 6 'RR' 'WW90.' 'LL10.' 'TI' 'WW92.' 'LL8.' 'TJ' 'WW65.' 'LL35.' 'EE'
 8 4 6 'RR' 'WW73.' 'LL27.' 'TI' 'WW83.' 'LL17.' 'TJ' 'WW100.' 'EE'
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 11 3 6 'RR' 'WW85.' 'LL2.' 'MM13.' 'TI' 'WW80.' 'LL12.' 'MM8.' 'TJ' 'WW81.' 'LL3.' 'MM16.' 'EE'
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 3 2 8 'TI' 'WW90.' 'SS5.' 'MM5.' 'TJ' 'WW100.' 'RR' 'MM15.' 'SS5.' 'WW80.' 'EE'
 3 3 8 'TI' 'MM5.' 'WW95.' 'TJ' 'WW100.' 'RR' 'MM5.' 'WW95.' 'EE'
 4 2 8 'TI' 'WW100.' 'TJ' 'WW50.' 'MM10.' 'LL10.' 'WW30.' 'RR' 'SS5.' 'MM5.' 'WW90.' 'EE'
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 8 3 8 'TI' 'WW45.' 'LL5.' 'MM5.' 'LL5.' 'WW40.' 'TJ' 'WW100.' 'RR' 'LL15.' 'MM5.' 'WW80.' 'EE'
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 11 3 8 'TI' 'WW75.' 'LL10.' 'MM5.' 'SS5.' 'MM5.' 'TJ' 'WW15.' 'MM15.' 'SS5.' 'WW65.' 'RR' 'SS5.' 'MM15.' 'LL5.' 'WW75.' 'EE'
 11 4 8 'TI' 'MM10.' 'LL10.' 'WW80.' 'TJ' 'WW100.' 'RR' 'MM3.' 'LL4.' 'WW93.' 'EE'
 12 3 8 'TI' 'WW75.' 'LL25.' 'TJ' 'WW10.' 'LL30.' 'SS5.' 'MM10.' 'LL10.' 'WW35.' 'RR' 'MM10.' 'LL25.' 'SS5.' 'WW60.' 'EE'
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 13 4 8 'TI' 'LL10.' 'MM5.' 'WW85.' 'TJ' 'WW100.' 'RR' 'MM5.' 'SS3.' 'LL15.' 'WW77.' 'EE'
 14 4 8 'TI' 'WW30.' 'MM10.' 'WW60.' 'TJ' 'WW100.' 'RR' 'MM5.' 'LL2.' 'WW93.' 'EE'
 2 2 10 'TI' 'WW60.' 'MM10.' 'WW30.' 'TJ' 'WW100.' 'RR' 'MM5.' 'WW95.' 'EE'
 3 2 10 'TI' 'WW90.' 'SS5.' 'MM5.' 'TJ' 'WW25.' 'MM20.' 'WW55.' 'RR' 'MM20.' 'WW80.' 'EE'
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 5 3 10 'TI' 'WW10.' 'MM5.' 'WW85.' 'TJ' 'WW100.' 'RR' 'MM10.' 'WW90.' 'EE'
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 14 4 10 'TI' 'WW100.' 'TJ' 'WW100.' 'RR' 'MM5.' 'WW95.' 'EE'

APPENDIX B. FILE "RESIST" USED AS INPUT TO PRE-PROCESSOR PROGRAM
TO DESCRIBE RESISTIVE LAYER RELATIVE PERMEABILITY DISTRIBUTION.

1 1	0.00 1	0.00 2	0.00 3	1.00 4
2 1	0.00 1	0.00 2	0.00 3	1.00 4
3 1	0.00 1	0.00 2	0.00 3	1.00 4
4 1	0.00 1	0.00 2	0.25 3	0.75 4
5 1	0.00 1	0.00 2	0.50 3	0.50 4
6 1	0.00 1	0.00 2	0.00 3	1.00 4
7 1	0.00 1	0.00 2	0.00 3	1.00 4
8 1	0.00 1	0.00 2	0.00 3	1.00 4
9 1	0.00 1	0.00 2	0.00 3	1.00 4
10 1	0.00 1	0.00 2	0.00 3	1.00 4
11 1	0.00 1	0.00 2	0.00 3	1.00 4
12 1	0.00 1	0.00 2	0.00 3	1.00 4
13 1	0.00 1	0.00 2	0.00 3	1.00 4
14 1	0.00 1	0.00 2	0.00 3	1.00 4
15 1	0.00 1	0.00 2	0.00 3	1.00 4
16 1	0.00 1	0.00 2	0.00 3	1.00 4
1 2	0.00 1	0.00 2	0.00 3	1.00 4
2 2	0.00 1	0.00 2	0.00 3	1.00 4
3 2	0.00 1	0.00 2	0.00 3	1.00 4
4 2	0.00 1	0.00 2	0.38 3	0.62 4
5 2	0.00 1	0.00 2	1.00 3	0.00 4
6 2	0.00 1	0.00 2	0.33 3	0.67 4
7 2	0.00 1	0.00 2	0.00 3	1.00 4
8 2	0.00 1	0.00 2	0.00 3	1.00 4
9 2	0.00 1	0.00 2	0.00 3	1.00 4
10 2	0.00 1	0.00 2	0.00 3	1.00 4
11 2	0.00 1	0.00 2	0.00 3	1.00 4
12 2	0.00 1	0.00 2	0.00 3	1.00 4
13 2	0.00 1	0.00 2	0.00 3	1.00 4
14 2	0.00 1	0.00 2	0.00 3	1.00 4
15 2	0.00 1	0.00 2	0.00 3	1.00 4
16 2	0.00 1	0.00 2	0.00 3	1.00 4
1 3	0.00 1	0.00 2	1.00 3	0.00 4
2 3	0.00 1	0.00 2	0.88 3	0.12 4
3 3	0.00 1	0.00 2	0.82 3	0.18 4
4 3	0.00 1	0.33 2	0.50 3	0.17 4
5 3	0.00 1	0.67 2	0.33 3	0.00 4
6 3	0.07 1	0.63 2	0.30 3	0.00 4
7 3	0.00 1	0.38 2	0.37 3	0.25 4
8 3	0.13 1	0.12 2	0.38 3	0.37 4
9 3	0.09 1	0.00 2	0.41 3	0.50 4
10 3	0.08 1	0.00 2	0.20 3	0.72 4
11 3	0.00 1	0.00 2	0.00 3	1.00 4
12 3	0.00 1	0.00 2	0.00 3	1.00 4
13 3	0.00 1	0.00 2	0.00 3	1.00 4
14 3	0.00 1	0.00 2	0.00 3	1.00 4
15 3	0.00 1	0.00 2	0.00 3	1.00 4
16 3	0.00 1	0.00 2	0.33 3	0.67 4
1 4	0.00 1	0.00 2	1.00 3	0.00 4
2 4	0.00 1	0.00 2	1.00 3	0.00 4
3 4	0.00 1	0.00 2	1.00 3	0.00 4
4 4	0.00 1	0.33 2	0.67 3	0.00 4
5 4	0.00 1	1.00 2	0.00 3	0.00 4
6 4	0.00 1	1.00 2	0.00 3	0.00 4

7 4	0.00	1	1.00	2	0.00	3	0.00	4
8 4	0.00	1	0.81	2	0.19	3	0.00	4
9 4	0.06	1	0.44	2	0.50	3	0.00	4
10 4	0.06	1	0.02	2	0.04	3	0.88	4
11 4	0.00	1	0.00	2	0.00	3	1.00	4
12 4	0.00	1	0.00	2	0.00	3	1.00	4
13 4	0.00	1	0.00	2	0.00	3	1.00	4
14 4	0.04	1	0.00	2	0.13	3	0.83	4
15 4	0.00	1	0.00	2	0.75	3	0.25	4
16 4	0.00	1	0.00	2	1.00	3	0.00	4
1 5	0.00	1	0.00	2	1.00	3	0.00	4
2 5	0.00	1	0.00	2	1.00	3	0.00	4
3 5	0.00	1	0.00	2	1.00	3	0.00	4
4 5	0.00	1	0.00	2	1.00	3	0.00	4
5 5	0.00	1	0.13	2	0.87	3	0.00	4
6 5	0.00	1	0.25	2	0.75	3	0.00	4
7 5	0.00	1	0.13	2	0.87	3	0.00	4
8 5	0.00	1	0.00	2	1.00	3	0.00	4
9 5	0.00	1	0.00	2	0.38	3	0.62	4
10 5	0.00	1	0.00	2	0.00	3	1.00	4
11 5	0.00	1	0.00	2	0.00	3	1.00	4
12 5	0.00	1	0.00	2	0.00	3	1.00	4
13 5	0.00	1	0.00	2	0.00	3	1.00	4
14 5	0.02	1	0.05	2	0.68	3	0.25	4
15 5	0.00	1	0.31	2	0.69	3	0.00	4
16 5	0.00	1	0.12	2	0.88	3	0.00	4

/

APPENDIX C. PRE-PROCESSOR PROGRAM USED TO GENERATE OREBODY
NODE CARDS FOR INPUT TO CALIBRATION AND SIMULATION
(FILE "PREP").


```

C *****
C *          PRE-PROCESSOR FOR GENERATION OF MINE NODES          *
C *          PREPARED FOR EXXON MINERALS                        *
C *          BY THOMAS A. PRICKETT AND ASSOCIATES                *
C *          URBANA, IL                                          *
C *****
C      PROGRAM PROG(INPUT,TEMP,REVORE,RESIST,NODES3,OUTPUT,TAPES=INPUT,TA
$PE7=NODES3,TAPE8=REVORE,TAPE9=RESIST,TAPE19=TEMP)
C      DIMENSION CAT(4),PERM(4),TEI(20,10,15),TEJ(20,10,15),R(20,10,15),D
$Z(13),PEK(20,10,15),PEI(20,10,15),PEJ(20,10,15),SF(20,10,15)
C      DIMENSION DYYI(20,10,15),DYYJ(20,10,15),TFR(20,10,15)
C      DIMENSION RSTTHK(16,5),PCAT(4),PRST(4)
C      DATA PERM/0.0,1.,30.,50./
C      DATA PRST/.55,.085,.005,.021/
C      DATA ((RSTTHK(I,J),I=1,16),J=1,5)/80*1.0/
C      DATA CAT/2HWW,2HLL,2HMK,2HSS/
C      DATA PCAT/2H 1,2H 2,2H 3,2H 4/
C      DATA (DZ(K),K=1,13)/
$0.0,3.281,161.695,147.645,4*73.8225,2*106.6325,2*90.2275,0.0/
C      DATA DX,DY/328.1,328.1/
C      DATA DFCAT/2HWW/
C      DATA STORE/5.E-08/
C      DATA ANTI,ANTJ,ANR/3*1.0/
C      DATA CW,CL,CH,CS/4*1./
C
C      INPUT PARAMETERS
C
C      PRINT*, 'INPUT PW,PL,PM,PS'
C      READ*,PERM
C      IF(EOF(5).NE.0.0) CONTINUE
C      PRINT*,PERM
C      PRINT*, 'INPUT THE ANISOTROPY FACTOR FOR TI,TJ,AND R'
C      READ*,ANTI,ANTJ,ANR
C      IF(EOF(5).NE.0.0) CONTINUE
C      PRINT*,ANTI,ANTJ,ANR
C      PRINT*, 'INPUT THE SPECIFIC STORAGE'
C      READ*,STORE
C      IF(EOF(5).NE.0.0) CONTINUE
C      PRINT*,STORE
C      PRINT*, ' ENTER CONTROLS ON WEATHERING GROUPS(DEFAULTS OF 1)'
C      READ*,CW,CL,CH,CS
C      IF(EOF(5).NE.0.0) CONTINUE
C      PRINT*,CW,CL,CH,CS
C      PRINT*, ' ENTER RESISTIVE LAYER PERMEABILITIES(GPD/FT**2)'
C      DO 9051 IPM=1,4
C      PRINT8052,PCAT(IPM)
8052 FORMAT(' **** ',A2,' ****')
C      READ*,PRST(IPM)
8051 IF(EOF(5).NE.0.0) CONTINUE
C      PRINT*,PRST(1),PRST(2),PRST(3),PRST(4)
C      WRITE(19,*)PERM,ANTI,ANTJ,ANR,STORE,CW,CL,CH,CS,PRST
C
C      FILL ARRAYS WITH DEFAULT MATERIAL PERMEABILITY
C      AND FILL STORAGE FACTOR ARRAY

```

```

C
DO 5 K=1,12
DO 5 I=1,20
DO 5 J=1,10
DO 6 IP=1,4
6 IF(DFCAT.EQ.CAT(IP)) P=PERM(IP)
DYYI(I,J,K)=DYYJ(I,J,K)=0.0
TFR(I,J,K)=0.0
PEK(I,J,K)=PEI(I,J,K)=PEJ(I,J,K)=P
DZZ=(DZ(K)+DZ(K+1))/2.0
SF(I,J,K)=7.48*STORE*DX*DY*DZZ
TEJ(I,J,K)=PEJ(I,J,K)*DX*DZZ/DY
TEI(I,J,K)=PEI(I,J,K)*DY*DZZ/DX
R(I,J,K)=0.0
5 CONTINUE
KMAX=IMAX=JMAX=0
1 CONTINUE
READ(8,*)I,J,K
IF(EOF(8).NE.0.0) GO TO 2
TFR(I,J,K)=0.0
C PRINT*, ' '
C PRINT*, I, J, K
TR=TEI(I,J,K)=TXLI=TXLJ=PEK(I,J,K)=TXK=0.0
PJW=PJL=PJM=PJS=0.
XJL=XJW=XJM=XJS=0.0
PIW=PIL=PIH=PIS=0.0
XIW=XIL=XIH=XIS=0.0
FLAG=3H
3 READ(8,*)IALP
DECODE(10,40,IALP)TW,XL
40 FORMAT(A2,F8.0)
IF(TW.EQ.2HEE) GO TO 99
IF(TW.EQ.2HTI) FLAG=TW
IF(TW.EQ.2HTJ) FLAG=TW
IF(TW.EQ.2HRR) FLAG=TW
IF(FLAG.EQ.TW) GO TO 3
IF(FLAG.EQ.2HTI) GO TO 100
IF(FLAG.EQ.2HTJ) GO TO 102
IF(FLAG.EQ.2HRR) GO TO 104
PRINT*, ' NO RECOGNIZABLE PARAMETER COMPUTATION'
STOP
100 CONTINUE
DO 200 IP=1,4
200 IF(CAT(IP).EQ.TW) P=PERM(IP)
IF(TW.EQ.2HWW) PIW=P
IF(TW.EQ.2HLL) PIL=P
IF(TW.EQ.2HMM) PIH=P
IF(TW.EQ.2HSS) PIS=P
IF(TW.EQ.2HWW.AND.K.EQ.2) PIW=P*CW
IF(TW.EQ.2HLL.AND.K.EQ.2) PIL=P*CL
IF(TW.EQ.2HMM.AND.K.EQ.2) PIH=P*CH
IF(TW.EQ.2HSS.AND.K.EQ.2) PIS=P*CS
IF(TW.EQ.2HWW) XIW=XIW+XL
IF(TW.EQ.2HLL) XIL=XIL+XL
IF(TW.EQ.2HMM) XIH=XIH+XL

```

```

      IF(TW.EQ.2HSS) XIS=XIS+XL
      TXLI=XIW+XIL+XIM+XIS
      GO TO 3
102 CONTINUE
      DO 202 IP=1,4
202 IF(CAT(IP).EQ.TW) P=PERM(IP)
      IF(TW.EQ.2HWW) PJW=P
      IF(TW.EQ.2HLL) PJL=P
      IF(TW.EQ.2HHM) PJM=P
      IF(TW.EQ.2HSS) PJS=P
      IF(TW.EQ.2HWW.AND.K.EQ.2) PJW=P*CW
      IF(TW.EQ.2HLL.AND.K.EQ.2) PJL=P*CL
      IF(TW.EQ.2HHM.AND.K.EQ.2) PJM=P*CM
      IF(TW.EQ.2HSS.AND.K.EQ.2) PJS=P*CS
      IF(TW.EQ.2HWW) XJW=XL+XJW
      IF(TW.EQ.2HLL) XJL=XL+XJL
      IF(TW.EQ.2HHM) XJM=XL+XJM
      IF(TW.EQ.2HSS) XJS=XL+XJS
      TXLJ=XJL+XJW+XJM+XJS
      GO TO 3
104 CONTINUE
      DO 204 IF=1,4
204 IF(CAT(IP).EQ.TW) P=PERM(IP)
      IF(TW.EQ.2HWW.AND.K.EQ.2) P=P*CW
      IF(TW.EQ.2HLL.AND.K.EQ.2) P=P*CL
      IF(TW.EQ.2HHM.AND.K.EQ.2) P=P*CM
      IF(TW.EQ.2HSS.AND.K.EQ.2) P=P*CS
      PEK(I,J,K)=PEK(I,J,K)+P*XL/100.
      IF(P.GT.0.0)TXK=TXK+XL
      TR=TR+XL
      IF(P.GT.0.0) TFR(I,J,K)=TFR(I,J,K)+XL/100.
      GO TO 3
99 CONTINUE
      DZZ=(DZ(K)+DZ(K+1))/2.0
      DYYJ(I,J,K)=0.0
      IF(PJW.GT.0.0) DYYJ(I,J,K)=DYYJ(I,J,K)+XJW
      IF(PJL.GT.0.0) DYYJ(I,J,K)=DYYJ(I,J,K)+XJL
      IF(PJM.GT.0.0) DYYJ(I,J,K)=DYYJ(I,J,K)+XJM
      IF(PJS.GT.0.0) DYYJ(I,J,K)=DYYJ(I,J,K)+XJS
      XP=1.0
      IF(PJW.GT.0.0) XP=XP*PJW
      IF(PJL.GT.0.0) XP=XP*PJL
      IF(PJM.GT.0.0) XP=XP*PJM
      IF(PJS.GT.0.0) XP=XP*PJS
      PEJ(I,J,K)=0.0
      QUOW=0.0
      IF(PJW.GT.0.0)QUOW=XJW/PJW
      QUOL=0.0
      IF(PJL.GT.0.0)QUOL=XJL/PJL
      QUOM=0.0
      IF(PJM.GT.0.0)QUOM=XJM/PJM
      QUOS=0.0
      IF(PJS.GT.0.0)QUOS=XJS/PJS
      IF(QUOW+QUOL+QUOM+QUOS.GT.0.0)
      $PEJ(I,J,K)=DYYJ(I,J,K)/(QUOW+QUOL+QUOM+QUOS)

```

```

      TEJ(I,J,K)=0.0
      IF(DYYJ(I,J,K).GT.0.0)TEJ(I,J,K)=PEJ(I,J,K)*DX*DZZ/DYYJ(I,J,K)
      $/3.281
      DYYI(I,J,K)=0.0
      IF(PIW.GT.0.0) DYYI(I,J,K)=DYYI(I,J,K)+XIW
      IF(PIL.GT.0.0) DYYI(I,J,K)=DYYI(I,J,K)+XIL
      IF(PIM.GT.0.0) DYYI(I,J,K)=DYYI(I,J,K)+XIM
      IF(PIS.GT.0.0) DYYI(I,J,K)=DYYI(I,J,K)+XIS
      PEI(I,J,K)=0.0
      IF(DYYI(I,J,K).GT.0.0)PEI(I,J,K)=(PIW*XIW+PIL*XIL+PIM*XIM+PIS*XIS)
      $/DYYI(I,J,K)
      TEI(I,J,K)=3.281*DYYI(I,J,K)*DZZ*PEI(I,J,K)/DX
      IF(TXK.LE.0.0)PEK(I,J,K)=0.0
      IF(TXK.GT.0.0)PEK(I,J,K)=PEK(I,J,K)/(TXK/100.)
      IF(K.GT.2)R(I,J,K)=((TFR(I,J,K)+TFR(I,J,K-1))/2.0)*DX*DY*(PEK(I,J,
      $K)+PEK(I,J,K-1))/2.0/DZ(K)
      IF(TR.NE.100.) PRINT*,I,J,K,' TR = ',TR
      IF(TXLI.NE.100.) PRINT*,I,J,K,' TXLI = ',TXLI
      IF(TXLJ.NE.100.) PRINT*,I,J,K,' TXLJ = ',TXLJ
      KMAX=MAX0(KMAX,K)
      JMAX=MAX0(JMAX,J)
      IMAX=MAX0(IMAX,I)
      GO TO 1
2 CONTINUE
C
C   SET ALL PARAMETERS FOR RESISTIVE LAYER
C
      K=1
      DO 1000 I=1,IMAX
      DO 1000 J=1,JMAX
      DZZ=(DZ(K)+DZ(K+1))/2.0
      TEJ(I,J,K)=TEI(I,J,K)=0.0
C
C   SET LAYER ONE SF HIGH TO MAINTAIN CONSTANT
C   HEAD BOUNDARY WITH 2-D MODEL
C
      SF(I,J,K)=1.E21
C
C   SET LAYER ONE DEFAULT R TO ZERO
C
      R(I,J,K)=0.0
      1000 CONTINUE
C
C   INPUT RG ROWE'S COMPOSITE RESISTANCE INDICES
C
      K=2
8833 READ(9,*)I,J,FR1,C1,FR2,C2,FR3,C3,FR4,C4
      IF(EOF(9).NE.0.0) GO TO 8834
      R(I,J,K)=(DX*DY/RSTTHK(I,J))*(FR1*PRST(1)+FR2*PRST(2)+FR3*PRST(3)+
      $FR4*PRST(4))
      GO TO 8833
8834 CONTINUE
C
C   FILL IN INTERMEDIATE LEVEL PARAMETERS
C

```

```

DO 1001 K=5,11,2
DO 1001 I=1,IMAX
DO 1001 J=1,JMAX
DZZ=(DZ(K)+DZ(K+1))/2.0
PEJ(I,J,K)=(PEJ(I,J,K-1)+PEJ(I,J,K+1))/2.0
DYJ=(DYYJ(I,J,K-1)+DYYJ(I,J,K+1))/2.0
DYI=(DYYI(I,J,K-1)+DYYI(I,J,K+1))/2.0
IF(DYJ.GT.0.0)TEJ(I,J,K)=PEJ(I,J,K)*DX*DZZ/DYJ/3.281
IF(DYJ.EQ.0.0) TEJ(I,J,K)=0.0
PEI(I,J,K)=(PEI(I,J,K-1)+PEI(I,J,K+1))/2.0
TEI(I,J,K)=PEI(I,J,K)*3.281*DYI*DZZ/DX
PEK(I,J,K)=(PEK(I,J,K-1)+PEK(I,J,K+1))/2.0
ATFR=(TFR(I,J,K-1)+TFR(I,J,K+1))/2.0
R(I,J,K)=ATFR*DX*DY*(PEK(I,J,K)+PEK(I,J,K-1))/2.0/DZ(K)
1001 CONTINUE
C
C   OUTPUT ALL NODE DATA
C
DO 1002 K=1,12
DO 1002 I=1,IMAX
DO 1002 J=1,JMAX
WRITE(7,737)I,J,K,ANTI*TEI(I,J,K),ANTJ*TEJ(I,J,K),ANR*R(I,J,
$K),SF(I,J,K)
737 FORMAT(3I3,4G15.6)
1002 CONTINUE
END
/

```

APPENDIX D. PROCEDURE FILE "EXXPRC" USED TO CONTROL
CALIBRATION EXECUTION FOR BOTH 211 AND 213 PUMP TESTS.

```

EXXPRC(MODEL=213)
GRAB,UOILIB.
RETURN,MINPLN.
GET,DUMMY.
GET,BEXXON=BEXX_MODEL.
ATTACH,D2_MODEL/M=W.
ATTACH,D3_MODEL/M=W.
SKIP EI,D2_MODEL.
SKIP EI,D3_MODEL.
GET,REVORE.
*** GET,BPREP.
GET,PREP.
RWF.
GET,REVORE,RESIST.
FTN,I=PREP,L=0,B=BPREP.
BPREP.
GET,POTEN,BOTOM,THICK.
GET,EXTBDY,RECHRG,PERMEA.
RWF.
SETTL(100D)
BEXXON,DUMMY,OUT,PL=30000.
RWF.
REPLACE,DD,DDD.
SKIP EI,D2_MODEL.
COPY EI,D2,D2_MODEL.
PACK,D2_MODEL.
SKIP EI,D3_MODEL.
COPY EI,D3,D3_MODEL.
PACK,D3_MODEL.
RETURN,D2_MODEL,D3_MODEL.
REPLACE,D2,D3,OUTP/NA.
GRAB,EZGRAPH/FUTURE.
RETURN,REVORE,RESIST,POTEN,BOTOM,THICK.
RETURN,EXTBDY,RECHRG,PERMEA.
$NOTE(OUTPUT,HR);*USE EZGRAPH COMMANDS 'RUN DD' FOR 2D + 'RUN DDD' FOR 3D PLOTS*.
CALL,TEK.
EZGRAPH.
/

```

APPENDIX E. CALIBRATED OREBODY NODE CARD FILE USED FOR BOTH
CALIBRATION AND UNMITIGATED INFLOW SIMULATION.

1	1	1	0.	0.	0.	.100000E+22
1	2	1	0.	0.	0.	.100000E+22
1	3	1	0.	0.	0.	.100000E+22
1	4	1	0.	0.	0.	.100000E+22
1	5	1	0.	0.	0.	.100000E+22
2	1	1	0.	0.	0.	.100000E+22
2	2	1	0.	0.	0.	.100000E+22
2	3	1	0.	0.	0.	.100000E+22
2	4	1	0.	0.	0.	.100000E+22
2	5	1	0.	0.	0.	.100000E+22
3	1	1	0.	0.	0.	.100000E+22
3	2	1	0.	0.	0.	.100000E+22
3	3	1	0.	0.	0.	.100000E+22
3	4	1	0.	0.	0.	.100000E+22
3	5	1	0.	0.	0.	.100000E+22
4	1	1	0.	0.	0.	.100000E+22
4	2	1	0.	0.	0.	.100000E+22
4	3	1	0.	0.	0.	.100000E+22
4	4	1	0.	0.	0.	.100000E+22
4	5	1	0.	0.	0.	.100000E+22
5	1	1	0.	0.	0.	.100000E+22
5	2	1	0.	0.	0.	.100000E+22
5	3	1	0.	0.	0.	.100000E+22
5	4	1	0.	0.	0.	.100000E+22
5	5	1	0.	0.	0.	.100000E+22
6	1	1	0.	0.	0.	.100000E+22
6	2	1	0.	0.	0.	.100000E+22
6	3	1	0.	0.	0.	.100000E+22
6	4	1	0.	0.	0.	.100000E+22
6	5	1	0.	0.	0.	.100000E+22
7	1	1	0.	0.	0.	.100000E+22
7	2	1	0.	0.	0.	.100000E+22
7	3	1	0.	0.	0.	.100000E+22
7	4	1	0.	0.	0.	.100000E+22
7	5	1	0.	0.	0.	.100000E+22
8	1	1	0.	0.	0.	.100000E+22
8	2	1	0.	0.	0.	.100000E+22
8	3	1	0.	0.	0.	.100000E+22
8	4	1	0.	0.	0.	.100000E+22
8	5	1	0.	0.	0.	.100000E+22
9	1	1	0.	0.	0.	.100000E+22
9	2	1	0.	0.	0.	.100000E+22
9	3	1	0.	0.	0.	.100000E+22
9	4	1	0.	0.	0.	.100000E+22
9	5	1	0.	0.	0.	.100000E+22
10	1	1	0.	0.	0.	.100000E+22
10	2	1	0.	0.	0.	.100000E+22
10	3	1	0.	0.	0.	.100000E+22
10	4	1	0.	0.	0.	.100000E+22
10	5	1	0.	0.	0.	.100000E+22
11	1	1	0.	0.	0.	.100000E+22
11	2	1	0.	0.	0.	.100000E+22
11	3	1	0.	0.	0.	.100000E+22
11	4	1	0.	0.	0.	.100000E+22

11	5	1	0.	0.	0.	.100000E+22
12	1	1	0.	0.	0.	.100000E+22
12	2	1	0.	0.	0.	.100000E+22
12	3	1	0.	0.	0.	.100000E+22
12	4	1	0.	0.	0.	.100000E+22
12	5	1	0.	0.	0.	.100000E+22
13	1	1	0.	0.	0.	.100000E+22
13	2	1	0.	0.	0.	.100000E+22
13	3	1	0.	0.	0.	.100000E+22
13	4	1	0.	0.	0.	.100000E+22
13	5	1	0.	0.	0.	.100000E+22
14	1	1	0.	0.	0.	.100000E+22
14	2	1	0.	0.	0.	.100000E+22
14	3	1	0.	0.	0.	.100000E+22
14	4	1	0.	0.	0.	.100000E+22
14	5	1	0.	0.	0.	.100000E+22
15	1	1	0.	0.	0.	.100000E+22
15	2	1	0.	0.	0.	.100000E+22
15	3	1	0.	0.	0.	.100000E+22
15	4	1	0.	0.	0.	.100000E+22
15	5	1	0.	0.	0.	.100000E+22
16	1	1	0.	0.	0.	.100000E+22
16	2	1	0.	0.	0.	.100000E+22
16	3	1	0.	0.	0.	.100000E+22
16	4	1	0.	0.	0.	.100000E+22
16	5	1	0.	0.	0.	.100000E+22
1	1	2	82.4880	82.4880	215.299	3.32105
1	2	2	82.4880	159.654	215.299	3.32105
1	3	2	2355.03	2474.64	215.299	3.32105
1	4	2	2474.64	2474.64	215.299	3.32105
1	5	2	2474.64	2474.64	215.299	3.32105
2	1	2	82.4880	82.4880	215.299	3.32105
2	2	2	82.4880	134.491	215.299	3.32105
2	3	2	2331.11	2474.64	215.299	3.32105
2	4	2	2474.64	2474.64	215.299	3.32105
2	5	2	2474.64	2474.64	215.299	3.32105
3	1	2	82.4880	82.4880	215.299	3.32105
3	2	2	82.4880	134.491	215.299	3.32105
3	3	2	1996.21	2474.64	215.299	3.32105
3	4	2	2474.64	2474.64	215.299	3.32105
3	5	2	2474.64	2474.64	215.299	3.32105
4	1	2	82.4880	82.4880	215.299	3.32105
4	2	2	82.4880	102.258	215.299	3.32105
4	3	2	1756.99	2474.64	3696.69	3.32105
4	4	2	2474.64	2474.64	3696.69	3.32105
4	5	2	2474.64	2474.64	215.299	3.32105
5	1	2	82.4880	82.4880	215.299	3.32105
5	2	2	82.4880	91.3151	215.299	3.32105
5	3	2	1709.15	2474.64	7283.57	3.32105
5	4	2	2474.64	2474.64	10765.0	3.32105
5	5	2	2474.64	2474.64	1586.76	3.32105
6	1	2	82.4880	82.4880	215.299	3.32105
6	2	2	82.4880	102.292	215.299	3.32105
6	3	2	1447.66	2474.64	14382.0	3.32105
6	4	2	2474.64	2474.64	10765.0	3.32105

6	5	2	2474.64	2474.64	2852.71	3.32105
7	1	2	82.4880	82.4880	215.299	3.32105
7	2	2	82.4880	83.3044	215.299	3.32105
7	3	2	1009.65	634.523	4224.17	3.32105
7	4	2	2474.64	2474.64	10765.0	3.32105
7	5	2	2474.64	2474.64	1586.76	3.32105
8	1	2	82.4880	82.4880	215.299	3.32105
8	2	2	82.4880	82.4880	215.299	3.32105
8	3	2	688.775	313.246	15447.7	3.32105
8	4	2	2235.42	2474.64	8760.53	3.32105
8	5	2	2474.64	2474.64	215.299	3.32105
9	1	2	82.4880	82.4880	215.299	3.32105
9	2	2	61.8660	82.4880	215.299	3.32105
9	3	2	322.528	134.784	9884.39	3.32105
9	4	2	2400.40	2474.64	11303.2	3.32105
9	5	2	2474.64	2474.64	215.299	3.32105
10	1	2	4.94928	329.952	215.299	3.32105
10	2	2	82.4880	343.700	215.299	3.32105
10	3	2	377.795	155.442	8810.04	3.32105
10	4	2	2169.43	1918.33	6872.35	3.32105
10	5	2	2474.64	2474.64	215.299	3.32105
11	1	2	0.	0.	215.299	3.32105
11	2	2	0.	412.440	215.299	3.32105
11	3	2	72.5894	100.155	215.299	3.32105
11	4	2	1549.12	364.991	215.299	3.32105
11	5	2	2474.64	2474.64	215.299	3.32105
12	1	2	0.	0.	215.299	3.32105
12	2	2	16.4976	164.976	215.299	3.32105
12	3	2	82.4880	135.671	215.299	3.32105
12	4	2	1699.25	89.5052	215.299	3.32105
12	5	2	1278.56	2474.64	215.299	3.32105
13	1	2	16.4976	374.945	215.299	3.32105
13	2	2	64.3406	103.110	215.299	3.32105
13	3	2	82.4880	91.4501	215.299	3.32105
13	4	2	1214.22	102.597	215.299	3.32105
13	5	2	202.096	221.941	215.299	3.32105
14	1	2	80.0134	86.8295	215.299	3.32105
14	2	2	82.4880	82.4880	215.299	3.32105
14	3	2	82.4880	82.4880	215.299	3.32105
14	4	2	365.422	116.839	4512.67	3.32105
14	5	2	688.775	91.3151	2891.47	3.32105
15	1	2	82.4880	82.4880	215.299	3.32105
15	2	2	82.4880	82.4880	215.299	3.32105
15	3	2	82.4880	82.4880	215.299	3.32105
15	4	2	82.4880	96.7034	215.299	3.32105
15	5	2	688.775	82.4880	3485.69	3.32105
16	1	2	82.4880	82.4880	215.299	3.32105
16	2	2	82.4880	82.4880	215.299	3.32105
16	3	2	82.4880	82.4880	215.299	3.32105
16	4	2	82.4880	91.4501	215.299	3.32105
16	5	2	284.584	82.4880	1481.26	3.32105
1	1	3	0.	0.	166.439	6.22716
1	2	3	15.4670	205.769	493.825	6.22716
1	3	3	4.64010	11600.3	10597.8	6.22716
1	4	3	92.8020	59001.2	12482.9	6.22716

1	5	3	0.	0.	4993.18	6.22716
2	1	3	0.	0.	166.439	6.22716
2	2	3	992.981	2088.25	6211.51	6.22716
2	3	3	187.151	0.	5012.15	6.22716
2	4	3	0.	0.	4993.18	6.22716
2	5	3	0.	0.	4993.18	6.22716
3	1	3	0.	0.	166.439	6.22716
3	2	3	185.604	5577.04	5809.84	6.22716
3	3	3	1979.78	0.	12686.7	6.22716
3	4	3	0.	0.	4993.18	6.22716
3	5	3	0.	0.	4993.18	6.22716
4	1	3	0.	0.	166.439	6.22716
4	2	3	0.	5742.70	166.439	6.22716
4	3	3	1234.27	0.	12611.9	6.22716
4	4	3	0.	0.	4993.18	6.22716
4	5	3	0.	0.	4993.18	6.22716
5	1	3	0.	0.	166.439	6.22716
5	2	3	0.	1218.51	166.439	6.22716
5	3	3	54.1345	305.310	9346.12	6.22716
5	4	3	9.28020	0.	5211.21	6.22716
5	5	3	0.	0.	4993.18	6.22716
6	1	3	0.	0.	166.439	6.22716
6	2	3	0.	6338.93	166.439	6.22716
6	3	3	1190.96	315.396	10374.5	6.22716
6	4	3	12.3736	0.	6036.75	6.22716
6	5	3	0.	0.	4993.18	6.22716
7	1	3	0.	0.	166.439	6.22716
7	2	3	0.	0.	166.439	6.22716
7	3	3	1056.40	467.375	7344.67	6.22716
7	4	3	136.110	0.	5727.18	6.22716
7	5	3	0.	0.	4993.18	6.22716
8	1	3	0.	0.	166.439	6.22716
8	2	3	0.	0.	166.439	6.22716
8	3	3	722.309	362.338	4465.18	6.22716
8	4	3	402.142	773.350	9722.72	6.22716
8	5	3	0.	0.	4993.18	6.22716
9	1	3	0.	0.	166.439	6.22716
9	2	3	0.	0.	166.439	6.22716
9	3	3	1139.92	2180.50	6309.38	6.22716
9	4	3	1856.04	7733.50	11831.2	6.22716
9	5	3	0.	0.	4993.18	6.22716
10	1	3	0.	0.	83.2196	6.22716
10	2	3	0.	0.	26.6303	6.22716
10	3	3	1051.76	2672.87	6507.69	6.22716
10	4	3	969.781	0.	12279.1	6.22716
10	5	3	0.	0.	4993.18	6.22716
11	1	3	0.	0.	0.	6.22716
11	2	3	0.	0.	0.	6.22716
11	3	3	185.604	1594.54	4998.48	6.22716
11	4	3	3340.87	1074.10	11430.9	6.22716
11	5	3	13.9203	0.	5211.21	6.22716
12	1	3	0.	0.	0.	6.22716
12	2	3	0.	0.	6.65757	6.22716
12	3	3	0.	768.738	164.775	6.22716
12	4	3	2763.95	870.563	9675.46	6.22716

12	5	3	1.54670	0.	4466.53	6.22716
13	1	3	0.	0.	1.66439	6.22716
13	2	3	0.	0.	89.8772	6.22716
13	3	3	0.	1471.18	166.439	6.22716
13	4	3	726.949	568.919	11580.6	6.22716
13	5	3	1082.69	15467.0	3694.90	6.22716
14	1	3	0.	0.	108.186	6.22716
14	2	3	0.	0.	166.439	6.22716
14	3	3	0.	154670.	166.439	6.22716
14	4	3	235.098	1316.71	8500.55	6.22716
14	5	3	1198.69	2209.57	7754.74	6.22716
15	1	3	0.	0.	166.439	6.22716
15	2	3	0.	0.	166.439	6.22716
15	3	3	0.	0.	166.439	6.22716
15	4	3	0.	551.081	166.439	6.22716
15	5	3	12.3736	3866.75	2536.19	6.22716
16	1	3	0.	0.	166.439	6.22716
16	2	3	0.	0.	166.439	6.22716
16	3	3	0.	0.	166.439	6.22716
16	4	3	0.	0.	166.439	6.22716
16	5	3	0.	0.	981.992	6.22716
1	1	4	0.	0.	0.	4.45825
1	2	4	203.750	8978.41	1077.00	4.45825
1	3	4	239.185	428.647	3265.41	4.45825
1	4	4	0.	11073.4	2090.73	4.45825
1	5	4	0.	0.	0.	4.45825
2	1	4	0.	0.	0.	4.45825
2	2	4	333.309	1786.03	2659.80	4.45825
2	3	4	0.	0.	9.11389	4.45825
2	4	4	0.	0.	0.	4.45825
2	5	4	0.	0.	0.	4.45825
3	1	4	0.	0.	0.	4.45825
3	2	4	332.201	22753.5	2741.76	4.45825
3	3	4	0.	38628.1	3087.79	4.45825
3	4	4	0.	0.	0.	4.45825
3	5	4	0.	0.	0.	4.45825
4	1	4	0.	0.	0.	4.45825
4	2	4	0.	1466.02	0.	4.45825
4	3	4	776.244	442.935	7105.91	4.45825
4	4	4	0.	0.	0.	4.45825
4	5	4	0.	0.	0.	4.45825
5	1	4	0.	0.	0.	4.45825
5	2	4	0.	498.352	0.	4.45825
5	3	4	438.506	851.798	3917.27	4.45825
5	4	4	0.	0.	1.82278	4.45825
5	5	4	0.	0.	0.	4.45825
6	1	4	0.	0.	0.	4.45825
6	2	4	0.	841.442	0.	4.45825
6	3	4	404.178	230.695	5361.52	4.45825
6	4	4	3129.34	0.	80.2022	4.45825
6	5	4	0.	0.	0.	4.45825
7	1	4	0.	0.	0.	4.45825
7	2	4	0.	1559.63	0.	4.45825
7	3	4	304.518	201.334	4090.34	4.45825
7	4	4	91.9090	0.	76.5567	4.45825

7	5	4	0.	0.	0.	4.45825
8	1	4	0.	0.	0.	4.45825
8	2	4	0.	0.	0.	4.45825
8	3	4	118.485	220.410	1611.82	4.45825
8	4	4	121.907	1845.56	2109.56	4.45825
8	5	4	0.	0.	0.	4.45825
9	1	4	0.	0.	0.	4.45825
9	2	4	0.	0.	0.	4.45825
9	3	4	548.132	667.071	3747.72	4.45825
9	4	4	565.849	0.	3328.59	4.45825
9	5	4	0.	0.	0.	4.45825
10	1	4	0.	0.	0.	4.45825
10	2	4	0.	0.	0.	4.45825
10	3	4	501.624	582.809	4278.66	4.45825
10	4	4	168.315	0.	4821.96	4.45825
10	5	4	0.	0.	0.	4.45825
11	1	4	0.	0.	0.	4.45825
11	2	4	0.	0.	0.	4.45825
11	3	4	0.	0.	0.	4.45825
11	4	4	941.237	442.935	6015.95	4.45825
11	5	4	0.	0.	1.82278	4.45825
12	1	4	0.	0.	0.	4.45825
12	2	4	0.	0.	0.	4.45825
12	3	4	0.	0.	0.	4.45825
12	4	4	0.	0.	0.	4.45825
12	5	4	0.	0.	0.	4.45825
13	1	4	0.	0.	0.	4.45825
13	2	4	0.	0.	0.	4.45825
13	3	4	0.	314.227	0.	4.45825
13	4	4	473.940	395.195	7669.43	4.45825
13	5	4	12.1807	0.	255.189	4.45825
14	1	4	0.	0.	0.	4.45825
14	2	4	0.	0.	0.	4.45825
14	3	4	0.	1344.94	0.	4.45825
14	4	4	560.313	244.806	4870.63	4.45825
14	5	4	124.022	0.	3973.66	4.45825
15	1	4	0.	0.	0.	4.45825
15	2	4	0.	0.	0.	4.45825
15	3	4	0.	0.	0.	4.45825
15	4	4	332.201	706.811	714.529	4.45825
15	5	4	69.7623	0.	848.743	4.45825
16	1	4	0.	0.	0.	4.45825
16	2	4	0.	0.	0.	4.45825
16	3	4	0.	0.	0.	4.45825
16	4	4	166.101	55366.9	218.733	4.45825
16	5	4	0.	0.	54.6833	4.45825
1	1	5	0.	0.	0.	2.97216
1	2	5	33.9584	5985.61	989.768	2.97216
1	3	5	39.8642	355.254	4433.00	2.97216
1	4	5	0.	7382.25	123.949	2.97216
1	5	5	0.	0.	0.	2.97216
2	1	5	0.	0.	0.	2.97216
2	2	5	179.976	16839.7	1952.20	2.97216
2	3	5	0.	0.	0.	2.97216
2	4	5	0.	0.	0.	2.97216

2	5	5	0.	0.	0.	2.97215
3	1	5	0.	0.	0.	2.97216
3	2	5	177.174	17960.1	5030.87	2.97216
3	3	5	38.9414	25752.0	437.467	2.97216
3	4	5	0.	0.	0.	2.97216
3	5	5	0.	0.	0.	2.97216
4	1	5	0.	0.	0.	2.97216
4	2	5	0.	681.667	0.	2.97216
4	3	5	397.353	295.290	8600.47	2.97216
4	4	5	0.	0.	0.	2.97216
4	5	5	0.	0.	0.	2.97216
5	1	5	0.	0.	0.	2.97216
5	2	5	0.	375.271	0.	2.97216
5	3	5	279.745	1054.61	3469.51	2.97216
5	4	5	0.	0.	0.	2.97216
5	5	5	0.	0.	0.	2.97216
6	1	5	0.	0.	0.	2.97216
6	2	5	0.	808.680	0.	2.97216
6	3	5	95.1998	220.366	4605.05	2.97216
6	4	5	521.556	0.	27.3417	2.97216
6	5	5	0.	0.	0.	2.97216
7	1	5	0.	0.	0.	2.97216
7	2	5	0.	1527.64	0.	2.97216
7	3	5	78.8055	246.075	1909.31	2.97216
7	4	5	30.2968	0.	80.2022	2.97216
7	5	5	0.	0.	0.	2.97216
8	1	5	0.	0.	0.	2.97216
8	2	5	0.	7382.25	0.	2.97216
8	3	5	32.8141	171.019	1284.45	2.97216
8	4	5	42.6887	1230.38	1793.61	2.97216
8	5	5	0.	0.	0.	2.97216
9	1	5	0.	0.	0.	2.97216
9	2	5	0.	0.	0.	2.97216
9	3	5	273.605	469.613	2680.33	2.97216
9	4	5	94.3082	0.	1288.96	2.97216
9	5	5	0.	0.	0.	2.97216
10	1	5	0.	0.	0.	2.97216
10	2	5	0.	0.	0.	2.97216
10	3	5	323.419	444.147	6150.41	2.97216
10	4	5	28.0526	0.	3925.79	2.97216
10	5	5	0.	0.	0.	2.97216
11	1	5	0.	0.	0.	2.97216
11	2	5	0.	0.	0.	2.97216
11	3	5	46.5082	2089.32	714.529	2.97216
11	4	5	578.908	295.290	4041.53	2.97216
11	5	5	0.	0.	0.	2.97216
12	1	5	0.	0.	0.	2.97216
12	2	5	0.	0.	0.	2.97216
12	3	5	3.13746	200.423	236.961	2.97216
12	4	5	123.284	0.	1159.29	2.97216
12	5	5	0.	0.	0.	2.97216
13	1	5	0.	0.	0.	2.97216
13	2	5	0.	0.	0.	2.97216
13	3	5	0.	215.271	3.64556	2.97216
13	4	5	273.168	263.464	6823.48	2.97216

13	5	5	6.27491	0.	16.4050	2.97216
14	1	5	0.	0.	0.	2.97216
14	2	5	0.	0.	0.	2.97216
14	3	5	0.	1184.24	0.	2.97216
14	4	5	438.578	289.230	5562.83	2.97216
14	5	5	20.6703	0.	597.142	2.97216
15	1	5	0.	0.	0.	2.97216
15	2	5	0.	0.	0.	2.97216
15	3	5	0.	0.	0.	2.97216
15	4	5	132.881	5062.97	5334.91	2.97216
15	5	5	11.6270	0.	601.517	2.97216
16	1	5	0.	0.	0.	2.97216
16	2	5	0.	0.	0.	2.97216
16	3	5	0.	0.	0.	2.97216
16	4	5	27.6834	36911.3	656.200	2.97216
16	5	5	0.	0.	164.050	2.97216
1	1	6	0.	0.	0.	2.97216
1	2	6	0.	0.	0.	2.97216
1	3	6	0.	671.114	25.5189	2.97216
1	4	6	0.	0.	18.2278	2.97216
1	5	6	0.	0.	0.	2.97216
2	1	6	0.	0.	0.	2.97216
2	2	6	132.881	110734.	218.733	2.97216
2	3	6	0.	0.	0.	2.97216
2	4	6	0.	0.	0.	2.97216
2	5	6	0.	0.	0.	2.97216
3	1	6	0.	0.	0.	2.97216
3	2	6	132.881	22146.8	1093.67	2.97216
3	3	6	155.765	0.	0.	2.97216
3	4	6	0.	0.	0.	2.97216
3	5	6	0.	0.	0.	2.97216
4	1	6	0.	0.	0.	2.97216
4	2	6	0.	425.408	0.	2.97216
4	3	6	278.311	0.	1640.50	2.97216
4	4	6	0.	0.	0.	2.97216
4	5	6	0.	0.	0.	2.97216
5	1	6	0.	0.	0.	2.97216
5	2	6	0.	429.534	0.	2.97216
5	3	6	242.876	7382.25	816.604	2.97216
5	4	6	0.	0.	0.	2.97216
5	5	6	0.	0.	0.	2.97216
6	1	6	0.	0.	0.	2.97216
6	2	6	0.	1458.94	0.	2.97216
6	3	6	9.59693	388.539	634.327	2.97216
6	4	6	0.	0.	0.	2.97216
6	5	6	0.	0.	0.	2.97216
7	1	6	0.	0.	0.	2.97216
7	2	6	0.	7382.25	0.	2.97216
7	3	6	8.85870	1476.45	18.2278	2.97216
7	4	6	9.59693	0.	3.64556	2.97216
7	5	6	0.	0.	0.	2.97216
8	1	6	0.	0.	0.	2.97216
8	2	6	0.	7382.25	0.	2.97216
8	3	6	5.90530	210.921	36.4556	2.97216
8	4	6	12.5498	0.	98.4300	2.97216

8	5	6	0.	0.	0.	2.97216
9	1	6	0.	0.	0.	2.97216
9	2	6	0.	0.	0.	2.97216
9	3	6	191.200	526.051	156.759	2.97216
9	4	6	0.	0.	7.29111	2.97216
9	5	6	0.	0.	0.	2.97216
10	1	6	0.	0.	0.	2.97216
10	2	6	0.	0.	0.	2.97216
10	3	6	311.531	550.914	1250.43	2.97216
10	4	6	0.	0.	109.367	2.97216
10	5	6	0.	0.	0.	2.97216
11	1	6	0.	0.	0.	2.97216
11	2	6	0.	0.	0.	2.97216
11	3	6	186.033	2089.32	1429.06	2.97216
11	4	6	400.118	0.	444.758	2.97216
11	5	6	0.	0.	0.	2.97216
12	1	6	0.	0.	0.	2.97216
12	2	6	0.	0.	0.	2.97216
12	3	6	12.5498	200.423	473.922	2.97216
12	4	6	493.134	0.	2318.57	2.97216
12	5	6	0.	0.	0.	2.97216
13	1	6	0.	0.	0.	2.97216
13	2	6	0.	0.	0.	2.97216
13	3	6	0.	220.453	7.29111	2.97216
13	4	6	189.724	0.	2679.48	2.97216
13	5	6	4.42935	0.	0.	2.97216
14	1	6	0.	0.	0.	2.97216
14	2	6	0.	0.	0.	2.97216
14	3	6	0.	1800.55	0.	2.97216
14	4	6	424.479	726.123	1028.05	2.97216
14	5	6	0.	0.	21.8733	2.97216
15	1	6	0.	0.	0.	2.97216
15	2	6	0.	0.	0.	2.97216
15	3	6	0.	0.	0.	2.97216
15	4	6	44.2935	18455.6	1312.40	2.97216
15	5	6	0.	0.	0.	2.97216
16	1	6	0.	0.	0.	2.97216
16	2	6	0.	0.	0.	2.97216
16	3	6	0.	0.	0.	2.97216
16	4	6	0.	0.	0.	2.97216
16	5	6	0.	0.	0.	2.97216
1	1	7	0.	0.	0.	2.97216
1	2	7	0.	0.	0.	2.97216
1	3	7	0.	671.114	38.2763	2.97216
1	4	7	0.	0.	27.3417	2.97216
1	5	7	0.	0.	0.	2.97216
2	1	7	0.	0.	0.	2.97216
2	2	7	177.174	110734.	1531.13	2.97216
2	3	7	0.	0.	0.	2.97216
2	4	7	0.	0.	0.	2.97216
2	5	7	0.	0.	0.	2.97216
3	1	7	0.	0.	0.	2.97216
3	2	7	206.703	22146.8	6835.42	2.97216
3	3	7	132.296	0.	273.417	2.97216
3	4	7	0.	0.	0.	2.97216

3	5	7	0.	0.	0.	2.97216
4	1	7	0.	0.	0.	2.97216
4	2	7	0.	541.009	729.111	2.97216
4	3	7	261.853	0.	6936.19	2.97216
4	4	7	0.	0.	0.	2.97216
4	5	7	0.	0.	0.	2.97216
5	1	7	0.	0.	0.	2.97216
5	2	7	0.	429.534	0.	2.97216
5	3	7	187.055	7382.25	2793.41	2.97216
5	4	7	0.	0.	0.	2.97216
5	5	7	0.	0.	0.	2.97216
6	1	7	0.	0.	0.	2.97216
6	2	7	0.	1458.94	0.	2.97216
6	3	7	2.39923	388.539	2363.08	2.97216
6	4	7	0.	0.	0.	2.97216
6	5	7	0.	0.	0.	2.97216
7	1	7	0.	0.	0.	2.97216
7	2	7	0.	7382.25	0.	2.97216
7	3	7	11.8116	1476.45	145.822	2.97216
7	4	7	2.39923	0.	5.46833	2.97216
7	5	7	0.	0.	0.	2.97216
8	1	7	0.	0.	0.	2.97216
8	2	7	0.	7382.25	0.	2.97216
8	3	7	49.5226	210.921	615.187	2.97216
8	4	7	3.13746	0.	147.645	2.97216
8	5	7	0.	0.	0.	2.97216
9	1	7	0.	0.	0.	2.97216
9	2	7	0.	0.	0.	2.97216
9	3	7	217.657	526.051	1963.05	2.97216
9	4	7	0.	0.	10.9367	2.97216
9	5	7	0.	0.	0.	2.97216
10	1	7	0.	0.	0.	2.97216
10	2	7	0.	0.	0.	2.97216
10	3	7	270.513	550.914	5472.84	2.97216
10	4	7	0.	0.	164.050	2.97216
10	5	7	0.	0.	0.	2.97216
11	1	7	0.	0.	0.	2.97216
11	2	7	0.	0.	0.	2.97216
11	3	7	290.676	7327.49	7772.32	2.97216
11	4	7	309.186	0.	1763.67	2.97216
11	5	7	0.	0.	0.	2.97216
12	1	7	0.	0.	0.	2.97216
12	2	7	0.	0.	0.	2.97216
12	3	7	15.5027	192.106	3597.96	2.97216
12	4	7	508.665	0.	8444.09	2.97216
12	5	7	0.	0.	0.	2.97216
13	1	7	0.	0.	0.	2.97216
13	2	7	0.	0.	0.	2.97216
13	3	7	0.	220.453	10.9367	2.97216
13	4	7	154.634	0.	7717.56	2.97216
13	5	7	1.10734	0.	0.	2.97216
14	1	7	0.	0.	0.	2.97216
14	2	7	0.	0.	0.	2.97216
14	3	7	0.	1800.55	0.	2.97216
14	4	7	338.584	726.123	3164.34	2.97216

14	5	7	0.	0.	32.8100	2.97216
15	1	7	0.	0.	0.	2.97216
15	2	7	0.	0.	0.	2.97216
15	3	7	0.	0.	0.	2.97216
15	4	7	11.0734	18455.6	1968.60	2.97216
15	5	7	0.	0.	0.	2.97216
16	1	7	0.	0.	0.	2.97216
16	2	7	0.	0.	0.	2.97216
16	3	7	0.	0.	0.	2.97216
16	4	7	0.	0.	0.	2.97216
16	5	7	0.	0.	0.	2.97216
1	1	8	0.	0.	0.	3.63265
1	2	8	0.	0.	0.	3.63265
1	3	8	0.	0.	0.	3.63265
1	4	8	0.	0.	0.	3.63265
1	5	8	0.	0.	0.	3.63265
2	1	8	0.	0.	0.	3.63265
2	2	8	270.683	0.	546.833	3.63265
2	3	8	0.	0.	0.	3.63265
2	4	8	0.	0.	0.	3.63265
2	5	8	0.	0.	0.	3.63265
3	1	8	0.	0.	0.	3.63265
3	2	8	360.910	0.	2551.89	3.63265
3	3	8	135.341	0.	546.833	3.63265
3	4	8	0.	0.	0.	3.63265
3	5	8	0.	0.	0.	3.63265
4	1	8	0.	0.	0.	3.63265
4	2	8	0.	873.169	1458.22	3.63265
4	3	8	284.217	0.	2059.74	3.63265
4	4	8	0.	0.	0.	3.63265
4	5	8	0.	0.	0.	3.63265
5	1	8	0.	0.	0.	3.63265
5	2	8	0.	0.	0.	3.63265
5	3	8	139.853	0.	601.517	3.63265
5	4	8	0.	0.	0.	3.63265
5	5	8	0.	0.	0.	3.63265
6	1	8	0.	0.	0.	3.63265
6	2	8	0.	0.	0.	3.63265
6	3	8	0.	0.	601.517	3.63265
6	4	8	0.	0.	0.	3.63265
6	5	8	0.	0.	0.	3.63265
7	1	8	0.	0.	0.	3.63265
7	2	8	0.	0.	0.	3.63265
7	3	8	18.0455	0.	54.6833	3.63265
7	4	8	0.	0.	0.	3.63265
7	5	8	0.	0.	0.	3.63265
8	1	8	0.	0.	0.	3.63265
8	2	8	0.	0.	0.	3.63265
8	3	8	144.364	0.	601.517	3.63265
8	4	8	0.	0.	0.	3.63265
8	5	8	0.	0.	0.	3.63265
9	1	8	0.	0.	0.	3.63265
9	2	8	0.	0.	0.	3.63265
9	3	8	279.705	0.	1676.96	3.63265
9	4	8	0.	0.	0.	3.63265

9	5	8	0.	0.	0.	3.63265
10	1	8	0.	0.	0.	3.63265
10	2	8	0.	0.	0.	3.63265
10	3	8	270.683	0.	1676.96	3.63265
10	4	8	0.	0.	0.	3.63265
10	5	8	0.	0.	0.	3.63265
11	1	8	0.	0.	0.	3.63265
11	2	8	0.	0.	0.	3.63265
11	3	8	505.274	15037.9	2570.12	3.63265
11	4	8	279.705	0.	342.682	3.63265
11	5	8	0.	0.	0.	3.63265
12	1	8	0.	0.	0.	3.63265
12	2	8	0.	0.	0.	3.63265
12	3	8	22.5569	223.151	2096.19	3.63265
12	4	8	595.501	0.	2041.51	3.63265
12	5	8	0.	0.	0.	3.63265
13	1	8	0.	0.	0.	3.63265
13	2	8	0.	0.	0.	3.63265
13	3	8	0.	0.	0.	3.63265
13	4	8	144.364	0.	1148.35	3.63265
13	5	8	0.	0.	0.	3.63265
14	1	8	0.	0.	0.	3.63265
14	2	8	0.	0.	0.	3.63265
14	3	8	0.	0.	0.	3.63265
14	4	8	270.683	0.	554.124	3.63265
14	5	8	0.	0.	0.	3.63265
15	1	8	0.	0.	0.	3.63265
15	2	8	0.	0.	0.	3.63265
15	3	8	0.	0.	0.	3.63265
15	4	8	0.	0.	0.	3.63265
15	5	8	0.	0.	0.	3.63265
16	1	8	0.	0.	0.	3.63265
16	2	8	0.	0.	0.	3.63265
16	3	8	0.	0.	0.	3.63265
16	4	8	0.	0.	0.	3.63265
16	5	8	0.	0.	0.	3.63265
1	1	9	0.	0.	0.	4.29313
1	2	9	0.	0.	0.	4.29313
1	3	9	0.	0.	0.	4.29313
1	4	9	0.	0.	0.	4.29313
1	5	9	0.	0.	0.	4.29313
2	1	9	0.	0.	0.	4.29313
2	2	9	319.898	0.	1514.31	4.29313
2	3	9	0.	0.	0.	4.29313
2	4	9	0.	0.	0.	4.29313
2	5	9	0.	0.	0.	4.29313
3	1	9	0.	0.	0.	4.29313
3	2	9	426.530	15994.9	6814.38	4.29313
3	3	9	159.949	0.	1514.31	4.29313
3	4	9	0.	0.	0.	4.29313
3	5	9	0.	0.	0.	4.29313
4	1	9	0.	0.	0.	4.29313
4	2	9	0.	13621.4	2839.33	4.29313
4	3	9	397.473	0.	4366.25	4.29313
4	4	9	0.	0.	0.	4.29313

4	5	9	0.	0.	0.	4.29313
5	1	9	0.	0.	0.	4.29313
5	2	9	0.	0.	0.	4.29313
5	3	9	181.942	0.	2072.71	4.29313
5	4	9	0.	0.	0.	4.29313
5	5	9	0.	0.	0.	4.29313
6	1	9	0.	0.	0.	4.2-313
6	2	9	0.	0.	0.	4.29313
6	3	9	0.	0.	1727.26	4.29313
6	4	9	0.	0.	0.	4.29313
6	5	9	0.	0.	0.	4.29313
7	1	9	0.	0.	0.	4.29313
7	2	9	0.	0.	0.	4.29313
7	3	9	5.33163	0.	56.7865	4.29313
7	4	9	0.	0.	0.	4.29313
7	5	9	0.	0.	0.	4.29313
8	1	9	0.	0.	0.	4.29313
8	2	9	0.	0.	0.	4.29313
8	3	9	42.6530	0.	1727.26	4.29313
8	4	9	0.	0.	0.	4.29313
8	5	9	0.	0.	0.	4.29313
9	1	9	0.	0.	0.	4.29313
9	2	9	0.	0.	0.	4.29313
9	3	9	82.6402	0.	2902.93	4.29313
9	4	9	0.	0.	0.	4.29313
9	5	9	0.	0.	0.	4.29313
10	1	9	0.	0.	0.	4.29313
10	2	9	0.	0.	0.	4.29313
10	3	9	79.9744	0.	3763.05	4.29313
10	4	9	0.	0.	0.	4.29313
10	5	9	0.	0.	0.	4.29313
11	1	9	0.	0.	0.	4.29313
11	2	9	0.	0.	0.	4.29313
11	3	9	149.286	22511.3	5506.44	4.29313
11	4	9	591.810	0.	1722.34	4.29313
11	5	9	0.	0.	0.	4.29313
12	1	9	0.	0.	0.	4.29313
12	2	9	0.	0.	0.	4.29313
12	3	9	6.66453	5525.02	5564.03	4.29313
12	4	9	513.329	0.	6087.52	4.29313
12	5	9	0.	0.	0.	4.29313
13	1	9	0.	0.	0.	4.29313
13	2	9	0.	0.	0.	4.29313
13	3	9	0.	0.	0.	4.29313
13	4	9	42.6530	0.	1192.52	4.29313
13	5	9	0.	0.	0.	4.29313
14	1	9	0.	0.	0.	4.29313
14	2	9	0.	0.	0.	4.29313
14	3	9	0.	0.	0.	4.29313
14	4	9	79.9744	0.	1440.76	4.29313
14	5	9	0.	0.	0.	4.29313
15	1	9	0.	0.	0.	4.29313
15	2	9	0.	0.	0.	4.29313
15	3	9	0.	0.	0.	4.29313
15	4	9	0.	0.	0.	4.29313

15	5	9	0.	0.	0.	4.29313
16	1	9	0.	0.	0.	4.29313
16	2	9	0.	0.	0.	4.29313
16	3	9	0.	0.	0.	4.29313
16	4	9	0.	0.	0.	4.29313
16	5	9	0.	0.	0.	4.29313
1	1	10	0.	0.	0.	3.96289
1	2	10	0.	0.	0.	3.96289
1	3	10	0.	0.	0.	3.96289
1	4	10	0.	0.	0.	3.96289
1	5	10	0.	0.	0.	3.96289
2	1	10	0.	0.	0.	3.96289
2	2	10	295.290	0.	378.577	3.96289
2	3	10	0.	0.	0.	3.96289
2	4	10	0.	0.	0.	3.96289
2	5	10	0.	0.	0.	3.96289
3	1	10	0.	0.	0.	3.96289
3	2	10	393.720	14764.5	1514.31	3.96289
3	3	10	147.645	0.	378.577	3.96289
3	4	10	0.	0.	0.	3.96289
3	5	10	0.	0.	0.	3.96289
4	1	10	0.	0.	0.	3.96289
4	2	10	0.	59058.0	378.577	3.96289
4	3	10	295.290	0.	757.154	3.96289
4	4	10	0.	0.	0.	3.96289
4	5	10	0.	0.	0.	3.96289
5	1	10	0.	0.	0.	3.96289
5	2	10	0.	0.	0.	3.96289
5	3	10	147.645	0.	757.154	3.96289
5	4	10	0.	0.	0.	3.96289
5	5	10	0.	0.	0.	3.96289
6	1	10	0.	0.	0.	3.96289
6	2	10	0.	0.	0.	3.96289
6	3	10	0.	0.	378.577	3.96289
6	4	10	0.	0.	0.	3.96289
6	5	10	0.	0.	0.	3.96289
7	1	10	0.	0.	0.	3.96289
7	2	10	0.	0.	0.	3.96289
7	3	10	0.	0.	0.	3.96289
7	4	10	0.	0.	0.	3.96289
7	5	10	0.	0.	0.	3.96289
8	1	10	0.	0.	0.	3.96289
8	2	10	0.	0.	0.	3.96289
8	3	10	0.	0.	378.577	3.96289
8	4	10	0.	0.	0.	3.96289
8	5	10	0.	0.	0.	3.96289
9	1	10	0.	0.	0.	3.96289
9	2	10	0.	0.	0.	3.96289
9	3	10	0.	0.	151.431	3.96289
9	4	10	0.	0.	0.	3.96289
9	5	10	0.	0.	0.	3.96289
10	1	10	0.	0.	0.	3.96289
10	2	10	0.	0.	0.	3.96289
10	3	10	0.	0.	757.154	3.96289
10	4	10	0.	0.	0.	3.96289

10	5 10	0.	0.	0.	3.96289
11	1 10	0.	0.	0.	3.96289
11	2 10	0.	0.	0.	3.96289
11	3 10	0.	29529.0	1009.54	3.96289
11	4 10	787.440	0.	1009.54	3.96289
11	5 10	0.	0.	0.	3.96289
12	1 10	0.	0.	0.	3.96289
12	2 10	0.	0.	0.	3.96289
12	3 10	0.	18455.6	1261.92	3.96289
12	4 10	157.488	0.	2019.08	3.96289
12	5 10	0.	0.	0.	3.96289
13	1 10	0.	0.	0.	3.96289
13	2 10	0.	0.	0.	3.96289
13	3 10	0.	0.	0.	3.96289
13	4 10	0.	0.	0.	3.96289
13	5 10	0.	0.	0.	3.96289
14	1 10	0.	0.	0.	3.96289
14	2 10	0.	0.	0.	3.96289
14	3 10	0.	0.	0.	3.96289
14	4 10	0.	0.	378.577	3.96289
14	5 10	0.	0.	0.	3.96289
15	1 10	0.	0.	0.	3.96289
15	2 10	0.	0.	0.	3.96289
15	3 10	0.	0.	0.	3.96289
15	4 10	0.	0.	0.	3.96289
15	5 10	0.	0.	0.	3.96289
16	1 10	0.	0.	0.	3.96289
16	2 10	0.	0.	0.	3.96289
16	3 10	0.	0.	0.	3.96289
16	4 10	0.	0.	0.	3.96289
16	5 10	0.	0.	0.	3.96289
1	1 11	0.	0.	0.	3.63265
1	2 11	0.	0.	0.	3.63265
1	3 11	0.	0.	0.	3.63265
1	4 11	0.	0.	0.	3.63265
1	5 11	0.	0.	0.	3.63265
2	1 11	0.	0.	0.	3.63265
2	2 11	67.6706	0.	671.114	3.63265
2	3 11	0.	0.	0.	3.63265
2	4 11	0.	0.	0.	3.63265
2	5 11	0.	0.	0.	3.63265
3	1 11	0.	0.	0.	3.63265
3	2 11	90.2275	13534.1	2684.45	3.63265
3	3 11	33.8353	0.	671.114	3.63265
3	4 11	0.	0.	0.	3.63265
3	5 11	0.	0.	0.	3.63265
4	1 11	0.	0.	0.	3.63265
4	2 11	0.	54136.5	671.114	3.63265
4	3 11	67.6706	0.	1342.23	3.63265
4	4 11	0.	0.	0.	3.63265
4	5 11	0.	0.	0.	3.63265
5	1 11	0.	0.	0.	3.63265
5	2 11	0.	0.	0.	3.63265
5	3 11	33.8353	0.	1342.23	3.63265
5	4 11	0.	0.	0.	3.63265

5	5	11	0.	0.	0.	3.63265
6	1	11	0.	0.	0.	3.63265
6	2	11	0.	0.	0.	3.63265
6	3	11	0.	0.	671.114	3.63265
6	4	11	0.	0.	0.	3.63265
6	5	11	0.	0.	0.	3.63265
7	1	11	0.	0.	0.	3.63265
7	2	11	0.	0.	0.	3.63265
7	3	11	0.	0.	0.	3.63265
7	4	11	0.	0.	0.	3.63265
7	5	11	0.	0.	0.	3.63265
8	1	11	0.	0.	0.	3.63265
8	2	11	0.	0.	0.	3.63265
8	3	11	0.	0.	671.114	3.63265
8	4	11	0.	0.	0.	3.63265
8	5	11	0.	0.	0.	3.63265
9	1	11	0.	0.	0.	3.63265
9	2	11	0.	0.	0.	3.63265
9	3	11	0.	0.	268.445	3.63265
9	4	11	0.	0.	0.	3.63265
9	5	11	0.	0.	0.	3.63265
10	1	11	0.	0.	0.	3.63265
10	2	11	0.	0.	0.	3.63265
10	3	11	0.	0.	1342.23	3.63265
10	4	11	0.	0.	0.	3.63265
10	5	11	0.	0.	0.	3.63265
11	1	11	0.	0.	0.	3.63265
11	2	11	0.	0.	0.	3.63265
11	3	11	0.	27068.3	1789.64	3.63265
11	4	11	180.455	0.	1789.64	3.63265
11	5	11	0.	0.	0.	3.63265
12	1	11	0.	0.	0.	3.63265
12	2	11	0.	0.	0.	3.63265
12	3	11	0.	16917.7	2237.05	3.63265
12	4	11	36.0910	0.	3579.27	3.63265
12	5	11	0.	0.	0.	3.63265
13	1	11	0.	0.	0.	3.63265
13	2	11	0.	0.	0.	3.63265
13	3	11	0.	0.	0.	3.63265
13	4	11	0.	0.	0.	3.63265
13	5	11	0.	0.	0.	3.63265
14	1	11	0.	0.	0.	3.63265
14	2	11	0.	0.	0.	3.63265
14	3	11	0.	0.	0.	3.63265
14	4	11	0.	0.	671.114	3.63265
14	5	11	0.	0.	0.	3.63265
15	1	11	0.	0.	0.	3.63265
15	2	11	0.	0.	0.	3.63265
15	3	11	0.	0.	0.	3.63265
15	4	11	0.	0.	0.	3.63265
15	5	11	0.	0.	0.	3.63265
16	1	11	0.	0.	0.	3.63265
16	2	11	0.	0.	0.	3.63265
16	3	11	0.	0.	0.	3.63265
16	4	11	0.	0.	0.	3.63265

16	5	11	0.	0.	0.	3.63265
1	1	12	0.	0.	0.	1.81632
1	2	12	0.	0.	0.	1.81632
1	3	12	0.	0.	0.	1.81632
1	4	12	0.	0.	0.	1.81632
1	5	12	0.	0.	0.	1.81632
2	1	12	0.	0.	0.	1.81632
2	2	12	0.	0.	0.	1.81632
2	3	12	0.	0.	0.	1.81632
2	4	12	0.	0.	0.	1.81632
2	5	12	0.	0.	0.	1.81632
3	1	12	0.	0.	0.	1.81632
3	2	12	0.	0.	0.	1.81632
3	3	12	0.	0.	0.	1.81632
3	4	12	0.	0.	0.	1.81632
3	5	12	0.	0.	0.	1.81632
4	1	12	0.	0.	0.	1.81632
4	2	12	0.	0.	0.	1.81632
4	3	12	0.	0.	0.	1.81632
4	4	12	0.	0.	0.	1.81632
4	5	12	0.	0.	0.	1.81632
5	1	12	0.	0.	0.	1.81632
5	2	12	0.	0.	0.	1.81632
5	3	12	0.	0.	0.	1.81632
5	4	12	0.	0.	0.	1.81632
5	5	12	0.	0.	0.	1.81632
6	1	12	0.	0.	0.	1.81632
6	2	12	0.	0.	0.	1.81632
6	3	12	0.	0.	0.	1.81632
6	4	12	0.	0.	0.	1.81632
6	5	12	0.	0.	0.	1.81632
7	1	12	0.	0.	0.	1.81632
7	2	12	0.	0.	0.	1.81632
7	3	12	0.	0.	0.	1.81632
7	4	12	0.	0.	0.	1.81632
7	5	12	0.	0.	0.	1.81632
8	1	12	0.	0.	0.	1.81632
8	2	12	0.	0.	0.	1.81632
8	3	12	0.	0.	0.	1.81632
8	4	12	0.	0.	0.	1.81632
8	5	12	0.	0.	0.	1.81632
9	1	12	0.	0.	0.	1.81632
9	2	12	0.	0.	0.	1.81632
9	3	12	0.	0.	0.	1.81632
9	4	12	0.	0.	0.	1.81632
9	5	12	0.	0.	0.	1.81632
10	1	12	0.	0.	0.	1.81632
10	2	12	0.	0.	0.	1.81632
10	3	12	0.	0.	0.	1.81632
10	4	12	0.	0.	0.	1.81632
10	5	12	0.	0.	0.	1.81632
11	1	12	0.	0.	0.	1.81632
11	2	12	0.	0.	0.	1.81632
11	3	12	0.	0.	0.	1.81632
11	4	12	0.	0.	0.	1.81632

11	5	12	0.	0.	0.	1.81632
12	1	12	0.	0.	0.	1.81632
12	2	12	0.	0.	0.	1.81632
12	3	12	0.	0.	0.	1.81632
12	4	12	0.	0.	0.	1.81632
12	5	12	0.	0.	0.	1.81632
13	1	12	0.	0.	0.	1.81632
13	2	12	0.	0.	0.	1.81632
13	3	12	0.	0.	0.	1.81632
13	4	12	0.	0.	0.	1.81632
13	5	12	0.	0.	0.	1.81632
14	1	12	0.	0.	0.	1.81632
14	2	12	0.	0.	0.	1.81632
14	3	12	0.	0.	0.	1.81632
14	4	12	0.	0.	0.	1.81632
14	5	12	0.	0.	0.	1.81632
15	1	12	0.	0.	0.	1.81632
15	2	12	0.	0.	0.	1.81632
15	3	12	0.	0.	0.	1.81632
15	4	12	0.	0.	0.	1.81632
15	5	12	0.	0.	0.	1.81632
16	1	12	0.	0.	0.	1.81632
16	2	12	0.	0.	0.	1.81632
16	3	12	0.	0.	0.	1.81632
16	4	12	0.	0.	0.	1.81632
16	5	12	0.	0.	0.	1.81632

APPENDIX F. FILE "EXTBDY" USED TO DESCRIBE EXTERIOR
BOUNDARY CONSTANT HEAD NODES FOR OVERBURDEN AQUIFER
MODEL.

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APPENDIX G. FILE "RECHRG" USED TO DEFINE OVERBURDEN AQUIFER
RECHARGE AREAS DIFFERENT THAN GLOBAL RECHARGE OF 220 MM/YEAR
(0.01478 GPD/FT²) IN GPD/FT².

14 22 0.0
15 22 0.0
16 22 0.0
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17 24 0.0
18 24 0.0
19 24 0.0
20 24 0.0
10 25 0.0
11 25 0.0
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13 25 0.0
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18 20 .00786
19 20 .00786
20 20 .00786
21 20 .00786
22 20 .00786
23 20 .00786

32 18 .02554
32 19 .02554

32 20 .02332
31 21 .02332
32 21 .02332
30 22 .02332
31 22 .02332
32 22 .02332
31 23 .02332

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APPENDIX H. FILE "PERMEA" USED TO DEFINE OVERBURDEN
AQUIFER PERMEABILITY HETEROGENEITY FOR NODES DIFFERENT
THAN $1.22\text{E-}4$ M/SEC (259 GPD/FT²) (FIGURES ARE IN
GPD/FT²).

15 4 80.576
16 4 80.576
17 4 80.576
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18 4 5.937
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APPENDIX I. FILE "BOTOM" USED TO DEFINE OVERBURDEN
AQUIFER BOTTOM ELEVATION IN FEET.

1
1413.3 1426.7 1444.8 1452.0 1453.0 1454.0 1454.0 1454.0 1454.0 1456.0
1520.0 1523.0 1523.0 1524.0 1524.0 1525.0 1525.0 1525.0 1525.0 1525.0
1525.0 1525.0 1525.0 1523.0 1500.0 1500.0 1500.0 1500.0 1463.0 1465.0
1463.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1462.0 1475.0
1477.0 1478.0 1479.0 1500.0

2
1413.9 1426.1 1443.1 1450.0 1450.0 1450.0 1453.0 1453.0 1460.0 1500.0
1520.0 1521.7 1526.0 1528.0 1544.3 1550.0 1550.0 1550.0 1550.0 1550.0
1550.0 1550.0 1550.0 1550.0 1550.0 1550.0 1550.0 1540.0 1530.0 1525.0
1520.0 1500.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1460.0
1475.0 1480.0 1485.0 1490.0

3
1413.6 1424.5 1439.5 1451.1 1465.2 1440.0 1450.0 1460.0 1460.0 1470.0
1500.0 1513.0 1525.0 1525.0 1537.2 1543.0 1548.8 1550.0 1550.0 1550.0
1550.0 1550.0 1550.0 1550.0 1550.0 1550.0 1550.0 1550.0 1550.0 1535.0
1525.0 1500.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1425.0
1450.0 1460.0 1475.0 1475.0

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1400.0 1400.0 1400.0 1400.0 1410.0 1415.0 1425.0 1445.0 1450.0 1450.0
1460.0 1475.0 1500.0 1500.0 1500.0 1515.0 1515.0 1525.0 1525.0 1525.0
1525.0 1525.0 1525.0 1525.0 1525.0 1525.0 1525.0 1520.0 1515.0 1510.0
1500.0 1450.0 1425.0 1420.0 1420.0 1420.0 1420.0 1425.0 1440.0 1450.0
1460.0 1465.0 1465.0 1465.0

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1398.0 1400.0 1400.0 1400.0 1400.0 1400.0 1400.0 1400.0 1400.0 1400.0
1400.0 1400.0 1400.0 1430.0 1430.0 1430.0 1430.0 1430.0 1430.0 1440.0
1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1450.0 1400.0
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1396.1 1399.4 1406.2 1410.3 1410.8 1410.8 1410.8 1416.3 1443.4 1476.4
1484.8 1488.7 1491.2 1494.5 1497.8 1501.0 1504.3 1507.6 1510.9 1514.2
1517.4 1520.7 1524.0 1525.7 1525.7 1525.7 1525.7 1543.2 1534.7 1533.0
1533.4 1527.9 1522.4 1508.8 1485.3 1458.1 1433.4 1416.9 1405.5 1416.2
1449.0 1471.0 1476.5 1400.0

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1392.8 1399.4 1402.7 1409.2 1410.8 1410.8 1410.8 1429.8 1467.2 1490.4
1499.6 1501.2 1501.0 1505.9 1510.9 1515.8 1522.3 1525.7 1525.7 1528.9
1532.2 1533.8 1538.7 1542.1 1542.1 1543.7 1548.6 1560.7 1559.8 1553.6
1546.1 1532.4 1519.2 1499.6 1474.9 1450.4 1425.7 1412.5 1410.8 1434.6
1467.6 1471.0 1470.9 1400.0

8
1395.2 1398.8 1406.0 1406.0 1410.8 1410.8 1421.7 1450.2 1471.2 1497.8
1514.8 1518.3 1522.3 1525.7 1528.9 1533.8 1538.7 1542.1 1545.3 1550.2
1551.9 1553.5 1556.8 1561.7 1569.9 1568.3 1565.0 1561.8 1561.8 1555.2
1547.1 1530.6 1515.4 1491.9 1464.0 1437.2 1418.0 1421.7 1443.7 1463.9
1469.4 1457.4 1462.5 1350.0

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1395.9 1400.0 1405.4 1410.8 1410.8 1417.4 1441.1 1456.6 1476.6 1502.9
1522.5 1542.1 1545.4 1548.6 1555.2 1561.8 1565.0 1565.0 1568.3 1571.6
1574.9 1574.9 1574.9 1574.9 1574.9 1574.9 1574.9 1574.9 1574.9 1561.8
1545.4 1532.2 1475.5 1442.7 1416.4 1410.9 1443.6 1470.8 1476.4 1459.0
1437.2 1432.7 1476.1 1325.0

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1395.4	1399.5	1404.0	1409.2	1410.8	1413.6	1432.9	1453.8	1481.3	1517.4
1529.9	1539.8	1545.4	1551.9	1548.6	1542.1	1542.1	1538.8	1542.1	1555.2
1568.3	1581.4	1588.0	1591.3	1588.0	1584.7	1568.3	1565.0	1563.4	1548.6
1535.5	1522.4	1496.1	1461.6	1431.5	1414.0	1424.6	1455.2	1473.3	1469.1
1449.8	1435.2	1450.8	1325.0						

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1396.9	1400.0	1405.8	1410.8	1410.8	1420.2	1446.0	1459.8	1492.7	1524.5
1532.2	1541.6	1542.1	1548.6	1542.1	1525.7	1460.0	1486.3	1502.7	1542.1
1555.2	1578.2	1588.0	1591.3	1588.0	1584.7	1571.6	1558.5	1551.9	1542.1
1532.2	1512.5	1486.3	1433.0	1413.8	1415.8	1446.5	1476.5	1474.5	1457.2
1433.8	1427.2	1449.5	1325.0						

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1398.4	1400.0	1406.6	1410.8	1410.8	1424.2	1446.8	1464.0	1490.3	1516.5
1528.3	1534.2	1542.1	1542.1	1532.2	1499.4	1450.2	1466.6	1483.0	1499.4
1538.8	1558.5	1574.9	1574.9	1568.3	1565.0	1551.9	1545.4	1542.1	1535.5
1525.7	1509.3	1476.5	1422.8	1410.8	1423.2	1455.5	1476.5	1470.5	1450.4
1431.4	1425.2	1447.1	1325.0						

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1400.0	1400.0	1406.7	1410.8	1410.8	1425.7	1447.7	1468.2	1487.9	1507.1
1515.7	1518.4	1532.2	1525.7	1509.3	1479.7	1446.9	1440.4	1463.3	1483.0
1499.4	1522.4	1542.1	1545.4	1542.1	1538.8	1532.2	1525.7	1525.7	1519.1
1515.8	1496.1	1463.3	1413.8	1410.8	1428.7	1462.1	1476.5	1464.0	1442.1
1428.8	1418.9	1442.3	1350.0						

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1375.0	1375.0	1405.4	1410.8	1415.6	1432.9	1446.1	1466.1	1486.2	1486.3
1493.9	1492.6	1515.8	1502.7	1483.0	1460.0	1437.1	1430.5	1440.4	1463.3
1483.0	1496.1	1512.5	1519.1	1525.7	1519.1	1506.0	1496.1	1474.4	1472.2
1448.9	1431.3	1415.0	1410.8	1410.8	1453.1	1474.4	1476.5	1452.6	1433.3
1418.2	1395.7	1452.6	1350.0						

15

1300.0	1325.0	1406.7	1410.8	1412.4	1426.0	1455.0	1485.4	1471.5	1460.0
1476.5	1466.6	1453.5	1443.6	1433.8	1427.2	1420.7	1417.4	1427.2	1437.1
1443.6	1453.5	1460.0	1463.3	1466.6	1469.9	1469.9	1469.9	1469.9	1466.6
1460.0	1443.6	1422.5	1410.8	1410.8	1424.2	1470.6	1476.5	1468.9	1440.4
1425.9	1408.2	1409.0	1350.0						

16

1300.0	1300.0	1405.1	1410.0	1416.6	1439.5	1465.0	1486.3	1461.6	1440.4
1443.6	1440.4	1433.8	1427.2	1410.8	1410.8	1410.8	1410.8	1410.8	1414.1
1420.7	1424.0	1430.5	1433.8	1433.8	1433.8	1433.8	1433.8	1433.8	1433.8
1430.5	1420.7	1412.5	1410.8	1415.9	1442.9	1476.5	1476.5	1468.9	1438.9
1415.0	1377.7	1371.8	1350.0						

17

1375.0	1350.0	1389.7	1402.4	1410.6	1461.4	1467.2	1445.2	1427.1	1418.9
1417.9	1419.2	1423.4	1427.3	1432.1	1432.2	1428.9	1428.8	1430.5	1430.5
1430.5	1430.5	1430.5	1430.5	1430.5	1430.5	1430.5	1417.4	1423.7	1423.7
1414.1	1410.8	1416.3	1432.7	1454.6	1471.0	1476.5	1471.0	1449.3	1418.1
1374.5	1330.5	1394.8	1350.0						

18

1387.3	1388.4	1390.3	1421.1	1440.2	1440.8	1427.1	1416.3	1410.8	1410.8
1391.1	1391.9	1403.2	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1416.3	1432.1	1453.4	1470.4	1476.5	1473.2	1459.6	1432.9	1400.1
1351.1	1315.1	1393.1	1350.0						

19

1391.1	1400.0	1414.1	1421.2	1423.3	1416.3	1410.8	1410.8	1410.8	1403.9
1390.0	1391.2	1399.1	1410.2	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1416.7	1434.1	1451.7	1463.7	1465.5	1452.9	1433.3	1405.4	1372.6
1334.5	1312.4	1393.1	1350.0						

20

1400.0	1400.0	1412.4	1414.1	1412.5	1410.8	1410.8	1410.8	1410.0	1389.2
1388.3	1389.0	1397.4	1408.9	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1412.4	1417.8	1426.4	1437.9	1440.3	1427.2	1403.8	1372.6	1339.8
1317.9	1312.4	1393.1	1350.0						

21

1400.0	1400.0	1410.8	1410.8	1416.3	1424.0	1424.1	1416.0	1400.9	1383.4
1386.7	1387.9	1392.2	1399.9	1407.8	1408.9	1410.8	1410.8	1410.8	1410.8
1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1410.8	1410.8	1412.4	1419.4	1423.9	1416.9	1389.3	1345.4	1317.9
1312.4	1312.4	1393.1	1350.0						

22

1400.0	1415.0	1427.3	1436.1	1436.2	1435.1	1426.7	1417.6	1408.6	1396.5
1397.1	1394.3	1399.4	1403.1	1405.8	1409.4	1410.2	1410.8	1410.8	1410.8
1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1421.8	1416.5	1416.5
1424.0	1418.7	1410.8	1410.8	1412.4	1414.1	1404.9	1373.3	1342.6	1339.9
1345.5	1345.5	1388.8	1350.0						

23

1400.0	1400.0	1449.7	1449.9	1453.5	1452.1	1446.3	1437.6	1419.0	1416.0
1413.7	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1410.8	1410.8	1422.1	1433.8	1432.2	1428.9	1453.5	1440.8	1436.9
1436.1	1429.0	1421.9	1415.3	1410.8	1403.2	1386.3	1381.9	1384.9	1385.3
1388.1	1388.1	1389.6	1350.0						

24

1400.0	1400.0	1462.2	1463.0	1469.9	1471.8	1468.9	1453.5	1437.1	1430.5
1419.2	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1410.8	1415.7	1423.9	1435.3	1443.6	1454.9	1465.0	1465.5	1462.6
1464.1	1456.5	1443.9	1429.6	1416.4	1401.7	1389.6	1390.5	1395.4	1396.6
1398.7	1401.0	1410.2	1355.0						

25

1425.0	1425.0	1470.1	1476.4	1476.5	1476.5	1474.9	1465.5	1448.6	1435.4
1419.2	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1415.7	1423.9	1430.5	1438.6	1459.8	1467.1	1467.1	1467.1	1465.5
1463.9	1455.3	1453.0	1448.8	1432.4	1419.3	1408.8	1401.1	1397.7	1398.8
1403.1	1407.6	1421.0	1365.0						

26

1435.0	1430.0	1474.5	1474.3	1475.1	1476.4	1473.2	1461.7	1445.3	1433.4
1418.0	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1415.7	1423.9	1430.5	1438.6	1451.7	1462.3	1463.3	1463.9	1458.9
1456.4	1451.3	1452.4	1460.0	1458.7	1440.6	1425.7	1418.1	1414.2	1059.3
1415.8	1417.4	1423.3	1375.0						

27

1450.0	1445.0	1472.6	1472.1	1473.7	1475.1	1471.6	1459.2	1442.8	1430.1
1418.1	1411.9	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1415.7	1423.9	1430.5	1438.6	1451.7	1460.6	1461.7	1462.2	1463.9
1468.2	1473.4	1477.8	1472.6	1469.9	1463.6	1444.9	1433.9	1427.3	1091.1
1425.1	1425.1	1432.3	1395.0						

28

1472.9	1460.0	1471.0	1470.4	1471.8	1472.3	1471.6	1449.3	1436.5	1433.4
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1424.0	1418.3	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8	1410.8
1410.8	1415.7	1423.9	1430.5	1437.0	1442.0	1451.7	1462.7	1465.3	1480.0
1489.9	1498.9	1500.0	1495.7	1486.3	1478.3	1463.0	1450.9	1442.7	1107.3
1438.0	1437.5	1437.0	1400.0						

29

1478.1	1475.6	1473.9	1472.9	1472.2	1472.2	1459.3	1449.4	1440.1	1441.1
1434.6	1430.7	1427.2	1427.2	1425.6	1424.0	1424.0	1424.0	1424.0	1422.3
1420.7	1420.7	1422.3	1427.2	1432.1	1438.6	1448.5	1457.8	1458.8	1468.6
1483.3	1497.1	1496.6	1492.9	1488.5	1481.4	1468.4	1459.0	1454.1	1123.0
1442.3	1441.8	1441.0	1415.0						

30

1482.8	1481.0	1476.5	1476.5	1476.5	1468.0	1458.0	1448.0	1453.2	1455.8
1458.2	1450.3	1443.6	1445.3	1446.9	1448.5	1450.2	1450.2	1450.2	1451.8
1453.5	1453.5	1453.5	1451.9	1450.2	1447.0	1446.9	1456.7	1456.7	1462.7
1471.9	1480.7	1481.8	1481.3	1480.2	1475.9	1468.3	1462.3	1459.0	1456.3
1454.7	1454.7	1459.5	1425.0						

31

1482.2	1480.7	1476.5	1476.5	1468.0	1458.0	1458.0	1458.0	1458.0	1458.2
1459.1	1460.8	1462.5	1463.5	1463.4	1458.4	1455.1	1453.5	1453.5	1451.9
1450.2	1450.2	1450.2	1450.2	1450.2	1451.8	1453.5	1460.0	1458.4	1462.8
1469.8	1475.4	1476.5	1476.5	1476.5	1475.4	1470.5	1464.5	1462.2	1462.2
1462.2	1462.2	1469.2	1435.0						

32

1475.0	1475.0	1476.5	1473.8	1458.7	1458.3	1458.0	1458.0	1458.0	1458.0
1458.3	1459.8	1461.5	1462.5	1464.0	1465.5	1466.5	1466.6	1463.4	1460.0
1460.0	1460.0	1460.0	1460.0	1460.0	1460.0	1460.0	1466.1	1463.9	1465.5
1471.5	1476.5	1476.5	1476.5	1476.5	1476.5	1474.9	1472.7	1472.1	1472.1
1472.1	1472.1	1474.3	1440.0						

33

1450.0	1450.0	1476.5	1474.7	1459.3	1458.8	1458.3	1458.0	1458.0	1458.0
1458.0	1458.9	1460.5	1461.5	1462.5	1464.0	1465.5	1466.5	1467.5	1469.0
1469.9	1469.9	1469.9	1469.9	1469.9	1469.9	1469.9	1473.7	1471.1	1470.0
1474.8	1476.5	1476.5	1476.5	1476.5	1476.5	1476.5	1476.5	1476.5	1476.5
1476.5	1476.5	1476.5	1450.0						

34

1425.0	1425.0	1425.0	1425.0	1425.0	1425.0	1424.0	1423.0	1422.0	1421.0
1420.0	1421.0	1421.0	1421.0	1422.0	1422.0	1422.0	1423.0	1423.0	1423.0
1424.0	1424.0	1424.0	1424.0	1424.0	1424.0	1425.0	1425.0	1425.0	1425.0
1425.0	1425.0	1430.0	1430.0	1435.0	1440.0	1445.0	1447.0	1450.0	1465.0
1480.0	1483.3	1480.0	1460.0						

35

1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0
1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0
1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1013.5	1235.6	1229.2
1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0
1400.0	1400.0	1400.0	1400.0						

36

1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0
1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0
1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1234.2	1016.0	1002.0
1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0
1400.0	1400.0	1400.0	1400.0						

37

1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0
1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0	1400.0

38

39

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41

42

43

44

45

1

APPENDIX J. FILE "POTEN" USED TO DEFINE OVERBURDEN
AQUIFER POTENTIOMETRIC SURFACE ELEVATION IN FEET.

1
1533.3 1537.7 1544.8 1553.0 1559.6 1562.3 1563.4 1562.9 1561.8 1561.8
1561.8 1561.8 1561.8 1561.8 1562.8 1565.0 1565.6 1567.2 1568.3 1568.3
1568.9 1570.0 1570.5 1572.1 1573.8 1574.9 1576.5 1576.5 1576.5 1576.5
1577.1 1578.2 1578.2 1578.7 1579.8 1579.8 1580.3 1582.5 1589.0 1601.1
1608.2 1609.9 1609.9 1620.0

2
1533.9 1537.1 1543.1 1551.0 1557.1 1559.8 1560.6 1559.5 1558.2 1557.9
1561.7 1566.7 1558.5 1558.5 1559.3 1560.9 1561.5 1562.8 1563.7 1564.5
1565.8 1567.8 1568.9 1570.5 1571.9 1572.7 1572.7 1575.2 1576.5 1576.5
1576.2 1577.6 1578.2 1578.4 1579.0 1579.2 1580.1 1582.2 1589.6 1600.5
1607.1 1609.9 1609.9 1618.7

3
1533.6 1535.5 1539.5 1546.1 1550.2 1552.4 1553.2 1552.1 1550.2 1549.1
1555.0 1549.3 1551.9 1551.9 1552.2 1553.0 1553.8 1554.1 1553.8 1554.6
1556.3 1559.3 1561.7 1564.2 1566.4 1568.0 1568.9 1571.4 1572.6 1574.8
1574.3 1577.1 1578.7 1579.8 1580.1 1580.9 1581.5 1582.3 1587.6 1598.3
1606.0 1609.9 1609.9 1617.3

4
1531.1 1532.7 1535.4 1539.5 1541.7 1543.1 1543.6 1543.4 1542.3 1541.5
1545.2 1541.2 1544.5 1544.8 1545.4 1546.2 1548.3 1549.2 1549.2 1550.8
1553.0 1556.8 1561.2 1564.7 1568.3 1570.2 1576.5 1571.4 1569.0 1570.6
1575.7 1578.2 1580.6 1582.3 1582.3 1582.5 1581.7 1579.2 1582.5 1592.2
1603.2 1608.7 1608.7 1617.0

5
1529.2 1530.0 1531.4 1533.5 1534.9 1535.5 1535.5 1536.0 1537.9 1540.4
1538.9 1548.2 1546.4 1547.5 1548.9 1550.0 1551.9 1553.8 1555.5 1559.3
1563.9 1568.8 1574.0 1576.5 1578.4 1579.0 1583.0 1578.7 1576.6 1577.2
1580.7 1581.5 1583.6 1584.5 1583.1 1581.4 1579.3 1576.2 1580.6 1587.7
1598.0 1605.4 1605.4 1615.7

6
1530.6 1530.6 1530.9 1531.7 1532.2 1532.5 1533.3 1535.5 1541.8 1549.3
1546.6 1559.3 1557.4 1558.7 1559.8 1561.2 1562.3 1564.2 1567.2 1571.6
1576.0 1579.5 1582.8 1584.2 1584.7 1584.7 1586.3 1584.2 1583.1 1583.1
1584.7 1585.0 1586.1 1586.9 1584.8 1580.6 1577.6 1576.5 1581.4 1586.6
1593.1 1600.5 1600.5 1608.3

7
1533.9 1533.9 1533.9 1533.9 1533.9 1534.2 1536.1 1542.4 1552.5 1559.3
1559.1 1565.6 1564.8 1565.9 1566.7 1569.1 1571.3 1573.2 1576.0 1579.2
1582.0 1583.9 1585.8 1586.6 1587.2 1587.2 1588.0 1586.9 1586.4 1586.4
1587.2 1587.2 1587.5 1588.0 1586.4 1581.8 1577.6 1575.7 1579.2 1583.6
1586.8 1592.8 1592.8 1601.6

8
1536.3 1536.6 1537.2 1537.2 1537.2 1537.4 1541.5 1551.9 1559.8 1563.4
1564.0 1568.4 1568.9 1570.2 1571.6 1574.0 1576.2 1577.9 1579.5 1581.4
1583.9 1586.4 1588.0 1588.0 1588.0 1588.0 1588.0 1588.0 1588.0 1588.0
1588.0 1588.0 1588.0 1588.0 1587.5 1584.5 1579.6 1576.6 1576.8 1580.9
1582.8 1587.1 1587.1 1593.3

9
1540.3 1541.1 1543.2 1543.7 1544.4 1547.9 1555.9 1561.6 1565.2 1568.5
1568.4 1578.2 1578.2 1581.4 1581.4 1583.1 1580.7 1579.6 1581.1 1582.8
1585.1 1586.9 1587.8 1588.0 1588.0 1591.3 1594.6 1597.9 1599.5 1591.3
1590.3 1590.5 1590.5 1589.2 1588.8 1586.9 1581.8 1578.0 1579.3 1582.4
1584.4 1586.0 1586.0 1591.0

10

1539.8	1540.6	1541.8	1543.7	1543.9	1545.5	1550.8	1558.8	1563.3	1566.6
1568.3	1572.6	1573.6	1575.2	1576.2	1577.2	1578.8	1579.5	1580.5	1582.4
1584.1	1586.4	1588.0	1593.9	1588.0	1588.0	1588.0	1588.0	1589.6	1588.1
1589.9	1590.5	1590.5	1590.1	1588.8	1588.3	1585.1	1579.9	1577.9	1580.5
1583.5	1585.1	1585.1	1591.0						

11

1544.5	1545.3	1546.9	1549.3	1553.4	1557.5	1560.8	1564.8	1568.2	1571.4
1571.6	1574.4	1573.9	1575.5	1576.5	1577.5	1578.8	1579.8	1580.8	1582.4
1584.1	1585.7	1588.0	1593.9	1588.0	1589.6	1588.0	1588.0	1588.0	1589.6
1590.4	1591.2	1591.3	1591.3	1590.5	1588.9	1586.5	1580.9	1577.5	1580.5
1581.4	1582.2	1582.2	1590.0						

12

1546.0	1546.2	1547.7	1550.9	1555.0	1558.3	1561.6	1565.7	1569.0	1571.5
1573.1	1573.6	1574.9	1575.5	1576.5	1577.5	1578.8	1579.8	1580.8	1582.1
1583.4	1584.7	1586.0	1587.0	1588.0	1588.7	1588.0	1588.1	1588.0	1589.5
1589.6	1590.4	1591.2	1591.3	1590.5	1589.7	1588.9	1581.8	1575.2	1577.2
1580.5	1581.4	1581.4	1590.0						

13

1547.8	1548.6	1551.1	1553.5	1556.0	1559.2	1562.5	1566.6	1569.9	1571.6
1571.6	1574.5	1574.9	1575.5	1576.5	1577.5	1578.5	1579.8	1580.8	1582.1
1583.1	1584.1	1585.4	1586.0	1587.0	1588.0	1588.0	1588.0	1588.0	1588.0
1590.4	1591.3	1592.9	1593.0	1591.3	1590.5	1589.7	1581.6	1577.5	1574.9
1579.7	1581.4	1581.4	1588.0						

14

1546.6	1548.2	1549.8	1552.3	1554.8	1557.6	1560.9	1564.5	1568.2	1570.7
1571.6	1573.8	1574.9	1575.5	1576.5	1577.2	1574.9	1579.5	1580.5	1581.8
1582.8	1583.7	1584.7	1585.7	1586.7	1587.3	1588.0	1588.0	1588.0	1588.0
1589.2	1590.9	1592.1	1593.0	1592.2	1590.9	1590.1	1585.7	1579.5	1576.2
1577.2	1580.6	1580.6	1587.0						

15

1549.5	1551.1	1554.3	1556.0	1557.6	1560.1	1563.3	1567.4	1569.9	1571.6
1594.6	1588.0	1574.9	1574.9	1576.5	1578.1	1578.2	1579.8	1580.6	1581.4
1581.4	1583.1	1583.9	1584.7	1585.5	1586.3	1588.0	1588.0	1588.0	1588.0
1591.2	1592.9	1594.5	1594.6	1593.0	1591.3	1589.7	1583.2	1580.7	1579.1
1577.3	1578.1	1578.1	1587.0						

16

1551.1	1552.7	1556.0	1557.6	1559.3	1560.9	1563.4	1568.3	1569.9	1571.6
1584.7	1581.5	1578.2	1574.9	1576.5	1578.1	1579.0	1580.6	1581.4	1582.3
1582.3	1583.9	1583.9	1584.7	1585.5	1586.4	1588.0	1588.0	1588.0	1589.6
1590.4	1592.1	1594.5	1594.6	1593.8	1592.1	1589.7	1586.4	1583.1	1581.4
1577.4	1574.9	1574.9	1585.7						

17

1550.5	1551.6	1553.8	1556.6	1558.2	1559.8	1561.8	1565.0	1568.9	1570.5
1572.1	1573.4	1574.3	1574.9	1575.4	1577.1	1578.4	1579.5	1580.9	1581.7
1582.3	1582.8	1583.9	1584.2	1585.0	1585.8	1586.9	1586.9	1586.9	1588.5
1589.3	1591.0	1592.9	1594.6	1594.3	1593.2	1591.3	1588.6	1585.3	1582.6
1580.1	1576.6	1576.6	1581.6						

18

1551.4	1552.5	1554.4	1556.5	1558.5	1560.7	1562.3	1564.7	1568.0	1569.7
1571.6	1572.4	1573.8	1574.9	1575.4	1577.1	1578.7	1580.3	1581.4	1582.0
1583.1	1583.6	1584.7	1585.0	1585.8	1586.4	1586.4	1586.7	1586.9	1588.0
1587.7	1589.1	1590.4	1592.3	1593.2	1593.7	1593.0	1590.8	1588.6	1585.3
1582.3	1579.8	1579.8	1582.7						

19

1551.9	1552.5	1554.1	1555.7	1557.6	1559.8	1561.5	1563.6	1566.4	1568.0
1570.5	1571.7	1573.0	1574.3	1575.1	1576.2	1577.9	1579.5	1580.9	1581.7
1582.3	1582.5	1583.4	1584.2	1584.7	1585.0	1585.3	1586.0	1586.3	1586.4
1586.9	1588.3	1589.4	1590.7	1591.5	1592.4	1592.6	1591.6	1589.6	1587.2
1584.7	1583.1	1583.1	1586.0						

20

1552.2	1552.7	1553.5	1555.7	1557.4	1559.0	1560.4	1561.7	1564.2	1566.4
1568.8	1569.5	1571.3	1573.0	1574.1	1574.6	1576.0	1577.1	1578.7	1579.8
1580.1	1580.9	1581.7	1582.3	1582.5	1583.4	1583.6	1584.7	1585.2	1586.3
1586.1	1587.7	1589.3	1590.5	1590.7	1591.3	1591.0	1590.2	1589.1	1587.5
1586.1	1585.6	1585.6	1585.0						

21

1551.3	1551.3	1551.3	1554.3	1556.5	1558.2	1559.6	1560.4	1561.7	1563.9
1567.2	1568.4	1569.4	1570.5	1571.9	1573.0	1574.1	1574.6	1576.0	1576.5
1577.1	1578.7	1580.1	1580.6	1581.2	1582.3	1582.5	1583.2	1583.6	1584.7
1585.3	1586.6	1587.7	1588.8	1589.3	1590.7	1591.0	1590.2	1589.4	1588.6
1587.7	1587.2	1587.2	1582.7						

22

1550.0	1548.9	1548.6	1551.3	1554.3	1556.5	1557.9	1558.7	1559.5	1560.6
1564.4	1564.9	1566.7	1567.2	1569.9	1573.5	1574.3	1575.1	1576.0	1576.8
1576.8	1576.0	1577.1	1578.4	1579.5	1580.6	1581.4	1582.2	1582.5	1584.7
1584.4	1585.5	1586.1	1587.4	1588.3	1589.3	1590.5	1590.2	1589.6	1589.4
1588.8	1588.8	1588.8	1583.3						

23

1548.9	1547.3	1546.4	1548.3	1551.9	1553.8	1554.6	1555.7	1556.8	1557.1
1560.6	1557.6	1561.2	1562.6	1565.6	1568.6	1569.7	1571.0	1572.1	1573.8
1574.6	1574.3	1575.4	1576.8	1577.9	1579.3	1580.3	1581.1	1581.4	1582.0
1582.8	1584.2	1585.3	1586.9	1588.0	1588.3	1588.8	1589.1	1589.9	1590.5
1590.2	1589.6	1589.6	1584.7						

24

1546.7	1545.6	1544.2	1545.0	1548.6	1550.5	1551.3	1551.9	1551.9	1551.9
1555.1	1550.3	1553.0	1554.4	1556.3	1557.6	1560.6	1563.9	1565.8	1568.0
1569.9	1572.4	1574.6	1576.0	1576.8	1577.9	1578.7	1579.8	1580.3	1581.4
1582.0	1583.6	1585.0	1586.1	1587.2	1587.4	1588.0	1588.5	1590.2	1591.3
1591.0	1590.2	1590.2	1581.6						

25

1545.1	1544.0	1542.3	1542.0	1544.2	1546.1	1547.8	1547.5	1547.0	1547.0
1548.6	1546.1	1547.3	1548.1	1549.2	1551.9	1557.3	1562.3	1564.2	1566.4
1568.0	1570.2	1573.0	1574.6	1576.0	1576.8	1578.7	1578.7	1578.7	1580.3
1582.0	1583.3	1584.2	1585.0	1585.8	1586.6	1587.4	1588.3	1589.1	1589.9
1590.7	1591.0	1591.0	1582.7						

26

1544.0	1542.1	1540.1	1539.9	1540.7	1542.0	1543.7	1543.7	1543.7	1543.7
1545.3	1543.2	1545.1	1546.4	1547.5	1550.8	1556.8	1560.9	1563.1	1565.0
1567.2	1569.1	1571.3	1573.0	1574.6	1575.7	1577.1	1578.1	1578.7	1580.3
1581.1	1582.5	1583.6	1584.7	1585.0	1585.8	1586.6	1587.4	1585.0	1584.3
1583.8	1583.3	1583.3	1583.3						

27

1542.3	1540.4	1538.2	1537.7	1539.3	1540.7	1541.2	1541.2	1541.2	1541.2
1542.1	1543.4	1545.6	1546.7	1548.6	1551.9	1556.3	1559.6	1562.3	1564.2
1566.4	1568.0	1569.4	1570.5	1572.1	1573.5	1575.4	1576.5	1577.0	1578.7
1579.8	1581.7	1582.8	1584.2	1584.7	1585.3	1586.4	1586.9	1585.0	1583.3
1583.2	1582.7	1582.3	1582.3						

28

1538.5	1537.7	1536.6	1536.0	1537.4	1537.9	1537.9	1537.9	1538.2	1539.0
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1541.0	1544.1	1546.4	1547.5	1549.7	1553.0	1556.0	1558.5	1560.7	1562.3
1563.9	1565.6	1566.9	1568.0	1569.7	1571.3	1572.7	1574.5	1575.4	1577.0
1578.4	1580.9	1582.0	1583.6	1584.7	1585.0	1585.8	1586.6	1585.0	1583.0
1583.0	1582.5	1582.0	1582.0						

29

1543.7	1541.2	1539.5	1538.5	1537.8	1537.8	1538.0	1538.0	1538.5	1539.5
1540.8	1542.8	1544.4	1545.9	1547.5	1549.0	1551.0	1553.0	1555.0	1557.0
1559.0	1561.0	1563.0	1565.0	1566.5	1568.0	1569.5	1569.7	1570.3	1572.9
1575.6	1579.1	1580.8	1581.8	1582.3	1582.3	1582.3	1582.3	1582.3	1582.3
1582.3	1581.8	1581.0	1580.7						

30

1542.8	1541.0	1539.5	1538.5	1538.0	1538.0	1538.0	1538.0	1538.2	1538.8
1540.1	1541.8	1543.5	1544.5	1546.0	1547.5	1549.0	1551.0	1553.0	1555.0
1557.0	1559.0	1561.0	1563.0	1564.5	1565.0	1566.0	1567.0	1568.0	1570.0
1571.8	1575.4	1578.5	1580.5	1581.3	1581.3	1581.3	1581.3	1581.3	1581.3
1581.0	1580.5	1579.5	1578.7						

31

1542.2	1540.7	1539.5	1538.5	1538.0	1538.0	1538.0	1538.0	1538.0	1538.2
1539.1	1540.8	1542.5	1543.5	1544.5	1546.0	1547.5	1549.0	1551.0	1553.0
1555.0	1556.5	1558.0	1559.5	1561.0	1562.5	1563.5	1563.6	1564.8	1567.0
1568.5	1571.0	1573.4	1576.0	1577.3	1579.0	1580.3	1580.3	1580.3	1579.7
1578.5	1577.0	1574.7	1573.3						

32

1541.7	1540.5	1539.5	1538.8	1538.7	1538.3	1538.0	1538.0	1538.0	1538.0
1538.3	1539.8	1541.5	1542.5	1544.0	1545.5	1546.5	1547.5	1549.0	1551.0
1553.0	1554.5	1555.5	1556.5	1558.0	1559.5	1560.5	1560.8	1561.6	1563.6
1564.5	1566.8	1568.8	1570.0	1570.1	1571.6	1573.6	1574.3	1574.6	1574.3
1573.1	1571.8	1570.2	1569.0						

33

1541.5	1540.5	1539.8	1539.7	1539.3	1538.8	1538.3	1538.0	1538.0	1538.0
1538.0	1538.9	1540.5	1541.5	1542.5	1544.0	1545.5	1546.5	1547.5	1549.0
1550.5	1551.5	1553.0	1555.0	1556.5	1557.0	1558.0	1558.3	1559.1	1560.3
1561.3	1562.8	1564.1	1564.3	1562.2	1561.8	1564.4	1566.4	1568.0	1568.6
1568.3	1568.0	1567.3	1566.7						

34

1541.2	1540.5	1540.0	1539.7	1539.2	1539.0	1538.8	1538.3	1538.0	1538.0
1538.0	1538.5	1539.5	1541.0	1542.5	1543.5	1544.5	1545.5	1546.0	1546.5
1548.0	1549.5	1550.5	1551.5	1553.0	1554.5	1556.0	1554.2	1555.8	1557.3
1557.5	1558.5	1558.8	1557.5	1552.5	1551.1	1556.1	1560.3	1562.0	1562.3
1562.6	1563.3	1563.5	1563.3						

35

1540.3	1540.2	1540.0	1539.8	1539.7	1539.7	1539.3	1538.8	1538.3	1538.0
1538.0	1538.4	1539.0	1539.5	1540.5	1542.0	1543.5	1544.5	1545.0	1545.5
1546.5	1547.5	1549.0	1550.0	1550.5	1551.0	1551.5	1093.5	1315.6	1309.2
1552.3	1552.3	1551.3	1547.7	1543.6	1544.4	1549.4	1553.8	1556.6	1558.3
1559.1	1560.1	1560.7	1560.7						

36

1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1539.8	1539.7	1539.5	1539.3
1538.7	1538.4	1538.5	1539.0	1539.5	1540.5	1542.0	1543.5	1544.0	1544.5
1545.0	1545.5	1546.5	1547.5	1548.5	1549.5	1550.0	1314.2	1096.0	1082.0
1543.4	1543.3	1542.8	1541.3	1540.3	1541.0	1542.4	1543.8	1544.9	1545.7
1546.1	1546.4	1546.6	1546.6						

37

1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1540.0
1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1540.0	1540.0

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J-5

APPENDIX K. FILE "THICK" USED TO DEFINE SATURATED THICK-
NESS OF OVERBURDEN AQUIFER IN FEET.

1									
120.0	111.0	100.0	95.0	85.0	80.0	70.0	60.0	55.0	45.0
40.0	35.0	25.0	20.0	15.0	10.0	5.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	5.0	15.0	20.0	20.0	23.0
25.0	28.0	30.0	33.0	35.0	37.0	38.0	40.0	43.0	45.0
45.0	45.0	45.0	45.0						
2									
120.0	111.0	100.0	95.0	85.0	80.0	70.0	60.0	55.0	45.0
40.0	35.0	25.0	20.0	15.0	10.0	5.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	5.0	15.0	20.0	20.0	23.0
25.0	28.0	30.0	33.0	35.0	37.0	38.0	40.0	43.0	45.0
45.0	45.0	45.0	45.0						
3									
120.0	111.0	100.0	95.0	85.0	80.0	70.0	60.0	55.0	45.0
40.0	35.0	25.0	20.0	15.0	10.0	5.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	5.0	15.0	20.0	20.0	23.0
25.0	28.0	30.0	33.0	35.0	37.0	38.0	40.0	43.0	45.0
45.0	45.0	45.0	45.0						
4									
124.7	121.4	114.8	108.3	98.4	88.6	82.0	65.6	59.1	55.8
42.7	36.1	32.8	26.2	23.0	19.7	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	16.4	16.4	19.7	23.0	23.0	26.2
29.5	32.8	36.1	39.4	42.7	42.7	45.9	49.2	49.2	55.8
50.0	50.0	50.0	50.0						
5									
131.2	124.7	121.4	114.8	108.3	98.4	85.3	82.0	65.6	59.1
52.5	45.9	42.7	39.4	36.1	26.2	23.0	19.7	0.0	0.0
0.0	0.0	0.0	16.4	16.4	19.7	23.0	26.2	26.2	29.5
32.8	36.1	39.4	42.7	42.7	45.9	49.2	52.5	52.5	59.1
55.0	55.0	55.0	55.0						
6									
134.5	131.2	124.7	121.4	114.8	105.0	91.9	88.6	78.7	65.6
55.8	52.5	49.2	45.9	42.7	39.4	36.1	32.8	19.7	9.8
0.0	0.0	9.8	16.4	19.7	23.0	26.2	26.2	26.2	32.8
36.1	39.4	39.4	42.7	45.9	49.2	49.2	52.5	59.1	65.6
57.0	57.0	57.0	57.0						
7									
141.1	134.5	131.2	124.7	118.1	114.8	105.0	95.1	85.3	68.9
55.8	49.2	49.2	45.9	42.7	39.4	36.1	32.8	16.4	0.0
0.0	6.6	13.1	16.4	19.7	19.7	23.0	26.2	26.2	32.8
36.1	39.4	42.7	42.7	45.9	52.5	55.8	59.1	65.6	78.7
70.0	70.0	70.0	70.0						
8									
141.1	137.8	131.2	131.2	121.4	118.1	111.6	101.7	88.6	65.6
49.2	45.9	45.9	42.7	39.4	32.8	26.2	16.4	13.1	8.2
0.0	0.0	3.3	13.1	16.4	19.7	23.0	26.2	26.2	32.8
32.8	39.4	45.9	49.2	52.5	55.8	59.1	65.6	82.0	82.0
80.0	80.0	80.0	80.0						
9									
144.4	141.1	137.8	131.2	124.7	121.4	114.8	105.0	88.6	65.6
45.9	36.1	32.8	32.8	26.2	21.3	15.7	13.1	8.2	5.6
0.0	0.0	0.0	0.0	9.8	16.4	19.7	23.0	24.6	29.5
32.8	39.4	45.9	49.2	52.5	59.1	65.6	82.0	82.0	82.0
80.0	80.0	80.0	80.0						

10									
144.4	141.1	137.8	134.5	128.0	121.4	114.8	105.0	82.0	42.7
39.4	32.8	26.2	23.0	26.2	32.8	36.1	39.4	36.1	26.2
13.1	3.3	0.0	0.0	0.0	3.3	19.7	23.0	26.2	32.8
36.1	41.0	47.6	55.8	59.1	75.5	82.0	82.0	82.0	82.0
80.0	80.0	80.0	80.0						
11									
147.6	144.4	141.1	137.8	131.2	121.4	114.8	105.0	75.5	45.9
39.4	32.8	29.5	26.2	32.8	39.4	42.7	45.9	45.9	39.4
26.2	6.6	0.0	0.0	0.0	3.3	16.4	29.5	32.8	36.1
39.4	42.7	49.2	59.1	65.6	82.0	82.0	82.0	82.0	75.5
75.0	75.0	75.0	75.0						
12									
147.6	144.4	141.1	137.8	131.2	121.4	114.8	101.7	78.7	49.2
39.4	39.4	32.8	29.5	42.7	42.7	45.9	55.8	49.2	49.2
42.7	23.0	6.6	9.8	19.7	23.0	36.1	42.7	35.4	37.7
41.0	45.9	51.5	64.0	82.0	82.0	78.7	75.5	75.5	65.6
65.0	65.0	65.0	65.0						
13									
147.6	147.6	144.4	141.1	131.2	121.4	114.8	98.4	82.0	49.2
49.2	45.9	42.7	45.9	49.2	49.2	62.3	72.2	65.6	62.3
55.8	42.7	42.7	39.4	42.7	49.2	52.5	52.5	50.9	49.2
49.2	49.2	60.7	82.0	82.0	72.2	72.2	72.2	68.9	49.2
60.0	60.0	60.0	60.0						
14									
150.9	147.6	144.4	141.1	137.8	124.7	114.8	98.4	82.0	73.8
72.2	65.6	59.1	59.1	62.3	72.2	75.5	75.5	75.5	72.2
68.9	65.6	52.5	49.2	52.5	55.8	55.8	55.8	57.4	57.4
57.4	62.3	82.0	98.4	65.6	55.8	59.1	59.1	55.8	49.2
60.0	60.0	60.0	60.0						
15									
154.2	150.9	147.6	141.1	137.8	124.7	108.3	82.0	98.4	111.6
118.1	121.4	118.1	114.8	98.4	111.6	105.0	106.6	101.7	98.4
88.6	82.0	80.4	78.7	78.7	78.7	78.7	82.0	82.0	91.9
98.4	114.8	121.4	98.4	49.2	49.2	49.2	49.2	49.2	49.2
60.0	60.0	60.0	60.0						
16									
164.1	154.2	150.9	147.6	141.1	121.4	98.4	82.0	108.3	131.2
141.1	141.1	144.4	141.1	141.1	141.1	141.1	141.1	131.2	131.2
131.2	121.4	114.8	101.7	101.7	101.7	101.7	105.0	108.3	111.6
114.8	131.2	131.2	82.0	49.2	49.2	49.2	49.2	49.2	49.2
60.0	60.0	60.0	60.0						
17									
164.1	164.1	164.1	154.2	147.6	98.4	75.5	88.6	121.4	144.4
154.2	154.2	150.9	147.6	141.1	137.8	131.2	121.4	121.4	131.2
131.2	131.2	131.2	121.4	118.1	114.8	114.8	114.8	118.1	131.2
131.2	131.2	108.3	65.6	52.5	55.8	59.1	55.8	52.5	65.6
80.0	80.0	80.0	80.0						
18									
164.1	164.1	164.1	131.2	82.0	65.6	82.0	105.0	131.2	147.6
180.5	180.5	170.6	157.5	141.1	114.8	98.4	82.0	98.4	114.8
131.2	147.6	147.6	147.6	144.4	141.1	141.1	141.1	141.1	141.1
141.1	134.5	98.4	65.6	75.5	78.7	75.5	82.0	82.0	72.2
80.0	80.0	80.0	80.0						
19									

160.8	147.6	98.4	65.6	65.6	82.0	95.1	114.8	141.1	164.1
180.5	180.5	173.9	164.1	147.6	131.2	118.1	118.1	118.1	131.2
147.6	150.9	164.1	164.1	164.1	164.1	164.1	157.5	157.5	154.2
147.6	137.8	98.4	65.6	49.2	82.0	88.6	108.3	49.2	32.8
40.0	40.0	40.0	40.0						
20									
131.2	82.0	52.5	65.6	82.0	98.4	114.8	137.8	154.2	177.2
180.5	180.5	173.9	164.1	154.2	150.9	147.6	147.6	147.6	147.6
147.6	147.6	147.6	147.6	147.6	147.6	147.6	147.6	147.6	147.6
147.6	141.1	131.2	91.9	88.6	95.1	114.8	164.1	147.6	98.4
90.0	90.0	90.0	90.0						
21									
65.6	49.2	65.6	82.0	98.4	114.8	131.2	144.4	160.8	180.5
180.5	180.5	177.2	170.6	164.1	164.1	160.8	157.5	154.2	150.9
147.6	147.6	147.6	147.6	147.6	147.6	147.6	147.6	147.6	147.6
147.6	141.1	137.8	121.4	118.1	121.4	147.6	187.0	187.0	164.1
150.0	150.0	150.0	150.0						
22									
49.2	62.3	82.0	101.7	118.1	121.4	131.2	141.1	150.9	164.1
167.3	170.6	167.3	164.1	164.1	164.1	164.1	154.2	154.2	150.9
147.6	147.6	147.6	147.6	147.6	144.4	144.4	144.4	144.4	141.1
137.8	121.4	118.1	114.8	118.1	137.8	164.1	200.1	213.3	213.3
200.0	200.0	200.0	200.0						
23									
65.6	82.0	82.0	98.4	98.4	101.7	108.3	118.1	137.8	141.1
144.4	144.4	141.1	141.1	141.1	137.8	137.8	134.5	131.2	131.2
131.2	131.2	131.2	128.0	128.0	128.0	128.0	124.7	124.7	121.4
118.1	114.8	114.8	121.4	114.8	131.2	154.2	180.5	187.0	196.9
200.0	200.0	200.0	200.0						
24									
82.0	82.0	82.0	82.0	78.7	78.7	78.7	98.4	114.8	121.4
121.4	121.4	121.4	118.1	118.1	114.8	114.8	114.8	114.8	114.8
114.8	114.8	114.8	114.8	114.8	114.8	114.8	114.8	114.8	114.8
114.8	114.8	131.2	131.2	114.8	121.4	150.9	164.1	173.9	180.5
180.0	180.0	180.0	180.0						
25									
82.0	75.5	72.2	65.6	65.6	65.6	65.6	82.0	98.4	111.6
111.6	111.6	111.6	111.6	111.6	111.6	111.6	111.6	111.6	111.6
111.6	111.6	111.6	111.6	111.6	111.6	111.6	111.6	111.6	114.8
118.1	128.0	131.2	131.2	121.4	114.8	137.8	154.2	157.5	164.1
170.0	170.0	170.0	170.0						
26									
65.6	65.6	65.6	65.6	65.6	65.6	65.6	82.0	98.4	108.3
108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3
108.3	108.3	111.6	111.6	111.6	111.6	114.8	114.8	114.8	121.4
124.7	131.2	131.2	124.7	121.4	114.8	131.2	147.6	150.9	525.0
160.0	160.0	160.0	160.0						
27									
65.6	65.6	65.6	65.6	65.6	65.6	65.6	82.0	98.4	105.0
105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	108.3
111.6	111.6	114.8	114.8	114.8	114.8	114.8	114.8	114.8	114.8
111.6	108.3	105.0	111.6	114.8	114.8	118.1	134.5	141.1	492.2
150.0	150.0	150.0	150.0						
28									
65.6	65.6	65.6	65.6	65.6	65.6	65.6	88.6	101.7	101.7

101.7	101.7	101.7	101.7	101.7	101.7	101.7	101.7	101.7	101.7
98.4	98.4	98.4	95.1	91.9	88.6	88.6	88.6	85.3	85.3
82.0	82.0	82.0	85.3	98.4	105.0	111.6	121.4	131.2	475.7
145.0	145.0	145.0	145.0						
29									
65.6	65.6	65.6	65.6	65.6	65.6	78.7	88.6	98.4	98.4
98.4	95.1	91.9	88.6	88.6	88.6	88.6	85.3	82.0	82.0
82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
82.0	82.0	82.0	82.0	82.0	98.4	108.3	114.8	118.1	459.3
140.0	140.0	140.0	140.0						
30									
60.0	60.0	60.0	60.0	60.0	70.0	80.0	90.0	85.0	83.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	85.0	90.0	100.0	115.0	120.0
120.0	120.0	120.0	120.0						
31									
60.0	60.0	60.0	60.0	70.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	85.0	95.0	100.0	105.0
105.0	105.0	105.0	105.0						
32									
60.0	60.0	60.0	65.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0						
33									
60.0	60.0	60.0	65.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0						
34									
60.0	60.0	60.0	65.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0						
35									
60.0	60.0	60.0	65.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0						
36									
60.0	60.0	60.0	65.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0						
37									
60.0	60.0	60.0	65.0	80.0	80.0	80.0	80.0	80.0	80.0
80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

[illegible]

APPENDIX L. FORTRAN SOURCE CODE FILE "EX211B" USED FOR 211
PUMP TEST CALIBRATION.

```

C$  DEBUG
C$  ARRAYS
PROGRAM SHROOK(INPUT,OUTPUT,D2,D3,NODES2,NODES3,OUTP,HEADS,TEMP,HI
$NPLN,POTEN,BOTOM,THICK,EXTBDY,RECHRG,PERMEA,DDD,DD,
$TAPE5=INPUT,TAPE14=OUT
$P,DEBUG=OUTPUT,TAPE10
$=I2,TAPE11=D3,TAPE12=NODES2,TAPE13=NODES3,TAPE15=HEADS,TAPE16=MIMP
$LN,TAPE6=OUTPUT,TAPE19=TEMP,TAPE21=POTEN,TAPE22=BOTOM,TAPE23=THICK
$,TAPE24=EXTBDY,TAPE25=RECHRG,TAPE26=PERMEA,
$TAPE96=DDD,TAPE97,TAPE98=DD,TAPE99)
COMMON H3(16,05,12),H03(16,05,12),H2(44,45),H02(44,45),Q2(44,45),Q
$3(16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12
$),TI2(44,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,
$05,12)
COMMON /STOR2D/ SA,SWT
DIMENSION TITLE(8),QD(16,05,12),DTME(9),APHA(8)
LOGICAL HINIT,ANS,OBSINK,RDDEL,PRNT
DATA SA,SWT/0.0001,0.15/
DATA XSF12/1.0/
DATA NSTEPS,DELTA,ACCDEL/9,1.,1./
DATA DTME/.1,5,1.,2.,3.,4.,5.,6.,7./
DATA TITLE/8*10H /
DATA HINIT,OBSINK/,FALSE.,.TRUE./
WRITE(98,756)
756 FORMAT('ENTER OBSW :')
WRITE(99,757)
757 FORMAT('ENTER COMW :')
WRITE(96,956)
956 FORMAT('ENTER OBSO :')
WRITE(97,957)
957 FORMAT('ENTER COMO :')
ERRMEA=0.0

C
C  OUTPUT BANNER WITH DATE AND TIME
C
PRINT*, ' EXXON-CRANDON 211 PUMP TEST'
CALL DATE(KMDDYY) $ CALL TIME(HHMMSS)
PRINT8820,KMDDYY,HHMMSS
8820 FORMAT(2A10)
WRITE(10,8820) KMDDYY,HHMMSS
WRITE(11,8820) KMDDYY,HHMMSS

C
C  READ AND ECHO USER-SUPPLIED TITLE
C
PRINT*, ' INPUT A TITLE FOR THIS RUN(<=80 CHARACTERS) '
READ7701,TITLE
IF(EOF(5).NE.0.0) GO TO 7703
7701 FORMAT(8A10)
7703 WRITE(14,7701)TITLE
WRITE(10,7701) TITLE
WRITE(11,7701) TITLE

C
C  DETERMINE IF DETAILED PRINTED IS DESIRED
C

```

```

C   FRNT=.FALSE.
C   PRINT*, ' DO YOU WANT DETAILED PRINTING ',PRNT,
C   READ*,PRNT
C   IF(EOF(5).NE.0.0) CONTINUE
C
C   SET GRID SIZES FOR BOTH MODELS
C   DEFINE OREBODY CONNECTION RECTANGLE
C
C   NC2=44
C   NR2=45
C   NC3=16
C   NR3=05
C   NL=12
C   IC3=13
C   JR3=10
C   IC3=IC3-1
C   JR3=JR3-1
C
C   INITIALIZE HEAD AND OREBODY FLOW ARRAYS FOR
C   2-D FLOW MODEL
C
C   DO 79 II=1,NC2
C   DO 80 J=1,NR2
C   H2(II,J)=0.0
C   Q2(II,J)=0.0
C   80 CONTINUE
C   79 CONTINUE
C
C   CHECK FOR 2-D HEAD FILE INITIALIZATION
C
C   PRINT*, ' IS A 2-D MODEL DRAWDOWN INITIALIZATION ARRAY TO BE INPUT'
C   READ*,HINIT
C   IF(EOF(5).NE.0.0) CONTINUE
C   IF(.NOT.HINIT) GO TO 609
C   READ(15,*) ((H2(I,J),I=1,NC2),J=1,NR2)
C   609 CONTINUE
C
C   INITIALIZE HEAD FOR 3-D OREBODY MODEL
C
C   DO 69 I=1,NC3
C   DO 69 J=1,NR3
C   DO 69 K=1,NL
C   69 H3(I,J,K)=0.0
C
C   ECHO MODEL GRID SIZES
C
C   WRITE(10,*) NC2,NR2
C   WRITE(11,*) NC3,NR3,NL
C
C   CHECK FOR A SINK SUBROUTINE FOR CALIBRATION
C
C   PRINT*, ' IS AN OREBODY SINK SCHEME DESIRED'
C   READ*,OBSINK
C   IF(EOF(5).NE.0.0) CONTINUE
C

```

```

C      INITIALIZE TIME AND NO. OF SIMULATION TIME ITERATIONS
C
TME=0.0
NIT=0

C
C      INPUT TIME SEQUENCING PARAMETERS AND VARIABLES
C      DEFAULTS ARE DEFINED IN DATA STATEMENTS
C
PRINT*, ' INPUT THE NO. OF TIME STEPS, '
PRINT*, '  AND THE TIME STEP ACCELERATION FACTOR(=1 FOR UNIFORM)'
RDEL=.FALSE.
READ*, NSTEPS, ACCDEL
IF (EOF(5).NE.0.0) GO TO 77788
RDEL=.TRUE.
77788 CONTINUE
PRINT*, ' INPUT THE TIME INCREMENT SCHEME'
READ*, (DTKE(I), I=1, NSTEPS)
IF (EOF(5).NE.0.0) CONTINUE
PRINT*, (DTKE(I), I=1, NSTEPS)

C
C      SET 2D MODEL STORAGE PARAMETERS
C
PRINT*, ' ENTER ARTESIAN AND WATER TABLE STORAGE COEFFS. ', SA, SWT,
READ*, SA, SWT
IF (EOF(5).NE.0.0) CONTINUE

C
C      INPUT THE MULTIPLIER FOR 2D MODEL STORAGE
C      DEFAULT IS 1.0
C
PRINT*, ' INPUT THE PLASM STORAGE FACTOR MULTIPLIER'
READ*, XSF12
IF (EOF(5).NE.0.0) CONTINUE

C
C      READ AND ECHO PARAMETERS FROM PRE-PROCESSOR OUTPUT
C      SCRATCH FILE
C
READ(19,*) PW, PL, PH, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CH, CS, PHW, PWB, PGD,
$ PSD
WRITE(10,191) PW, PL, PH, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CH, CS, PHW, PWB, P
$ GD, PSD, XSF12
WRITE(11,191) PW, PL, PH, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CH, CS, PHW, PWB, P
$ GD, PSD, XSF12
191 FORMAT(' (PW,PL,PH,PS)=', 4F12.5, '/', ' (ANTI,ANTJ,ANR)=', 3F12.5, '/', ' S
$ SPECIFIC STORAGE OF DREBODY =', E20.5, '/', ' (CW,CL,CH,CS)=', 4F12.5, '/', '
$ (PHW,PWB,PGD,PSD)=', 4F12.5, '/', ' 2-D STORAGE MULTIPLIER =', F12.5)

C
C      START OF SIMULATION LOOP
C
TO=0.0
DO 11 ISTEP=1, NSTEPS
PRINT*, ' '
IF (PRNT) PRINT*, '#####'
NIT=NIT+1
C      TME=TME+DELTA
      TME=DTKE(ISTEP)

```

```

      PRINT*, ' TIME = ',TME
      DELTA=TME-T0
      IF(DELTA.LE.0.0) PRINT*, ' DELTA<=0.0, ILLEGAL TIME SCHEME'
      IF(DELTA.LE.0.0)STOP
      T0=TME
C
C      UPDATE THE INITIAL VALUE HEAD ARRAY FOR
C      3D MODEL
C
      DO 91 I=1,NC3
      DO 91 J=1,NR3
      DO 91 K=2,NL
91 H03(I,J,K)=H3(I,J,K)
C
C      PERFORM HEAD CONNECTION BETWEEN 3D AND 2D MODELS
C      FOR 3D SIMULATION
C
      DO 92 I=1,NC3
      DO 92 J=1,NR3
92 H03(I,J,1)=H3(I,J,1)=H2(I+IC3,J+JR3)
C
C      ENTER 3D MODEL
C
      CALL DIM3(NC3,NR3,NL,DELTA,TME,NIT,ORBSINK,IC3,JR3,QD,
$NC2,NR2,PRNT,NSTEPS,ISTEP)
C
C      SUM THE FLOW THRU THE RESISTIVE LAYER AND
C      PERFORM FLOW CONNECTION BETWEEN 2D AND 3D MODEL
C      FOR 2D SIMULATION
C
      Q2TOT=0.0
      DO 401 I=1,NC3
      DO 401 J=1,NR3
      Q2(I+IC3,J+JR3)=QD(I,J,2)
      Q2TOT=Q2TOT+Q2(I+IC3,J+JR3)
401 CONTINUE
C
C      UPDATE THE INITIAL VALUE HEAD ARRAY FOR
C      2D MODEL
C
      DO 81 I=1,NC2
      DO 81 J=1,NR2
81 H02(I,J)=H2(I,J)
      IF(ABS(Q2TOT).LE.1.0)PRINT*, ' NO CONNECTION BETWEEN OREBODY AND GL
$ACIAL MODELS'
      IF(ABS(Q2TOT).GT.1.0) CALL PLASH(NC2,NR2,DELTA,TME,NIT,XSF12,ISTEP
$,Q2TOT,PRNT,NSTEPS)
      DELTA=DELTA*ACCDDEL
C
C      COMPARE OBSERVED AND COMPUTED WITH CALIBRATION
C      ROUTINE
C
      CALL CALIB(ISTEP,DTIME,NR3,ERRHEA,IC3,JR3,NL)
      PRINT*, ' ACC % ERROR FROM OBSERVED ',ERRHEA,' %'
C

```

```

C      QUERY INTERACTIVE USER FOR PRE-MATURE SIMULATION
C      TERMINATION
C
      PRINT*, ' DO YOU WANT TO TERMINATE THE SIMULATION '
      READ*,ANS
      IF(EOF(5),NE,0.0) GO TO 10
      IF(ANS) GO TO 6666
10     CONTINUE
11     CONTINUE
6666    CONTINUE
C
C      FORM EZGRAPH FILES
C
      REWIND 97
      REWIND 99
209    READ(97,309) APHA
      IF(EOF(97),NE,0.0) GO TO 408
309    FORMAT(8A10)
      WRITE(96,309) APHA
      GO TO 209
408    READ(99,309) APHA
      IF(EOF(99),NE,0.0) GO TO 208
      WRITE(98,309) APHA
      GO TO 408
208    CONTINUE
      WRITE(98,453)
453    FORMAT(
      $'XTITLE 'OBSERVED OVERBURDEN AQUIFER DRAWDOWN'',/,
      $'YTITLE 'COMPUTED OVERBURDEN DRAWDOWN'',/,
      $'TITLE 'OVERBURDEN DRAWDOWN'',/,
      $'DEFINE Y=OBSW'',/,
      $'GRAPH OBSW,CONW,Y;SYMBOL 1,1;LINE 1,0;XGRID;YGRID')
      WRITE(96,457)
457    FORMAT(
      $'XTITLE 'OBSERVED OREBODY DRAWDOWN'',/,
      $'YTITLE 'COMPUTED OREBODY DRAWDOWN'',/,
      $'TITLE 'OREBODY DRAWDOWN'',/,
      $'DEFINE Y=ORSO'',/,
      $'GRAPH ORSO,COMO,Y;SYMBOL 1,1;LINE 1,0;XGRID;YGRID')
      STOP
      END
C
C      CALIBRATION SUBROUTINE FOR 213 PUMP TEST
C      NOTE THAT THIS CODE IS UNIQUE TO 211
C
      SUBROUTINE CALIB(ISTEP,DTHE,NR3,ERRRHEA,IC3,JR3,NL)
      COMMON H3(16,05,12),H03(16,05,12),H2(44,45),H02(44,45),Q
      $3(16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12
      $),TI2(44,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,
      $05,12)
      DIMENSION ID(47),H0BS(47,9),IGR(47),JOR(47),KOR(47),DTHE(9),JOR(47
      $),OTHE(39)
      DATA NORS/47/
      DATA (ID(I),I=1,11)/5H223 ,5H211 ,5H209 ,5H228 ,5H210 ,5H218
      $ ,5H217 ,5H229 ,5H216 ,5H226 ,5HWW4 /

```

DATA (ID(I),I=12,21)/5H218 ,5H230 ,5H216 ,5H213 ,5H209 ,5HWW2
 \$,5HWW4 ,5H155 ,5H223 ,5H210 /
 DATA (ID(I),I=22,47)/5H211 ,5H219 ,5H220 ,5H226 ,5H217 ,5H228
 \$,5H227 ,5H232 ,5H222 ,5H221 ,5H224 ,5H195E ,5H229 ,5H2113L
 \$,5H2113U,5H2111 ,5H2112U,5H2112L,5H2161 ,5H2162 ,5H2131 ,5H2133U,
 \$5H2132 ,5H2133L,5H212L ,5HTW1 /
 DATA (IOB(I),I=1,11)/13,6,12,10,14,5,13,10,10,10,12/
 DATA (IOB(I),I=12,21)/5,7,10,13,12,05,12,12,13,14/
 DATA (IOB(I),I=22,47)/
 \$6,6,6,10,13,10,10,11,12,12,13,14,10,6,6,6,7,7,9,10,12,12,13,12,16,
 \$16/
 DATA (JOB(J),J=1,11)/10*99999,04/
 DATA (JOB(J),J=12,21)/5*9999,03,04,1,2*9999/
 DATA (JOB(J),J=22,47)/
 \$14*99999,4*3,99999,3,4,4,4,99999,2,2/
 DATA (KOB(K),K=1,11)/3,5,7,5,6,8,4,3,7,6,99999/
 DATA (KOB(K),K=12,21)/8,5,7,5,7,2*9999,9999,3,6/
 DATA (KOB(K),K=22,47)/
 \$5,5,4,6,4,5,5*4,3,3,2,4*99999,2,4*99999,2,2*99999/
 DATA OTHE/.1,5,1.,2.,3.,4.,5.,6.,7./
 DATA (HOBS(1,I),I=1,9)/48.,80.,85.,86.,87.,88.,89.,2*90./
 DATA (HOBS(2,I),I=1,9)/0.,1,4,2,4,3.,3,1,3,4,3*3,5/
 DATA (HOBS(3,I),I=1,9)/77.,112.,116.,120.,121.,122.,123.,124.,125.
 \$/
 DATA (HOBS(4,I),I=1,9)/19.,50.,54.,56.,57.,58.,59.,60.,60./
 DATA (HOBS(5,I),I=1,9)/70.,108.,115.,116.,117.,118.,119.,2*120./
 DATA (HOBS(6,I),I=1,9)/0.,25.,73,1,2,1,4,1,5,1,6,1,7,1,8/
 DATA (HOBS(7,I),I=1,9)/75.,110.,115.,117.,2*118.,2*119.,120./
 DATA (HOBS(8,I),I=1,9)/1.E21,56.,63.,65.,2*66.,2*67.,68./
 DATA (HOBS(9,I),I=1,9)/10.,20.,24.,25,5,26.,26.,2*26,5,27./
 DATA (HOBS(10,I),I=1,9)/1.E21,56.,63.,66.,2*67.,68.,69.,70./
 DATA (HOBS(11,I),I=1,9)/.1.,7,1,0,1,7,2,4,2,9,3,3,3,5,3,9/
 DATA (HOBS(12,I),I=1,9)/0.,40.,62.,70.,74.,77.,79.,81.,82./
 DATA (HOBS(13,I),I=1,9)/80.,160.,190.,208.,215.,221.,225.,226.,229
 \$./
 DATA (HOBS(14,I),I=1,9)/0.,5.,85,1,1,1,27,1,4,1,45,1,5,1,55/
 DATA (HOBS(15,I),I=1,9)/0.,1.,26.,34.,4.,41.,43.,46.,48/
 DATA (HOBS(16,I),I=1,9)/0.,25.,45.,63.,7.,74.,76.,82.,83/
 DATA (HOBS(17,I),I=1,9)/.6,3,5,5.,6.,6,4,6,6,7.,7,2,7,3/
 DATA (HOBS(18,I),I=1,9)/0.,0.,02.,03.,04.,05.,05.,06.,07/
 DATA (HOBS(19,I),I=1,9)/0.,0.,05.,09.,1.,15.,2.,25.,3/
 DATA (HOBS(20,I),I=1,9)/0.,2.,5.,63.,78.,8.,87.,86.,86/
 DATA (HOBS(21,I),I=1,9)/0.,25.,41.,55.,59.,62.,69.,71.,72/
 DATA (HOBS(22,I),I=1,9)/8*99999.,308./
 DATA (HOBS(23,I),I=1,9)/8*99999.,258./
 DATA (HOBS(24,I),I=1,9)/8*99999.,223./
 DATA (HOBS(25,I),I=1,9)/8*99999.,2,1/
 DATA (HOBS(26,I),I=1,9)/8*99999.,0,8/
 DATA (HOBS(27,I),I=1,9)/8*99999.,3,2/
 DATA (HOBS(28,I),I=1,9)/8*99999.,1,9/
 DATA (HOBS(29,I),I=1,9)/8*99999.,1,1/
 DATA (HOBS(30,I),I=1,9)/8*99999.,0,8/
 DATA (HOBS(31,I),I=1,9)/8*99999.,0,8/
 DATA (HOBS(32,I),I=1,9)/8*99999.,0,8/
 DATA (HOBS(33,I),I=1,9)/8*99999.,0,2/

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DATA (HOBS(34,I),I=1,9)/8*-99999.,2.2/
DATA (HOBS(35,I),I=1,9)/8*-99999.,140./
DATA (HOBS(36,I),I=1,9)/8*-99999.,1.2/
DATA (HOBS(37,I),I=1,9)/8*-99999.,15.1/
DATA (HOBS(38,I),I=1,9)/8*-99999.,2.2/
DATA (HOBS(39,I),I=1,9)/8*-99999.,2.4/
DATA (HOBS(40,I),I=1,9)/8*-99999.,2.8/
DATA (HOBS(41,I),I=1,9)/8*-99999.,0.5/
DATA (HOBS(42,I),I=1,9)/8*-99999.,0.1/
DATA (HOBS(43,I),I=1,9)/8*-99999.,0.1/
DATA (HOBS(44,I),I=1,9)/8*-99999.,0.1/
DATA (HOBS(45,I),I=1,9)/8*-99999.,0.0/
DATA (HOBS(46,I),I=1,9)/8*-99999.,0.07/
DATA (HOBS(47,I),I=1,9)/8*-99999.,0.08/
ERRINC=0.0
NINC=0

C
C   DETERMINE IF SIMULATION TIME=DATA TIME
C
IST=9999
DO 4432 ITI=1,9
4432 IF(ABS(DTIME(ISTEP)-DTIME(ITI)),LT.0.01) IST=ITI
    IF(IST.GT.1000) GO TO 8899

C
C   IF SO COMPARE COMPUTED AND OBSERVED HEADS
C   IN OREBODY FOR CALIBRATION
C
DO 1005 IOBS=1,NHRS
    IF(IDES.LT.12) GO TO 1005
    H3INT=0.0
    NR3A=0
    DO 2006 J=1,NR3
        IF(KOB(IOBS).GT.9000) GO TO 5511
C        IF(TI3(IOB(IOBS),J,KOB(IOBS)),LE.0.0.AND.
C        $TJ3(IOB(IOBS),J,KOB(IOBS)),LE.0.0)
C        $GO TO 2006
        I=IOB(IOBS)
        K=KOB(IOBS)
C        PRINT*,I,J,K
        IF((TI3(I,J,K)+TI3(MAX0(I-1,1),J,K)+TJ3(I,J,K)+TJ3(I,MAX0(J-1,1),K
        $)+R3(I,J,K)+R3(I,J,MIN0(K+1,NL)))/6.0.LE.10.0) GO TO 2006
        PRINT*, '   NODE (' ,IOB(IOBS),',',J,',',KOB(IOBS),') ACTIVE FOR ',I
        $D(IOBS), ' H = ',H3(IOB(IOBS),J,KOB(IOBS))
C        PRINT*,
C        $   TI3(I,J,K),TI3(MAX0(I-1,1),J,K),TJ3(I,J,K),TJ3(I,MAX0(J-1,1),K
C        $),R3(I,J,K),R3(I,J,MIN0(K+1,NL))
        H3INT=H3INT+H3(IOB(IOBS),J,KOB(IOBS))
        NR3A=NR3A+1
2006 CONTINUE
    IF(NR3A.GT.0)H3INT=H3INT/FLOAT(NR3A)
    GO TO 6622
5511 CONTINUE
    H3INT=H3(IOB(IOBS),JOB(IOBS),1)
C    IF(ID(IOBS).EQ.5HWW2 .OR.ID(IOBS).EQ.5HWW4 )
C    $H3INT=H2(IOB(IOBS))+IC3,JOB(IOBS)+JR3)

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6622 PRINT6606, ID(IOBS), -HOBS(IOBS, IST), H3INT,
      $IOB(IOBS), JOB(IOBS), KOB(IOBS)
6606 FORMAT(' OBS WELL = ', A5, ' OBSERVED = ', F10.3, ' COMPUTED = ',
      $F10.3, ' AT (', I3, ', ', I3, ', ', I3, ')')
      IF(HOBS(IDBS, IST).LE.0.0) GO TO 1004
      NINC=NINC+1
      ERRMEA=ERRMEA+100.*ABS(H3INT+HOBS(IDBS, IST))/HOBS(IOBS, IST)
      ERRINC=ERRINC+100.*ABS(H3INT+HOBS(IDBS, IST))/HOBS(IOBS, IST)
      PRINT*, ' % ERROR CONTRIBUTION FROM THIS COMPARISON ',
      $100.*ABS(H3INT+HOBS(IDBS, IST))/HOBS(IOBS, IST)
1004 CONTINUE
      IF(JOB(IDBS).GT.1000) GO TO 69
      IF(IST.EQ.9.AND.IDBS.NE.NOBS)WRITE(98,67) HOBS(IDBS, IST)
67 FORMAT(F15.2, ' %')
      IF(IST.EQ.9.AND.IDBS.EQ.NOBS)WRITE(98,68) HOBS(IDBS, IST)
68 FORMAT(F15.2)
      IF(IST.EQ.9.AND.IDBS.NE.NOBS)WRITE(99,67) -H3INT
      IF(IST.EQ.9.AND.IDBS.EQ.NOBS)WRITE(99,68) -H3INT
      GO TO 1005
69 CONTINUE
      IF(IST.EQ.9.AND.IDBS.NE.NOBS-2)WRITE(96,67) HOBS(IDBS, IST)
      IF(IST.EQ.9.AND.IDBS.EQ.NOBS-2)WRITE(96,68) HOBS(IDBS, IST)
      IF(IST.EQ.9.AND.IDBS.NE.NOBS-2)WRITE(97,67) -H3INT
      IF(IST.EQ.9.AND.IDBS.EQ.NOBS-2)WRITE(97,68) -H3INT
1005 CONTINUE
      PRINT*, ' % ERROR FOR THIS TIME STEP ', ERRINC, ERRINC/FLOAT(NINC)
8899 PRINT*, ' $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$'
      RETURN
      END
C *****
C *   THREE-DIMENSIONAL FINITE DIFFERENCE FLOW MODEL   *
C *****
      SUBROUTINE DIM3(NC, NR, NL, DELTA, TIME, NIT, OBSINK, IC3, JR3, QD,
      $NC2, NR2, FRNT, NSTEPS, ISTEP)
      DIMENSION SF1(16,05,12), TJ(16,05,12), TI(16,05,12), B(16,13), G(16,1
      $3), R(16,05,12), DL(16,05,12), TT(15), S1(15), HH(15), QQ(15), RR(15), ROW
      $(20), TAB(2,20), QV(15), DZ(15), QS(15), THINE(16,5,12), LAYER(12), QD(16
      $,05,12)
      COMMON H(16,05,12), HO(16,05,12), H2(44,45), HO2(44,45), Q2(44,45), Q(1
      $6,05,12), TI(16,05,12), TJ(16,05,12), R(16,05,12), SF1(16,05,12), TI2(4
      $4,45), TJ2(44,45), R2(44,45), SF12(44,45), THCK(44,45), ELEV(16,05,12)
      COMMON /PARAM/POT(44,45), BOT(44,45), PERM(44,45,2), THINE(16,05,12),
      $DZ(15)
      INTEGER OUT
      LOGICAL OBSINK, ANS, FRNT
      DATA LAYER/10H RESIST, 10H SUBCROP, 10H 95 METERS, 10H 140 METERS
      $, 10H 163 METERS, 10H 185 METERS, 10H 207 METERS, 10H 230 METERS, 10H 263 ME
      $TERS, 10H 295 METERS, 10H 322 METERS, 10H 350 METERS/
      DATA TT/15*300./
      DATA S1/15*1.74/
      DATA QQ/15*0.0/
      DATA HH/15*0.0/
      DATA RR/15*300./
C   DATA (DZ(K), K=1,13)/0.0, 3.281, 161.695, 147.645, 4*73.8225, 2*106.6325
      DATA (DZ(K), K=1,13)/0.0, 1.000, 161.695, 147.645, 4*73.8225, 2*106.6325

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```

      $,2*90.2275,0.0/
C
C   DEFINE THE CATEGORY PRINTOUT FOR 3D MODEL
C
      DATA (TAB(1,I),I=1,14)/0.,1.,5.,10.,20.,30.,40.,50.,60.,70.,80.,90
      $,100.,110./
      DATA (TAB(2,I),I=1,13)/1HK,1HA,1HB,1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8
      $,1H9,1H0/
      DATA NTABS/13/
      PRINT*, '*****ENTERING 3D MODEL*****'
C
C   DEFINE INPUT AND OUTPUT DEVICE NUMBERS
C
      IN=13
      OUT=14
C
C   READ PARAMETERS AND DEFAULT VALUE CARDS
C
      ERROR=5.
C
C   FILL ARRAYS WITH DEFAULT VALUES
C
      DO 20 K=1,NL
      DO 20 I=1,NC
      DO 20 J=1,NR
20  Q(I,J,K)=QQ(K)
C
C   PERFORM REQUIRED INPUT/OUTPUT FOR 3D SIMULATION
C   LOOP 1
C
      IF(NIT.GT.1) GO TO 999
C
      READ GOLDR POT VALUES
C
      DO 995 J=1,NR2
      READ(21,*) JPOT
995  READ(21,*) (POT(I,J),I=1,NC2)
C
C   READ DAP BOTTOM ELEVATIONS
C
      DO 996 J=1,NR2
      READ(22,*) JBOT
996  READ(22,*) (BOT(I,J),I=1,NC2)
C
C   READ DAP SATURATED THICKNESSES SINCE THEY
      ARE REQUIRED FOR 3D SIMULATION
C
      DO 997 J=1,NR2
      READ(23,*) JTHICK
997  READ(23,*) (THCK(I,J),I=1,NC2)
C
C   SET TO HIGH TO COMPUTE MINE SCHED. ORIGIN FOR SIMULATION
C
      TO=1.E99
C

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C      READ NODE CARDS
C
      REWIND IN
      REWIND 16
99 READ(IN,*)I,J,K,TI(I,J,K),TJ(I,J,K),R(I,J,K),SF1(I,J,K)
   IF(EOF(IN).NE.0.0) GO TO 888
      GO TO 99
888 DO 666 K=1,NL
      DO 666 I=1,NC
      DO 666 J=1,NR
666  THINE(I,J,K)=1.E99
      KCNTRL=2
      CNTRL=1.0
      PRINT*, ' INPUT THE CONTROL LAYER, AMOUNT OF CONTROL '
      READ*, KCNTRL, CNTRL
      IF(EOF(5).NE.0.0) CONTINUE
      DO 667 I=1,NC
      DO 667 J=1,NR
667  R(I,J,KCNTRL)=R(I,J,KCNTRL)*CNTRL
777 READ(16,*)I,J,K,THINE(I,J,K),JUNK
   IF(EOF(16).NE.0.0) GO TO 222

C
C      DETERMINE SIMULATION TIME ORIGIN FROM MINE PLAN
C
      TO=AMIN1(TO,THINE(I,J,K))
      GO TO 777
222 CONTINUE

C
C      ECHO MINE PLAN
C
      PRINT*, ' '
      PRINT*, '*****ECHO OF MINE PLAN*****'
      DO 9701 K=1,NL
      DO 9701 I=1,NC
      DO 9701 J=1,NR
      IF(THINE(I,J,K).GT.1.E50) GO TO 9701
      PRINT*, ' I = ',I, ' J = ',J, ' K = ',K, ' TIME COMPLETED(DAYS) = '
      $,THINE(I,J,K)-TO, ' *',LAYER(K), '*'
      THINE(I,J,K)=THINE(I,J,K)-TO
9701 CONTINUE
      PRINT*, '*****END OF MINE PLAN*****'
      PRINT*, ' '

C
C      ZERO THE VERTICAL TRANSMISSIVITY AT THE SUBCROP
C      LEVEL IF COARSE DRIFT SATURATED THICKNESS IS
C      ZERO OR GOLDIER POT IS APPROX. EQUAL TO SUBCROP
C      ELEV.
C
      DO 263 I=1,NC
      DO 263 J=1,NR
      IF(THCK(I+IC3,J+JR3).LE.0.0.OR.ABS(THCK(I+IC3,J+JR3)).LE.0.1)R(I,J
      $,2)=0.0
      IF(POT(I+IC3,J+JR3)-POT(I+IC3,J+JR3).LT.0.11)R(I,J,2)=0.0
263 CONTINUE
C

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C      COMPUTE SUBLEVEL ELEVATIONS EACH SIMULATION
C      TIME STEP
C
C      CALL COMELV(NC,NR,NL,IC3,JR3,NIT)
C
C      OUTPUT ISOPACH THICKNESS AND POT-BOT
C
C      PRINT563,(I,I=1,NC)
563  FORMAT(///," ISOPACH THICKNESS ",/,6X,16I3)
C      DO 363 J=1,NR
363  PRINT463,J,(INT(THCK(I+IC3,J+JR3)),I=1,NC)
463  FORMAT(15," !",16I3)
C      PRINT763,(I,I=1,NC)
763  FORMAT(///," GOLDER POT - DAP BOT",/,6X,16I3)
C      DO 663 J=1,NR
663  PRINT463,J,(INT(POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3)),I=1,N
      $C)
C      PRINT863,(I,I=1,NC)
863  FORMAT(///," 3D RESISTIVE LAYER R ARRAY",/,6X,16I7)
C      DO 773 J=1,NR
773  PRINT291,J,(INT(R(I,J,2)),I=1,NC)
291  FORMAT(15," !",16I7)
999  CONTINUE
C
C      OUTPUT EFFECTIVE MINE NODES
C
C      DO 444 K=2,NL
C      DO 444 I=1,NC
C      DO 444 J=1,NR
444  IF(TIME.GT.TMINE(I,J,K))PRINT*, " MINE NODE ('I','J','K') EFF
      $ECTIVE"
C
C      CALL SINK DEFINITION ROUTINE FOR CALIBRATION
C
C      IF(OBSINK) CALL SINK(NC,NR,NL,NIT)
C
C      START 3D SIMULATION
C
C      ITER=0
C      MAXIT=100
C      EOLD=1E99
C      GO TO 53
52  EOLD=E
53  E=0.0
C      ITER=ITER+1
C
C      STACK, COLUMN, AND ROW CALCULATIONS
C
C      DO 160 K=2,NL
C      DO 160 I=1,NC
C      DO 140 J=1,NR
C      CALL SETPAR(I,J,K,NL,IC3,JR3,RB,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
      $,RIJKP1,TIME)
C      CALL CONVRG(I,J,K,NL,IC3,JR3,RB,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
      $,RIJKP1,TIME)

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      CALL CONECT(I,J,K,IC3,JR3,RE,RIJK,SF1IJK)
C
C      CALCULATE B AND G ARRAYS
C
      DD=HO(I,J,K)*SF1IJK/DELTA-Q(I,J,K)+RE
      BB=SF1IJK/DELTA+RIJK*RB
      AA=0.0
      CC=0.0
      IF(K-NL,EQ.0) GO TO 55
      BB=BB+RIJKP1
      DD=DD+RIJKP1*H(I,J,K+1)
55  IF(J-1) 60,70,60
60  AA=-TJ(I,J-1,K)
      BB=BB+TJ(I,J-1,K)
70  IF(J-NR) 80,90,80
80  CC=-TJ(I,J,K)
      BB=BB+TJ(I,J,K)
90  IF(I-1) 100,110,100
100 BB=BB+TIIM1JK
      DD=DD+H(I-1,J,K)*TIIM1JK
110 IF(I-NC) 120,130,120
120 BB=BB+TIIJK
      DD=DD+H(I+1,J,K)*TIIJK
130 IF(J.GT.1)W=BB-AA*B(J-1,K)
      IF(J,EQ.1) W=BB
      R(J,K)=CC/W
      IF(J.GT.1)G(J,K)=(DD-AA*G(J-1,K))/W
140 IF(J,EQ.1) G(J,K)=DD/W
C
C      RE-ESTIMATE HEADS
C
      E=E+ABS(H(I,NR,K)-G(NR,K))
      H(I,NR,K)=G(NR,K)
      N=NR-1
150 HA=G(N,K)-B(N,K)*H(I,N+1,K)
      E=E+ABS(HA-H(I,N,K))
      H(I,N,K)=HA
      N=N-1
      IF(N) 160,160,150
160 CONTINUE
C
C      STACK AND ROW CALCULATIONS
C
      DO 271 K=2,NL
      DO 271 J=1,NR
      DO 250 I=1,NC
      CALL SETPAR(I,J,K,NL,IC3,JR3,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
$,RIJKP1,TINE)
      CALL CONVRG(I,J,K,NL,IC3,JR3,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
$,RIJKP1,TINE)
      CALL CONECT(I,J,K,IC3,JR3,RE,RIJK,SF1IJK)
C
C      CALCULATE B AND G ARRAYS
C
      DD=HO(I,J,K)*SF1IJK/DELTA-Q(I,J,K)+RE

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      BB=SF1IJK/DELTA+RIJK*RB
      AA=0.0
      CC=0.0
      IF(K-NL, EQ, 0.0) GO TO 165
      BB=BB+RIJKP1
      DD=DD+RIJKP1*H(I, J, K+1)
165  IF(J-1) 170, 180, 170
170  BB=BB+TJ(I, J-1, K)
      DD=DD+H(I, J-1, K)*TJ(I, J-1, K)
180  IF(J-NR) 190, 200, 190
190  DD=DD+H(I, J+1, K)*TJ(I, J, K)
      BB=BB+TJ(I, J, K)
200  IF(I-1) 210, 220, 210
210  BB=BB+TIIM1JK
      AA=-TIIM1JK
220  IF(I-NC) 230, 240, 230
230  BB=BB+TIIJK
      CC=-TIIJK
240  IF(I.GT.1) W=BB-AA*B(I-1, K)
      IF(I.EQ.1) W=BB
      B(I, K)=CC/W
      IF(I.GT.1) G(I, K)=(DD-AA*G(I-1, K))/W
250  IF(I.EQ.1) G(I, K)=DD/W
C
C      RE-ESTIMATE HEADS
C
      E=E+ABS(H(NC, J, K)-G(NC, K))
      H(NC, J, K)=G(NC, K)
      N=NC-1
260  HA=G(N, K)-B(N, K)*H(N+1, J, K)
      E=E+ABS(H(N, J, K)-HA)
      H(N, J, K)=HA
      N=N-1
      IF(N) 270, 270, 260
270  CONTINUE
271  CONTINUE
C
C      OUTPUT ITERATIVE INFORMATION FOR INTERACTIVE USER
C
      IF((ITER/5)*5.EQ.ITER.OR.ITER.EQ.MAXIT.OR.E.LE.ERROR.OR.ITER.EQ.1)
        PRINT*, ' ITER = ', ITER, ' ERROR = ', E, ' NORM ERROR = ', E/FLOAT(NC*N
        $R)
      IF((EOLD-E)/E.LT.-0.10) PRINT*, ' WARNING:  INSTABILITY IN CONVERGE
        $NCE ', ITER-1, EOLD, ITER, E
C
C      REQUIRE A MINIMUM OF 5 ITERATIONS PER SIMULATION
C      TIME STEP
C
      IF((EOLD-E)/E.LT.-0.10) GO TO 334
      IF(ITER.LT.5) GO TO 52
C
C      TEST FOR CONVERGENCE
C
      IF(ITER.EQ.MAXIT) GO TO 333
      IF(E.GT.ERROR) GO TO 52

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        GO TO 334
333 CONTINUE
    ANS=.FALSE.
    PRINT*, ' INCREASE MAX NO. OF ITERATIONS TO ',MAXIT+5,' ',ANS,
    READ*,ANS
    IF(EOF(5).NE.0.0) CONTINUE
    IF (ANS) MAXIT=MAXIT+5
    IF (ANS) GO TO 52
C
C     PRINT SUMMARY RESULTS FOR THIS SIMULATION
C     TIME TO GENERAL OUTPUT FILE
C
334 WRITE(OUT,300)TIME,E,ITER
300 FORMAT('1','TIME =',F8.2,'DAYS'///' ERROR =',E20.7,' FEET'/' NUMBE
    $R OF ITERATIONS =',I5)
C
C     DUMP DETAILED RESULTS FOR THIS SIMULATION
C     TIME STEP TO D3 FILE FOR POST ANALYSES
C
    DO 7734 K=1,NL
        WRITE(11,456) TIME,K
    456 FORMAT(' TIME = ',F20.3,' LAYER = ',I10)
    7734 WRITE(11,455)(J,(H(I,J,K),I=1,NC),J=1,NR)
    455 FORMAT(5(' ROW = ',I10,/,10F8.2,/,6F8.2,///))
C
C     OUTPUT PLAN VIEW CATEGORY PRINT-OUT FOR EACH
C     LAYER FOR THE INTERACTIVE USER
C
    PRNT=.FALSE.
    PRINT*, ' 3D DRAWDOWN MAPS ',PRNT,
    READ*,PRNT
    IF(EOF(5).NE.0.0) CONTINUE
    IF(ISTEP.EQ.NSTEPS) PRNT=.TRUE.
    IF(.NOT.PRNT) GO TO 33457
    DO 33456 K=1,NL
        PRINT*, ' '
        PRINT*, ' LEVEL = ',LAYER(K),'(' ,K,')'
    DO 44567 J=1,NR
    DO 22833 I=1,NC
C     DO 33228 NT=1,NTABS
C3228 IF((-H(I,J,K).GE.TAB(1,NT).AND.-H(I,J,K).LT.TAB(1,NT+1)) ROW(I)=TAB
C     $(2,NT)
C     IF((-H(I,J,K).GE.TAB(1,NTABS+1)) ROW(I)=1H>
        ROW(I)=-H(I,J,K)
    22833 CONTINUE
    44567 PRINT66832,(INT(ROW(I)+0.5),I=1,NC)
    66832 FORMAT(20I4)
    33456 CONTINUE
    33457 CONTINUE
C
C     DUMP AN INTEGRATED CROSS-SECTION CATEGORY PRINTOUT
C
    PRNT=.TRUE.
    PRINT*, ' INTEGRATED CROSS-SECTION DRAWDOWN MAP ',PRNT,
    WRITE(11,*) ' INTEGRATED CROSS-SECTION DRAWDOWN MAP '

```

```

      READ*,PRNT
      IF(EOF(5).NE.0.0) CONTINUE
      IF(ISTEP.EQ.NSTEPS) PRNT=.TRUE.
C     IF(.NOT.PRNT) GO TO 66457
      IF(PRNT) PRINT 77832,(I,I=1,NC)
      WRITE(11,77832)(I,I=1,NC)
77832 FORMAT(6X,20I4)
      DO 66456 K=1,NL
      DO 22866 I=1,NC
      ROW(I)=0.0
      TOTJ=0.0
      DO 66567 J=1,NR
C
C     CHECK FOR A NON-ZERO PRIMARY DIRECTION TRANSMISSIVITY TENSOR
C
      IF(J.EQ.1) GO TO 748
      IF((TI(I,J,K)+TI(MAX0(I-1,1),J,K)+TJ(I,J,K)+TJ(I,MAX0(J-1,1),K)
      $+R(I,J,K)+R(I,J,MIN0(K+1,NL)))/6.0.LE.10.0) GO TO 66567
      748 TOTJ=TOTJ+1.0
      ROW(I)=ROW(I)-H(I,J,K)
66567 CONTINUE
      IF(TOTJ.GT.0.0)ROW(I)=ROW(I)/TOTJ
22866 CONTINUE
      IF(PRNT) PRINT88832,K,(INT(ROW(I)+0.5),I=1,NC)
      WRITE(11,88832)K,(INT(ROW(I)+0.5),I=1,NC)
88832 FORMAT(I5,' ! ',20I4)
66456 CONTINUE
66457 CONTINUE
C
C     OUTPUT WHETHER WATER TABLE OR ARTESIAN CONDITIONS
C     EXIST AT RESISTIVE LAYER
C
      PRINT*,' '
      PRINT*,' STORAGE STATE ABOVE RESISTIVE LAYER'
      PRINT*,' A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS '
      PRINT*,' D-DRY NODE'
      DO 55567 J=1,NR
      DO 33833 I=1,NC
      IF(H(I,J,1)+POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3).GE.THCK(I+IC3,J+JR3)
      $) ROW(I)=1HA
      IF(H(I,J,1)+POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3).LT.THCK(I+IC3,J+JR3)
      $) ROW(I)=1HW
      IF(H(I,J,1)+POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3).LT.0.11) ROW(I)=1HD
      IF(THCK(I+IC3,J+JR3).LT.0.11) ROW(I)=1H0
      33833 CONTINUE
55567 PRINT55832,(ROW(I),I=1,NC)
55832 FORMAT(66A4)
      IF(NIT.EQ.1) GO TO 193
      PRINT262,(I,I=1,NC)
      262 FORMAT(///,' 2D STORAGE ABOVE RESIST ',/,6X,16I7)
      DO 163 J=1,NR
      163 PRINT291,J,(INT(SF12(I+IC3,J+JR3)),I=1,NC)
      193 CONTINUE
C
C     PERFORM 3-D WATER BALANCE

```



```

C
DO 970 K=2,NL
  QV(K)=0.0
  QS(K)=0.0
  DO 969 I=1,NC
    DO 968 J=1,NR
      CALL SETPAR(I,J,K,NL,IC3,JR3,RB,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
$,RIJKP1,TIME)
      CALL CONVRG(I,J,K,NL,IC3,JR3,RB,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
$,RIJKP1,TIME)
      CALL CONECT(I,J,K,IC3,JR3,RB,RE,RIJK,SF1IJK)
      IF(K.GT.2) GO TO 6682
      IF(H(I,J,2),LT,ELEV(I,J,2)) GO TO 81
6682 RE=RE-RIJK*H(I,J,K)
      81 QV(K)=QV(K)+RE
      QS(K)=QS(K)-(H(I,J,K)-HO(I,J,K))*SF1IJK/DELTA
      QD(I,J,K)=RE
968 CONTINUE
969 CONTINUE
970 CONTINUE
  QV(1)=QV(2)

C
C   DUMP WATER BALANCE RESULTS FOR INTERACTIVE
C   USER REFERENCE
C
  PRINT 6341,(K,QV(K),K=1,NL)
6341 FORMAT(
1///, '*****',
2  /,'***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL *****',
3  /,'*****',
4  /,'* M O D E L L A Y E R * F L O W I N T O ( G P D ) *',
5  /,'*****',
612(/,'*      ',I5,'      *      ',F10.1      *'),
7  /,'*****')
  QS(1)=0.0
  PRINT 6342,(K,QS(K),K=1,NL)
6342 FORMAT(
1///, '*****',
2  /,'***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL *****',
3  /,'*****',
4  /,'* M O D E L L A Y E R * F L O W F R O M ( G P D ) *',
5  /,'*****',
612(/,'*      ',I5,'      *      ',F10.1      *'),
7  /,'*****')
  PRINT *, ' 3D WATER BALANCE IS WITHIN ',100.*(QV(5)-QV(6)+QS(5)-338
;400.)/338400., ' % '

C
C   OUTPUT VERTICAL Q DISTR. FOR ALL LAYERS
C   TO DETAILED OUTPUT FILE D3 FOR POST ANALYSIS
C
  PRINT963,(I,I=1,NC)
963 FORMAT(///, ' 3D RESISTIVE LAYER VERT. Q',/,6X,16I7)
  DO 973 J=1,NR
973 PRINT291,J,(INT(QD(I,J,2))),I=1,NC)
  DO 909 KK=1,NL

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```

      IF(KK.EQ.1)K=2
909 WRITE(11,908) KK,((QD(I,J,K),I=1,NC),J=1,NR)
908 FORMAT(' K = ',I10,'/',S(16E9.3,/))
C
C      IDENTIFY HEAD BELOW ELEV. NODES
C
      DO 8872 K=1,NL
      DO 8872 J=1,NR
      DO 8872 I=1,NC
C      ELEV(1)=-THCK(IC3+I,JR3+J)
C      ELEV(2)=ELEV(1)
8872 IF(H(I,J,K),LT,ELEV(I,J,K)) PRINT*, ' 3D HEAD BELOW ELEV. AT NODE '
      $,I,J,K,
      $ELEV(I,J,K), ' H=',H(I,J,K)
C
C      RETURN TO MAIN PROGRAM
C
      RETURN
      END
      SUBROUTINE CONVRG(I,J,K,NL,IC3,JR3,RB,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
      $,RIJKP1,TIME)
      COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
      $6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
      $4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
      $DZ(15)
C
C      ADJUST TI'S AND R'S TO REFLECT CONVERGING FLOW
C      INTO A MINE NODE
C
      IF(THINE(I,J,K).GT.1.E50) GO TO 6004
      IF(TIME.LE.THINE(I,J,K)) GO TO 6004
      FCTR=ALOG10(SQRT(328.1*DZ(K))/4.81/2.38732/3.281)
      RIJK=RIJK/(1.466*FCTR+1.)
      IF(K.LT.NL)
      $FCTR=ALOG10(SQRT(328.1*DZ(K+1))/4.81/2.38732/3.281)
      IF(K.LT.NL) RIJKP1=RIJKP1/(1.466*FCTR+1.)
      FCTR=ALOG10(SQRT(328.1*(DZ(K)+DZ(K+1))/2.)/4.81/2.38732/3.281)
      IF(I.GT.1)TIIM1JK=TIIM1JK/(1.466*FCTR+1.)
      TIIJK=TIIJK/(1.466*FCTR+1.)
6004 CONTINUE
      RETURN
      END
      SUBROUTINE SETPAR(I,J,K,NL,IC3,JR3,RB,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
      $,RIJKP1,TIME)
      COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
      $6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
      $4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
      $DZ(15)
C
C      SET APPROPRIATE PARAMETERS
C
      IF(I.GT.1) TIIM1JK=TI(I-1,J,K)
      TIIJK=TI(I,J,K)

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```

      RIJK=R(I,J,K)
      IF(K,LT,NL)RIJKP1=R(I,J,K+1)
C
C      CHECK FOR DRY NODES AT THE SUBCROP
C      AND ZERO R ARRAY IF DRY
C
      IF(K,NE,2) GO TO 1
      IF(H(I,J,1)+POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3).LT,0.11) RIJK=0.0
1 SF1IJK=SF1(I,J,K)
C
C      000
C      ELEV(1)=-THCK(IC3+I,JR3+J)
C      ELEV(2)=ELEV(1)
C      ELEV(I,J,1)=BOT(I,J)-(POT(I,J)+H2(I,J))
C
C      SET HEAD TO ELEVATION IF AN EFFECTIVE MINE
C      NODE EXISTS AND THE HEAD IS ABOVE THIS ELEVATION
C
      IF(TIME,GT,THINE(I,J,K).AND,H(I,J,K).GT,ELEV(I,J,K))
      $SF1IJK=1.E15
      IF(TIME,GT,THINE(I,J,K).AND,H(I,J,K).GT,ELEV(I,J,K))
      $H(I,J,K)=H0(I,J,K)=ELEV(I,J,K)
C
C      RESET THE STORAGE FACTOR WHEN W.T. CONDITIONS OCCUR
C      IN THIS SOURCE CONFIGURATION NO ADJUSTMENT IS PERFORMED
C
      IF(H(I,J,K).LT,ELEV(I,J,K-1))SF1IJK=SF1IJK*1.E01
      RETURN
      END
      SUBROUTINE CONECT(I,J,K,IC3,JR3,RE,RIJK,SF1IJK)
      COMMON H(16,05,12),H0(16,05,12),H2(44,45),H02(44,45),Q2(44,45),Q(1
      $6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
      $4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
      $DZ(15)
      RE=0.0
C
C      MAKE STORAGE NEGLIGIBLE WHEN HEAD DROPS
C      BELOW ELEVATION
C
      IF(H(I,J,K).LT,ELEV(K)) SF1IJK=1.E-21
C
C      ADJUST FOR HEADS FALLING BELOW ELEVATION
C
      IF(K,GT,2) GO TO 6682
C
C      USE INDUCED INFILTRATION THEORY FROM BULL. 55 TO
C      REPRESENT MINE INFLOW BOUNDARY CONDITON AT SUBCROP
C
      IF(H(I,J,2).LT,ELEV(I,J,2)) GO TO 81
6682 RE=H(I,J,K-1)*RIJK
      RB=1.0
      GO TO 82
C
C 81 RE=RIJK*AMAX1(H(I,J,K-1)-ELEV(I,J,K),ELEV(I,J,K-1)-ELEV(I,J,K))
C 81 RE=RIJK*(H(I,J,1)+POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3))
      IF (RE.LT,0.0) PRINT*,' ERROR: RE < 0 AT ',I,J,K

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      RB=0.0
82 RETURN
      END
      SUBROUTINE COMELV(NC,NR,NL,IC3,JR3,NIT)
      COMMON H(16,05,12),H0(16,05,12),H2(44,45),H02(44,45),Q2(44,45),Q(1
$6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
$4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERH(44,45,2),THINE(16,05,12),
$DZ(15)

C
C      NOTE:
C      365 METERS IS THE ELEVATION OF THE 140M(K=4)
C      LEVEL AS RECEIVED FROM RG HITE 9/22/82...HLV
C
C      LOOP TO PRODUCE ELEVATIONS
C
      DO 1 I=1,NC
      DO 1 J=1,NR
      ELEV(I,J,1)=BOT(I+IC3,J+JR3)-(POT(I+IC3,J+JR3)+0.0)

C
C      LEVEL 2 ELEVATION ASSUMES A RESISTIVE LAYER
C      THICKNESS OF 1 FOOT
C
      ELEV(I,J,2)=(BOT(I+IC3,J+JR3)-1.)-(POT(I+IC3,J+JR3)+0.0)
      ELEV(I,J,3)=((365.+45.)*3.128-(POT(I+IC3,J+JR3)+0.0))
      ELEV(I,J,4)=(365.*3.128-(POT(I+IC3,J+JR3)+0.0))

C
C      SET REMAINING SUBLEVELS ELEVATIONS
C      ***
C      SATTHCK=70.0
C      ELEV(1)=-SATTHCK
C      ELEV(2)=ELEV(1)
C
C      COMPUTE ELEVATIONS OF REMAINING SUBLEVELS
C
      DO 6604 K=5,NL
6604 ELEV(I,J,K)=ELEV(I,J,K-1)-DZ(K)
      1 CONTINUE

C
C      DUMP THE ELEVATION ARRAY ON FIRST SIMULATION
C      LOOP
C
      GO TO 2
      IF(NIT.GT.1) GO TO 2
      PRINT44
44 FORMAT(' ECHO OF ELEVATION ARRAY FOR LOOP 1')
      DO 55 K=1,NL
55 PRINT66,K,((INT(ELEV(I,J,K))),I=1,NC),J=1,NR)
66 FORMAT(/,' LEVEL = ',I5,/, (16I5))
      2 RETURN
      END
      SUBROUTINE SINK(NC,NR,NL,NIT)
C

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C      THIS SUBROUTINE IS FOR THE 211 CALIBRATION
C
      COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
$6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
$4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      DIMENSION TR(5)
C
      INPUT OREBODY SINK(NC,NR,NL) SCHEME
      THIS IS FOR 211 PUMP TEST
C
C
C
C
C      PROPORTION DISCHARGES ONLY TO ACTIVE NODES
C
      Q211=338400.
      TOTJ=0.0
      DO 1 J=1,NR
      TR(J)
      T=TI(06,J,5)+TJ(06,J,5)+R(06,J,5)+TI(05,J,5)+R(06,J,6)
      IF(J.GT.1) TR(J)=TR(J)+TJ(06,J-1,5)
      TOTJ=TOTJ+TR(J)
1  CONTINUE
      DO 2 J=1,NR
      IF(NIT.GT.1) GO TO 3
      PRINT*, ' '
3   Q(06,J,5)=Q211*TR(J)/TOTJ
      IF(NIT.GT.1) GO TO 2
      PRINT*, ' Q(06,',J,',5) = ',Q(06,J,5)
      PRINT*, '      ACTIVITY RATIO = ',TR(J)/TOTJ
      PRINT*, '      TRANSMISSIVITIES (GPD/FT) '
      PRINT*,
      $TI(06,J,5),TJ(06,J,5),R(06,J,5),TI(5,J,5),TJ(06,J-1,5),R(06,J,6)
2  CONTINUE
      RETURN
      END
C *****
C *      TWO -DIMENSIONAL FINITE DIFFERENCE FLOW MODEL *
C *****
      SUBROUTINE PLASH(NC,NR,DELTA,TIME,NIT,XSF12,ISTEP,Q2TOT,PRNT,
$NSTEPS)
      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
$16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
$TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
$)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERH(44,45,2),THINE(16,05,12),
$DZ(15)
      DIMENSION SF1(44,45),TI(44,45),B(50),G(50),R(44,45),DL(44,45),RDW(
$50),TAB(2,20),RH(44,45),RD(44,45),DELX(44),DELY(45),TJ(44,45),PERH
$(44,45,2),Q(44,45)
      REAL INFET
      INTEGER OUT
      LOGICAL AWS,PRNT
      DATA DELX/10*1000.,750.,458.645,372.695,14*328.1,244.648,330.598,5
$00.,750.,13*1000./
      DATA DELY/7*1000.,750.,684.146,598.196,3*328.1,493.877,659.654,829
$.827,28*1000.,1000./

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C
      CALL HETERO(DEIX,DELY)
C
C      SET CATEGORY PRINTOUT VARIABLES FOR 2D MODEL
C
      NT=10
      TAB(1,1)=1H0 $ TAB(2,1)=-1.0
      TAB(1,2)=1H1 $ TAB(2,2)=-5.0
      TAB(1,3)=1H2 $ TAB(2,3)=-10.
      TAB(1,4)=1H3 $ TAB(2,4)=-15.
      TAB(1,5)=1H4 $ TAB(2,5)=-20.
      TAB(1,6)=1H5 $ TAB(2,6)=-25.
      TAB(1,7)=1H6 $ TAB(2,7)=-30.
      TAB(1,8)=1H7 $ TAB(2,8)=-35.
      TAB(1,9)=1H8 $ TAB(2,9)=-40.
      TAB(1,10)=1H9 $ TAB(2,10)=-50.
      DO 7801 IT=1,10
7801 TAB(2,IT)=TAB(2,IT)/10.
C
C      READ AND WRITE OUT NODE CARDS
C
C      WRITE (OUT,1055)
1055 FORMAT (1H ///19H NODE CARD VALUES://70H I J P1 P2
      1 SF1 H, Q R RH RD)
C      REWIND IN
C 15 READ (IN,*)I,J,PERM(I,J,1),PERM(I,J,2),SF1(I,J),HO(I,J),H(I,J),Q(I
C $,J),XXXX
C IF (EOF(IN),NE.0.0) GO TO 18
C SF1(I,J)=SF1(I,J)*XSFI2
C WRITE (OUT,1060) I,J,PERM(I,J,1),PERM(I,J,2),SF1(I,J),H(I,J),Q(I,J
C $),R(I,J),RH(I,J),RD(I,J)
1060 FORMAT (2I3,3E10.3,F6.0,E10.3,3F6.0)
C GO TO 15
C
C      ZERO Q-ARRAY TO SHUT-OFF INFILTRATION
C
18 DO 8805 I=1,NC
      DO 8805 J=1,NR
8805 Q(I,J)=0.0
C
C      FORM PARTIAL TRANSMISSIVITIES FROM PERMEABILITIES
C      AND VARIABLE GRID DATA
C
      DO 510 I=1,NC
      DO 500 J=1,NR
      PERM(I,J,1)=PERM(I,J,1)*2.*DEIX(I)/(DELY(J)+DELY(MINO(J+1,NR)))
      PERM(I,J,2)=PERM(I,J,2)*2.*DELY(J)/(DEIX(I)+DEIX(MINO(I+1,NC)))
C
C      ADJUST AQUIFER PARAMETERS FOR VARIABLE GRID
C
      SF1(I,J)=SF1(I,J)*7.48*DEIX(I)*DELY(J)*3.281*3.281
      R(I,J)=R(I,J)*DELY(J)*DEIX(I)*3.281*3.281
C 500 CONTINUE
C 510 CONTINUE
C

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C      DUMP PARAMETERS FOR FIRST SIMULATION LOOP
C
C      CALL TRSET(NC,NR)
C      PRINT*, ' '
C      PRINT*, ' TI DUMP '
C      DO 4710 J=1,NR
C4710 PRINT4711,J,(TI(I,J),I=1,NC)
C      4711 FORMAT(I10,/, (10F8.0))
C      PRINT*, ' '
C      PRINT*, ' TJ DUMP '
C      DO 3710 J=1,NR
C3710 PRINT4711,J,(TJ(I,J),I=1,NC)
C      19 CONTINUE
C
C      ECHO CATEGORY PRINTOUT DATA
C
C      WRITE (OUT,1025) ((TAB(I,J),I=1,2),J=1,NT)
C      1025 FORMAT (27H CATEGORY PRINTOUT LEGEND:/(2X,A2,26H IF HEAD IS GRE
C      1ATER THAN ,F8.2))
C
C      PLACE Q2-ARRAY IN Q TO MAKE OREBODY CONNECTION
C
C      DO 8806 I=1,NC
C      DO 8806 J=1,NR
C8806 Q(I,J)=Q2(I,J)
C
C
C      2D SIMULATION START
C
C      20 CONTINUE
C      DEL=DELTA
C      KC=1
C      DELTA=DEL
C      NLOOP=0
C      35 ITER=0
C
C      PREDICT HEADS FOR NEXT TIME INCREMENT
C
C      DO 40 I=1,NC
C      DO 40 J=1,NR
C      D=H(I,J)-HO(I,J)
C      HO(I,J)=H(I,J)
C      F=1.0
C      IF(DL(I,J).EQ.0.0) GO TO 45
C      IF(ISTEP.GT.2) F=D/DL(I,J)
C      IF(F.GT.5) F=5.0
C      IF(F.LT.0.0) G=0.0
C      45 DL(I,J)=D
C      40 H(I,J)=H(I,J)+D*F
C      537 CONTINUE
C      MAXIT=20
C      MXLOOP=3
C      DO 633 I=1,NC
C      DO 633 J=1,NR
C      CALL TRSET(I,J,NC,NR,RR,RRH,RED,DELX,DELY,RH,RD)

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      CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
638 SF1(I,J)=SF1IJ
      E=0.0
      ITER=ITER+1
C
C      COLUMN CALCULATIONS
C
C
C      ADJUST PARAMETERS FOR WATER TABLE CONDITIONS
C
C      CALL TRSET(NC,HR)
      DO 115 II=1,NC
      I=II
C
C      ALTERNATE COLUMN DIRECTIONS
C
      IF (MOD(ISTEP+ITER,2).EQ.1) I=NC-I+1
      DO 105 J=1,HR
C      CALL TRSET(I,J)
C      CALL TRSET(I,J-1)
C      CALL TRSET(I-1,J)
C      CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
      SF1IJ=SF1(I,J)
C
C      INFILTRATION CONTROL
C      OR EVAPOTRANSPIRATION CONTROL
C
      IF (H(I,J).LT.RD(I,J)) GO TO 55
      RE=RH(I,J)*R(I,J)
      RB=1.0
      GO TO 60
55 RE=(RH(I,J)-RD(I,J))*R(I,J)
      RB=0.0
C
C      CALCULATE B AND G ARRAYS
C
60 DD=HO(I,J)*SF1IJ/DELTA-Q(I,J)+RE
      BB=SF1IJ/DELTA+R(I,J)*RB
      AA=0.0
      CC=0.0
      IF (J-1) 65,70,65
65 AA=-TJ(I,J-1)
      BB=BB+TJ(I,J-1)
70 IF (J=HR) 75,80,75
75 CC=-TJ(I,J)
      BB=BB+TJ(I,J)
80 IF (I-1) 85,90,85
85 BB=BB+TI(I-1,J)
      DD=DD+H(I-1,J)*TI(I-1,J)
90 IF (I=NC) 95,100,95
95 BB=BB+TI(I,J)
      DD=DD+H(I+1,J)*TI(I,J)
100 IF (J.GT.1) W=BB-AA*B(J-1)
      IF (J.EQ.1) W=BB
      B(J)=CC/W

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      IF (J.GT.1) G(J)=(DD-AA*G(J-1))/W
105 IF (J.EQ.1) G(J)=DD/W
C
C   RE-ESTIMATE HEADS
C
      E=E+ABS(H(I,NR)-G(NR))
      H(I,NR)=G(NR)
      N=NR-1
110 HA=G(N)-B(N)*H(I,N+1)
      E=E+ABS(HA-H(I,N))
      H(I,N)=HA
      N=N-1
      IF (N) 115,115,110
115 CONTINUE
C
C   ROW CALCULATIONS
C
C
C   ADJUST PARAMETERS FOR WATER TABLE CONDITIONS
C
C   CALL TRSET(NC,NR)
C   DO 738 I=1,NC
C   DO 738 J=1,NR
C   CALL TRSET(I,J)
C   CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
C 738 SF1(I,J)=SF1IJ
      DO 180 JJ=1,NR
      J=JJ
C
C   ALTERNATE ROW DIRECTIONS
C
      IF (MOD(ISTEP+ITER,2).EQ.1) J=NR-J+1
      DO 170 I=1,NC
C   CALL TRSET(I,J)
C   CALL TRSET(I,J-1)
C   CALL TRSET(I-1,J)
C   CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
      SF1IJ=SF1(I,J)
C
C   ET BOTTOM ELEV. FOR INFIL
C   OR EVAPTRANSPIRATION CONTROL
C
      IF (H(I,J).LT.RD(I,J)) GO TO 120
      RE=RH(I,J)*R(I,J)
      RB=1.0
      GO TO 125
120 RE=(RH(I,J)-RD(I,J))*R(I,J)
      RB=0.0
125 DD=HO(I,J)*SF1IJ/DELTA-Q(I,J)+RE
      BB=SF1IJ/DELTA+R(I,J)*RB
      AA=0.0
      CC=0.0
      IF (J-1) 130,135,130
130 BB=BB+TJ(I,J-1)
      DD=DD+H(I,J-1)*TJ(I,J-1)

```

```

135 IF (J-NR) 140,145,140
140 DD=DD+H(I,J+1)*TJ(I,J)
    BB=BB+TJ(I,J)
145 IF (I-1) 150,155,150
150 BB=BB+TI(I-1,J)
    AA=-TI(I-1,J)
155 IF (I-NC) 160,165,160
160 BB=BB+TI(I,J)
    CC=-TI(I,J)
165 IF (I.GT.1) W=BB-AA*B(I-1)
    IF (I.EQ.1) W=BB
    B(I)=CC/W
    IF (I.GT.1) G(I)=(DD-AA*G(I-1))/W
170 IF (I.EQ.1) G(I)=DD/W
C
C   RE-ESTIMATE HEADS BY GAUSS-SEIDEL AND
C   COMPUTE CONVERGENCE ERROR
C
    E=E+ABS(H(NC,J)-G(NC))
    H(NC,J)=G(NC)
    N=NC-1
175 HA=G(N)-B(N)*H(N+1,J)
    E=E+ABS(H(N,J)-HA)
    H(N,J)=HA
    N=N-1
    IF (N) 180,180,175
180 CONTINUE
C
C   2D SYSTEM WATER BALANCE CALCULATIONS
C   TO TEST FOR CONVERGENCE
C
    STORE=0.0
    PUMP=0.0
    INFET=0.0
    DO 185 I=1,NC
    DO 185 J=1,NR
C   CALL SFSET(I,J,SF1(I,J),XSF12)
    SF1IJ=SF1(I,J)
    STORE=STORE+SF1IJ*(H(I,J)-H(I,J))/DELTA
    PUMP=PUMP+Q(I,J)
    IF (H(I,J).GT.RD(I,J)) INFET=INFET+R(I,J)*(RH(I,J)-H(I,J))
    IF (H(I,J).LE.RD(I,J)) INFET=INFET+R(I,J)*(RH(I,J)-RD(I,J))
185 CONTINUE
    TOTIN=STORE+INFET
    TOTOUT=PUMP
    DIFF=0.0
    IF (TOTOUT.GT.0.0.AND.TOTIN.GT.0.0) DIFF=ABS(1.0-TOTOUT/TOTIN)*100.0
    IF ((ITER/5)*5.EQ.ITER.OR.ITER.EQ.MAXIT.OR.E.LE.ERROR.OR.ITER.EQ.1)
    *PRINT*,' ITER = ',ITER,' ERROR = ',E,' WBAL = ',DIFF,' Z'
    IF (ITER.EQ.MAXIT) GO TO 194
    IF (TOTOUT.EQ.0.0) GO TO 190
    IF (DIFF.GT.2.00) GO TO 50
190 IF (E.GT.ERROR) GO TO 50
    IF (ITER.LT.5) GO TO 50
    GO TO 195

```

```

194 ANS=.TRUE.
   PRINT*, ' INCREASE MAX NO OF ITERS TO ', MAXIT+5, ' ', ANS, ' ',
   READ*, ANS
   IF (EOF(5).NE.0.0) CONTINUE
   IF (ANS) MAXIT=MAXIT+5
   IF (ANS) GO TO 50
C
C   PRINT RESULTS
C   PRINT OUT TIME STEP DATA
C
195 CONTINUE
   NLOOP=NLOOP+1
   ANS=.TRUE.
   IF (NLOOP.EQ.MXLOOP) GO TO 8403
   PRINT*, ' LOOP AGAIN TO CHANGE 2D PARAMETERS ', ANS, ' ',
   READ*, ANS
   IF (EOF(5).NE.0.0) CONTINUE
   IF (ANS) ITER=0
   IF (ANS) GO TO 537
8403 CONTINUE
   YEARS=TIME/365
   WRITE (OUT,1070) TIME,YEARS,E,ITER,STORE,INFET,PUMP,DIFF
1070 FORMAT ( /7H TIME=,E15.3,12H DAYS,
1 OR,E10.3,7H YEARS./9H ERROR=,E13.5,7H FEET /30H THE NUMBER OF
2 ITERATIONS IS ,I4///24H WATER BALANCE RESULTS://21H FLOW FROM S
3 STORAGE =,E20.3,5H GPD/29H FLOW FROM INFILTRATION PLUS/32H FLOW
4 FROM EVAPOTRANSPIRATION =,E9.3,5H GPD/27H FLOW TO DISCHARGE UNIT
5S =,E14.3,5H GPD/29H THE WATER BALANCE IS WITHIN,F12.3,3H Z////
6/)
C
C   INCREASE TIME INCREMENT
C   FOR NEXT TIME STEP
C
C   DELTA=DELTA*1.2
C
C   PRINT OUT CATEGORY
C   PRINTOUT MAP
C   WRITE (OUT,1075)
1075 FORMAT (20H CATEGORY PRINTOUT://)
   DO 210 J=1,NR
   DO 205 I=1,NC
   DO 200 K=1,NT
   IF (-H(I,J)+TAB(2,K)) 205,205,200
200 CONTINUE
205 ROW(I)=TAB(1,K)
210 WRITE (OUT,1080) J,(ROW(K),K=1,NC)
1080 FORMAT (I4,2X,50A2)
C
C
C   2D WATER BALANCE TO MINE
C
C   QRO=QSD=0.0
C   QSTORE=0.0
C
C   PERFORM WATER BALANCES ON NORTH AND SOUTH

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```

C      BOUNDARIES
C
DO 8341 I=13,28
  J=9
  IDX=1
8344 IF (IDX.EQ.1) QNO=QNO+TJ(I,J)*(H(I,J)-H(I,J+1))
      IF (IDX.EQ.2) QSO=QSO+TJ(I,J)*(H(I,J+1)-H(I,J))
      IF (IDX.EQ.2) GO TO 8341
      J=14
      IDX=2
      GO TO 8344
8341 CONTINUE
C
C      PERFORM 2D WATER BALANCES ON WEST AND EAST
C      MINE REGION BOUNDARIES
C
      QW=QE=0.0
      DO 9341 J=10,14
        I=12
        IDX=1
9344 IF (IDX.EQ.1) QW=QW+TI(I,J)*(H(I,J)-H(I+1,J))
        IF (IDX.EQ.2) QE=QE+TI(I,J)*(H(I+1,J)-H(I,J))
        IF (IDX.EQ.2) GO TO 9341
        I=28
        IDX=2
        GO TO 9344
9341 CONTINUE
      DO 7341 I=13,28
        DO 7341 J=10,14
C      CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
        SF1IJ=SF1(I,J)
7341 QSTORE=QSTORE+(H0(I,J)-H(I,J))*SF1IJ/DELTA
C
C      12.5 IN/YR IS THE RECHARGE RATE
C      THIS MUST BE CHANGED HERE IN THE
C      THE SOURCE CODE
C      VVVV
C      QR=12.5*1500.*400.*3.281*3.281*7.48/12./365.
C      THE ABOVE COMPUTATION OF INDUCED INFIL IS INCORRECT
C      THIS SHOULD INCLUDE THE TOTAL INDUCED INFIL FOR
C      THE MODEL AREA
C      QR=INFET
      QR=0.0
      DO 613 J=10,14
        DO 613 I=13,28
          IF (H(I,J).GT.RD(I,J)) QR=QR+R(I,J)*(RH(I,J)-H(I,J))
613 IF (H(I,J).LE.RD(I,J)) QR=QR+R(I,J)*(RH(I,J)-RD(I,J))
      QMINE=QNO+QSO+QW+QE
      WBL=Q2TOT-QR-QSTORE-QMINE
C
C      DUMP MINE REGION WATER BALANCE RESULTS
C
      PRINT333,QNO,QSO,QE,QW,QR,QSTORE,QMINE,WBL
333 FORMAT(///,
  &'      *****',/,

```

```

$' * EXXON CRANDON MINE REGION *',/
$' * FLOWS FROM 2D MODEL (GPD) *',/
$' *****',/
$' *NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *',/
$' *****',/
$' *,F11.0,*,F12.0,*,F11.0,*,F11.0,*,/
$' *****',/
$' *LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *',/
$' *****',/
$' *,F11.0,*,F12.0,*,F11.0,*,F11.0,*,/
$' *****')
PRINT*, ' THIS REPRESENTS A % ERROR OF ',WBL*100./Q2TOT

C
C   PERFORM SWAMP CREEK AND HEMLOCK CREEK IMPACT FLOWS
C
C   CALL SWAMP
C   CALL HEMLCK
C
C   PRINT OUT HEAD VALUES AT THE
C   END OF THE TIME INCREMENT
C
C   IPASS=(NC+9)/10
C   DO 215 K=1,IPASS
C   ISTART=(K-1)*10+1
C   IEND=K*10
C   IF (IEND.GT.NC) IEND=NC
C   IF (K.EQ.1) WRITE (OUT,1085)
C1085 FORMAT (1H ///42H HEAD VALUES AT THE END OF THIS TIMESTEP:/)
C   IF (K.GT.1) WRITE (OUT,1100)
C1100 FORMAT (1H ,24HHEAD VALUES (CONTINUED):)
C   WRITE (OUT,1090) ((I),I=ISTART,IEND)
C1090 FORMAT(5X,10(5X,I2))
C   DO 215 J=1,NR
C   WRITE (OUT,1095) J,(H(I,J),I=ISTART,IEND)
C1095 FORMAT(2X,I3,10(F7.1))
C   215 CONTINUE
C   WRITE(10,8813) TIME
C8813 FORMAT(' TIME = ',F20.3)
C   DO 821 JJJ=1,NR
C   J=NR+1-JJJ
C   821 WRITE(10,8811) JJJ,(H(I,JJJ),I=1,NC)
C8811 FORMAT(' ROW = ',I3,/,10F8.2,/,10F8.2,/,10F8.2,/,10F8.2,/,4F8.2)
C
C   UNUSED SYSTEM WATER BALANCE
C
C   DO 903 I=2,31
C   DO 903 J=2,40
C903 Q(I,J)=TJ(I,J)*(4.*H(I,J)-H(I+1,J)-H(I-1,J)-H(I,J+1)-H(I,J-1))
C   PRINT*, ' WATER BALANCE'
C   DO 823 JJJ=2,40
C   J=NR+1-JJJ
C823 WRITE(OUT,9911) JJJ,(H(I,J),I=2,31)
C9911 FORMAT(' ROW = ',I3,/,8E15.5,/,8E15.5,/,8E15.5,/,6E15.5,/)
C
C   CHECK FOR THE DRY NODES

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C
C      DO 8872 I=1,NC
C      DO 8872 J=1,NR
C      IF(THCK(I,J).LT.0.1)PRINT*, " ZERO THICKNESS IN 2D AT NODE ",I,J
C      $,THCK(I,J)
C8872 IF(H(I,J)+POT(I,J).LT.BOT(I,J)+0.11)
C      $PRINT*, " NODE ",I,J," IS DRY IN 2D MODEL",H(I,J)+POT(I,J),BOT(I,J)
C      DO 128 JJJ=1,NR
C      J=NR+1-JJJ
C      WRITE(6,1188) JJJ,(THCK(I,JJJ),I=1,NC)
C      WRITE(6,1188) JJJ,(TI(I,JJJ),I=1,NC)
C 128 WRITE(6,1188) JJJ,(TJ(I,JJJ),I=1,NC)
1188 FORMAT(' ROW = ',I3,/,10F8.0,/,10F8.0,/,10F8.0,/,10F8.0,/,4F8.0)
C
C      DUMP 2D MODEL DRAWDOWNS IF USER
C      SO DESIRES
C
C      ANS=.FALSE.
C      PRINT*, " 2D DRAWDOWN MAP ",ANS
C      READ*,ANS
C      IF(EOF(5).NE.0.0) CONTINUE
C      IF(ISTEP.EQ.NSTEPS) ANS=.TRUE.
C      IF(.NOT.ANS) GO TO 848
C      PRINT 849,(I,I=1,40)
849 FORMAT(5X,40I3,/,5X,40(3H---))
C      DO 863 J=1,NR
863 PRINT 873,J,(INT(-H(I,J)+0.5),I=1,40)
873 FORMAT(I4,'!',40I3)
848 CONTINUE
C
C      RETURN TO MAIN PROGRAM
C
C      RETURN
C      END
C      SUBROUTINE TRSET(II,JJ,NC,NR,RR,RRH,RRD,DELX,DELY,RH,RD)
C      COMMON H3(16,05,12),H03(16,05,12),H(44,45),H0(44,45),Q(44,45),Q3(1
C      $6,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),T
C      $I(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(12)
C      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
C      $DZ(15)
C      DIMENSION SF1(44,45),TI(44,45),B(50),G(50),R(44,45),DL(44,45),RDW(
C      $50),TAB(2,20),RH(44,45),RD(44,45),DELX(44),DELY(45),TJ(44,45),PERM
C      $(44,45,2),Q(44,45)
C      I=II
C      J=JJ
C      IF(II.LE.0) I=1
C      IF(JJ.LE.0) J=1
C      IF(II.GT.NC) I=NC
C      IF(JJ.GT.NR) J=NR
C
C      WATER TABLE TRANSMISSIVITY CONTROL ROUTINE
C
C      DO 93 I=1,NC
C      DO 93 J=1,NR

```

```

C      CHECK FOR COMPLETE NODE DE-WATERING
C      AND ADJUST HEADS ACCORDINGLY
C
C      IF(H(I,J)+POT(I,J).LT.BOT(I,J)+0.11) H(I,J)=BOT(I,J)-POT(I,J)+0.1
C      IF(I.EQ.NC) GO TO 6103
C      IF(H(I+1,J)+POT(I+1,J).LT.BOT(I+1,J)+0.11) H(I+1,J)=BOT(I+1,J)-POT
C      $(I+1,J)+0.1
C6103 IF(J.EQ.NR) GO TO 6203
C      IF(H(I,J+1)+POT(I,J+1).LT.BOT(I,J+1)+0.11) H(I,J+1)=BOT(I,J+1)-POT
C      $(I,J+1)+0.1
C6203 CONTINUE
C
C      COMPUTE SATURATED THICKNESSES USED FOR
C      TI TRANSMISSIVITY COMPUTATIONS
C      CHECK FOR ZERO SATURATED THICK.
C
      TLIJ=H(I,J)+POT(I,J)-BOT(I,J)
      IF(TLIJ.GT.THCK(I,J)) TLIJ=THCK(I,J)
      IF(THCK(I,J).LT.0.1) TLIJ=0.0
      TLIP1J=TLIJ
      IF(I.EQ.NC) GO TO 4091
      TLIP1J=H(I+1,J)+POT(I+1,J)-BOT(I+1,J)
      IF(TLIP1J.GT.THCK(I+1,J)) TLIP1J=THCK(I+1,J)
      IF(THCK(I+1,J).LT.0.1) TLIP1J=0.0
4091 CONTINUE
      IF(TLIJ.LT.0.0) TLIJ=0.1
      IF(TLIP1J.LT.0.0) TLIP1J=0.1
C
C      CALCULATE TI TRANSMISSIVITY FROM SATURATED
C      THICKNESSES PREVIOUSLY COMPUTED
C
      TI(I,J)=PERM(I,J,2)*SQRT(TLIJ*TLIP1J)
C
C      COMPUTE SATURATED THICKNESSES USED FOR
C      TJ TRANSMISSIVITY COMPUTATIONS
C      CHECK FOR ZERO SATURATED THICK.
C
      TLIJP1=TLIJ
      IF(J.EQ.NR) GO TO 3091
      TLIJP1=H(I,J+1)+POT(I,J+1)-BOT(I,J+1)
      IF(TLIJP1.GT.THCK(I,J+1)) TLIJP1=THCK(I,J+1)
      IF(THCK(I,J+1).LT.0.1) TLIJP1=0.0
3091 CONTINUE
      IF(TLIJ.LT.0.0) TLIJ=0.1
      IF(TLIJP1.LT.0.0) TLIJP1=0.1
C
C      CALCULATE TJ TRANSMISSIVITY FROM SATURATED
C      THICKNESSES PREVIOUSLY COMPUTED
C
      TJ(I,J)=PERM(I,J,1)*SQRT(TLIJ*TLIJP1)
C 93 CONTINUE
C
C      SET THE INDUCED INFILTRATION VARIABLES
C
      R(I,J)=RR*DELX(I)*DELY(J)

```



```

      RH(I,J)=RRH
      RD(I,J)=RRD
      RETURN
      END
      SUBROUTINE SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
$16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
$TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
$)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
$DZ(15)
      COMMON /STOR2D/ SA,SWT
      DIMENSION DELX(44),DELY(45)
C      SA=SF1(I,J)
C      SWT=SF1(I,J)
C      SA=0.0001
C      SWT=0.15
      SF1IJ=7.48*SWT*XSF12*DELX(I)*DELY(J)
      IF(POT(I,J)+H(I,J)-BOT(I,J).GE.THCK(I,J)) SF1IJ=7.48*SA*XSF12
$*DELX(I)*DELY(J)
C      IF(THCK(I,J).LE.0.0) SF1(I,J)=1E-20
C      SF1(I,J)=SF1IJ
C
C      PROPORTION FOR CHANGE FROM ARTESIAN TO WATER TABLE
C
      IF(HO(I,J)+POT(I,J).GE.THCK(I,J).AND.H(I,J)+POT(I,J).LT.THCK(I,J))
$SF1IJ=((THCK(I,J)-(H(I,J)+POT(I,J)))*SWT+(HO(I,J)+POT(I,J)-THCK(I
$,J))*SA)/(HO(I,J)-H(I,J))*7.48*DELX(I)*DELY(J)
C
C      PROPORTION FOR CHANGE FROM WATER TABLE TO ARTESIAN
C
      IF(HO(I,J)+POT(I,J).LT.THCK(I,J).AND.H(I,J)+POT(I,J).GE.THCK(I,J))
$SF1IJ=((THCK(I,J)-(HO(I,J)+POT(I,J)))*SWT+(H(I,J)+POT(I,J)-THCK(I
$,J))*SA)/(H(I,J)-HO(I,J))*7.48*DELX(I)*DELY(J)
      RETURN
      END
      SUBROUTINE BOUND
      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
$16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
$TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
$)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
$DZ(15)
1 READ(24,*) I,J
      IF(EOF(24).NE.0.0) GO TO 2
      SF1(I,J)=1E20
      GO TO 1
2 RETURN
      END
      SUBROUTINE HETERO(DELX,DELY)
      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
$16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
$TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
$)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),

```

```
$DZ(15)
  DIMENSION DELX(44),DELY(45)
```

```
C
C   DEFINE THE RECHARGE HETEROGENEITY
C
```

```
1 READ(25,*) I,J,RRRR
  IF(EOF(25).NE.0.0) GO TO 2
  R(I,J)=RRRR*DELX(I)*DELY(J)
  GO TO 1
2 CONTINUE
```

```
C
C   DEFINE THE PERMEABILITY HETEROGENEITY
C
```

```
3 READ(26,*) I,J,PPPP
  IF(EOF(26).NE.0.0) GO TO 4
  PERM(I,J,1)=PERM(I,J,2)=PPPP
  GO TO 3
```

```
4 RETURN
END
```

```
SUBROUTINE SWAMP
```

```
COMMON H3(16,05,12),H03(16,05,12),H(44,45),H0(44,45),Q2(44,45),Q3(
$16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
$TI(44,45),TJ(44,45),R(44,45),S(44,45),THCK(44,45),ELEV3(16,05,12
$)
```

```
COMMON /PARAH/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
```

```
$DZ(15)
  DIMENSION ISWP(46),JSWP(46)
  DATA NBND5/46/
  DATA ISWP/
```

```
$01,02,02,03,03,04,04,05,05,05,
$06,06,07,08,08,09,09,10,11,11,
$12,13,14,15,15,16,17,18,19,20,21,
$22,23,24,25,26,27,28,29,30,31,31,
$32,32,33,34/
```

```
  DATA JSWP/
$06,06,07,07,08,08,07,07,06,05,
$05,06,06,06,05,05,04,04,04,05,
$05,05,05,05,04,04,04,04,04,04,
$04,04,04,04,04,04,04,04,04,04,
$04,03,03,02,02,02/
```

```
  QSWP=0.0
```

```
  DO 1 NB=1,NBND5
```

```
    I=ISWP(NB)
```

```
    J=JSWP(NB)
```

```
    QIN=0.0
```

```
    IF(SF1(I+1,J).GT.1E15) GO TO 2
```

```
    QIN=TI(I,J)*(H(I+1,J)-H(I,J))
```

```
2 IF(I.LE.1) GO TO 3
```

```
    IF(SF1(I-1,J).GT.1E15) GO TO 3
```

```
    QIN=QIN+TI(I-1,J)*(H(I-1,J)-H(I,J))
```

```
3 IF(SF1(I,J+1).GT.1E15) GO TO 4
```

```
    QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
```

```
4 QSWP=QSWP+QIN
```

```
1 CONTINUE
```

```
  PRINT*, ' IMPACTED FLOW TO SWAMP CREEK (GPD) = ',QSWP
```

```

RETURN
END
SUBROUTINE HEMLOCK
COMMON H3(16,05,12),H03(16,05,12),H(44,45),H0(44,45),Q2(44,45),Q3(
$16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
$TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
$)
COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
$DZ(15)
DIMENSION IHEM(26),JHEM(26)
DATA NBND5/26/
DATA IHEM/
$35,35,36,36,36,36,36,36,37,37,
$38,38,38,38,38,38,38,39,39,40,
$41,42,42,43,43,42/
DATA JHEM/
$02,03,03,04,05,06,07,08,08,09,
$09,10,11,12,13,14,15,15,16,16,
$16,16,17,17,18,18/
QIHEM=0.0
DO 1 NB=1,NBND5
I=IHEM(NB)
J=JHEM(NB)
QIN=0.0
IF(SF1(I-1,J).GT.1E15) GO TO 3
QIN=TI(I-1,J)*(H(I-1,J)-H(I,J))
3 IF(SF1(I,J-1).GT.1E15) GO TO 4
QIN=QIN+TJ(I,J-1)*(H(I,J-1)-H(I,J))
4 IF(SF1(I,J+1).GT.1E15) GO TO 6
QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
6 QIHEM=QIHEM+QIN
1 CONTINUE
PRINT*,' IMPACTED FLOW TO HEMLOCK CREEK (GPD) = ',QIHEM
C QHEM=0.0
C DO 2 NB=1,NBND5
C I=IHEM(NB)
C J=JHEM(NB)
C QIN=0.0
C IF(SF1(I-1,J).GT.1E15) GO TO 7
C QIN=TI(I-1,J)*(H(I-1,J)-H(I,J))
C 7 IF(SF1(I,J-1).GT.1E15) GO TO 8
C QIN=QIN+TJ(I,J-1)*(H(I,J-1)-H(I,J))
C 8 IF(SF1(I,J+1).GT.1E15) GO TO 9
C QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
C 9 QHEM=QHEM+QIN
C 2 CONTINUE
C PRINT*,' TOTAL FLOW TO HEMLOCK CREEK (GPD) = ',QHEM
RETURN
END
??

```

APPENDIX M. FORTRAN SOURCE CODE FILE "EXX213B" USED FOR
213 PUMP TEST CALIBRATION.

```

C$  DERUG
C$  ARRAYS
    PROGRAM SHROOH(INPUT,OUTPUT,D2,D3,NODES2,NODES3,OUTP,HEADS,TEHP,HI
$NPLN,POTEN,BOTOM,THICK,EXTBDY,RECHRG,PERMEA,DDD,DD,
$TAPE5=INPUT,TAPE14=OUT
$P,DEBUG=OUTPUT,TAPE10
$=D2,TAPE11=D3,TAPE12=NODES2,TAPE13=NODES3,TAPE15=HEADS,TAPE16=KINP
$LN,TAPE6=OUTPUT,TAPE19=TEHP,TAPE21=POTEN,TAPE22=BOTOM,TAPE23=THICK
$,TAPE24=EXTBDY,TAPE25=RECHRG,TAPE26=PERMEA,
$TAPE96=DDD,TAPE97,TAPE98=DD,TAPE99)
    COMMON H3(16,05,12),H03(16,05,12),H2(44,45),H02(44,45),Q2(44,45),Q
$3(16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12
$),TI2(44,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,
$05,12)
    COMMON /STOR2D/ SA,SWT
    DIMENSION TITLE(8),QD(16,05,12),DTHE(9),APHA(8)
    LOGICAL HINIT,ANS,OBSINK,RDEL,PRNT
    DATA SA,SWT/0.0001,0.15/
    DATA XSF12/1.0/
    DATA NSTEPS,DELTA,ACCDEL/9,1.,1./
    DATA DTHE/.1,.5,1.,2.,3.,4.,5.,6.,7./
    DATA TITLE/8*10H      /
    DATA HINIT,OBSINK/,FALSE.,.TRUE./
    WRITE(98,756)
756  FORMAT('ENTER ORSW &')
    WRITE(99,757)
757  FORMAT('ENTER COMW &')
    WRITE(96,956)
956  FORMAT('ENTER OBSO &')
    WRITE(97,957)
957  FORMAT('ENTER CONO &')
    ERRMEA=0.0

C
C  OUTPUT BANNER WITH DATE AND TIME
C
    PRINT*, ' EXXON-CRANDON 213 PUMP TEST'
    CALL DATE(MMDDYY) & CALL TIME(HHMMSS)
    PRINT9820,MMDDYY,HHMMSS
8820  FORMAT(2A10)
    WRITE(10,8820) MMDDYY,HHMMSS
    WRITE(11,8820) MMDDYY,HHMMSS

C
C  READ AND ECHO USER-SUPPLIED TITLE
C
    PRINT*, ' INPUT A TITLE FOR THIS RUN(<=80 CHARACTERS)'
    READ7701,TITLE
    IF(EOF(5).NE.0.0) GO TO 7703
7701  FORMAT(8A10)
7703  WRITE(14,7701)TITLE
    WRITE(10,7701) TITLE
    WRITE(11,7701) TITLE

C
C  DETERMINE IF DETAILED PRINTED IS DESIRED
C

```

```

C   PRNT=.FALSE.
C   PRINT*, ' DO YOU WANT DETAILED PRINTING ', PRNT,
C   READ*, PRNT
C   IF (EOF(5).NE.0.0) CONTINUE
C
C   SET GRID SIZES FOR BOTH MODELS
C   DEFINE OREBODY CONNECTION RECTANGLE
C
C   NC2=44
C   NR2=45
C   NC3=16
C   NR3=05
C   NL=12
C   IC3=13
C   JR3=10
C   IC3=IC3-1
C   JR3=JR3-1
C
C   INITIALIZE HEAD AND OREBODY FLOW ARRAYS FOR
C   2-D FLOW MODEL
C
C   DO 79 II=1,NC2
C   DO 80 J=1,NR2
C   H2(II,J)=0.0
C   Q2(II,J)=0.0
C   80 CONTINUE
C   79 CONTINUE
C
C   CHECK FOR 2-D HEAD FILE INITIALIZATION
C
C   PRINT*, ' IS A 2-D MODEL DRAWDOWN INITIALIZATION ARRAY TO BE INPUT'
C   READ*, HINIT
C   IF (EOF(5).NE.0.0) CONTINUE
C   IF (.NOT.HINIT) GO TO 609
C   READ(15,*) ((H2(I,J),I=1,NC2),J=1,NR2)
C   609 CONTINUE
C
C   INITIALIZE HEAD FOR 3-D OREBODY MODEL
C
C   DO 69 I=1,NC3
C   DO 69 J=1,NR3
C   DO 69 K=1,NL
C   69 H3(I,J,K)=0.0
C
C   ECHO MODEL GRID SIZES
C
C   WRITE(10,*) NC2,NR2
C   WRITE(11,*) NC3,NR3,NL
C
C   CHECK FOR A SINK SUBROUTINE FOR CALIBRATION
C
C   PRINT*, ' IS AN OREBODY SINK SCHEME DESIRED'
C   READ*, OBSINK
C   IF (EOF(5).NE.0.0) CONTINUE
C

```

```

C      INITIALIZE TIME AND NO. OF SIMULATION TIME ITERATIONS
C
      TME=0.0
      NIT=0
C
C      INPUT TIME SEQUENCING PARAMETERS AND VARIABLES
C      DEFAULTS ARE DEFINED IN DATA STATEMENTS
C
      PRINT*, ' INPUT THE NO. OF TIME STEPS, '
      PRINT*, '   AND THE TIME STEP ACCELERATION FACTOR(=1 FOR UNIFORM)'
      RDDEL=.FALSE.
      READ*, NSTEPS, ACCDEL
      IF(EOF(5).NE.0.0) GO TO 77788
      RDDEL=.TRUE.
77788 CONTINUE
      PRINT*, 'INPUT THE TIME INCREMENT SCHEME'
      READ*, (DTME(I), I=1, NSTEPS)
      IF(EOF(5).NE.0.0) CONTINUE
      PRINT*, (DTME(I), I=1, NSTEPS)
C
C      SET 2D MODEL STORAGE PARAMETERS
C
      PRINT*, ' ENTER ARTESIAN AND WATER TABLE STORAGE COEFFS. ', SA, SWT,
      READ*, SA, SWT
      IF(EOF(5).NE.0.0) CONTINUE
C
C      INPUT THE MULTIPLIER FOR 2D MODEL STORAGE
C      DEFAULT IS 1.0
C
      PRINT*, 'INPUT THE PLASH STORAGE FACTOR MULTIPLIER'
      READ*, XSF12
      IF(EOF(5).NE.0.0) CONTINUE
C
C      READ AND ECHO PARAMETERS FROM PRE-PROCESSOR OUTPUT
C      SCRATCH FILE
C
      READ(19, *) PW, PL, PH, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CH, CS, PHW, PWB, PGD,
      $ PSD
      WRITE(10, 191) PW, PL, PH, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CH, CS, PHW, PWB, P
      $ GD, PSD, XSF12
      WRITE(11, 191) PW, PL, PH, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CH, CS, PHW, PWB, P
      $ GD, PSD, XSF12
191 FORMAT(' (PW,PL,PH,PS)=', 4F12.5, '/', ' (ANTI,ANTJ,ANR)=', 3F12.5, '/', ' S
      $ PECIFIC STORAGE OF OREROBY =', E20.5, '/', ' (CW,CL,CH,CS)=', 4F12.5, '/', '
      $ (PHW,PWB,PGD,PSD)=', 4F12.5, '/', ' 2-D STORAGE MULTIPLIER =', F12.5)
C
C      START OF SIMULATION LOOP
C
      TO=0.0
      DO 11 ISTEP=1, NSTEPS
      PRINT*, ' '
      IF (FENT) PRINT*, '#####'
      NIT=NIT+1
      TME=TME+DELTA
      DTME=DTME(ISTEP)

```

```

PRINT*, ' TIME = ',TME
DELTA=TME-T0
IF(DELTA.LE.0.0) PRINT*, ' DELTA<=0.0, ILLEGAL TIME SCHEME'
IF(DELTA.LE.0.0)STOP
T0=TME

C
C   UPDATE THE INITIAL VALUE HEAD ARRAY FOR
C   3D MODEL
C
DO 91 I=1,NC3
DO 91 J=1,NR3
DO 91 K=2,NL
91 H03(I,J,K)=H3(I,J,K)

C
C   PERFORM HEAD CONNECTION BETWEEN 3D AND 2D MODELS
C   FOR 3D SIMULATION
C
DO 92 I=1,NC3
DO 92 J=1,NR3
92 H03(I,J,1)=H3(I,J,1)=H2(I+IC3,J+JR3)

C
C   ENTER 3D MODEL
C
CALL DIM3(NC3,NR3,NL,DELTA,TME,NIT,OBSINK,IC3,JR3,QD,
$NC2,NR2,PRNT,NSTEPS,ISTEP)

C
C   SUM THE FLOW THRU THE RESISTIVE LAYER AND
C   PERFORM FLOW CONNECTION BETWEEN 2D AND 3D MODEL
C   FOR 2D SIMULATION
C
Q2TOT=0.0
DO 401 I=1,NC3
DO 401 J=1,NR3
Q2(I+IC3,J+JR3)=QD(I,J,2)
Q2TOT=Q2TOT+Q2(I+IC3,J+JR3)
401 CONTINUE

C
C   UPDATE THE INITIAL VALUE HEAD ARRAY FOR
C   2D MODEL
C
DO 81 I=1,NC2
DO 81 J=1,NR2
81 H02(I,J)=H2(I,J)
IF(ABS(Q2TOT).LE.1.0)PRINT*, ' NO CONNECTION BETWEEN OREBODY AND GL
$ACIAL MODELS'
IF(ABS(Q2TOT).GT.1.0) CALL PLASH(NC2,NR2,DELTA,TME,NIT,XSF12,ISTEP
$,Q2TOT,PRNT,NSTEPS)
DELTA=DELTA*ACCDEL

C
C   COMPARE OBSERVED AND COMPUTED WITH CALIBRATION
C   ROUTINE
C
CALL CALIB(ISTEP,DTME,NR3,ERRMEA,IC3,JR3,NL)
PRINT*, ' ACC % ERROR FROM OBSERVED ',ERRMEA, ' %'

C

```



```

C      QUERY INTERACTIVE USER FOR PRE-MATURE SIMULATION
C      TERMINATION
C
      PRINT*, ' DO YOU WANT TO TERMINATE THE SIMULATION '
      READ*,ANS
      IF(EOF(5),NE.0.0) GO TO 10
      IF(ANS) GO TO 6666
10 CONTINUE
11 CONTINUE
6666 CONTINUE
C
C      FORM EZGRAPH FILES
C
      REWIND 97
      REWIND 99
209 READ(97,309) APHA
      IF(EOF(97),NE.0.0) GO TO 408
309 FORMAT(8A10)
      WRITE(96,309) APHA
      GO TO 209
408 READ(99,309) APHA
      IF(EOF(99),NE.0.0) GO TO 208
      WRITE(98,309) APHA
      GO TO 408
208 CONTINUE
      WRITE(98,453)
453 FORMAT(
      $'XTITLE 'OBSERVED OVERRURDEN AQUIFER DRAWDOWN'',/,
      $'YTITLE 'COMPUTED OVERRURDEN DRAWDOWN'',/,
      $'TITLE 'OVERRURDEN DRAWDOWN'',/,
      $'DEFINE Y=OBSW'',/,
      $'GRAPH OBSW,COMW,Y;SYMBOL 1,1;LINE 1,0;XGRID;YGRID')
      WRITE(96,457)
457 FORMAT(
      $'XTITLE 'OBSERVED OREBODY DRAWDOWN'',/,
      $'YTITLE 'COMPUTED OREBODY DRAWDOWN'',/,
      $'TITLE 'OREBODY DRAWDOWN'',/,
      $'DEFINE Y=OBSO'',/,
      $'GRAPH OBSO,COMO,Y;SYMBOL 1,1;LINE 1,0;XGRID;YGRID')
      STOP
      END
C
C      CALIBRATION SUBROUTINE FOR 213 PUMP TEST
C      NOTE THAT THIS CODE IS UNIQUE TO 213
C
      SUBROUTINE CALIB(ISTEP,DTHE,NR3,ERRMEA,IC3,JR3,NL)
      COMMON H3(16,05,12),HO3(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q
      $3(16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12
      $),TI2(44,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,
      $05,12)
      DIMENSION ID(39),HOBS(39,9),IOB(39),JOB(39),KOB(39),DTHE(9),JOB(39
      $),OTHE(39)
      DATA HOBS/39/
      DATA (ID(I),I=1,11)/
      $      3H223,3H211,3H209,3H228,3H210,3H218,3H217,3H229,3H216,3H22

```

```

$6,3HWW4/
  DATA (ID(I),I=12,39)/5H220 ,5H219 ,5HDM51 ,5HTW1 ,5HDM21 ,5HDMI
$1 ,5HSTS81,5H2162 ,5H2161 ,
$5H2133U,5H2132 ,5H2131 ,5H2111 ,5H2112U,5H2113U,5HWW2 ,5HDM3 ,
$5H195W ,5H2112L,5H2113L,5H2133L,5H195E ,5H224 ,5H222
$,5H232 ,5H227 ,5H213 ,5H230 /
  DATA (IOB(I),I=1,11)/13,6,12,10,14,5,13,10,10,10,12/
  DATA (IOB(I),I=12,39)/
$6,6,2,16,16,13,11,10,9,12,13,12,6
$,7,6,5,1,14,7,6,12,14,13,12,11,10,
$13,6/
  DATA (KOB(K),K=1,11)/3,5,7,5,6,8,4,3,7,6,99999/
  DATA (KOB(I),I=12,39)/
$4,5,6*99999,2,10*9999,2,2,3,4*4,5,5/
  DATA (JOB(J),J=1,11)/10*99999,04/
  DATA (JOB(I),I=12,39)/
$2*99999,1,4*2,3,99999,3*4,4*3,4,3,3,9*99999/
  DATA OTME/,1,5,1,2,3,4,5,6,7./
  DATA (HOB5(1,I),I=1,9)/48.,80.,85.,86.,87.,88.,89.,2*90./
  DATA (HOB5(2,I),I=1,9)/0.,1,4,2,4,3,3,1,3,4,3*3.5/
  DATA (HOB5(3,I),I=1,9)/77.,112.,116.,120.,121.,122.,123.,124.,125.
$/
  DATA (HOB5(4,I),I=1,9)/19.,50.,54.,56.,57.,58.,59.,60.,60./
  DATA (HOB5(5,I),I=1,9)/70.,108.,115.,116.,117.,118.,119.,2*120./
  DATA (HOB5(6,I),I=1,9)/0.,25.,73,1,2,1,4,1,5,1,6,1,7,1,8/
  DATA (HOB5(7,I),I=1,9)/75.,110.,115.,117.,2*118.,2*119.,120./
  DATA (HOB5(8,I),I=1,9)/1.E21,56.,63.,65.,2*66.,2*67.,68./
  DATA (HOB5(9,I),I=1,9)/10.,20.,24.,25.5,26.,26.,2*26.5,27./
  DATA (HOB5(10,I),I=1,9)/1.E21,56.,63.,66.,2*67.,68.,69.,70./
  DATA (HOB5(11,I),I=1,9)/.1,7,1,0,1,7,2,4,2,9,3,3,3,5,3,9/
  DATA (HOB5(12,I),I=1,9)/8*-99999.,3.7/
  DATA (HOB5(13,I),I=1,9)/8*-99999.,3.6/
  DATA (HOB5(14,I),I=1,9)/8*-99999.,0.4/
  DATA (HOB5(15,I),I=1,9)/8*-99999.,0.1/
  DATA (HOB5(16,I),I=1,9)/8*-99999.,0.3/
  DATA (HOB5(17,I),I=1,9)/8*-99999.,1.2/
  DATA (HOB5(18,I),I=1,9)/8*-99999.,4.0/
  DATA (HOB5(19,I),I=1,9)/8*-99999.,14./
  DATA (HOB5(20,I),I=1,9)/8*-99999.,49./
  DATA (HOB5(21,I),I=1,9)/8*-99999.,3.4/
  DATA (HOB5(22,I),I=1,9)/8*-99999.,3.5/
  DATA (HOB5(23,I),I=1,9)/8*-99999.,3.1/
  DATA (HOB5(24,I),I=1,9)/8*-99999.,0.8/
  DATA (HOB5(25,I),I=1,9)/8*-99999.,0.3/
  DATA (HOB5(26,I),I=1,9)/8*-99999.,0.3/
  DATA (HOB5(27,I),I=1,9)/8*-99999.,0.4/
  DATA (HOB5(28,I),I=1,9)/8*-99999.,0.2/
  DATA (HOB5(29,I),I=1,9)/8*-99999.,1.9/
  DATA (HOB5(30,I),I=1,9)/8*-99999.,0.5/
  DATA (HOB5(31,I),I=1,9)/8*-99999.,4.3/
  DATA (HOB5(32,I),I=1,9)/8*-99999.,6.8/
  DATA (HOB5(33,I),I=1,9)/8*-99999.,33./
  DATA (HOB5(34,I),I=1,9)/8*-99999.,91./
  DATA (HOB5(35,I),I=1,9)/8*-99999.,94./
  DATA (HOB5(36,I),I=1,9)/8*-99999.,98./

```

```

DATA (HOBS(37,I),I=1,9)/8*-99999.,71./
DATA (HOBS(38,I),I=1,9)/8*-99999.,221./
DATA (HOBS(39,I),I=1,9)/8*-99999.,4.2/
ERRINC=0.0
NINC=0

C
C   DETERMINE IF SIMULATION TIME=DATA TIME
C
IST=9999
DO 4432 ITI=1,9
4432 IF(ABS(DTIME(ISTEP)-OTIME(ITI)).LT.0.01) IST=ITI
    IF(IST.GT.1000) GO TO 8899

C
C   IF SO COMPARE COMPUTED AND OBSERVED HEADS
C   IN OREBODY FOR CALIBRATION
C
DO 1005 IOBS=1,NOBS
H3INT=0.0
NR3A=0
DO 2006 J=1,NR3
C   IF(ID(IOBS).EQ.3HWW4) GO TO 5511
    IF(KOB(IOBS).GT.9000) GO TO 5511
C   IF(TI3(IOB(IOBS),J,KOB(IOBS)).LE.0.0.AND.
C   $TJ3(IOB(IOBS),J,KOB(IOBS)).LE.0.0)
C   $GO TO 2006
    I=IOB(IOBS)
    K=KOB(IOBS)
    IF((TI3(I,J,K)+TI3(MAX0(I-1,1),J,K)+TJ3(I,J,K)+TJ3(I,MAX0(J-1,1),K
    $)+R3(I,J,K)+R3(I,J,KINO(K+1,NL)))/6.0.LE.10.0) GO TO 2006
    PRINT*,'NODE (' ,IOB(IOBS),',',J,',',KOB(IOBS),') ACTIVE FOR ',ID(I
    $OBS), ' H = ',H3(IOB(IOBS),J,KOB(IOBS))
C   PRINT*,
C   $   TI3(I,J,K),TI3(MAX0(I-1,1),J,K),TJ3(I,J,K),TJ3(I,MAX0(J-1,1),K
C   $),R3(I,J,K),R3(I,J,KINO(K+1,NL))
    H3INT=H3INT+H3(IOB(IOBS),J,KOB(IOBS))
    NR3A=NR3A+1
2006 CONTINUE
    IF(NR3A.GT.0)H3INT=H3INT/FLOAT(NR3A)
    GO TO 6622
5511 CONTINUE
C5511 IF(ID(IOBS).NE.3HWW4.AND.IST.LT.9) GO TO 1005
    H3INT=H2(IOB(IOBS)+IC3,JOB(IOBS)+JR3)
C   IF(ID(IOBS).EQ.3HWW4)H3INT=H3(IOB(IOBS),JOB(IOBS),1)
6622 PRINT6606,ID(IOBS),-HORS(IOBS,IST),H3INT,
    $IOB(IOBS),JOB(IOBS),KOB(IOBS)
6606 FORMAT(' OBS WELL = ',A5,' OBSERVED = ',F10.3,' COMPUTED = ',
    $F10.3,' AT (' ,I3,',',I3,',',I3,')')
    IF(HORS(IOBS,IST).LE.0.0) GO TO 1004
    NINC=NINC+1
    ERRKEA=ERRKEA+100.*ABS(H3INT+HOBS(IOBS,IST))/HORS(IOBS,IST)
    ERRINC=ERRINC+100.*ABS(H3INT+HOBS(IOBS,IST))/HORS(IOBS,IST)
    PRINT*,' % ERROR CONTRIEUTION FROM THIS COMPARISON ',
    $100.*ABS(H3INT+HORS(IOBS,IST))/HORS(IOBS,IST)
1004 CONTINUE
    IF(JOB(IOBS).GT.1000) GO TO 69

```

```

        IF(IST.EQ.9.AND.IOBS.NE.NOBS-9)WRITE(98,67) HOBS(IOBS,IST)
67  FORMAT(F15.2,' ')
        IF(IST.EQ.9.AND.IOBS.EQ.NOBS-9)WRITE(98,68) HOBS(IOBS,IST)
68  FORMAT(F15.2)
        IF(IST.EQ.9.AND.IOBS.NE.NOBS-9)WRITE(99,67) -H3INT
        IF(IST.EQ.9.AND.IOBS.EQ.NOBS-9)WRITE(99,68) -H3INT
        GO TO 1005
69  CONTINUE
        IF(IST.EQ.9.AND.IOBS.NE.NOBS)WRITE(96,67) HOBS(IOBS,IST)
        IF(IST.EQ.9.AND.IOBS.EQ.NOBS)WRITE(96,68) HOBS(IOBS,IST)
        IF(IST.EQ.9.AND.IOBS.NE.NOBS)WRITE(97,67) -H3INT
        IF(IST.EQ.9.AND.IOBS.EQ.NOBS)WRITE(97,68) -H3INT
1005 CONTINUE
8899 PRINT*, '#####'
        PRINT*, ' % ERROR FOR THIS TIME STEP ',ERRINC,ERRINC/FLOAT(HINC)
        RETURN
        END
C *****
C *   THREE-DIMENSIONAL FINITE DIFFERENCE FLOW MODEL   *
C *****
        SUBROUTINE DIM3(NC,NR,NL,DELTA,TIME,NIT,OBSINK,IC3,JR3,QD,
        $NC2,NR2,PRNT,NSTEPS,ISTEP)
        DIMENSION SF1(16,05,12),TJ(16,05,12),TI(16,05,12),B(16,13),E(16,1
        $3),R(16,05,12),DL(16,05,12),TT(15),S1(15),HH(15),QQ(15),RR(15),ROW
        $(20),TAB(2,20),QV(15),DZ(15),QS(15),THINE(16,5,12),LAYER(12),QD(16
        $,05,12)
        COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
        $6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
        $4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
        COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
        $DZ(15)
        INTEGER OUT
        LOGICAL OBSINK,ANS,PRNT
        DATA LAYER/10H RESIST,10H SUBCROP,10H 95 METERS,10H140 METERS
        $,10H163 METERS,10H185 METERS,10H207 METERS,10H230 METERS,10H263 ME
        $TERS,10H295 METERS,10H322 METERS,10H350 METERS/
        DATA TT/15*300./
        DATA S1/15*1.74/
        DATA QQ/15*0.0/
        DATA HH/15*0.0/
        DATA RR/15*300./
C        DATA (DZ(K),K=1,13)/0.0,3.281,161.695,147.645,4*73.8225,2*106.6325
        DATA (DZ(K),K=1,13)/0.0,1.000,151.695,147.645,4*73.8225,2*106.6325
        $,2*90.2275,0.0/
C
C        DEFINE THE CATEGORY PRINTOUT FOR 3D MODEL
C
C        DATA (TAB(1,I),I=1,14)/0.,1.,5.,10.,20.,30.,40.,50.,60.,70.,80.,90
        $.,100.,110./
        DATA (TAB(2,I),I=1,13)/1H1,1H4,1H8,1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8
        $,1H9,1H0/
        DATA NTABS/13/
        PRINT*, '#####ENTERING 3D MODEL#####'
C
C        DEFINE INPUT AND OUTPUT DEVICE NUMBERS

```

```

C      IN=13
      OUT=14
C
C      READ PARAMETERS AND DEFAULT VALUE CARDS
C
      ERROR=5.
C
C      FILL ARRAYS WITH DEFAULT VALUES
C
      DO 20 K=1,NL
      DO 20 I=1,NC
      DO 20 J=1,NR
20  Q(I,J,K)=QQ(K)
C
C      PERFORM REQUIRED INPUT/OUTPUT FOR 3D SIMULATION
C      LOOP 1
C
      IF(NIT,GT,1) GO TO 999
C
      READ GOLDER POT VALUES
C
      DO 995 J=1,NR2
      READ(21,*) JPOT
995  READ(21,*) (POT(I,J),I=1,NC2)
C
      READ DAP BOTTOM ELEVATIONS
C
      DO 996 J=1,NR2
      READ(22,*) JBOT
996  READ(22,*) (BOT(I,J),I=1,NC2)
C
      READ DAP SATURATED THICKNESSES SINCE THEY
      ARE REQUIRED FOR 3D SIMULATION
C
      DO 997 J=1,NR2
      READ(23,*) JTHICK
997  READ(23,*) (THCK(I,J),I=1,NC2)
C
      SET TO HIGH TO COMPUTE HINE SCHED. ORIGIN FOR SIMULATION
C
      TO=1.E99
C
      READ NODE CARDS
C
      REWIND IN
      REWIND 16
99  READ(IN,*)I,J,K,TI(I,J,K),TJ(I,J,K),R(1,J,K),SF1(I,J,K)
      IF(EOF(IN).NE.0.0) GO TO 999
      GO TO 99
888 DO 666 K=1,NL
      DO 666 I=1,NC
      DO 666 J=1,NR
666  THINE(I,J,K)=1.E99
      KCTRL=2

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```

        CNTRL=1.0
        PRINT*, ' INPUT THE CONTROL LAYER, AMOUNT OF CONTROL '
        READ*, KCNTRL, CNTRL
        IF (EOF(5).NE.0.0) CONTINUE
        DO 667 I=1, NC
        DO 667 J=1, NR
667 R(I, J, KCNTRL)=R(I, J, KCNTRL)*CNTRL
777 READ(16, *) I, J, K, THINE(I, J, K), JUNK
        IF (EOF(16).NE.0.0) GO TO 222

C
C      DETERMINE SIMULATION TIME ORIGIN FROM MINE PLAN
C
        TO=AMIN1(TO, THINE(I, J, K))
        GO TO 777
222 CONTINUE

C
C      ECHO MINE PLAN
C
        PRINT*, ' '
        PRINT*, '*****ECHO OF MINE PLAN*****'
        DO 9701 K=1, NL
        DO 9701 I=1, NC
        DO 9701 J=1, NR
        IF (THINE(I, J, K).GT.1.E50) GO TO 9701
        PRINT*, ' I = ', I, ' J = ', J, ' K = ', K, ' TIME COMPLETED(DAYS) = '
        *, THINE(I, J, K)-TO, ' ', LAYER(K), '*'
        THINE(I, J, K)=THINE(I, J, K)-TO
9701 CONTINUE
        PRINT*, '*****END OF MINE PLAN*****'
        PRINT*, ' '

C
C      ZERO THE VERTICAL TRANSMISSIVITY AT THE SUBCROP
C      LEVEL IF COARSE DRIFT SATURATED THICKNESS IS
C      ZERO OR GOLDER POT IS APPROX. EQUAL TO SUBCROP
C      ELEV.
C
        DO 263 I=1, NC
        DO 263 J=1, NR
        IF (THCK(I+IC3, J+JR3).LE.0.0.OR.ABS(THCK(I+IC3, J+JR3)).LE.0.1)*R(I, J
        *, 2)=0.0
        IF (POT(I+IC3, J+JR3)-BOT(I+IC3, J+JR3).LT.0.11)*R(I, J, 2)=0.0
263 CONTINUE

C
C      COMPUTE SUBLEVEL ELEVATIONS EACH SIMULATION
C      TIME STEP
C
        CALL COMELV(NC, NR, NL, IC3, JR3, HIT)

C
C      OUTPUT ISOPACH THICKNESS AND POT-BOT
C
        PRINT563, (I, I=1, NC)
563 FORMAT(///, ' ISOPACH THICKNESS ', //, 6X, 16I3)
        DO 363 J=1, NR
363 PRINT463, J, (INT(THCK(I+IC3, J+JR3)), I=1, NC)
463 FORMAT(15, ' ', 16I3)

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```

        PRINT763,(I,I=1,NC)
763 FORMAT(///,' GOLDER POT - DAP POT',/,6X,16I3)
        DO 663 J=1,NR
663  PRINT463,J,(INT(POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3)),I=1,N
        $C)
        PRINT863,(I,I=1,NC)
863 FORMAT(///,' 3D RESISTIVE LAYER R ARRAY',/,6X,16I7)
        DO 773 J=1,NR
773  PRINT291,J,(INT(R(I,J,2)),I=1,NC)
291  FORMAT(15,' !',16I7)
999  CONTINUE
C
C      OUTPUT EFFECTIVE MINE NODES
C
        DO 444 K=2,NL
        DO 444 I=1,NC
        DO 444 J=1,NR
444  IF(TIME.GT.THINE(I,J,K))PRINT*, ' MINE NODE ('',I'',',J'',',K'',') EFF
        $ECTIVE"
C
C      CALL SINK DEFINITION ROUTINE FOR CALIBRATION
C
        IF(OBSINK) CALL SINK(NC,HR,NL,NIT)
C
C      START 3D SIMULATION
C
        ITER=0
        MAXIT=100
        EOLD=1E99
        GO TO 53
52  EOLD=E
53  E=0.0
        ITER=ITER+1
C
C      STACK, COLUMN, AND ROW CALCULATIONS
C
        DO 160 K=2,NL
        DO 160 I=1,NC
        DO 140 J=1,NR
        CALL SETPAR(I,J,K,NL,IC3,JR3,RE,RE,RIJK,SF1IJK,TIIM1JK,TI1JK
        $,RIJKP1,TIME)
        CALL CONVRG(I,J,K,NL,IC3,JR3,RE,RE,RIJK,SF1IJK,TIIM1JK,TI1JK
        $,RIJKP1,TIME)
        CALL CONECT(I,J,K,IC3,JR3,RE,RE,RIJK,SF1IJK)
C
C      CALCULATE R AND G ARRAYS
C
        DD=HO(I,J,K)*SF1IJK/DELTA-Q(I,J,K)+SE
        BB=SF1IJK/DELTA+RIJK*RE
        AA=0.0
        CC=0.0
        IF(K-NL.EQ.0) GO TO 55
        EE=BB+RIJKP1
        DD=DD+RIJKP1*H(I,J,K+1)
55  IF(J-1) 60,70,60

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```

60 AA=-TJ(I,J-1,K)
   BB=BB+TJ(I,J-1,K)
70 IF(J-NR) 80,90,80
80 CC=-TJ(I,J,K)
   BB=BB+TJ(I,J,K)
90 IF(I-1) 100,110,100
100 BB=BB+TIIM1JK
    DD=DD+H(I-1,J,K)*TIIM1JK
110 IF(I-NC) 120,130,120
120 BB=BB+TIIJK
    DD=DD+H(I+1,J,K)*TIIJK
130 IF(J.GT.1)W=BB-AA*B(J-1,K)
    IF(J.EQ.1) W=BB
    B(J,K)=CC/W
    IF(J.GT.1)G(J,K)=(DD-AA*G(J-1,K))/W
140 IF(J.EQ.1) G(J,K)=DD/W

C
C   RE-ESTIMATE HEADS
C
   E=E+ABS(H(I,NR,K)-G(NR,K))
   H(I,NR,K)=G(NR,K)
   N=NR-1
150 HA=G(N,K)-B(N,K)*H(I,N+1,K)
   E=E+ABS(HA-H(I,N,K))
   H(I,N,K)=HA
   N=N-1
   IF(N) 160,160,150
160 CONTINUE

C
C   STACK AND ROW CALCULATIONS
C
   DO 271 K=2,NL
   DO 271 J=1,NR
   DO 250 I=1,NC
   CALL SETPAR(I,J,K,NL,IC3,JR3,RE,RIJK,SF11JK,TIIM1JK,TIIJK
$,RIJKP1,TIME)
   CALL CONVRG(I,J,K,NL,IC3,JR3,RE,RIJK,SF11JK,TIIM1JK,TIIJK
$,RIJKP1,TIME)
   CALL CORRECT(I,J,K,IC3,JR3,RE,RIJK,SF11JK)

C
C   CALCULATE B AND G ARRAYS
C
   DD=HO(I,J,K)*SF11JK/DELTA-Q(I,J,K)*RE
   BB=SF11JK/DELTA+RIJK*RE
   AA=0.0
   CC=0.0
   IF(K-NL.EQ.0.0) GO TO 165
   BB=BB+RIJKP1
   DD=DD+RIJKP1*H(I,J,K+1)
165 IF(J-1) 170,180,170
170 BB=BB+TJ(I,J-1,K)
    DD=DD+H(I,J-1,K)*TJ(I,J-1,K)
180 IF(J-NR) 190,200,190
190 DD=DD+H(I,J+1,K)*TJ(I,J,K)
    BB=BB+TJ(I,J,K)

```



```

200 IF(I-1) 210,220,210
210 BB=BB+TIIM1JK
    AA=-TIIM1JK
220 IF(I-NC) 230,240,230
230 BB=BB+TIIM1JK
    CC=-TIIM1JK
240 IF(I.GT.1)W=BB-AA*B(I-1,K)
    IF(I.EQ.1) W=BB
    B(I,K)=CC/W
    IF(I.GT.1)G(I,K)=(DD-AA*G(I-1,K))/W
250 IF(I.EQ.1) G(I,K)=DD/W
C
C    RE-ESTIMATE HEADS
C
    E=E+ABS(H(NC,J,K)-G(NC,K))
    H(NC,J,K)=G(NC,K)
    N=NC-1
260 HA=G(N,K)-B(N,K)*H(N+1,J,K)
    E=E+ABS(H(N,J,K)-HA)
    H(N,J,K)=HA
    N=N-1
    IF(N) 270,270,260
270 CONTINUE
271 CONTINUE
C
C    OUTPUT ITERATIVE INFORMATION FOR INTERACTIVE USER
C
    IF((ITER/5)*5.EQ.ITER.OR.ITER.EQ.MAXIT.OR.E.LE.ERROR.OR.ITER.EQ.1)
$PRINT*,' ITER = ',ITER,' ERROR = ',E,' NORM ERROR = ',E/FLOAT(NC*N
$R)
    IF((EOLD-E)/E.LT.-0.10) PRINT*,' WARNING:  INSTABILITY IN CONVERGE
$NCE ',ITER-1,EOLD,ITER,E
C
C    REQUIRE A MINIMUM OF 5 ITERATIONS PER SIMULATION
C    TIME STEP
C
    IF((EOLD-E)/E.LT.-0.10) GO TO 334
    IF(ITER.LT.5)GO TO 52
C
C    TEST FOR CONVERGENCE
C
    IF(ITER.EQ.MAXIT) GO TO 333
    IF(E.GT.ERROR) GO TO 52
    GO TO 334
333 CONTINUE
    ANS=.FALSE.
    PRINT*,' INCREASE MAX NO. OF ITERATIONS TO ',MAXIT+5,' ',ANS,
    READ*,ANS
    IF(EOF(5).NE.0.0) CONTINUE
    IF (ANS) MAXIT=MAXIT+5
    IF (ANS) GO TO 52
C
C    PRINT SUMMARY RESULTS FOR THIS SIMULATION
C    TIME TO GENERAL OUTPUT FILE
C

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334 WRITE(OUT,300)TIME,E,ITER
300 FORMAT('1','TIME =',F8.2,'DAYS'///' ERROR =',E20.7,' FEET'/' NUMBE
    $R OF ITERATIONS =',I5)
C
C     DUMP DETAILED RESULTS FOR THIS SIMULATION
C     TIME STEP TO D3 FILE FOR POST ANALYSES
C
    DO 7734 K=1,NL
    WRITE(11,456) TIME,K
    456 FORMAT(' TIME = ',F20.3,' LAYER = ',I10)
7734 WRITE(11,455)(J,(H(I,J,K),I=1,NC),J=1,NR)
    455 FORMAT(5(' ROW = ',I10,'/,10F8.2,'/,6F8.2,'/'))
C
C     OUTPUT PLAN VIEW CATEGORY PRINT-OUT FOR EACH
C     LAYER FOR THE INTERACTIVE USER
C
    PRNT=.FALSE.
    PRINT*, ' 3D DRAWDOWN MAPS ',PRNT,
    READ*,PRNT
    IF(EOF(5).NE.0.0) CONTINUE
    IF(ISTEP.EQ.NSTEPS) PRNT=.TRUE.
    IF(.NOT.PRNT) GO TO 33457
    DO 33456 K=1,NL
    PRINT*, ' '
    PRINT*, ' LEVEL = ',LAYER(K), '(',K,')'
    DO 44567 J=1,NR
    DO 22833 I=1,NC
C     DO 33228 NT=1,NTABS
C3228 IF(-H(I,J,K).GE.TAB(1,NT).AND.-H(I,J,K).LT.TAB(1,NT+1)) ROW(I)=TAB
C     $(2,NT)
C     IF(-H(I,J,K).GE.TAB(1,NTABS+1)) ROW(I)=1H>
    ROW(I)=-H(I,J,K)
22833 CONTINUE
44567 PRINT66832,(INT(ROW(I)+0.5),I=1,NC)
66832 FORMAT(20I4)
33456 CONTINUE
33457 CONTINUE
C
C     DUMP AN INTEGRATED CROSS-SECTION CATEGORY PRINTOUT
C
    PRNT=.TRUE.
    PRINT*, ' INTEGRATED CROSS-SECTION DRAWDOWN MAP ',PRNT,
    WRITE(11,*) ' INTEGRATED CROSS-SECTION DRAWDOWN MAP '
    READ*,PRNT
    IF(EOF(5).NE.0.0) CONTINUE
    IF(ISTEP.EQ.NSTEPS) PRNT=.TRUE.
C     IF(.NOT.PRNT) GO TO 66457
    IF(PRNT) PRINT 77832,(I,I=1,NC)
    WRITE(11,77832)(I,I=1,NC)
77832 FORMAT(6X,20I4)
    DO 66456 K=1,NL
    DO 22866 I=1,NC
    ROW(I)=0.0
    TOTJ=0.0
    DO 66567 J=1,NR

```

```

C
C   CHECK FOR A NON-ZERO PRIMARY DIRECTION TRANSMISSIVITY TENSOR
C
      IF(J.EQ.1) GO TO 748
      IF((TI(I,J,K)+TI(MAX0(I-1,1),J,K)+TJ(I,J,K)+TJ(I,MAX0(J-1,1),K)
      $+R(I,J,K)+R(I,J,MIN0(K+1,NL)))/6.0.LE.10.0) GO TO 66567
748  TOTJ=TOTJ+1.0
      ROW(I)=ROW(I)-H(I,J,K)
66567 CONTINUE
      IF(TOTJ.GT.0.0)ROW(I)=ROW(I)/TOTJ
22866 CONTINUE
      IF(PRNT) PRINT88832,K,(INT(ROW(I)+0.5),I=1,NC)
      WRITE(11,88832)K,(INT(ROW(I)+0.5),I=1,NC)
88832 FORMAT(I5,' ! ',20I4)
66456 CONTINUE
66457 CONTINUE
C
C   OUTPUT WHETHER WATER TABLE OR ARTESIAN CONDITIONS
C   EXIST AT RESISTIVE LAYER
C
      PRINT*, ' '
      PRINT*, ' STORAGE STATE ABOVE RESISTIVE LAYER'
      PRINT*, '   A-ARTESIAN  W-WATER TABLE  0-ZERO THICKNESS '
      PRINT*, '           D-DRY NODE'
      DO 55567 J=1,NR
      DO 33833 I=1,NC
      IF(H(I,J,1)+POT(I+IC3,J+JR3)-ROT(I+IC3,J+JR3).GE.THCK(I+IC3,J+JR3)
      $) ROW(I)=1HA
      IF(H(I,J,1)+POT(I+IC3,J+JR3)-ROT(I+IC3,J+JR3).LT.THCK(I+IC3,J+JR3)
      $) ROW(I)=1HW
      IF(H(I,J,1)+POT(I+IC3,J+JR3)-ROT(I+IC3,J+JR3).LT.0.11) ROW(I)=1HD
      IF(THCK(I+IC3,J+JR3).LT.0.11) ROW(I)=1HG
33833 CONTINUE
55567 PRINT55832,(ROW(I),I=1,NC)
55832 FORMAT(66A4)
      IF(NIT.EQ.1) GO TO 193
      PRINT262,(I,I=1,NC)
262  FORMAT(///,' 2D STORAGE ABOVE RESIST  ',/,6X,16I7)
      DO 163 J=1,NR
      163 PRINT291,J,(INT(SF12(I+IC3,J+JR3)),I=1,NC)
      193 CONTINUE
C
C   PERFORM 3-D WATER BALANCE
C
      DO 970 K=2,NL
      QV(K)=0.0
      QS(K)=0.0
      DO 969 I=1,NC
      DO 968 J=1,NR
      CALL SETPAR(I,J,K,NL,IC3,JR3,RB,RE,RIJK,SF11JK,TIIM1JK,TI1JK
      $,RIJKP1,TIME)
      CALL CONVRG(I,J,K,NL,IC3,JR3,RB,RE,RIJK,SF11JK,TIIM1JK,TI1JK
      $,RIJKP1,TIME)
      CALL CONECT(I,J,K,IC3,JR3,RB,RE,RIJK,SF11JK)
      IF(K.GT.2) GO TO 6682

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      IF(H(I,J,2).LT.ELEV(I,J,2)) GO TO 81
6682 RE=RE-RIJK*H(I,J,K)
      QV(K)=QV(K)+RE
      QS(K)=QS(K)-(H(I,J,K)-HO(I,J,K))*SF1IJK/DELTA
      QD(I,J,K)=RE
968 CONTINUE
969 CONTINUE
970 CONTINUE
      QV(1)=QV(2)

C
C      DUMP WATER BALANCE RESULTS FOR INTERACTIVE
C      USER REFERENCE
C
      PRINT 6341,(K,QV(K),K=1,NL)
6341 FORMAT(
1///, '*****',
2  /, '***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL ****',
3  /, '*****',
4  /, '* MODEL LAYER * FLOW INTO (GPD) *',
5  /, '*****',
612(/, '*      ', I5, '      *      ', F10.1 '      *'),
7  /, '*****')
      QS(1)=0.0
      PRINT 6342,(K,QS(K),K=1,NL)
6342 FORMAT(
1///, '*****',
2  /, '***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL ****',
3  /, '*****',
4  /, '* MODEL LAYER * FLOW FROM (GPD) *',
5  /, '*****',
612(/, '*      ', I5, '      *      ', F10.1 '      *'),
7  /, '*****')
      PRINT *, ' 3D WATER BALANCE IS WITHIN ', 100.*(QV(5)-QV(6)+QS(5)-772
$000.)/792000., ' % '

C
C      OUTPUT VERTICAL Q DISTR. FOR ALL LAYERS
C      TO DETAILED OUTPUT FILE D3 FOR POST ANALYSIS
C
      PRINT 963,(I,I=1,NC)
963 FORMAT(///, ' 3D RESISTIVE LAYER VERT. Q',/, 6X, 16I7)
      DO 973 J=1,NR
973 PRINT 291,J,(INT(QD(I,J,2)),I=1,NC)
      DO 909 KK=1,NL
      IF(KK.EQ.1)K=2
909 WRITE(11,908) KK,((QD(I,J,K),I=1,NC),J=1,NR)
908 FORMAT(' K = ', I10,/, 5(16E9.3, /))

C
C      IDENTIFY HEAD BELOW ELEV. NODES
C
      DO 8872 K=1,NL
      DO 8872 J=1,NR
      DO 8872 I=1,NC
C      ELEV(1)=THCK(IC3+I,JR3+J)
C      ELEV(2)=ELEV(1)
8872 IF(H(I,J,K).LT.ELEV(I,J,2)) PRINT *, ' 3D HEAD BELOW ELEV. AT NODE '

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```

      $,I,J,K,
      $ELEV(I,J,K),* H=*,H(I,J,K)
C
C      RETURN TO MAIN PROGRAM
C
      RETURN
      END
      SUBROUTINE CONVRG(I,J,K,NL,IC3,JR3,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
      $,RIJKP1,TIME)
      COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
      $6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
      $4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERN(44,45,2),THINE(16,05,12),
      $DZ(15)
C
C      ADJUST TI'S AND R'S TO REFLECT CONVERGING FLOW
C      INTO A MINE NODE
C
      IF (THINE(I,J,K).GT.1.E50) GO TO 6004
      IF (TIME.LE.THINE(I,J,K)) GO TO 6004
      FCTR=ALOG10(SQRT(328.1*DZ(K)))/4.81/2.38732/3.281)
      RIJK=RIJK/(1.466*FCTR+1.)
      IF (K.LT.NL)
      $FCTR= ALOG10(SQRT(328.1*DZ(K+1)))/4.81/2.38732/3.281)
      IF (K.LT.NL) RIJKP1=RIJKP1/(1.466*FCTR+1.)
      FCTR= ALOG10(SQRT(328.1*(DZ(K)+DZ(K+1))/2.))/4.81/2.38732/3.281)
      IF (I.GT.1) TIIM1JK=TIIM1JK/(1.466*FCTR+1.)
      TIIJK=TIIJK/(1.466*FCTR+1.)
6004 CONTINUE
      RETURN
      END
      SUBROUTINE SETPAR(I,J,K,NL,IC3,JR3,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
      $,RIJKP1,TIME)
      COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
      $6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
      $4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERN(44,45,2),THINE(16,05,12),
      $DZ(15)
C
C      SET APPROPRIATE PARAMETERS
C
      IF (I.GT.1) TIIM1JK=TI(I-1,J,K)
      TIIJK=TI(I,J,K)
      RIJK=R(I,J,K)
      IF (K.LT.NL) RIJKP1=R(I,J,K+1)
C
C      CHECK FOR DRY NODES AT THE SUBCROP
C      AND ZERO R ARRAY IF DRY
C
      IF (K.NE.2) GO TO 1
      IF (H(I,J,1)+POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3).LT.0.11) RIJK=0.0
1 SF1IJK=SF1(I,J,K)
C
C      ***
C      ELEV(1)=-THCK(IC3+I,JR3+J)
C      ELEV(2)=ELEV(1)

```

```

C   ELEV(I,J,1)=BOT(I,J)-(POT(I,J)+H2(I,J))
C
C   SET HEAD TO ELEVATION IF AN EFFECTIVE MINE
C   NODE EXISTS AND THE HEAD IS ABOVE THIS ELEVATION
C
C   IF(TIME.GT.TMINE(I,J,K).AND.H(I,J,K).GT.ELEV(I,J,K))
C   $SF11JK=1.E15
C   IF(TIME.GT.TMINE(I,J,K).AND.H(I,J,K).GT.ELEV(I,J,K))
C   $H(I,J,K)=HO(I,J,K)=ELEV(I,J,K)
C
C   RESET THE STORAGE FACTOR WHEN W.T. CONDITIONS OCCUR
C   IN THIS SOURCE CONFIGURATION NO ADJUSTMENT IS PERFORMED
C
C   IF(H(I,J,K).LT.ELEV(I,J,K-1))SF11JK=SF11JK*1.E01
C   RETURN
C   END
C   SUBROUTINE CORRECT(I,J,K,IC3,JR3,RE,RIJK,SF11JK)
C   COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
C   $6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
C   $4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
C   COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),TMINE(16,05,12),
C   $DZ(15)
C   RE=0.0
C
C   MAKE STORAGE NEGLIGIBLE WHEN HEAD DROPS
C   BELOW ELEVATION
C
C   IF(H(I,J,K).LT.ELEV(K)) SF11JK=1.E-21
C
C   ADJUST FOR HEADS FALLING BELOW ELEVATION
C
C   IF(K.GT.2) GO TO 6682
C
C   USE INDUCED INFILTRATION THEORY FROM BULL. 55 TO
C   REPRESENT MINE INFLOW BOUNDARY CONDITION AT SUBCROP
C
C   IF(H(I,J,2).LT.ELEV(I,J,2)) GO TO 81
C 6682 RE=H(I,J,K-1)*RIJK
C   RR=1.0
C   GO TO 82
C 81 RE=RIJK*AMAX1(H(I,J,K-1)-ELEV(I,J,K),ELEV(I,J,K-1)-ELEV(I,J,K))
C 81 RE=RIJK*(H(I,J,1)+POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3))
C   IF (RE.LT.0.0) PRINT*, ' ERROR: RE < 0 AT ',I,J,K
C   RB=0.0
C 82 RETURN
C   END
C   SUBROUTINE CORRELV(HC,HR,NL,IC3,JR3,NIT)
C   COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
C   $6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
C   $4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
C   COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),TMINE(16,05,12),
C   $DZ(15)
C
C   NOTE:
C   365 METERS IS THE ELEVATION OF THE 1400 M=40

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```

C      LEVEL AS RECEIVED FROM RG HITE 9/22/82...MLV
C
C
C      LOOP TO PRODUCE ELEVATIONS
C
      DO 1 I=1,NC
      DO 1 J=1,NR
      ELEV(I,J,1)=BOT(I+IC3,J+JR3)-(POT(I+IC3,J+JR3)+0.0)
C
C      LEVEL 2 ELEVATION ASSUMES A RESISTIVE LAYER
C      THICKNESS OF 1 FOOT
C
      ELEV(I,J,2)=(BOT(I+IC3,J+JR3)-1.)-(POT(I+IC3,J+JR3)+0.0)
      ELEV(I,J,3)=(365.+45.)*3.128-(POT(I+IC3,J+JR3)+0.0)
      ELEV(I,J,4)=(365.*3.128-(POT(I+IC3,J+JR3)+0.0))
C
C      SET REMAINING SUBLEVELS ELEVATIONS
C      ***
C      SATTHCK=70.0
C      ELEV(1)=-SATTHCK
C      ELEV(2)=ELEV(1)
C
C      COMPUTE ELEVATIONS OF REMAINING SUBLEVELS
C
      DO 6604 K=5,NL
6604  ELEV(I,J,K)=ELEV(I,J,K-1)-DZ(K)
      1 CONTINUE
C
C      DUMP THE ELEVATION ARRAY ON FIRST SIMULATION
C      LOOP
C
      GO TO 2
      IF(NIT.GT.1) GO TO 2
      PRINT44
44  FORMAT(' ECHO OF ELEVATION ARRAY FOR LOOP 1')
      DO 55 K=1,NL
55  PRINT66,K,((INT(ELEV(I,J,K)),I=1,NC),J=1,NR)
66  FORMAT(/,' LEVEL = ',I5,/, (16I5))
      2 RETURN
      END
      SUBROUTINE SINX(NC,NR,NL,NIT)
C
C      THIS SUBROUTINE IS FOR THE 213 CALIBRATION
C
      COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
      6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
      4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      DIMENSION TR(5)
C
C      INPUT OREBODY SINX(NC,NR,NL) SCHEME
C      THIS IS FOR 213 PUMP TEST
C
C      PROPORTION DISCHARGES ONLY TO ACTIVE HOLES
C

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      TAB(1,8)=1H7 $ TAB(2,8)=-35.
      TAB(1,9)=1H8 $ TAB(2,9)=-40.
      TAB(1,10)=1H9 $ TAB(2,10)=-50.
      DO 7801 IT=1,10
7801 TAB(2,IT)=TAB(2,IT)/10.
C
C      READ AND WRITE OUT NODE CARDS
C
C      WRITE (OUT,1055)
1055 FORMAT (1H ///19H NODE CARD VALUES:///70H I J      P1      P2
      1      SF1      H ,      Q      R      RH      RD)
C      REWIND IN
C 15 READ (IN:*)I,J,PERM(I,J,1),PERM(I,J,2),SF1(I,J),HO(I,J),H(I,J),Q(I
C $,J),XXXX
C      IF (EOF(IN),NE,0.0) GO TO 18
C      SF1(I,J)=SF1(I,J)*XSFI2
C      WRITE (OUT,1060) I,J,PERM(I,J,1),PERM(I,J,2),SF1(I,J),H(I,J),Q(I,J
C $),R(I,J),RH(I,J),RD(I,J)
1060 FORMAT (2I3,3E10.3,F6.0,E10.3,3F6.0)
C      GO TO 15
C
C      ZERO Q-ARRAY TO SHUT-OFF INFILTRATION
C
18      DO 8805 I=1,NC
      DO 8805 J=1,NR
8805 Q(I,J)=0.0
C
C      FORM PARTIAL TRANSMISSIVITIES FROM PERMEABILITIES
C      AND VARIABLE GRID DATA
C
      DO 510 I=1,NC
      DO 500 J=1,NR
      PERM(I,J,1)=PERM(I,J,1)*2.*DELX(I)/(DELY(J)+DELY(MINO(J+1,NR)))
      PERM(I,J,2)=PERM(I,J,2)*2.*DELY(J)/(DELX(I)+DELX(MINO(I+1,NC)))
C
C      ADJUST AQUIFER PARAMETERS FOR VARIABLE GRID
C
      SF1(I,J)=SF1(I,J)*7.48*DELX(I)*DELY(J)*3.281*3.281
      R(I,J)=R(I,J)*DELY(J)*DELX(I)*3.281*3.281
500 CONTINUE
510 CONTINUE
C
C      DUMP PARAMETERS FOR FIRST SIMULATION LOOP
C
C      CALL TRSET(NC,NR)
      PRINT*, ' '
C      PRINT*, ' TI DUMP '
C      DO 4710 J=1,NR
C4710 PRINT4711,J,(TI(I,J),I=1,NC)
4711 FORMAT(110,/, (10F8.0))
C      PRINT*, ' '
C      PRINT*, ' TJ DUMP '
C      DO 3710 J=1,NR
C3710 PRINT4711,J,(TJ(I,J),I=1,NC)
19 CONTINUE

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```

C
C      ECHO CATEGORY PRINTOUT DATA
C
      WRITE (OUT,1025) ((TAB(I,J),I=1,2),J=1,NT)
1025 FORMAT (27H CATEGORY PRINTOUT LEGEND:/(2X,A2,26H IF HEAD IS GRE
      1ATER THAN ,F8.2))
C
C      PLACE Q2-ARRAY IN Q TO MAKE GREEBODY CONNECTION
C
      DO 8806 I=1,NC
      DO 8806 J=1,NR
8806 Q(I,J)=Q2(I,J)
C
C
C      2D SIMULATION START
C
      20 CONTINUE
      DEL=DELTA
      KC=1
      DELTA=DEL
      NLOOP=0
      35 ITER=0
C
C      PREDICT HEADS FOR NEXT TIME INCREMENT
C
      DO 40 I=1,NC
      DO 40 J=1,NR
      D=H(I,J)-HO(I,J)
C      HO(I,J)=H(I,J)
      F=1.0
      IF(DL(I,J).EQ.0.0) GO TO 45
      IF(ISTEP.GT.2) F=D/DL(I,J)
      IF(F.GT.5) F=5.0
      IF(F.LT.0.0) G=0.0
      45 DL(I,J)=D
      40 H(I,J)=H(I,J)+D*F
537 CONTINUE
      MAXIT=20
      MXLOOP=3
      DO 638 I=1,NC
      DO 638 J=1,NR
      CALL TRSET(I,J,NC,NR,RR,RRH,RRD,DELX,DELY,RRH,RRD)
      CALL SFSET(I,J,SF11,XSF12,DELX,DELY)
638 SF1(I,J)=SF11J
      50 E=0.0
      ITER=ITER+1
C
C      COLUMN CALCULATIONS
C
C
C      ADJUST PARAMETERS FOR WATER TABLE CONDITIONS
C
C
C      CALL TRSET(NC,NR)
      DO 115 II=1,NC
      I=II

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```

C
C   ALTERNATE COLUMN DIRECTIONS
C
  IF (MOD(ISTEP+ITER,2).EQ.1) I=NC-I+1
  DO 105 J=1,NR
C   CALL TRSET(I,J)
C   CALL TRSET(I,J-1)
C   CALL TRSET(I-1,J)
C   CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
  SF1IJ=SF1(I,J)
C
C   INFILTRATION CONTROL
C   OR EVAPOTRANSPIRATION CONTROL
C
  IF (H(I,J).LT.RD(I,J)) GO TO 55
  RE=RH(I,J)*R(I,J)
  RB=1.0
  GO TO 60
55 RE=(RH(I,J)-RD(I,J))*R(I,J)
  RB=0.0
C
C   CALCULATE B AND G ARRAYS
C
60 DD=HO(I,J)*SF1IJ/DELTA-Q(I,J)+RE
  BB=SF1IJ/DELTA+R(I,J)*RB
  AA=0.0
  CC=0.0
  IF (J-1) 65,70,65
65 AA=-TJ(I,J-1)
  BB=BB+TJ(I,J-1)
70 IF (J-NR) 75,80,75
75 CC=-TJ(I,J)
  BB=BB+TJ(I,J)
80 IF (I-1) 85,90,85
95 BB=BB+TI(I-1,J)
  DD=DD+H(I-1,J)*TI(I-1,J)
90 IF (I-NC) 95,100,95
95 BB=BB+TI(I,J)
  DD=DD+H(I+1,J)*TI(I,J)
100 IF (J.GT.1) W=BB-AA+R(J-1)
  IF (J.EQ.1) W=BB
  B(J)=CC/W
  IF (J.GT.1) G(J)=(DD-AA+G(J-1))/W
105 IF (J.EQ.1) G(J)=DD/W
C
C   RE-ESTIMATE HEADS
C
  E=E+ABS(H(I,NR)-G(NR))
  H(I,NR)=G(NR)
  N=NR-1
110 HA=3(N)-B(N)*H(I,N+1)
  E=E+ABS(HA-H(I,N))
  H(I,N)=HA
  N=N-1
  IF (N) 115,115,110

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115 CONTINUE
C
C   ROW CALCULATIONS
C
C
C   ADJUST PARAMETERS FOR WATER TABLE CONDITIONS
C
C   CALL TRSET(NC,NR)
C   DO 738 I=1,NC
C   DO 738 J=1,NR
C   CALL TRSET(I,J)
C   CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
C 738 SF1(I,J)=SF1IJ
      DO 180 JJ=1,NR
      J=JJ
C
C   ALTERNATE ROW DIRECTIONS
C
C   IF (MOD(ISTEP+ITER,2).EQ.1) J=NR-J+1
      DO 170 I=1,NC
C   CALL TRSET(I,J)
C   CALL TRSET(I,J-1)
C   CALL TRSET(I-1,J)
C   CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
      SF1IJ=SF1(I,J)
C
C   ET BOTTOM ELEV. FOR INFIL
C   OR EVAPTRANSPIRATION CONTROL
C
      IF (H(I,J).LT.RD(I,J)) GO TO 120
      RE=RH(I,J)*R(I,J)
      RB=1.0
      GO TO 125
120 RE=(RH(I,J)-RD(I,J))*R(I,J)
      RB=0.0
125 DD=HO(I,J)*SF1IJ/DELTA-2*(I,J)+RE
      BB=SF1IJ/DELTA+R(I,J)*RE
      AA=0.0
      CC=0.0
      IF (J-1) 130,135,130
130 BB=BB+TJ(I,J-1)
      DD=DD+H(I,J-1)*TJ(I,J-1)
135 IF (J=NR) 140,145,140
140 DD=DD+H(I,J+1)*TJ(I,J)
      BB=BB+TJ(I,J)
145 IF (I-1) 150,155,150
150 BB=BB+TI(I-1,J)
      AA=-TI(I-1,J)
155 IF (I=NC) 160,165,160
160 BB=BB+TI(I,J)
      CC=-TI(I,J)
165 IF (I.GT.1) W=BB-AA*(I-1)
      IF (I.EQ.1) W=BB
      R(I)=CC/W
      IF (I.GT.1) S(I)=(DD-AA*(I-1))/W

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170 IF (I.EQ.1) G(I)=DD/W
C
C   RE-ESTIMATE HEADS BY GAUSS-SEIDEL AND
C   COMPUTE CONVERGENCE ERROR
C
E=E+ABS(H(NC,J)-G(NC))
H(NC,J)=G(NC)
N=NC-1
175 HA=G(N)-B(N)*H(N+1,J)
E=E+ABS(H(N,J)-HA)
H(N,J)=HA
N=N-1
IF (N) 180,180,175
180 CONTINUE
C
C   2D SYSTEM WATER BALANCE CALCULATIONS
C   TO TEST FOR CONVERGENCE
C
STORE=0.0
PUMP=0.0
INFET=0.0
DO 185 I=1,NC
DO 185 J=1,NR
C   CALL SFSET(I,J,SF1(I,J),XSF12)
SF1IJ=SF1(I,J)
STORE=STORE+SF1IJ*(HO(I,J)-H(I,J))/DELTA
PUMP=PUMP+Q(I,J)
IF (H(I,J).GT.RD(I,J)) INFET=INFET+R(I,J)*(RH(I,J)-H(I,J))
IF (H(I,J).LE.RD(I,J)) INFET=INFET+R(I,J)*(RH(I,J)-RD(I,J))
185 CONTINUE
TOTIN=STORE+INFET
TOTOUT=PUMP
DIFF=0.0
IF (TOTOUT.GT.0.0.AND.TOTIN.GT.0.0) DIFF=ABS(1.0-TOTOUT/TOTIN)*100.0
IF ((ITER/5)*5.EQ.ITER.OR.ITER.EQ.MAXIT.OR.E.LE.ERROR.OR.ITER.EQ.1)
$PRINT*,' ITER = ',ITER,' ERROR = ',E,' REAL = ',DIFF,' %'
IF (ITER.EQ.MAXIT) GO TO 194
IF (TOTOUT.EQ.0.0) GO TO 190
IF (DIFF.GT.2.00) GO TO 50
190 IF (E.GT.ERROR) GO TO 50
IF (ITER.LT.5) GO TO 50
GO TO 195
194 ANS=.TRUE.
PRINT*,' INCREASE MAX NO OF ITERS TO ',MAXIT+5,' ',ANS,' ',
READ*,ANS
IF (EOF(5).NE.0.0) CONTINUE
IF (ANS) MAXIT=MAXIT+5
IF (ANS) GO TO 50
C
C   PRINT RESULTS
C   PRINT OUT TIME STEP DATA
C
195 CONTINUE
NLOOP=NLCOP+1
ANS=.TRUE.

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      IF(NLOOP.EQ.MXLOOP) GO TO 8403
      PRINT*, ' LOOP AGAIN TO CHANGE 2D PARAMETERS ',ANS, ' ',
      READ*,ANS
      IF(EOF(5).NE.0.0) CONTINUE
      IF(ANS) ITER=0
      IF(ANS) GO TO 537
8403 CONTINUE
      YEARS=TIME/365
      WRITE (OUT,1070) TIME,YEARS,E,ITER,STORE,INFET,PUMP,DIFF
1070 FORMAT ( /7H TIME=,E15.3,12H DAYS,
1 OR,E10.3,7H YEARS,/9H ERROR= ,E13.5,7H FEET /30H THE NUMBER OF
2 ITERATIONS IS ,I4///24H WATER BALANCE RESULTS://21H FLOW FROM S
3 STORAGE =,E20.3,5H GPD/29H FLOW FROM INFILTRATION PLUS/32H FLOW
4 FROM EVAPOTRANSPIRATION =,E9.3,5H GPD/27H FLOW TO DISCHARGE UNIT
5S =,E14.3,5H GPD/29H THE WATER BALANCE IS WITHIN,F12.3,3H Z///
6/)
C
C      INCREASE TIME INCREMENT
C      FOR NEXT TIME STEP
C
C      DELTA=DELTA*1.2
C
C      PRINT OUT CATEGORY
C      PRINTOUT MAP
      WRITE (OUT,1075)
1075 FORMAT (20H CATEGORY PRINTOUT:/)
      DO 210 J=1,NR
      DO 205 I=1,NC
      DO 200 K=1,NT
      IF (-H(I,J)+TAB(2,K)) 205,205,200
200 CONTINUE
205 ROW(I)=TAB(1,K)
210 WRITE (OUT,1080) J,(ROW(K),K=1,NC)
1080 FORMAT (I4,2X,50A2)
C
C
C      2D WATER BALANCE TO NINE
C
      QNO=QSO=0.0
      QSTORE=0.0
C
C      PERFORM WATER BALANCES ON NORTH AND SOUTH
C      BOUNDARIES
C
      DO 8341 I=13,28
      J=9
      IDX=1
8344 IF (IDX.EQ.1) QNO=QNO+TJ(I,J)*(H(I,J)-H(I,J+1))
      IF (IDX.EQ.2) QSO=QSO+TJ(I,J)*(H(I,J+1)-H(I,J))
      IF (IDX.EQ.2) GO TO 8341
      J=14
      IDX=2
      GO TO 8344
8341 CONTINUE
C

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C     PERFORM 2D WATER BALANCES ON WEST AND EAST
C     MINE REGION BOUNDARIES
C
      QW=QE=0.0
      DO 9341 J=10,14
      I=12
      IDX=1
9344 IF (IDX.EQ.1) QW=QW+TI(I,J)*(H(I,J)-H(I+1,J))
      IF (IDX.EQ.2) QE=QE+TI(I,J)*(H(I+1,J)-H(I,J))
      IF (IDX.EQ.2) GO TO 9341
      I=28
      IDX=2
      GO TO 9344
9341 CONTINUE
      DO 7341 I=13,28
      DO 7341 J=10,14
C     CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
      SF1IJ=SF1(I,J)
9341 QSTORE=QSTORE+(H(I,J)-H(I,J))*SF1IJ/DELTA
C
C     12.5 IN/YR IS THE RECHARGE RATE
C     THIS MUST BE CHANGED HERE IN THE
C     THE SOURCE CODE
C     VVVV
C     QR=12.5*1500.*400.*3.281*3.281*7.48/12./365.
C     THE ABOVE COMPUTATION OF INDUCED INFIL IS INCORRECT
C     THIS SHOULD INCLUDE THE TOTAL INDUCED INFIL FOR
C     THE MODEL AREA
C     QR=INFET
      QR=0.0
      DO 613 J=10,14
      DO 613 I=13,28
      IF (H(I,J).GT.RD(I,J)) QR=QR+R(I,J)*(RH(I,J)-H(I,J))
613 IF (H(I,J).LE.RD(I,J)) QR=QR+R(I,J)*(RH(I,J)-RD(I,J))
      QMINE=QNO+QSO+QW+QE
      WBL=Q2TOT-QR-QSTORE-QMINE
C
C     DUMP MINE REGION WATER BALANCE RESULTS
C
      PRINT333,QNO,QSO,QE,QW,QR,QSTORE,QMINE,WBL
333 FORMAT(///,
$' *****',/,
$' * EXXON CRANDON MINE REGION *',/,
$' * FLOWS FROM 2D MODEL (GPD) *',/,
$' *****',/,
$' *NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *',/,
$' *****',/,
$' *,F11.0,'*',F12.0,'*',F11.0,'*',F11.0,'*',/,
$' *****',/,
$' *LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *',/,
$' *****',/,
$' *,F11.0,'*',F12.0,'*',F11.0,'*',F11.0,'*',/,
$' *****')
      PRINT*, ' THIS REPRESENTS A % ERROR OF ',WBL/100./Q2TOT

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C     PERFORM SWAMP CREEK AND HEHLOCK CREEK IMPACT FLOWS
C
C     CALL SWAMP
C     CALL HEHLCK
C
C     PRINT OUT HEAD VALUES AT THE
C     END OF THE TIME INCREMENT
C
      IPASS=(NC+9)/10
      DO 215 K=1,IPASS
        ISTART=(K-1)*10+1
        IEND=K*10
        IF (IEND.GT.NC) IEND=NC
C     IF (K.EQ.1) WRITE (OUT,1085)
C1085 FORMAT (1H ///42H HEAD VALUES AT THE END OF THIS TIMESTEP://)
C     IF (K.GT.1) WRITE (OUT,1100)
C1100 FORMAT (1H ,24HHEAD VALUES (CONTINUED):)
C     WRITE (OUT,1090) ((I),I=ISTART,IEND)
C1090 FORMAT(5X,10(5X,I2))
C     DO 215 J=1,NR
C     WRITE (OUT,1095) J,(H(I,J),I=ISTART,IEND)
C1095 FORMAT(2X,I3,10(F7.1))
      215 CONTINUE
      WRITE(10,8813) TIME
      8813 FORMAT(' TIME = ',F20.3)
      DO 821 JJJ=1,NR
        J=NR+1-JJJ
      821 WRITE(10,8811) JJJ,(H(I,JJJ),I=1,NC)
      8811 FORMAT(' ROW = ',I3,/,10F8.2,/,10F8.2,/,10F8.2,/,10F8.2,/,4F8.2)
C
C     UNUSED SYSTEM WATER BALANCE
C
C     DO 903 I=2,31
C     DO 903 J=2,40
C 903 Q(I,J)=TJ(I,J)*(4.*H(I,J)-H(I+1,J)-H(I-1,J)-H(I,J+1)-H(I,J-1))
C     PRINT*, ' WATER BALANCE'
C     DO 823 JJJ=2,40
C     J=NR+1-JJJ
C 823 WRITE(OUT,9911) JJJ,(H(I,J),I=2,31)
C9911 FORMAT(' ROW = ',I3,/,8E15.5,/,8E15.5,/,8E15.5,/,8E15.5,/)
C
C     CHECK FOR THE DRY NODES
C
C     DO 8872 I=1,NC
C     DO 8872 J=1,NR
C     IF (THCK(I,J).LT.0.1)PRINT*, ' ZERO THICKNESS IN 2D AT NODE ',I,J
C     $,THCK(I,J)
C8872 IF (H(I,J)+POT(I,J).LT.POT(I,J)+0.11)
C     $PRINT*, ' NODE ',I,J,' IS DRY IN 2D MODEL',H(I,J)+POT(I,J),POT(I,J)
C     DO 128 JJJ=1,NR
C     J=NR+1-JJJ
C     WRITE(6,1189) JJJ,(THCK(I,JJJ),I=1,NC)
C     WRITE(6,1189) JJJ,(TI(I,JJJ),I=1,NC)
C 128 WRITE(6,1189) JJJ,(TJ(I,JJJ),I=1,NC)
      1188 FORMAT(' ROW = ',I3,/,10F8.0,/,10F8.0,/,10F8.0,/,10F8.0,/,4F8.0)

```

```

C
C      DUMP 2D MODEL DRAWDOWNS IF USER
C      SO DESIRES
C
      ANS=.FALSE.
      PRINT*, ' 2D DRAWDOWN MAP ',ANS
      READ*,ANS
      IF(EOF(5).NE.0.0) CONTINUE
      IF(ISTEP.EQ.NSTEPS) ANS=.TRUE.
      IF(.NOT.ANS) GO TO 848
      PRINT 849,(I,I=1,40)
849  FORMAT(5X,40I3,/,5X,40(3H---))
      DO 863 J=1,NR
863  PRINT 873,J,(INT(-H(I,J)+0.5),I=1,40)
873  FORMAT(I4,'!',40I3)
848  CONTINUE

C
C      RETURN TO MAIN PROGRAM
C
      RETURN
      END
      SUBROUTINE TRSET(II,JJ,NC,NR,RR,RRH,RRD,DELX,DELY,RH,RD)
      COMMON H3(16,05,12),H03(16,05,12),H(44,45),H0(44,45),Q(44,45),Q3(1
$6,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),T
$I(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THIN(16,05,12),
$DZ(15)
      DIMENSION SF1(44,45),TI(44,45),B(50),G(50),R(44,45),DL(44,45),ROW(
$50),TAB(2,20),RH(44,45),RD(44,45),DELX(44),DELY(45),TJ(44,45),PERM
$(44,45,2),Q(44,45)
      I=II
      J=JJ
      IF(II.LE.0) I=1
      IF(JJ.LE.0) J=1
      IF(II.GT.NC) I=NC
      IF(JJ.GT.NR) J=NR

C
C      WATER TABLE TRANSMISSIVITY CONTROL ROUTINE
C
      DO 93 I=1,NC
      DO 93 J=1,NR

C
C      CHECK FOR COMPLETE NODE DE-WATERING
C      AND ADJUST HEADS ACCORDINGLY
C
      IF(H(I,J)+POT(I,J).LT.BOT(I,J)+0.11) H(I,J)=BOT(I,J)-POT(I,J)+0.1
      IF(I.EQ.NC) GO TO 6103
      IF(H(I+1,J)+POT(I+1,J).LT.BOT(I+1,J)+0.11) H(I+1,J)=BOT(I+1,J)-POT
$(I+1,J)+0.1
C6103 IF(J.EQ.NR) GO TO 6203
      IF(H(I,J+1)+POT(I,J+1).LT.BOT(I,J+1)+0.11) H(I,J+1)=BOT(I,J+1)-POT
$(I,J+1)+0.1
C6203 CONTINUE
C
C      COMPUTE SATURATED THICKNESSES USED FOR

```

```

C      TI TRANSMISSIVITY COMPUTATIONS
C      CHECK FOR ZERO SATURATED THICK.
C
      TLIJ=H(I,J)+POT(I,J)-BOT(I,J)
      IF(TLIJ.GT.THCK(I,J))TLIJ=THCK(I,J)
      IF(THCK(I,J).LT.0.1) TLIJ=0.0
      TLIP1J=TLIJ
      IF(I.EQ.NC) GO TO 4091
      TLIP1J=H(I+1,J)+POT(I+1,J)-BOT(I+1,J)
      IF(TLIP1J.GT.THCK(I+1,J))TLIP1J=THCK(I+1,J)
      IF(THCK(I+1,J).LT.0.1)TLIP1J=0.0
4091 CONTINUE
      IF(TLIJ.LT.0.0) TLIJ=0.1
      IF(TLIP1J.LT.0.0) TLIP1J=0.1

C
C      CALCULATE TI TRANSMISSIVITY FROM SATURATED
C      THICKNESSES PREVIOUSLY COMPUTED
C
      TI(I,J)=PERM(I,J,2)*SQRT(TLIJ*TLIP1J)

C
C      COMPUTE SATURATED THICKNESSES USED FOR
C      TJ TRANSMISSIVITY COMPUTATIONS
C      CHECK FOR ZERO SATURATED THICK.
C
      TLIJP1=TLIJ
      IF(J.EQ.NR) GO TO 3091
      TLIJP1=H(I,J+1)+POT(I,J+1)-BOT(I,J+1)
      IF(TLIJP1.GT.THCK(I,J+1))TLIJP1=THCK(I,J+1)
      IF(THCK(I,J+1).LT.0.1)TLIJP1=0.0
3091 CONTINUE
      IF(TLIJ.LT.0.0) TLIJ=0.1
      IF(TLIJP1.LT.0.0) TLIJP1=0.1

C
C      CALCULATE TJ TRANSMISSIVITY FROM SATURATED
C      THICKNESSES PREVIOUSLY COMPUTED
C
      TJ(I,J)=PERM(I,J,1)*SQRT(TLIJ*TLIJP1)
C 93 CONTINUE.

C
C      SET THE INDUCED INFILTRATION VARIABLES
C
      R(I,J)=RR*DELX(I)*DELY(J)
      RH(I,J)=RRH
      RD(I,J)=RRD
      RETURN
      END
      SUBROUTINE SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
      COMMON H3(16,05,12),H03(16,05,12),H(44,45),H0(44,45),02(44,45),03(
      $16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
      $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
      $)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),TLINE(16,05,12),
      $DZ(15)
      COMMON /STOR2D/ SA,SWT
      DIMENSION DELX(44),DELY(45)

```

```

C   SA=SF1(I,J)
C   SWT=SF1(I,J)
C   SA=0.0001
C   SWT=0.15
      SF1IJ=7.48*SWT*XSFI2*DELX(I)*DELY(J)
      IF(POT(I,J)+H(I,J)-BOT(I,J).GE.THCK(I,J)) SF1IJ=7.48*SA*XSFI2
      $*DELX(I)*DELY(J)
C   IF(THCK(I,J).LE.0.0) SF1(I,J)=1E-20
C   SF1(I,J)=SF1IJ
C
C   PROPORTION FOR CHANGE FROM ARTESIAN TO WATER TABLE
C
      IF(HO(I,J)+POT(I,J).GE.THCK(I,J).AND.H(I,J)+POT(I,J).LT.THCK(I,J))
      $SF1IJ=((THCK(I,J)-(H(I,J)+POT(I,J))*SWT+(HO(I,J)+POT(I,J)-THCK(I
      $,J))*SA)/(HO(I,J)-H(I,J))*7.48*DELX(I)*DELY(J)
C
C   PROPORTION FOR CHANGE FROM WATER TABLE TO ARTESIAN
C
      IF(HO(I,J)+POT(I,J).LT.THCK(I,J).AND.H(I,J)+POT(I,J).GE.THCK(I,J))
      $SF1IJ=((THCK(I,J)-(HO(I,J)+POT(I,J))*SWT+(H(I,J)+POT(I,J)-THCK(I
      $,J))*SA)/(H(I,J)-HO(I,J))*7.48*DELX(I)*DELY(J)
      RETURN
      END
      SUBROUTINE BOUND
      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
      $16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
      $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
      $)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
      $DZ(15)
1 READ(24,*) I,J
      IF(EOF(24).NE.0.0) GO TO 2
      SF1(I,J)=1E20
      GO TO 1
2 RETURN
      END
      SUBROUTINE HETERO(DELX,DELY)
      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
      $16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
      $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
      $)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
      $DZ(15)
      DIMENSION DELX(44),DELY(45)
C
C   DEFINE THE RECHARGE HETEROGENEITY
C
1 READ(25,*) I,J,RRRR
      IF(EOF(25).NE.0.0) GO TO 2
      R(I,J)=RRRR*DELX(I)*DELY(J)
      GO TO 1
2 CONTINUE
C
C   DEFINE THE PERMEABILITY HETEROGENEITY
C

```

```

3 READ(26,*) I,J,PPPP
  IF(EOF(26).NE.0.0) GO TO 4
  PERM(I,J,1)=PERM(I,J,2)=PPPP
  GO TO 3
4 RETURN
  END
  SUBROUTINE SWAMP
    COMMON H3(16,05,12),H03(16,05,12),H(44,45),H0(44,45),Q2(44,45),Q3(
    $16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
    $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
    $)
    COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
    $DZ(15)
    DIMENSION ISWP(46),JSWP(46)
    DATA NBND5/46/
    DATA ISWP/
    $01,02,02,03,03,04,04,05,05,05,
    $06,06,07,08,08,09,09,10,11,11,
    $12,13,14,15,15,16,17,18,19,20,21,
    $22,23,24,25,26,27,28,29,30,31,31,
    $32,32,33,34/
    DATA JSWP/
    $06,06,07,07,08,08,07,07,06,05,
    $05,06,06,06,05,05,04,04,04,05,
    $05,05,05,05,04,04,04,04,04,04,
    $04,04,04,04,04,04,04,04,04,04,
    $04,03,03,02,02,02/
    QSWP=0.0
    DO 1 NB=1,NBND5
      I=ISWP(NB)
      J=JSWP(NB)
      QIN=0.0
      IF(SF1(I+1,J).GT.1E15) GO TO 2
      QIN=TI(I,J)*(H(I+1,J)-H(I,J))
2     IF(I.LE.1) GO TO 3
      IF(SF1(I-1,J).GT.1E15) GO TO 3
      QIN=QIN+TI(I-1,J)*(H(I-1,J)-H(I,J))
3     IF(SF1(I,J+1).GT.1E15) GO TO 4
      QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
4     QSWP=QSWP+QIN
1     CONTINUE
    PRINT*, " IMPACTED FLOW TO SWAMP CREEK (GPD) = ",QSWP
    RETURN
  END
  SUBROUTINE HEHLCK
    COMMON H3(16,05,12),H03(16,05,12),H(44,45),H0(44,45),Q2(44,45),Q3(
    $16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
    $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
    $)
    COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
    $DZ(15)
    DIMENSION IHEN(26),JHEN(26)
    DATA NBND5/26/
    DATA IHEN/
    $35,35,36,36,36,36,36,36,37,37,

```

```

$38,39,38,38,38,38,39,39,40,
$41,42,42,43,43,42/
DATA JHEM/
$02,03,03,04,05,06,07,08,08,09,
$09,10,11,12,13,14,15,15,16,16,
$16,16,17,17,18,18/
QIHEM=0.0
DO 1 NB=1,NBND5
I=IHEM(NB)
J=JHEM(NB)
QIN=0.0
IF(SF1(I-1,J).GT.1E15) GO TO 3
QIN=TI(I-1,J)*(H(I-1,J)-H(I,J))
3 IF(SF1(I,J-1).GT.1E15) GO TO 4
QIN=QIN+TJ(I,J-1)*(H(I,J-1)-H(I,J))
4 IF(SF1(I,J+1).GT.1E15) GO TO 6
QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
6 QIHEM=QIHEM+QIN
1 CONTINUE
PRINT*, ' IMPACTED FLOW TO HEMLOCK CREEK (GPD) = ',QIHEM
C QHEM=0.0
C DO 2 NB=1,NBND5
C I=IHEM(NB)
C J=JHEM(NB)
C QIN=0.0
C IF(SF1(I-1,J).GT.1E15) GO TO 7
C QIN=TI(I-1,J)*(H(I-1,J)-H(I,J))
C 7 IF(SF1(I,J-1).GT.1E15) GO TO 8
C QIN=QIN+TJ(I,J-1)*(H(I,J-1)-H(I,J))
C 8 IF(SF1(I,J+1).GT.1E15) GO TO 9
C QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
C 9 QHEM=QHEM+QIN
C 2 CONTINUE
C PRINT*, ' TOTAL FLOW TO HEMLOCK CREEK (GPD) = ',QHEM
C RETURN
C END
/

```

APPENDIX N. PROCEDURE FILE "EXXBSM" USED TO CONTROL
SIMULATION EXECUTION.

```

EXXESH(MODEL=SIM)
GRAB,UOILIB.
GET,MINFLN=MMINE.
GET,DUMMY.
GET,REXXON=REXX_MODEL.
ATTACH,D22_MODEL/M=W.
ATTACH,D32_MODEL/M=W.
SKIPFI,D22_MODEL.
SKIPFI,D32_MODEL.
GET,REVORE.
*** GET,BFPREP.
GET,PREP.
RWF.
GET,REVORE,RESIST.
FTN,I=PREP,L=0,B=BFPREP.
BFPREP.
GET,POTEN,BOTOM,THICK.
GET,EXTBDY,RECHRG,PERMEA.
RWF.
SETTL(2500)
REXXON,DUMMY,OUTSIM,PL=50000.
RWF.
REPLACE,OUTSIM.
REPLACE,MINFLW,SWPFLW,HEMFLW.
RENAME,MMN=MINFLW,SSS=SWPFLW,HHH=HEMFLW.
SKIPFI,D22_MODEL.
COPYFI,D2,D22_MODEL.
PACK,D22_MODEL.
SKIPFI,D32_MODEL.
COPYFI,D3,D32_MODEL.
PACK,D32_MODEL.
RETURN,D22_MODEL,D32_MODEL.
REPLACE,D2,D3,OUTP/NA.
/

```


APPENDIX O. FILE "NMINE" WHICH DEFINES WHEN MINE NODES
BECOME ACTIVE.

1 2 3 28
10 4 3 35
14 3 3 18
1 2 4 28
10 4 4 35
12 1 4 2
12 2 4 4
14 3 4 18
1 2 6 28
10 4 6 35
12 2 6 5
14 3 6 18
1 1 8 27
1 2 8 26
1 3 8 26
2 2 8 24
2 3 8 25
3 2 8 23
3 3 8 44
3 4 8 24
4 2 8 21
4 3 8 22
4 4 8 23
5 2 8 20
5 3 8 33
5 4 8 25
6 2 8 19
6 3 8 26
6 4 8 27
7 2 8 18
7 3 8 31
7 4 8 24
8 3 8 17
8 4 8 23
9 2 8 14
9 3 8 16
9 4 8 22
10 2 8 13
10 3 8 15
10 4 8 19
11 2 8 12
11 3 8 12
11 4 8 20
12 1 8 4
12 2 8 6
12 3 8 11
12 4 8 21
13 3 8 14
13 4 8 16
13 5 8 17
14 3 8 16
14 4 8 34
14 5 8 18
15 3 8 17

15 4 8 21
15 5 8 20
16 4 8 22
1 2 10 29
1 3 10 30
2 2 10 29
2 3 10 46
3 2 10 28
3 3 10 42
4 2 10 27
4 3 10 27
4 4 10 28
5 2 10 26
5 3 10 34
6 2 10 26
6 3 10 32
6 4 10 33
7 2 10 25
7 3 10 25
7 4 10 31
8 3 10 24
8 4 10 39
9 2 10 13
9 3 10 21
10 1 10 16
10 2 10 14
10 3 10 14
10 4 10 41
11 2 10 15
11 3 10 20
12 2 10 7
12 3 10 20
13 3 10 21
13 4 10 22
13 5 10 23
14 3 10 22
14 4 10 35
15 3 10 23
15 4 10 36
1 2 12 24
1 3 12 25
2 2 12 23
2 3 12 24
3 2 12 22
3 3 12 22
4 2 12 21
4 3 12 21
5 2 12 19
5 3 12 20
5 4 12 20
6 2 12 19
6 3 12 39
6 4 12 19
7 2 12 18
7 3 12 37

7 4 12 18
8 3 12 18
8 4 12 17
8 5 12 28
9 2 12 17
9 3 12 15
9 4 12 17
9 5 12 30
10 1 12 16
10 2 12 17
10 3 12 14
10 4 12 16
11 2 12 18
11 3 12 12
11 4 12 16
12 1 12 8
12 2 12 8
12 3 12 11
12 4 12 15
13 3 12 13
13 4 12 14
13 5 12 16
14 3 12 15
14 4 12 38
15 3 12 16
15 4 12 39
16 3 12 36
16 4 12 37
/

APPENDIX P. FORTRAN SOURCE FILE "EXXSIM5" USED FOR
MINE PLAN SIMULATIONS.

```

C$  DEBUG
C$  ARRAYS
PROGRAM SHROOM(INPUT,OUTPUT,D2,D3,NODES2,NODES3,OUTP,HEADS,TEMP,HI
$NPLN,POTEN,BOTOM,THICK,EXTBDY,RECHRG,PERMEA,
$MINFLW,SWPFLW,HEMFLW,
$TAPE5=INPUT,TAPE14=OUT
$P,DEBUG=OUTPUT,TAPE10
$=D2,TAPE11=D3,TAPE12=NODES2,TAPE13=NODES3,TAPE15=HEADS,TAPE16=MINP
$LN,TAPE6=OUTPUT,TAPE19=TEMP,TAPE21=POTEN,TAPE22=BOTOM,TAPE23=THICK
$,TAPE24=EXTBDY,TAPE25=RECHRG,TAPE26=PERMEA,
$TAPE96=MINFLW,TAPE97=SWPFLW,TAPE98=HEMFLW,TAPE99)
COMMON H3(16,05,12),H03(16,05,12),H2(44,45),H02(44,45),Q2(44,45),Q
$3(16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12
$),TI2(44,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,
$05,12)
COMMON /STOR2D/ SA,SWT
COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
$DZ(15)
DIMENSION TITLE(8),QD(16,05,12),DTME(38),APHA(8),ROW(44)
LOGICAL HINIT,ANS,OBSSINK,RDDEL,PRNT,ENT3D
DATA SA,SWT/0.0050,0.005/
DATA XSF12/1.0/
DATA NSTEPS,DELTA,ACCDL/027,1.,1./
DATA DTME/269.9,15.1,36*30.0/
DATA TITLE/8*10H /
DATA HINIT,OBSSINK/,FALSE.,FALSE./
ENT3D=.TRUE.
WRITE(96,941)
WRITE(97,941)
WRITE(98,941)
941 FORMAT('ENTER T :')
DTME0=60.0
DO 634 I=1,NSTEPS
DTME0=DTME0+DTME(I)
IF(I.EQ,NSTEPS) GO TO 633
WRITE(96,956)DTME0
WRITE(97,956)DTME0
WRITE(98,956)DTME0
956 FORMAT(F7.1,' :')
IF(I.NE,NSTEPS) GO TO 634
633 WRITE(96,958)DTME0
WRITE(97,958)DTME0
WRITE(98,958)DTME0
958 FORMAT(F7.1)
634 CONTINUE
WRITE(96,942)
942 FORMAT('ENTER QSIM :')
WRITE(97,943)
943 FORMAT('ENTER QSWP :')
WRITE(98,944)
944 FORMAT('ENTER QHEM :')

```

```

ERRHEA=0.0
C
C   OUTPUT BANNER WITH DATE AND TIME
C
PRINT*, ' EXXON-CRANDON MINEPLAN SIMULATION'
CALL DATE(MMDDYY) & CALL TIME(HHMMSS)
PRINT8820,MMDDYY,HHMMSS
8820 FORMAT(2A10)
WRITE(10,8820) MMDDYY,HHMMSS
WRITE(11,8820) MMDDYY,HHMMSS
C
C   READ AND ECHO USER-SUPPLIED TITLE
C
PRINT*, ' INPUT A TITLE FOR THIS RUN(<=80 CHARACTERS)'
READ7701,TITLE
IF(EOF(5).NE.0.0) GO TO 7703
7701 FORMAT(8A10)
7703 WRITE(14,7701)TITLE
WRITE(10,7701) TITLE
WRITE(11,7701) TITLE
C
C   DETERMINE IF DETAILED PRINTED IS DESIRED
C
C   PRNT=.FALSE.
C   PRINT*, ' DO YOU WANT DETAILED PRINTING ',PRNT,
C   READ*,PRNT
C   IF(EOF(5).NE.0.0) CONTINUE
C
C   SET GRID SIZES FOR BOTH MODELS
C   DEFINE OREBODY CONNECTION RECTANGLE
C
NC2=44
NR2=45
NC3=16
NR3=05
NL=12
IC3=13
JR3=10
IC3=IC3-1
JR3=JR3-1
C
C   INITIALIZE HEAD AND OREBODY FLOW ARRAYS FOR
C   2-D FLOW MODEL
C
DO 79 II=1,NC2
DO 80 J=1,NR2
H2(II,J)=0.0
Q2(II,J)=0.0
80 CONTINUE
79 CONTINUE
C
C   CHECK FOR 2-D HEAD FILE INITIALIZATION

```

```

C      PRINT*, ' IS A 2-D MODEL DRAWDOWN INITIALIZATION ARRAY TO BE INPUT'
      READ*, HINIT
      IF (EOF(5).NE.0.0) CONTINUE
      IF (.NOT.HINIT) GO TO 609
      READ(15,*) ((H2(I,J),I=1,NC2),J=1,NR2)
609  CONTINUE
C
C      INITIALIZE HEAD FOR 3-D OREBODY MODEL
C
      DO 69 I=1,NC3
      DO 69 J=1,NR3
      DO 69 K=1,NL
69  H3(I,J,K)=0.0
C
C      ECHO MODEL GRID SIZES
C
      WRITE(10,*) NC2, NR2
      WRITE(11,*) NC3, NR3, NL
C
C      CHECK FOR A SINK SUBROUTINE FOR CALIBRATION
C
      PRINT*, ' IS AN OREBODY SINK SCHEME DESIRED'
      READ*, OBSINK
      IF (EOF(5).NE.0.0) CONTINUE
C
C      INITIALIZE TIME AND NO. OF SIMUATION TIME ITERATIONS
C
      TME=0.0
      NIT=0
C
C      INPUT TIME SEQUENCING PARAMETERS AND VARIABLES
C      DEFAULTS ARE DEFINED IN DATA STATEMENTS
C
      PRINT*, ' INPUT THE NO. OF TIME STEPS,'
      PRINT*, ' AND THE TIME STEP ACCELERATION FACTOR(=1 FOR UNIFORM)'
      RDEL=.FALSE.
      READ*, NSTEPS, ACCDEL
      IF (EOF(5).NE.0.0) GO TO 77788
      RDEL=.TRUE.
77788 CONTINUE
      PRINT*, 'INPUT THE TIME INCREMENT SCHEME'
      READ*, (DTME(I),I=1,NSTEPS)
      IF (EOF(5).NE.0.0) CONTINUE
      PRINT*, (DTME(I),I=1,NSTEPS)
C
C      SET 2D MODEL STORAGE PARAMETERS
C
      PRINT*, ' ENTER ARTESIAN AND WATER TABLE STORAGE COEFFS. ', SA, SWT,
      READ*, SA, SWT
      IF (EOF(5).NE.0.0) CONTINUE
C

```



```

C      INPUT THE MULTIPLIER FOR 2D MODEL STORAGE
C      DEFAULT IS 1.0
C
C      PRINT*, 'INPUT THE PLASM STORAGE FACTOR MULTIPLIER'
C      READ*, XSF12
C      IF (EOF(5), NE, 0.0) CONTINUE
C
C      READ AND ECHO PARAMETERS FROM PRE-PROCESSOR OUTPUT
C      SCRATCH FILE
C
C      READ(19,*) PW, PL, PM, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CM, CS, PHW, PWB, PGD,
C      $PSD
C      WRITE(10,191) PW, PL, PM, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CM, CS, PHW, PWB, P
C      $GD, PSD, XSF12
C      WRITE(11,191) PW, PL, PM, PS, ANTI, ANTJ, ANR, STORE, CW, CL, CM, CS, PHW, PWB, P
C      $GD, PSD, XSF12
191 FORMAT(' (PW,PL,PM,PS)=',4F12.5,/, ' (ANTI,ANTJ,ANR)=',3F12.5,/, ' S
C      $SPECIFIC STORAGE OF OREBODY =',E20.5,/, ' (CW,CL,CM,CS)=',4F12.5,/, '
C      $ (PHW,PWB,PGD,PSD)=',4F12.5,/, ' 2-D STORAGE MULTIPLIER =',F12.5)
C
C      START OF SIMULATION LOOP
C
C      T0=0.0
C      DO 11 ISTEP=1,NSTEPS
C      PRINT*, ' '
C      IF (PRNT) PRINT*, '#####'
C      NIT=NIT+1
C      DELTA=DTME(ISTEP)
C      PRINT*, ' INPUT DELTA ', DELTA, ' ',
C      READ*, DELTA
C      IF (EOF(5), NE, 0.0) CONTINUE
C      TME=TME+DELTA
C      PRINT*, ' TIME = ', TME, DELTA
C      DELTA=TME-T0
C      IF (DELTA, LE, 0.0) PRINT*, ' DELTA<=0.0, ILLEGAL TIME SCHEME'
C      IF (DELTA, LE, 0.0) STOP
C      T0=TME
C
C      UPDATE THE INITIAL VALUE HEAD ARRAY FOR
C      3D MODEL
C
C      DO 91 I=1,NC3
C      DO 91 J=1,NR3
C      DO 91 K=2,NL
C      91 H03(I,J,K)=H3(I,J,K)
C
C      PERFORM HEAD CONNECTION BETWEEN 3D AND 2D MODELS
C      FOR 3D SIMULATION
C
C      DO 92 I=1,NC3
C      DO 92 J=1,NR3
C      92 H03(I,J,1)=H3(I,J,1)=H2(I+IC3,J+JR3)

```

```

C
C   ENTER 3D MODEL
C
PRINT*, ' ENTER 3D MODEL ', ENT3D, ' ',
READ*, ENT3D
IF (EOF(5).NE.0.0) CONTINUE
IF (ENT3D)
$CALL DIM3(NC3, NR3, NL, DELTA, TME, NIT, OBSINK, IC3, JR3, QD,
$NC2, NR2, PRNT, NSTEPS, ISTEP, .TRUE.)
C
IF (ENT3D) GO TO 9920
C
C   COMPUTE FLOW THRU RESISTIVE LAYER IF 3D MODEL IS NOT ENTERED
C
C   DO 970 K=2,2
C   DO 969 I=1, NC3
C   DO 968 J=1, NR3
C   RIJK=R3(I, J, K)
C   CALL CONECT(I, J, K, IC3, JR3, RB, RE, RIJK)
C   RE=RE-RB*RIJK*H3(I, J, K)
C   QD(I, J, K)=RE
C 968 CONTINUE
C 969 CONTINUE
C 970 CONTINUE
C   PRINT*, ' STORAGE STATE ABOVE RESISTIVE LAYER'
C   PRINT*, '   A-ARTESIAN   W-WATER TABLE   0-ZERO THICKNESS '
C   PRINT*, '               D-DRY NODE'
C   DO 55567 J=1, NR3
C   DO 33833 I=1, NC3
C   IF (H3(I, J, 1)+POT(I+IC3, J+JR3)-POT(I+IC3, J+JR3).GE.THCK(I+IC3, J+JR3
C   $)) ROW(I)=1HA
C   IF (H3(I, J, 1)+POT(I+IC3, J+JR3)-POT(I+IC3, J+JR3).LT.THCK(I+IC3, J+JR3
C   $)) ROW(I)=1HW
C   IF (H3(I, J, 1)+POT(I+IC3, J+JR3)-POT(I+IC3, J+JR3).LT.0.11) ROW(I)=1HI
C   IF (THCK(I+IC3, J+JR3).LT.0.11) ROW(I)=1H0
C3833 CONTINUE
C5567 PRINT55832, (ROW(I), I=1, NC3)
C5832 FORMAT(66A4)
C   PRINT963, (I, I=1, NC3)
C 963 FORMAT(///, ' 3D RESISTIVE LAYER VERT. Q', /, 6X, 16I7)
C   DO 973 J=1, NR3
C 973 PRINT291, J, (INT(QD(I, J, 2))), I=1, NC3)
C 291 FORMAT(I5, ' !', 16I7)
C
C   NEW SECTION TO CALL 3D-MODEL TO COMPUTE FLOW THRU
C   RESISTIVE LAYER WITH NO ACTUAL FINITE DIFFERENCE COMP-
C   UTATIONS
C
CALL DIM3(NC3, NR3, NL, DELTA, TME, NIT, OBSINK, IC3, JR3, QD,
$NC2, NR2, PRNT, NSTEPS, ISTEP, .FALSE.)
9920 CONTINUE
C   SUM THE FLOW THRU THE RESISTIVE LAYER AND

```

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C      PERFORM FLOW CONNECTION BETWEEN 2D AND 3D MODEL
C      FOR 2D SIMULATION
C
      Q2TOT=0.0
      DO 401 I=1,NC3
      DO 401 J=1,NR3
      Q2(I+IC3,J+JR3)=QD(I,J,2)
      Q2TOT=Q2TOT+Q2(I+IC3,J+JR3)
401 CONTINUE
C
C      OUTPUT TOTAL RESISTIVE LAYER FLOW
C
      PRINT*, ' ***** TOTAL RESISTIVE LAYER FLOW = ', Q2TOT
C
C      UPDATE THE INITIAL VALUE HEAD ARRAY FOR
C      2D MODEL
C
      DO 81 I=1,NC2
      DO 81 J=1,NR2
81 H02(I,J)=H2(I,J)
      IF (ABS(Q2TOT).LE.1.0) PRINT*, ' NO CONNECTION BETWEEN GROUND AND GL
      ACIAL MODELS'
      CALL PLASH(NC2,NR2,DELTA,TIME,NIT,XSF12,ISTEP
      $,Q2TOT,PRNT,NSTEPS)
C      DELTA=DELTA*ACCDEL
C
C      COMPARE OBSERVED AND COMPUTED WITH CALIBRATION
C      ROUTINE
C
      CALL CALIB(ISTEP,ITIME,NR3,ERRMEA,IC3,JR3,NL)
      PRINT*, ' ACC % ERROR FROM OBSERVED ', ERRMEA, ' %'
C
C      QUERY INTERACTIVE USER FOR PRE-MATURE SIMULATION
C      TERMINATION
C
      PRINT*, ' DO YOU WANT TO TERMINATE THE SIMULATION '
      READ*,ANS
      IF (EDF(5).NE.0.0) GO TO 10
      IF (ANS) GO TO 6666
      10 CONTINUE
      11 CONTINUE
      6666 CONTINUE
      STOP
      END
C *****
C *   THREE-DIMENSIONAL FINITE DIFFERENCE FLOW MODEL   *
C *****
      SUBROUTINE DIM3(NC,NR,NL,DELTA,TIME,NIT,OPSINK,IC3,JR3,QD,
      $NC2,NR2,PRNT,NSTEPS,ISTEP,DOFD)
      DIMENSION SF1(16,05,12), TJ(16,05,12), TI(16,05,12), B(16,13), G(16,1
      $3), R(16,05,12), DL(16,05,12), TT(15), S1(15), HH(15), QQ(15), RR(15), ROW
      $(20), TAR(2,20), QV(15), DZ(15), QS(15), THINE(16,5,12), LAYER(12), QD(16

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$,05,12)
COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
$,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
$,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
$DZ(15)
INTEGER OUT
LOGICAL OBSINK,ANS,FRNT,DOFD
DATA LAYER/10H RESIST,10H SURCRDP,10H 95 METERS,10H140 METERS
$,10H163 METERS,10H185 METERS,10H207 METERS,10H230 METERS,10H263 ME
$,TERS,10H295 METERS,10H322 METERS,10H350 METERS/
DATA TT/15*300./
DATA S1/15*1.74/
DATA Q2/15*0.0/
DATA HH/15*0.0/
DATA RR/15*300./
C DATA (DZ(K),K=1,13)/0.0,3.281,161.695,147.645,4*73.8225,2*106.6325
DATA (DZ(K),K=1,13)/0.0,1.000,161.695,147.645,4*73.8225,2*106.6325
$,2*90.2275,0.0/
C
C DEFINE THE CATEGORY PRINTOUT FOR 3D MODEL
C
DATA (TAB(1,I),I=1,14)/0.,1.,5.,10.,20.,30.,40.,50.,60.,70.,80.,90
$,100.,110./
DATA (TAB(2,I),I=1,13)/1H<,1HA,1HE,1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8
$,1H9,1H0/
DATA NTABS/13/
PRINT*, '*****ENTERING 3D MODEL*****'
PRINT*, ' DO 3D FINITE DIFFERENCE COMPUTATIONS = ',DOFD
C
C DEFINE INPUT AND OUTPUT DEVICE NUMBERS
C
IH=13
OUT=14
C
C READ PARAMETERS AND DEFAULT VALUE CARDS
C
ERROR=5.
C
C FILL ARRAYS WITH DEFAULT VALUES
C
DO 20 K=1,NL
DO 20 I=1,NC
DO 20 J=1,NR
20 Q(I,J,K)=QQ(K)
C
C PERFORM REQUIRED INPUT/OUTPUT FOR 3D SIMULATION
C LOOP 1
C
IF(NIT.GT.1) GO TO 999
C
C READ GOLDER POT VALUES

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C
  DO 995 J=1,NR2
  READ(21,*) JPOT
995 READ(21,*) (POT(I,J),I=1,NC2)
C
C   READ DAP BOTTOM ELEVATIONS
C
  DO 996 J=1,NR2
  READ(22,*) JBOT
996 READ(22,*) (BOT(I,J),I=1,NC2)
C
C   READ DAP SATURATED THICKNESSES SINCE THEY
C   ARE REQUIRED FOR 3D SIMULATION
C
  DO 997 J=1,NR2
  READ(23,*) JTHICK
997 READ(23,*) (THCK(I,J),I=1,NC2)
C
C   SET TO HIGH TO COMPUTE MINE SCHED. ORIGIN FOR SIMULATION
C
  T0=1.E99
C
C   READ NODE CARDS
C
  REWIND IN
  REWIND 16
99 READ(IN,*)I,J,K,TI(I,J,K),TJ(I,J,K),R(I,J,K),SF1(I,J,K)
  IF(EOF(IN).NE.0.0) GO TO 888
  GO TO 99
888 DO 666 K=1,NL
  DO 666 I=1,NC
  DO 666 J=1,NR
666 THINE(I,J,K)=1.E99
  KCNTRL=2
  CNTRL=1.0
  PRINT*, " INPUT THE CONTROL LAYER, AMOUNT OF CONTROL "
  READ*, KCNTRL, CNTRL
  IF(EOF(5).NE.0.0) CONTINUE
  DO 667 I=1,NC
  DO 667 J=1,NR
667 R(I,J,KCNTRL)=R(I,J,KCNTRL)*CNTRL
777 READ(16,*)I,J,K,THINE(I,J,K)
  IF(EOF(16).NE.0.0) GO TO 222
C
C   DETERMINE SIMULATION TIME ORIGIN FROM MINE PLAN
C
C   CONVERT TO MONTHS
C
  THINE(I,J,K)=THINE(I,J,K)*30.0
  T0=AMIN1(T0,THINE(I,J,K))
  GO TO 777

```

```

222 CONTINUE
C
C   ECHO MINE PLAN
C
PRINT*, ' TIME ORIGIN OF MINEPLAN = ', TO
C   PRINT*, ' '
C   PRINT*, '*****ECHO OF MINE PLAN*****'
DO 9701 K=1,NL
DO 9701 I=1,NC
DO 9701 J=1,NR
IF (THINE(I,J,K).GT.1.E50) GO TO 9701
C   PRINT*, ' I = ', I, ' J = ', J, ' K = ', K, ' TIME COMPLETED(DAYS) = '
C   $, THINE(I,J,K)-TO, ' *', LAYER(K), '*'
THINE(I,J,K)=THINE(I,J,K)-TO
9701 CONTINUE
C   PRINT*, '*****END OF MINE PLAN*****'
C   PRINT*, ' '
C
C   ZERO THE VERTICAL TRANSMISSIVITY AT THE SURCROP
C   LEVEL IF COARSE DRIFT SATURATED THICKNESS IS
C   ZERO OR GOLDER POT IS APPROX. EQUAL TO SURCROP
C   ELEV.
C
DO 263 I=1,NC
DO 263 J=1,NR
IF (THCK(I+IC3,J+JR3).LE.0.0.OR.ABS(THCK(I+IC3,J+JR3)).LE.0.1)R(I,J
$,2)=0.0
IF (POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3).LT.0.11)R(I,J,2)=0.0
263 CONTINUE
C
C   COMPUTE SUBLEVEL ELEVATIONS EACH SIMULATION
C   TIME STEP
C
CALL COMELV(NC,NR,NL,IC3,JR3,NIT)
C
C   OUTPUT ISOPACH THICKNESS AND POT-BOT
C
PRINT563,(I,I=1,NC)
563 FORMAT(///,' ISOPACH THICKNESS ',/,6X,16I3)
DO 363 J=1,NR
363 PRINT463,J,(INT(THCK(I+IC3,J+JR3)),I=1,NC)
463 FORMAT(I5,' !',16I3)
PRINT763,(I,I=1,NC)
763 FORMAT(///,' GOLDER POT - IAP BOT',/,6X,16I3)
DO 663 J=1,NR
663 PRINT463,J,(INT(POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3)),I=1,N
$C)
PRINT863,(I,I=1,NC)
863 FORMAT(///,' 3D RESISTIVE LAYER R ARRAY',/,6X,16I7)
DO 773 J=1,NR
773 PRINT291,J,(INT(R(I,J,2)),I=1,NC)
291 FORMAT(I5,' !',16I7)

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999 CONTINUE
C
C   OUTPUT EFFECTIVE MINE NODES
C
C   DO 444 K=2,NL
C   DO 444 I=1,NC
C   DO 444 J=1,NR
C 444 IF(TIME.GT.TMINE(I,J,K))PRINT*," MINE NODE ('I','J','K') EFF
C   $ECTIVE"
C       IF(.NOT.DOFD) GO TO 5353
C
C   CALL SINK DEFINITION ROUTINE FOR CALIBRATION
C
C   IF(OBSINK) CALL SINK(NC,NR,NL,NIT)
C
C   START 3D SIMULATION
C
C       ITER=0
C       MAXIT=050
C       EOLD=1E99
C       GO TO 53
52 EOLD=E
53 E=0.0
C       ITER=ITER+1
C
C   STACK, COLUMN, AND ROW CALCULATIONS
C
C       DO 160 K=2,NL
C       DO 160 I=1,NC
C       DO 140 J=1,NR
C       CALL SETPAR(I,J,K,NL,IC3,JR3,RE,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
C   $,RIJKP1,TIME)
C       CALL CONVRG(I,J,K,NL,IC3,JR3,RE,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
C   $,RIJKP1,TIME)
C       CALL CONECT(I,J,K,IC3,JR3,RE,RE,RIJK,SF1IJK)
C
C   CALCULATE B AND G ARRAYS
C
C       DD=HD(I,J,K)*SF1IJK/DELTA-Q(I,J,K)+RE
C       BB=SF1IJK/DELTA+RIJK*RB
C       AA=0.0
C       CC=0.0
C       IF(K-NL.EQ.0) GO TO 55
C       BB=BB+RIJKP1
C       DD=DD+RIJKP1*H(I,J,K+1)
55 IF(J-1) 60,70,60
60 AA=-TJ(I,J-1,K)
C       BB=BB+TJ(I,J-1,K)
70 IF(J-NR) 80,90,80
80 CC=-TJ(I,J,K)
C       BB=BB+TJ(I,J,K)
90 IF(I-1) 100,110,100

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100 BB=BB+TIIM1JK
    DD=DD+H(I-1,J,K)*TIIM1JK
110 IF(I-NC) 120,130,120
120 BB=BB+TIIJK
    DD=DD+H(I+1,J,K)*TIIJK
130 IF(J.GT.1)W=BB-AA*B(J-1,K)
    IF(J.EQ.1) W=BB
    R(J,K)=CC/W
    IF(J.GT.1)G(J,K)=(DD-AA*G(J-1,K))/W
140 IF(J.EQ.1) G(J,K)=DD/W
C
C     RE-ESTIMATE HEADS
C
    E=E+ABS(H(I,NR,K)-G(NR,K))
    H(I,NR,K)=G(NR,K)
    N=NR-1
150 HA=G(N,K)-B(N,K)*H(I,N+1,K)
    E=E+ABS(HA-H(I,N,K))
    H(I,N,K)=HA
    N=N-1
    IF(N) 160,160,150
160 CONTINUE
C
C     STACK AND ROW CALCULATIONS
C
    DO 271 K=2,NL
    DO 271 J=1,NR
    DO 250 I=1,NC
    CALL SETPAR(I,J,K,NL,IC3,JR3,RR,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
    $,RIJKP1,TIME)
    CALL CONVRG(I,J,K,NL,IC3,JR3,RR,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
    $,RIJKP1,TIME)
    CALL CONECT(I,J,K,IC3,JR3,RR,RE,RIJK,SF1IJK)
C
C     CALCULATE B AND G ARRAYS
C
    DD=HD(I,J,K)*SF1IJK/DELTA-Q(I,J,K)+RE
    BB=SF1IJK/DELTA+RIJK*RB
    AA=0.0
    CC=0.0
    IF(K-NL.EQ.0.0) GO TO 165
    BB=BB+RIJKP1
    DD=DD+RIJKP1*H(I,J,K+1)
165 IF(J-1) 170,180,170
170 BB=BB+TJ(I,J-1,K)
    DD=DD+H(I,J-1,K)*TJ(I,J-1,K)
180 IF(J-NR) 190,200,190
190 DD=DD+H(I,J+1,K)*TJ(I,J,K)
    BB=BB+TJ(I,J,K)
200 IF(I-1) 210,220,210
210 BB=BB+TIIM1JK
    AA=-TIIM1JK

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220 IF(I-NC) 230,240,230
230 RB=RB+TIIJK
    CC=-TIIJK
240 IF(I.GT.1)W=RB-AA*B(I-1,K)
    IF(I.EQ.1) W=RB
    R(I,K)=CC/W
    IF(I.GT.1)G(I,K)=(DD-AA*G(I-1,K))/W
250 IF(I.EQ.1) G(I,K)=DD/W
C
C    RE-ESTIMATE HEADS
C
    E=E+ABS(H(NC,J,K)-G(NC,K))
    H(NC,J,K)=G(NC,K)
    N=NC-1
260 HA=G(N,K)-B(N,K)*H(N+1,J,K)
    E=E+ABS(H(N,J,K)-HA)
    H(N,J,K)=HA
    N=N-1
    IF(N) 270,270,260
270 CONTINUE
271 CONTINUE
C
C    OUTPUT ITERATIVE INFORMATION FOR INTERACTIVE USER
C
    IF((ITER/5)*5.EQ.ITER.OR.ITER.EQ.MAXIT.OR.E.LE.ERROR.OR.ITER.EQ.1)
$PRINT*,' ITER = ',ITER,' ERROR = ',E,' NORM ERROR = ',E/FLOAT(NC*N
$R)
    IF((EOLD-E)/E.LT.-0.10) PRINT*,' WARNING:  INSTABILITY IN CONVERGE
$NCE ',ITER-1,EOLD,ITER,E
C
C    REQUIRE A MINIMUM OF 5 ITERATIONS PER SIMULATION
C    TIME STEP
C
    IF((EOLD-E)/E.GE.-0.10) GO TO 6623
    ANS=.TRUE.
    PRINT*,'CONTINUE ',ANS,
    READ*,ANS
    IF(EQF(5).NE.0.0) CONTINUE
    IF(ANS) GO TO 52
6623 CONTINUE
    IF(ITER.LT.5)GO TO 52
C
C    TEST FOR CONVERGENCE
C
    IF(ITER.EQ.MAXIT) GO TO 333
    IF(E.GT.ERROR) GO TO 52
    GO TO 334
333 CONTINUE
    ANS=.TRUE.
    PRINT*,' INCREASE MAX NO. OF ITERATIONS TO ',MAXIT+5,' ',ANS.
    READ*,ANS
    IF(EQF(5).NE.0.0) CONTINUE

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      IF(ITER,GE,075) GO TO 334
      IF (ANS) MAXIT=MAXIT+5
      IF (ANS) GO TO 52
C
C      PRINT SUMMARY RESULTS FOR THIS SIMULATION
C      TIME TO GENERAL OUTPUT FILE
C
334 WRITE(OUT,300)TIME,E,ITER
300 FORMAT('1','TIME =',F8.2,'DAYS'///' ERROR =',E20.7,' FEET'/' NUMBE
      $R OF ITERATIONS =',I5)
C
C      DUMP DETAILED RESULTS FOR THIS SIMULATION
C      TIME STEP TO D3 FILE FOR POST ANALYSES
C
      DO 7734 K=1,NL
      WRITE(11,456) TIME,K
456 FORMAT(' TIME = ',F20.3,' LAYER = ',I10)
7734 WRITE(11,455)(J,(H(I,J,K),I=1,NC),J=1,NR)
455 FORMAT(5(' ROW = ',I10,/,10F8.2,/,6F8.2,/,/))
C
C      OUTPUT PLAN VIEW CATEGORY PRINT-OUT FOR EACH
C      LAYER FOR THE INTERACTIVE USER
C
      PRNT=.TRUE.
      PRINT*, ' 3D DRAWDOWN MAPS ',PRNT,
      READ*,PRNT
      IF(EOF(5),NE,0,0) CONTINUE
      IF(ISTEP,EQ,NSTEPS) PRNT=.TRUE.
      IF(.NOT.PRNT) GO TO 33457
      DO 33456 K=1,NL
      PRINT*, ' '
      PRINT*, ' LEVEL = ',LAYER(K), '(' ,K, ')'
      DO 44567 J=1,NR
      DO 22833 I=1,NC
C      DO 33228 NT=1,NTABS
C3228 IF(-H(I,J,K),GE,TAB(1,NT),AND,-H(I,J,K),LT,TAB(1,NT+1)) ROW(I)=TAB
C      $(2,NT)
C      IF(-H(I,J,K),GE,TAB(1,NTABS+1)) ROW(I)=1H>
      ROW(I)=-H(I,J,K)
22833 CONTINUE
44567 PRINT66832,(INT(ROW(I)+0.5),I=1,NC)
66832 FORKAT(20I4)
33456 CONTINUE
33457 CONTINUE
C
C      DUMP AN INTEGRATED CROSS-SECTION CATEGORY PRINTOUT
C
5353 PRNT=.TRUE.
      PRINT*, ' INTEGRATED CROSS-SECTION DRAWDOWN MAP ',PRNT,
      WRITE(11,*) ' INTEGRATED CROSS-SECTION DRAWDOWN MAP '
      READ*,PRNT
      IF(EOF(5),NE,0,0) CONTINUE

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```

      IF(ISTEP, EQ, NSTEPS) PRNT=.TRUE.
C      IF(.NOT. PRNT) GO TO 66457
      IF(PRNT) PRINT 77832, (I, I=1, NC)
      WRITE(11, 77832) (I, I=1, NC)
77832 FORMAT(6X, 20I4)
      DO 66456 K=1, NL
      DO 22866 I=1, NC
      ROW(I)=0.0
      TOTJ=0.0
      DO 66567 J=1, NR
C
C      CHECK FOR A NON-ZERO PRIMARY DIRECTION TRANSMISSIVITY TENSOR
C
      IF(J, EQ, 1) GO TO 748
      IF((TI(I, J, K)+TI(MAX0(I-1, 1), J, K)+TJ(I, J, K)+TJ(I, MAX0(J-1, 1), K)
      $+R(I, J, K)+R(I, J, MIN0(K+1, NL)))/6.0, LE, 10.0) GO TO 66567
      748 TOTJ=TOTJ+1.0
      ROW(I)=ROW(I)-H(I, J, K)
66567 CONTINUE
      IF(TOTJ, GT, 0.0) ROW(I)=ROW(I)/TOTJ
22866 CONTINUE
      IF(PRNT) PRINT 88832, K, (INT(ROW(I)+0.5), I=1, NC)
      WRITE(11, 88832) K, (INT(ROW(I)+0.5), I=1, NC)
88832 FORMAT(15, ' ! ', 20I4)
66456 CONTINUE
66457 CONTINUE
C
C      OUTPUT WHETHER WATER TABLE OR ARTESIAN CONDITIONS
C      EXIST AT RESISTIVE LAYER
C
      PRINT*, ' '
      PRINT*, ' STORAGE STATE ABOVE RESISTIVE LAYER'
      PRINT*, ' A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS '
      PRINT*, ' D-DRY NODE'
      DO 55567 J=1, NR
      DO 33833 I=1, NC
      IF(H(I, J, 1)+POT(I+IC3, J+JR3)-BOT(I+IC3, J+JR3), GE, THCK(I+IC3, J+JR3)
      $) ROW(I)=1HA
      IF(H(I, J, 1)+POT(I+IC3, J+JR3)-BOT(I+IC3, J+JR3), LT, THCK(I+IC3, J+JR3)
      $) ROW(I)=1HW
      IF(H(I, J, 1)+POT(I+IC3, J+JR3)-BOT(I+IC3, J+JR3), LT, 0.11) ROW(I)=1HD
      IF(THCK(I+IC3, J+JR3), LT, 0.11) ROW(I)=1H0
33833 CONTINUE
55567 PRINT 55832, (ROW(I), I=1, NC)
55832 FORMAT(66A4)
      IF(NIT, EQ, 1) GO TO 193
      PRINT 262, (I, I=1, NC)
      262 FORMAT(///, ' 2D STORAGE ABOVE RESIST ', /, 6X, 16I7)
      DO 163 J=1, NR
      163 PRINT 291, J, (INT(SF12(I+IC3, J+JR3)), I=1, NC)
      193 CONTINUE
C

```

```

C      PERFORM 3-D WATER BALANCE
C
      QMMAX=-1.E25
      KOMX=-9999
      DO 970 K=2,NL
      QV(K)=0.0
      QS(K)=0.0
      DO 969 I=1,NC
      DO 968 J=1,NR
      CALL SETPAR(I,J,K,NL,IC3,JR3,RR,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
      $,RIJKP1,TIME)
      CALL CONVRG(I,J,K,NL,IC3,JR3,RR,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
      $,RIJKP1,TIME)
      CALL CONECT(I,J,K,IC3,JR3,RR,RE,RIJK,SF1IJK)
      IF(K.GT.2) GO TO 6682
      IF(H(I,J,2),LT,ELEV(I,J,2)) GO TO 81
6682 RE=RE-RIJK*H(I,J,K)
      81 QV(K)=QV(K)+RE
      IF(QV(K).GT.QMMAX) KOMX=K
      QMMAX=AMAX1(QV(K),QMMAX)
      QS(K)=QS(K)-(H(I,J,K)-HO(I,J,K))*SF1IJK/DELTA
C      IF(K.EQ.2.AND..NOT.DOFD)
C      $PRINT*,'RE',RE,'RIJK',RIJK,'H',H(I,J,K),
C      $'H(K-1)',H(I,J,K-1),I,J
      QD(I,J,K)=RE
968 CONTINUE
969 CONTINUE
970 CONTINUE
C
C      DUMP MAX MINE INFLOW TO PLOT FILE
C
      IF(ISTEP.NE,NSTEPS)WRITE(96,438) QMMAX
438 FORMAT(F25.1,' ')
      IF(ISTEP.EQ,NSTEPS)WRITE(96,439) QMMAX
439 FORMAT(F25.1)
      PRINT*,' THE LAYER @ WHICH MAX FLOW OCCURS = ',KOMX
      QV(1)=QV(2)
C
C      DUMP WATER BALANCE RESULTS FOR INTERACTIVE
C      USER REFERENCE
C
      PRINT 6341,(K,QV(K),K=1,NL)
6341 FORMAT(
1//, '*****',
2 /, '**** VERTICAL WATER BALANCE FOR 3D GREBODY MODEL ****',
3 /, '*****',
4 /, '* M O D E L L A Y E R * F L O W I N T O ( G P D ) *',
5 /, '*****',
612(/, '* ',15, ' * ',F10.1 ' '),
7 /, '*****')
      QS(1)=0.0
      PRINT 6342,(K,QS(K),K=1,NL)

```

```

6342 FORMAT(
1///, '*****',
2 /,'***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL *****',
3 /,'*****',
4 /,'* MODEL LAYER * FLOW FROM (GPD) *',
5 /,'*****',
612(/,'* ',15,' * ',F10.1 ' *'),
7 /,'*****')
PRINT *, ' 3D WATER BALANCE IS WITHIN ',100.*(QV(5)-QV(6)+QS(5)-792
$000.)/792000., ' % '

C
C OUTPUT VERTICAL Q DISTR. FOR ALL LAYERS
C TO DETAILED OUTPUT FILE D3 FOR POST ANALYSIS
C

PRINT963,(I,I=1,NC)
963 FORMAT(///, ' 3D RESISTIVE LAYER VERT. Q',/,6X,16I7)
DO 973 J=1,NR
973 PRINT291,J,(INT(QD(I,J,2)),I=1,NC)
DO 909 KK=1,NL
IF(KK,EQ.1)K=2
909 WRITE(11,908) KK,((QD(I,J,K),I=1,NC),J=1,NR)
908 FORMAT(' K = ',I10,/,5(16E9.3,/))

C
C IDENTIFY HEAD BELOW ELEV. NODES
C

DO 8872 K=1,NL
DO 8872 J=1,NR
DO 8872 I=1,NC
C ELEV(1)=-THCK(IC3+I,JR3+J)
C ELEV(2)=ELEV(1)
8872 IF(H(I,J,K).LT.ELEV(I,J,K).AND.K.EQ.2)
$PRINT*, ' 3D HEAD BELOW ELEV. AT NODE '
$,I,J,K,
$ELEV(I,J,K), ' H=',H(I,J,K)

C
C RETURN TO MAIN PROGRAM
C

RETURN
END
SUBROUTINE CONVRG(I,J,K,NL,IC3,JR3,RE,RIJK,SF1IJK,TI1IJK,TIIJK
$,RIJKP1,TIME)
COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
$,6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
$,4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
COMMON /PARAM/POT(44,45),POT(44,45),PERM(44,45,2),THINE(16,05,12),
$,DZ(15)

C
C ADJUST TI'S AND R'S TO REFLECT CONVERGING FLOW
C INTO A MINE NODE
C

IF(THINE(I,J,K).GT.1.E50) GO TO 6004
IF(TIME.LE.THINE(I,J,K)) GO TO 6004

```

```

FCTR=ALOG10(SQRT(328.1*DZ(K))/4.81/2.38732/3.281)
RIJK=RIJK/(1.466*FCTR+1.)
IF(K,LT,NL)
$FCTR= ALOG10(SQRT(328.1*DZ(K+1))/4.81/2.38732/3.281)
IF(K,LT,NL) RIJKP1=RIJKP1/(1.466*FCTR+1.)
FCTR= ALOG10(SQRT(328.1*(DZ(K)+DZ(K+1))/2.)/4.81/2.38732/3.281)
IF(I,GT,1)TIIM1JK=TIIM1JK/(1.466*FCTR+1.)
TIIJK=TIIJK/(1.466*FCTR+1.)
6004 CONTINUE
RETURN
END
SUBROUTINE SETPAR(I,J,K,NL,IC3,JR3,RE,RIJK,SF1IJK,TIIM1JK,TIIJK
$,RIJKP1,TIME)
COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
$,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
$,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
COMMON /PARAM/POT(44,45),BOT(44,45),PERH(44,45,2),TMINE(16,05,12),
$DZ(15)
C
C SET APPROPRIATE PARAMETERS
C
IF(I,GT,1) TIIM1JK=TI(I-1,J,K)
TIIJK=TI(I,J,K)
RIJK=R(I,J,K)
IF(K,LT,NL)RIJKP1=R(I,J,K+1)
C
C CHECK FOR DRY NODES AT THE SUBCROP
C AND ZERO R ARRAY IF DRY
C
IF(K,NE,2) GO TO 1
IF(H(I,J,1)+POT(I+IC3,J+JR3)-BOT(I+IC3,J+JR3),LT,0.11) RIJK=0.0
1 SF1IJK=SF1(I,J,K)
C
C
C ELEV(1)=-THCK(IC3+I,JR3+J)
C ELEV(2)=ELEV(1)
C ELEV(I,J,1)=BOT(I,J)-(POT(I,J)+H2(I,J))
C
C SET HEAD TO ELEVATION IF AN EFFECTIVE MINE
C NODE EXISTS AND THE HEAD IS ABOVE THIS ELEVATION
C
IF(TIME,GT,TMINE(I,J,K),AND,H(I,J,K),GT,ELEV(I,J,K))
$SF1IJK=1.E15
IF(TIME,GT,TMINE(I,J,K),AND,H(I,J,K),GT,ELEV(I,J,K))
$H(I,J,K)=HO(I,J,K)=ELEV(I,J,K)
C
C RESET THE STORAGE FACTOR WHEN W.T. CONDITIONS OCCUR
C IN THIS SOURCE CONFIGURATION NO ADJUSTMENT IS PERFORMED
C
IF(H(I,J,K),LT,ELEV(I,J,K-1))SF1IJK=SF1IJK*1.E01
C
C SET LAYER ONE STORAGE HIGH TO MAINTAIN
C OVERBURDEN AQUIFER HEADS

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C      RETURN
      END
      SUBROUTINE CONECT(I,J,K,IC3,JR3,RE,RIJK,SF1IJK)
      COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
$6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
$4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
$DZ(15)
      RE=0.0

C
C      MAKE STORAGE NEGLIGIBLE WHEN HEAD DROPS
C      BELOW ELEVATION
C
C      IF(H(I,J,K).LT.ELEV(K)) SF1IJK=1.E-21
C
C      ADJUST FOR HEADS FALLING BELOW ELEVATION
C
C      IF(K.GT.2) GO TO 6682

C
C      USE INDUCED INFILTRATION THEORY FROM BULL. 55 TO
C      REPRESENT MINE INFLOW BOUNDARY CONDITON AT SUBCROP
C
      IF(H(I,J,2).LT.ELEV(I,J,2)) GO TO 81
6682 RE=H(I,J,K-1)*RIJK
      RB=1.0
      GO TO 82
C 81 RE=RIJK*AMAX1(H(I,J,K-1)-ELEV(I,J,K),ELEV(I,J,K-1)-ELEV(I,J,K))
81 RE=RIJK*(H(I,J,1)+POT(I+IC3,J+JR3)-(BOT(I+IC3,J+JR3)))
      IF (RE.LT.0.0) PRINT*, ' ERROR: RE < 0 AT ',I,J,K
      RB=0.0
82 RETURN
      END
      SUBROUTINE CONELV(NC,NR,NL,IC3,JR3,NIT)
      COMMON H(16,05,12),HO(16,05,12),H2(44,45),HO2(44,45),Q2(44,45),Q(1
$6,05,12),TI(16,05,12),TJ(16,05,12),R(16,05,12),SF1(16,05,12),TI2(4
$4,45),TJ2(44,45),R2(44,45),SF12(44,45),THCK(44,45),ELEV(16,05,12)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
$DZ(15)

C
C      NOTE:
C      365 METERS IS THE ELEVATION OF THE 140M(K=4)
C      LEVEL AS RECEIVED FROM RG HITE 9/22/82...MLV
C
C      LOOP TO PRODUCE ELEVATIONS
C
      DO 1 I=1,NC
      DO 1 J=1,NR
      ELEV(I,J,1)=BOT(I+IC3,J+JR3)-(POT(I+IC3,J+JR3)+0.0)

C
C      LEVEL 2 ELEVATION ASSUMES A RESISTIVE LAYER

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```

C      THICKNESS OF 1 FOOT
C
ELEV(I,J,2)=(BOT(I+IC3,J+JR3)-1.)-(POT(I+IC3,J+JR3)+0.0)
ELEV(I,J,3)=((365.+45.)*3.128-(POT(I+IC3,J+JR3)+0.0))
ELEV(I,J,4)=(365.*3.128-(POT(I+IC3,J+JR3)+0.0))
C
C      SET REMAINING SURLEVELS ELEVATIONS
C      ***
C      SATTHCK=70.0
C      ELEV(1)=-SATTHCK
C      ELEV(2)=ELEV(1)
C
C      COMPUTE ELEVATIONS OF REMAINING SURLEVELS
C
      DO 6604 K=5,NL
6604 ELEV(I,J,K)=ELEV(I,J,K-1)-DZ(K)
      1 CONTINUE
C
C      DUMP THE ELEVATION ARRAY ON FIRST SIMULATION
C      LOOP
C
      GO TO 2
      IF(NIT.GT.1) GO TO 2
      PRINT*44
44 FORMAT(' ECHO OF ELEVATION ARRAY FOR LOOP 1')
      DO 55 K=1,NL
55 PRINT*66,K,((INT(ELEV(I,J,K)),I=1,NC),J=1,NR)
66 FORMAT(/,' LEVEL = ',I5,/, (16I5))
      2 RETURN
      END
      SUBROUTINE SINK(NC,NR,NL,NIT)
C
C      THIS SUBROUTINE IS A DUMMY SUBR FOR MINEPLAN SIMULATION
C
      PRINT*,' ERROR: THERE IS NO DISCHARGE FOR SIMULATION'
      PRINT*,'      ALL 3D MODEL NODE SINK Q'S ARE 0.0'
      RETURN
      END
C *****
C *      TWO -DIMENSIONAL FINITE DIFFERENCE FLOW MODEL      *
C *****
      SUBROUTINE PLASH(NC,NR,DELTA,TIME,NIT,XSF12,ISTEP,Q2TOT,PRNT,
$NSTEPS)
      COMMON H3(16,05,12),H03(16,05,12),H(44,45),H0(44,45),Q2(44,45),Q3(
$16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
$TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
$)
      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),TMIN(16,05,12),
$DZ(15)
      DIMENSION SF1(44,45),TI(44,45),R(50),G(50),R(44,45),DL(44,45),ROW(
$50),TAB(2,20),RH(44,45),RD(44,45),DELX(44),DELY(45),TJ(44,45),PERM
$(44,45,2),Q(44,45)

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```

      PERM(I,J,1)=PP
      PERM(I,J,2)=PF
      SF1(I,J)=S1
      H(I,J)=HH
      HO(I,J)=HH
C     BOT(I,J)=BOTT
      R(I,J)=RR*DELX(I)*DELY(J)
      RH(I,J)=RRH
      RD(I,J)=RRD
      Q(I,J)=RQ
10  CONTINUE
C
C     SET THE EXTERNAL DAP BOUNDARY CONDITIONS
C
C     CALL BOUND
C
C     TAKE CARE OF ANY DAP PARAMETER HETEROGENEITY
C
C     CALL HETERO(DELX,DELY)
C
C     SET CATEGORY PRINTOUT VARIABLES FOR 2D MODEL
C
      NT=10
      TAB(1,1)=1H0 $ TAB(2,1)=-1.0
      TAB(1,2)=1H1 $ TAB(2,2)=-5.0
      TAB(1,3)=1H2 $ TAB(2,3)=-10.
      TAB(1,4)=1H3 $ TAB(2,4)=-15.
      TAB(1,5)=1H4 $ TAB(2,5)=-20.
      TAB(1,6)=1H5 $ TAB(2,6)=-25.
      TAB(1,7)=1H6 $ TAB(2,7)=-30.
      TAB(1,8)=1H7 $ TAB(2,8)=-35.
      TAB(1,9)=1H8 $ TAB(2,9)=-40.
      TAB(1,10)=1H9 $ TAB(2,10)=-50.
      DO 7801 IT=1,10
7801  TAB(2,IT)=TAB(2,IT)/10.
C
C     READ AND WRITE OUT NODE CARDS
C
C     WRITE (OUT,1055)
1055  FORMAT (1H ////19H  NODE CARD VALUES://70H  I  J      P1      P2
      1      SF1      H ,  Q      R  RH  RD)
C     REWIND IN
C 15  READ (IN,*)I,J,PERM(I,J,1),PERM(I,J,2),SF1(I,J),HO(I,J),H(I,J),Q(I
C     $,J),XXXX
C     IF (EOF(IN).NE.0.0) GO TO 18
C     SF1(I,J)=SF1(I,J)*XSFI2
C     WRITE (OUT,1060) I,J,PERM(I,J,1),PERM(I,J,2),SF1(I,J),H(I,J),Q(I,J
C     $),R(I,J),RH(I,J),RD(I,J)
1060  FORMAT (2I3,3E10.3,F6.0,E10.3,3F6.0)
C     GO TO 15
C
C     ZERO Q-ARRAY TO SHUT-OFF INFILTRATION

```

```

C
18  DO 8805 I=1,NC
    DO 8805 J=1,NR
      8805 Q(I,J)=0.0
C
C    FORM PARTIAL TRANSMISSIVITIES FROM PERMEABILITIES
C    AND VARIABLE GRID DATA
C
    DO 510 I=1,NC
      DO 500 J=1,NR
        PERM(I,J,1)=PERM(I,J,1)*2.*DELX(I)/(DELY(J)+DELY(MIN0(J+1,NR)))
        PERM(I,J,2)=PERM(I,J,2)*2.*DELY(J)/(DELX(I)+DELX(MIN0(I+1,NC)))
C
C    ADJUST AQUIFER PARAMETERS FOR VARIABLE GRID
C
C    SF1(I,J)=SF1(I,J)*7.48*DELX(I)*DELY(J)*3.281*3.281
C    R(I,J)=R(I,J)*DELY(J)*DELX(I)*3.281*3.281
    500 CONTINUE
    510 CONTINUE
C
C    DUMP PARAMETERS FOR FIRST SIMULATION LOOP
C
C    CALL TRSET(NC,NR)
    PRINT*,' '
C    PRINT*,' TI DUMP '
C    DO 4710 J=1,NR
C4710 PRINT4711,J,(TI(I,J),I=1,NC)
C4711 FORMAT(I10,/, (10F8.0))
C    PRINT*,' '
C    PRINT*,' TJ DUMP '
C    DO 3710 J=1,NR
C3710 PRINT4711,J,(TJ(I,J),I=1,NC)
    19 CONTINUE
C
C    ECHO CATEGORY PRINTOUT DATA
C
    WRITE (OUT,1025) ((TAB(I,J),I=1,2),J=1,NT)
    1025 FORMAT (27H CATEGORY PRINTOUT LEGEND:/(2X,A2,26H IF HEAD IS GRE
      1ATER THAN ,F8.2))
C
C    PLACE Q2-ARRAY IN Q TO MAKE OREBODY CONNECTION
C
    DO 8806 I=1,NC
      DO 8806 J=1,NR
        8806 Q(I,J)=Q2(I,J)
C
C
C    2D SIMULATION START
C
    20 CONTINUE
    DEL=DELTA
    KC=1

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```

      DELTA=DEL
      NLOOP=0
35  ITER=0
C
C      PREDICT HEADS FOR NEXT TIME INCREMENT
C
      DO 40 I=1,NC
      DO 40 J=1,NR
      D=H(I,J)-HD(I,J)
C      HO(I,J)=H(I,J)
      F=1.0
      IF(DL(I,J).EQ.0.0) GO TO 45
      IF(ISTEP.GT.2) F=I/DL(I,J)
      IF(F.GT.5) F=5.0
      IF(F.LT.0.0) G=0.0
45  DL(I,J)=D
40  H(I,J)=H(I,J)+D*F
537 CONTINUE
      MAXIT=20
      MXLOOP=3
      DO 638 I=1,NC
      DO 638 J=1,NR
      CALL TRSET(I,J,NC,NR,RR,RH,RRD,DELX,DELY,RH,RD)
      CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
638 SF1(I,J)=SF1IJ
50  E=0.0
      ITER=ITER+1
C
C      COLUMN CALCULATIONS
C
C
C      ADJUST PARAMETERS FOR WATER TABLE CONDITIONS
C
C      CALL TRSET(NC,NR)
      DO 115 II=1,NC
      I=II
C
C      ALTERNATE COLUMN DIRECTIONS
C
      IF (MOD(ISTEP+ITER,2).EQ.1) I=NC-I+1
      DO 105 J=1,NR
C      CALL TRSET(I,J)
C      CALL TRSET(I,J-1)
C      CALL TRSET(I-1,J)
C      CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
      SF1IJ=SF1(I,J)
C
C      INFILTRATION CONTROL
C      OR EVAPOTRANSPIRATION CONTROL
C
      IF (H(I,J).LT.RD(I,J)) GO TO 55
      RE=RH(I,J)*R(I,J)

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```

      RB=1.0
      GO TO 60
55 RE=(RH(I,J)-RD(I,J))*R(I,J)
      RB=0.0
C
C      CALCULATE R AND G ARRAYS
C
60 DD=HO(I,J)*SF1IJ/DELTA-Q(I,J)+RE
      RR=SF1IJ/DELTA+R(I,J)*RB
      AA=0.0
      CC=0.0
      IF (J-1) 65,70,65
65 AA=-TJ(I,J-1)
      RR=RR+TJ(I,J-1)
70 IF (J-NR) 75,80,75
75 CC=-TJ(I,J)
      RR=RR+TJ(I,J)
80 IF (I-1) 85,90,85
85 BB=BB+TI(I-1,J)
      DD=DD+H(I-1,J)*TI(I-1,J)
90 IF (I-NC) 95,100,95
95 BB=BB+TI(I,J)
      DD=DD+H(I+1,J)*TI(I,J)
100 IF (J.GT.1) W=BB-AA*R(J-1)
      IF (J.EQ.1) W=BB
      B(J)=CC/W
      IF (J.GT.1) G(J)=(DD-AA*G(J-1))/W
105 IF (J.EQ.1) G(J)=DD/W
C
C      RE-ESTIMATE HEADS
C
      E=E+ABS(H(I,NR)-G(NR))
      H(I,NR)=G(NR)
      N=NR-1
110 HA=G(N)-B(N)*H(I,N+1)
      E=E+ABS(HA-H(I,N))
      H(I,N)=HA
      N=N-1
      IF (N) 115,115,110
115 CONTINUE
C
C      ROW CALCULATIONS
C
C      ADJUST PARAMETERS FOR WATER TABLE CONDITIONS
C
C      CALL TRSET(NC,NR)
C      DO 738 I=1,NC
C      DO 738 J=1,NR
C      CALL TRSET(I,J)
C      CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
C 738 SF1(I,J)=SF1IJ

```

```

DO 180 JJ=1,NR
J=JJ
C
C   ALTERNATE ROW DIRECTIONS
C
IF (MOD(ISTEP+ITER,2).EQ.1) J=NR-J+1
DO 170 I=1,NC
C   CALL TRSET(I,J)
C   CALL TRSET(I,J-1)
C   CALL TRSET(I-1,J)
C   CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
SF1IJ=SF1(I,J)
C
C   ET BOTTOM ELEV. FOR INFIL
C   OR EVAPTRANSPIRATION CONTROL
C
IF (H(I,J).LT.RD(I,J)) GO TO 120
RE=RH(I,J)*R(I,J)
RB=1.0
GO TO 125
120 RE=(RH(I,J)-RD(I,J))*R(I,J)
RB=0.0
125 DD=HD(I,J)*SF1IJ/DELTA-Q(I,J)+RE
BB=SF1IJ/DELTA+R(I,J)*RB
AA=0.0
CC=0.0
IF (J-1) 130,135,130
130 BB=BB+TJ(I,J-1)
DD=DD+H(I,J-1)*TJ(I,J-1)
135 IF (J=NR) 140,145,140
140 DD=DD+H(I,J+1)*TJ(I,J)
BB=BB+TJ(I,J)
145 IF (I-1) 150,155,150
150 BB=BB+TI(I-1,J)
AA=-TI(I-1,J)
155 IF (I=NC) 160,165,160
160 BB=BB+TI(I,J)
CC=-TI(I,J)
165 IF (I.GT.1) W=BB-AA*R(I-1)
IF (I.EQ.1) W=BB
B(I)=CC/W
IF (I.GT.1) G(I)=(DD-AA*G(I-1))/W
170 IF (I.EQ.1) G(I)=DD/W
C
C   RE-ESTIMATE HEADS BY GAUSS-SEIDEL AND
C   COMPUTE CONVERGENCE ERROR
C
E=E+ABS(H(NC,J)-G(NC))
H(NC,J)=G(NC)
N=NC-1
175 HA=G(N)-B(N)*H(N+1,J)
E=E+ABS(H(N,J)-HA)

```

```

      H(N,J)=HA
      N=N-1
      IF (N) 180,180,175
180 CONTINUE
C
C      2D SYSTEM WATER BALANCE CALCULATIONS
C      TO TEST FOR CONVERGENCE
C
      STORE=0.0
      PUMP=0.0
      INFET=0.0
      DO 185 I=1,NC
      DO 185 J=1,NR
C      CALL SFSET(I,J,SF1(I,J),XSF12)
      SF1IJ=SF1(I,J)
      STORE=STORE+SF1IJ*(HO(I,J)-H(I,J))/DELTA
      PUMP=PUMP+Q(I,J)
      IF (H(I,J).GT.RD(I,J)) INFET=INFET+R(I,J)*(RH(I,J)-H(I,J))
      IF (H(I,J).LE.RD(I,J)) INFET=INFET+R(I,J)*(RH(I,J)-RD(I,J))
185 CONTINUE
      TOTIN=STORE+INFET
      TOTOUT=PUMP
      DIFF=0.0
      IF (TOTOUT.GT.0.0.AND.TOTIN.GT.0.0) DIFF=ABS(1.0-TOTOUT/TOTIN)*100.0
      IF ((ITER/5)*5.EQ.ITER.OR.ITER.EQ.MAXIT.OR.E.LE.ERROR.OR.ITER.EQ.1)
        $PRINT*,' ITER = ',ITER,' ERROR = ',E,' WBAL = ',DIFF,' %'
      IF (ITER.EQ.MAXIT) GO TO 194
      IF (TOTOUT.EQ.0.0) GO TO 190
      IF (DIFF.GT.2.00) GO TO 50
190 IF (E.GT.ERROR) GO TO 50
      IF (ITER.LT.5) GO TO 50
      GO TO 195
194 ANS=.TRUE.
      PRINT*,' INCREASE MAX NO OF ITERS TO ',MAXIT+5,' ',ANS,' ',
      READ*,ANS
      IF (EOF(5).NE.0.0) CONTINUE
      IF (ITER.GE.075) GO TO 195
      IF (ANS) MAXIT=MAXIT+5
      IF (ANS) GO TO 50
C
C      PRINT RESULTS
C      PRINT OUT TIME STEP DATA
C
195 CONTINUE
      NLOOP=NLOOP+1
      ANS=.FALSE.
      IF (NLOOP.EQ.MXLOOP) GO TO 8403
      PRINT*,' LOOP AGAIN TO CHANGE 2D PARAMETERS ',ANS,' ',
      READ*,ANS
      IF (EOF(5).NE.0.0) CONTINUE
      IF (ANS) ITER=0
      IF (ANS) GO TO 537

```

```

8403 CONTINUE
      YEARS=TIME/365
      WRITE (OUT,1070) TIME,YEARS,E,ITER,STORE,INFET,PUMP,DIFF
1070 FORMAT (               /7H TIME=,E15.3,12H DAYS,
      1 0R,E10.3,7H YEARS,/9H ERROR= ,E13.5,7H FEET /30H THE NUMBER OF
      2 ITERATIONS IS ,I4///24H WATER BALANCE RESULTS://21H FLOW FROM S
      3 STORAGE =,E20.3,5H GPD/29H FLOW FROM INFILTRATION PLUS/32H FLOW
      4 FROM EVAPOTRANSPIRATION =,E9.3,5H GPD/27H FLOW TO DISCHARGE UNIT
      5S =,E14.3,5H GPD/29H THE WATER BALANCE IS WITHIN,F12.3,3H Z////
      6/)

```

```

C
C      INCREASE TIME INCREMENT
C      FOR NEXT TIME STEP
C
C      DELTA=DELTA*1.2
C
C      PRINT OUT CATEGORY
C      PRINTOUT MAP
      WRITE (OUT,1075)
1075 FORMAT (20H CATEGORY PRINTOUT:/)
      DO 210 J=1,NR
      DO 205 I=1,NC
      DO 200 K=1,NT
      IF (-H(I,J)+TAB(2,K)) 205,205,200
200 CONTINUE
205 ROW(I)=TAB(1,K)
210 WRITE (OUT,1080) J,(ROW(K),K=1,NC)
1080 FORMAT (I4,2X,50A2)

```

```

C
C
C      2D WATER BALANCE TO MINE
C
      QND=QSD=0.0
      QSTORE=0.0
C
C      PERFORM WATER BALANCES ON NORTH AND SOUTH
C      BOUNDARIES
C

```

```

      DO 8341 I=13,28
      J=9
      IDX=1
8344 IF (IDX.EQ.1) QND=QND+TJ(I,J)*(H(I,J)-H(I,J+1))
      IF (IDX.EQ.2) QSD=QSD+TJ(I,J)*(H(I,J+1)-H(I,J))
      IF (IDX.EQ.2) GO TO 8341
      J=14
      IDX=2
      GO TO 8344
8341 CONTINUE

```

```

C
C      PERFORM 2D WATER BALANCES ON WEST AND EAST
C      MINE REGION BOUNDARIES
C

```



```

      QW=QE=0.0
      DO 9341 J=10,14
      I=12
      IDX=1
9344 IF (IDX,EQ,1) QW=QW+TI(I,J)*(H(I,J)-H(I+1,J))
      IF (IDX,EQ,2) QE=QE+TI(I,J)*(H(I+1,J)-H(I,J))
      IF (IDX,EQ,2) GO TO 9341
      I=28
      IDX=2
      GO TO 9344
9341 CONTINUE
      DO 7341 I=13,28
      DO 7341 J=10,14
C      CALL SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
      SF1IJ=SF1(I,J)
7341 QSTORE=QSTORE+(H0(I,J)-H(I,J))*SF1IJ/DELTA
C
C      12.5 IN/YR IS THE RECHARGE RATE
C      THIS MUST BE CHANGED HERE IN THE
C      THE SOURCE CODE
C      VVVV
C      QR=12.5*1500.*400.*3.281*3.281*7.48/12./365.
C      THE ABOVE COMPUTATION OF INDUCED INFIL IS INCORRECT
C      THIS SHOULD INCLUDE THE TOTAL INDUCED INFIL FOR
C      THE MODEL AREA
C      QR=INFET
      QR=0.0
      DO 613 J=10,14
      DO 613 I=13,28
      IF (H(I,J).GT.RD(I,J)) QR=QR+R(I,J)*(RH(I,J)-H(I,J))
613 IF (H(I,J).LE.RD(I,J)) QR=QR+R(I,J)*(RH(I,J)-RD(I,J))
      QMINE=QNO+QSO+QW+QE
      WBL=Q2TOT-QR-QSTORE-QMINE
C
C      DUMP MINE REGION WATER BALANCE RESULTS
C
      PRINT333,QNO,QSO,QE,QW,QR,QSTORE,QMINE,WBL
333 FORMAT(///,
$' *****',/,
$' * EXXON CRANDON MINE REGION *',/,
$' * FLOWS FROM 2D MODEL (GPD) *',/,
$' *****',/,
$' *NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *',/,
$' *****',/,
$' *',F11.0,'*',F12.0,'*',F11.0,'*',F11.0,'*',/,
$' *****',/,
$' *LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *',/,
$' *****',/,
$' *',F11.0,'*',F12.0,'*',F11.0,'*',F11.0,'*',/,
$' *****')
      PRINT*,' THIS REPRESENTS A % ERROR OF ',WBL*100./
      $AAX1(Q2TOT,1E-50)

```

```

C
C   PERFORM SWAMP CREEK AND HENLOCK CREEK IMPACT FLOWS
C
C   CALL SWAMP(ISTEP,NSTEPS)
C   CALL HENLCK(ISTEP,NSTEPS)
C
C   PRINT OUT HEAD VALUES AT THE
C   END OF THE TIME INCREMENT
C
C   IPASS=(NC+9)/10
C   DO 215 K=1,IPASS
C   ISTART=(K-1)*10+1
C   IEND=K*10
C   IF (IEND.GT.NC) IEND=NC
C   IF (K.EQ.1) WRITE (OUT,1085)
C1085 FORMAT (1H ///42H HEAD VALUES AT THE END OF THIS TIMESTEP:/)
C   IF (K.GT.1) WRITE (OUT,1100)
C1100 FORMAT (1H ,24HHEAD VALUES (CONTINUED):)
C   WRITE (OUT,1090) ((I),I=ISTART,IEND)
C1090 FORMAT(5X,10(5X,I2))
C   DO 215 J=1,NR
C   WRITE (OUT,1095) J,(H(I,J),I=ISTART,IEND)
C1095 FORMAT(2X,I3,10(F7.1))
C   215 CONTINUE
C   WRITE(10,8813) TIME
C8813 FORMAT(' TIME = ',F20.3)
C   DO 821 JJJ=1,NR
C   J=NR+1-JJJ
C   821 WRITE(10,8811) JJJ,(H(I,JJJ),I=1,NC)
C8811 FORMAT(' ROW = ',I3,/,10F8.2,/,10F8.2,/,10F8.2,/,10F8.2,/,4F8.2)
C
C   UNUSED SYSTEM WATER BALANCE
C
C   DO 903 I=2,31
C   DO 903 J=2,40
C 903 Q(I,J)=TJJ(I,J)*(4.*H(I,J)-H(I+1,J)-H(I-1,J)-H(I,J+1)-H(I,J-1))
C   PRINT*, ' WATER BALANCE'
C   DO 823 JJJ=2,40
C   J=NR+1-JJJ
C 823 WRITE(OUT,9911) JJJ,(H(I,J),I=2,31)
C9911 FORMAT(' ROW = ',I3,/,8E15.5,/,8E15.5,/,8E15.5,/,6E15.5,/)
C
C   CHECK FOR THE DRY NODES
C
C   DO 8872 I=1,NC
C   DO 8872 J=1,NR
C   IF (THCK(I,J).LT.0.1)PRINT*, ' ZERO THICKNESS IN 2D AT NODE ',I,J
C   ,THCK(I,J)
C8872 IF (H(I,J)+POT(I,J).LT.BOT(I,J)+0.11)
C   $PRINT*, ' NODE ',I,J, ' IS DRY IN 2D MODEL',H(I,J)+POT(I,J),BOT(I,J)
C   DO 128 JJJ=1,NR
C   J=NR+1-JJJ

```

```

C   WRITE(6,1188) JJJ,(THCK(I,JJJ),I=1,NC)
C   WRITE(6,1188) JJJ,(TI(I,JJJ),I=1,NC)
C 128 WRITE(6,1188) JJJ,(TJ(I,JJJ),I=1,NC)
1188 FORMAT(' ROW = ',I3,/,10F8.0,/,10F8.0,/,10F8.0,/,10F8.0,/,4F8.0)
C
C   RESET HEADS WHICH FALL BELOW ROT
C
C   DO 983 I=1,NC
C   DO 983 J=1,NR
983 IF(POT(I,J)+H(I,J).LT.ROT(I,J)) H(I,J)=ROT(I,J)-POT(I,J)
C
C   DUMP 2D MODEL DRAWDOWNS IF USER
C   SO DESIRES
C
ANS=.TRUE.
PRINT*, ' 2D DRAWDOWN MAP ',ANS
READ*,ANS
IF(EOF(5).NE.0.0) CONTINUE
IF(ISTEP.EQ.NSTEPS) ANS=.TRUE.
IF(.NOT.ANS) GO TO 848
PRINT 849,(I,I=1,40)
849 FORMAT(5X,40I3,/,5X,40(3H---))
DO 863 J=1,NR
863 PRINT 873,J,(INT(-H(I,J)+0.5),I=1,40)
873 FORMAT(I4,'!',40I3)
848 CONTINUE
C
C   RETURN TO MAIN PROGRAM
C
C
C   DUMP PARAMETERS FOR LAST SIMULATION LOOP
C
IF(NIT.LT.NSTEPS) RETURN
PRINT*, ' '
PRINT*, ' PI DUMP '
DO 4710 J=1,NR
4710 PRINT4711,J,(PERM(I,J,2),I=1,NC)
4711 FORMAT(I10,/, (10E11.3))
PRINT*, ' '
PRINT*, ' PJ DUMP '
DO 3710 J=1,NR
3710 PRINT4711,J,(PERM(I,J,1),I=1,NC)
PRINT*, ' SF DUMP '
DO 2710 J=1,NR
2710 PRINT4711,J,(SF1(I,J),I=1,NC)
RETURN
END
SUBROUTINE TRSET(II, JJ, NC, NR, RR, RRH, RRD, DELX, DELY, RH, RD)
COMMON H3(16,05,12), HD3(16,05,12), H(44,45), HO(44,45), Q(44,45), Q3(1
$6,05,12), TI3(16,05,12), TJ3(16,05,12), R3(16,05,12), SF13(16,05,12), T
$I(44,45), TJ(44,45), R(44,45), SF1(44,45), THCK(44,45), ELEV3(12)
COMMON /PARAM/POT(44,45), BOT(44,45), PERM(44,45,2), TMINE(16,05,12),

```

```

$DZ(15)
DIMENSION SF1(44,45),TI(44,45),R(50),G(50),R(44,45),DL(44,45),ROW(
$50),TAB(2,20),RH(44,45),RD(44,45),DELX(44),DELY(45),TJ(44,45),PERM
$(44,45,2),Q(44,45)
I=II
J=JJ
IF(II.LE.0) I=1
IF(JJ.LE.0) J=1
IF(II.GT.NC) I=NC
IF(JJ.GT.NR) J=NR
C
C   WATER TABLE TRANSMISSIVITY CONTROL ROUTINE
C
C   DO 93 I=1,NC
C   DO 93 J=1,NR
C
C   CHECK FOR COMPLETE NODE DE-WATERING
C   AND ADJUST HEADS ACCORDINGLY
C
C   IF(H(I,J)+POT(I,J).LT.ROT(I,J)+0.11) H(I,J)=ROT(I,J)-POT(I,J)+0.1
C   IF(I.EQ.NC) GO TO 6103
C   IF(H(I+1,J)+POT(I+1,J).LT.ROT(I+1,J)+0.11) H(I+1,J)=ROT(I+1,J)-POT
C   $(I+1,J)+0.1
C6103 IF(J.EQ.NR) GO TO 6203
C   IF(H(I,J+1)+POT(I,J+1).LT.ROT(I,J+1)+0.11) H(I,J+1)=ROT(I,J+1)-POT
C   $(I,J+1)+0.1
C6203 CONTINUE
C
C   COMPUTE SATURATED THICKNESSES USED FOR
C   TI TRANSMISSIVITY COMPUTATIONS
C   CHECK FOR ZERO SATURATED THICK.
C
C   TLIJ=H(I,J)+POT(I,J)-ROT(I,J)
C   IF(TLIJ.GT.THCK(I,J))TLIJ=THCK(I,J)
C   IF(THCK(I,J).LT.0.1) TLIJ=0.0
C   TLIP1J=TLIJ
C   IF(I.EQ.NC) GO TO 4091
C   TLIP1J=H(I+1,J)+POT(I+1,J)-ROT(I+1,J)
C   IF(TLIP1J.GT.THCK(I+1,J))TLIP1J=THCK(I+1,J)
C   IF(THCK(I+1,J).LT.0.1)TLIP1J=0.0
C4091 CONTINUE
C   IF(TLIJ.LT.0.0) TLIJ=0.1
C   IF(TLIP1J.LT.0.0) TLIP1J=0.1
C
C   CALCULATE TI TRANSMISSIVITY FROM SATURATED
C   THICKNESSES PREVIOUSLY COMPUTED
C
C   TI(I,J)=PERM(I,J,2)*SQRT(TLIJ*TLIP1J)
C
C   COMPUTE SATURATED THICKNESSES USED FOR
C   TJ TRANSMISSIVITY COMPUTATIONS
C   CHECK FOR ZERO SATURATED THICK.

```

```

C
  TLIJPI=TLIJ
  IF(J.EQ.NR) GO TO 3091
  TLIJPI=H(I,J+1)+POT(I,J+1)-BOT(I,J+1)
  IF(TLIJPI.GT.THCK(I,J+1)) TLIJPI=THCK(I,J+1)
  IF(THCK(I,J+1).LT.0.1) TLIJPI=0.0
3091 CONTINUE
  IF(TLIJ.LT.0.0) TLIJ=0.1
  IF(TLIJPI.LT.0.0) TLIJPI=0.1
C
C   CALCULATE TJ TRANSMISSIVITY FROM SATURATED
C   THICKNESSES PREVIOUSLY COMPUTED
C
  TJ(I,J)=PERM(I,J,1)*SQRT(TLIJ*TLIJPI)
C 93 CONTINUE
C
C   SET THE INDUCED INFILTRATION VARIABLES
C
  R(I,J)=RR*DELX(I)*DELY(J)
  RH(I,J)=RRH
  RD(I,J)=FRD
  RETURN
END
SUBROUTINE SFSET(I,J,SF1IJ,XSF12,DELX,DELY)
  COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
  $16,05,12),II3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
  $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
  $)
  COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
  $DZ(15)
  COMMON /STOR2D/ SA,SWT
  DIMENSION DELX(44),DELY(45)
C  SA=SF1(I,J)
C  SWT=SF1(I,J)
C  SA=0.0001
C  SWT=0.15
  IF(SF1(I,J).GT.1E15) SF1IJ=SF1(I,J)
  IF(SF1(I,J).GT.1E15) RETURN
  SF1IJ=7.48*SWT*XSFI2*DELX(I)*DELY(J)
  IF(POT(I,J)+H(I,J)-BOT(I,J).GE.THCK(I,J)) SF1IJ=7.48*SA*XSFI2
  $*DELX(I)*DELY(J)
C  IF(THCK(I,J).LE.0.0) SF1(I,J)=1E-20
C  SF1(I,J)=SF1IJ
C
C   PROPORTION FOR CHANGE FROM ARTESIAN TO WATER TABLE
C
  IF(HO(I,J)+POT(I,J).GE.THCK(I,J).AND.H(I,J)+POT(I,J).LT.THCK(I,J))
  $SF1IJ=((THCK(I,J)-(H(I,J)+POT(I,J)))*SWT+(HO(I,J)+POT(I,J)-THCK(I
  $,J))*SA)/(HO(I,J)-H(I,J))*7.48*DELX(I)*DELY(J)
C
C   PROPORTION FOR CHANGE FROM WATER TABLE TO ARTESIAN
C

```

```

      IF(HO(I,J)+POT(I,J).LT.THCK(I,J).AND.H(I,J)+POT(I,J).GE.THCK(I,J))
      $SF1IJ=((THCK(I,J)-(HO(I,J)+POT(I,J))*SWT+(H(I,J)+POT(I,J)-THCK(I
      $,J))*SA)/(H(I,J)-HO(I,J)))*7.48*DELX(I)*DELY(J)

```

```

      RETURN

```

```

      END

```

```

      SUBROUTINE ROUND

```

```

      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
      $16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
      $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
      $)

```

```

      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
      $DZ(15)

```

```

1 READ(24,*) I,J

```

```

      IF(EOF(24).NE.0.0) GO TO 2

```

```

      SF1(I,J)=1E20

```

```

      GO TO 1

```

```

2 RETURN

```

```

      END

```

```

      SUBROUTINE HETERO(DELX,DELY)

```

```

      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
      $16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
      $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
      $)

```

```

      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
      $DZ(15)

```

```

      DIMENSION DELX(44),DELY(45)

```

```

C
C
C

```

```

      DEFINE THE RECHARGE HETEROGENEITY

```

```

      REWIND 25

```

```

      REWIND 26

```

```

1 READ(25,*) I,J,RRRR

```

```

      IF(EOF(25).NE.0.0) GO TO 2

```

```

      R(I,J)=RRRR*DELX(I)*DELY(J)

```

```

      GO TO 1

```

```

2 CONTINUE

```

```

C
C
C

```

```

      DEFINE THE PERMEABILITY HETEROGENEITY

```

```

3 READ(26,*) I,J,PPPP

```

```

      IF(EOF(26).NE.0.0) GO TO 4

```

```

      PERM(I,J,1)=PERM(I,J,2)=PPPP

```

```

      GO TO 3

```

```

4 RETURN

```

```

      END

```

```

      SUBROUTINE SWAMP(ISTEP,NSTEPS)

```

```

      COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
      $16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
      $TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
      $)

```

```

      COMMON /PARAM/POT(44,45),BOT(44,45),PERM(44,45,2),THINE(16,05,12),
      $DZ(15)

```

```

DIMENSION ISWP(46),JSWP(46)
DATA NBND5/46/
DATA ISWP/
$01,02,02,03,03,04,04,05,05,05,
$06,06,07,08,08,09,09,10,11,11,
$12,13,14,15,15,16,17,18,19,20,21,
$22,23,24,25,26,27,28,29,30,31,31,
$32,32,33,34/
DATA JSWP/
$06,06,07,07,08,08,07,07,06,05,
$05,06,06,06,05,05,04,04,04,05,
$05,05,05,05,04,04,04,04,04,04,
$04,04,04,04,04,04,04,04,04,04,
$04,03,03,02,02,02/
QSWP=0.0
DO 1 NR=1,NBND5
I=ISWP(NR)
J=JSWP(NR)
QIN=0.0
IF(SF1(I+1,J).GT.1E15) GO TO 2
QIN=TI(I,J)*(H(I+1,J)-H(I,J))
2 IF(I.LE.1) GO TO 3
IF(SF1(I-1,J).GT.1E15) GO TO 3
QIN=QIN+TI(I-1,J)*(H(I-1,J)-H(I,J))
3 IF(SF1(I,J+1).GT.1E15) GO TO 4
QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
4 QSWP=QSWP+QIN
1 CONTINUE
IF(ISTEP.NE.NSTEPS)WRITE(97,161) QSWP
161 FORMAT(F10.1,' ')
IF(ISTEP.EQ.NSTEPS)WRITE(97,163) QSWP
163 FORMAT(F10.1)
PRINT*, ' IMPACTED FLOW TO SWAMP CREEK (GPD) = ',QSWP
RETURN
END
SUBROUTINE HEMLCK(ISTEP,NSTEPS)
COMMON H3(16,05,12),HO3(16,05,12),H(44,45),HO(44,45),Q2(44,45),Q3(
$16,05,12),TI3(16,05,12),TJ3(16,05,12),R3(16,05,12),SF13(16,05,12),
$TI(44,45),TJ(44,45),R(44,45),SF1(44,45),THCK(44,45),ELEV3(16,05,12
$)
COMMON /PARAM/POT(44,45),BOT(44,45),PERH(44,45,2),THINE(16,05,12),
$DZ(15)
DIMENSION IHEM(26),JHEM(26)
DATA NBND5/26/
DATA IHEM/
$35,35,36,36,36,36,36,37,37,
$38,38,38,38,38,38,38,39,39,40,
$41,42,42,43,43,42/
DATA JHEM/
$02,03,03,04,05,04,07,08,08,09,
$09,10,11,12,13,14,15,15,16,16,
$16,16,17,17,18,18/

```

```

QIHEM=0.0
DO 1 NR=1,NRND5
I=IHEM(NR)
J=JHEM(NR)
QIN=0.0
IF(SF1(I-1,J).GT.1E15) GO TO 3
QIN=TI(I-1,J)*(H(I-1,J)-H(I,J))
3 IF(SF1(I,J-1).GT.1E15) GO TO 4
QIN=QIN+TJ(I,J-1)*(H(I,J-1)-H(I,J))
4 IF(SF1(I,J+1).GT.1E15) GO TO 6
QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
6 QIHEM=QIHEM+QIN
1 CONTINUE
IF(ISTEP.NE.NSTEPS)WRITE(98,161) QIHEM
161 FORMAT(F10.1,' ')
IF(ISTEP.EQ.NSTEPS)WRITE(98,163) QIHEM
163 FORMAT(F10.1)
PRINT*, ' IMPACTED FLOW TO HEMLOCK CREEK (GPD) = ',QIHEM
C QHEM=0.0
C DO 2 NR=1,NRND5
C I=IHEM(NR)
C J=JHEM(NR)
C QIN=0.0
C IF(SF1(I-1,J).GT.1E15) GO TO 7
C QIN=TI(I-1,J)*(H(I-1,J)-H(I,J))
C 7 IF(SF1(I,J-1).GT.1E15) GO TO 8
C QIN=QIN+TJ(I,J-1)*(H(I,J-1)-H(I,J))
C 8 IF(SF1(I,J+1).GT.1E15) GO TO 9
C QIN=QIN+TJ(I,J)*(H(I,J+1)-H(I,J))
C 9 QHEM=QHEM+QIN
C 2 CONTINUE
C PRINT*, ' TOTAL FLOW TO HEMLOCK CREEK (GPD) = ',QHEM
C RETURN
C END
/

```


APPENDIX Q. PARTIAL UNMITIGATED SIMULATION OF MINE PLAN.

EXXON-CRANDON MINEPLAN SIMULATION

82/12/21, 17.32.31.

INPUT A TITLE FOR THIS RUN(<=80 CHARACTERS)
 IS A 2-D MODEL DRAWDOWN INITIALIZATION ARRAY TO BE INPUT
 IS AN ORERODY SINK SCHEME DESIRED
 INPUT THE NO. OF TIME STEPS,
 AND THE TIME STEP ACCELERATION FACTOR(=1 FOR UNIFORM)
 INPUT THE TIME INCREMENT SCHEME
 269.9 15.1 30.
 ENTER ARTESIAN AND WATER TABLE STORAGE COEFFS. .005 .005
 INPUT THE PLASH STORAGE FACTOR MULTIPLIER

#####

INPUT DELTA 269.9
 TIME = 269.9 269.9
 ENTER 3D MODEL T
 *****ENTERING 3D MODEL*****
 DO 3D FINITE DIFFERENCE COMPUTATIONS = T
 INPUT THE CONTROL LAYER,AMOUNT OF CONTROL
 TIME ORIGIN OF MINEPLAN = 66.

ISOPACH THICKNESS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	26	23	26	32	36	39	36	26	13	3	0	0	0	3	19	23
2 !	29	26	32	39	42	45	45	39	26	6	0	0	0	3	16	29
3 !	32	29	42	42	45	55	49	49	42	23	6	9	19	23	36	42
4 !	42	45	49	49	62	72	65	62	55	42	42	39	42	49	52	52
5 !	59	59	62	72	75	75	75	72	68	65	52	49	52	55	55	55

GOLDER POT - DAP BOT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	28	23	27	35	36	40	38	27	15	5	0	2	0	3	19	23
2 !	31	26	34	51	118	93	78	40	28	7	0	2	0	4	16	29
3 !	32	33	44	78	128	113	97	82	44	26	11	12	19	23	36	42
4 !	42	49	67	97	131	139	117	99	83	61	43	40	44	49	55	62
5 !	59	72	93	117	137	149	140	118	99	87	72	66	61	68	82	91

3D RESISTIVE LAYER R ARRAY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	215	215	215	215	215	215	215	215	215	215	0	0	0	215	215	215
2 !	215	215	215	215	215	215	215	215	215	215	0	0	0	215	215	215
3 !	215	215	215	3696	7283	14382	4224	15447	9884	8810	215	215	215	215	215	215
4 !	215	215	215	3696	10765	10765	10765	8760	11303	6872	215	215	215	4512	215	215
5 !	215	215	215	215	1586	2852	1586	215	215	215	215	215	215	2891	3485	148

ITER = 1 ERROR = 6.548361852765E-11 NORM ERROR = 8.185452315956E-13

ITER = 2 ERROR = 6.548361852765E-11 NORM ERROR = 8.185452315956E-13
 ITER = 3 ERROR = 6.548361852765E-11 NORM ERROR = 8.185452315956E-13
 ITER = 4 ERROR = 6.548361852765E-11 NORM ERROR = 8.185452315956E-13
 ITER = 5 ERROR = 6.548361852765E-11 NORM ERROR = 8.185452315956E-13
 3D DRAWDOWN MAPS T

LEVEL = RESIST(1)
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = SUBCROP(2)
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 95 METERS(3)
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 140 METERS(4)
 0 0 0 0 0 0 0 0 0 0 0 452 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 452 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 163 METERS(5)
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 185 METERS(6)
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 600 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 207 METERS(7)
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	961	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	0	0	0	1141	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1141	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 !	0	0	0	0	0	0	0	0	0	0	0	151	0	0	0	0
5 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 !	0	0	0	0	0	0	0	0	0	0	0	249	0	0	0	0
9 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 !	0	0	0	0	0	0	0	0	0	0	0	1141	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER
 A-ARTESIAN W-WATER TABLE O-ZERO THICKNESS
 D-DRY NODE

A	A	A	A	A	A	A	A	A	A	0	0	0	A	W	A
A	A	A	A	A	A	A	A	A	A	0	0	0	A	A	A
A	A	A	A	A	A	A	A	A	A	A	A	W	A	W	W
A	A	A	A	A	A	A	A	A	A	A	A	A	W	A	A
W	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

THE LAYER @ WHICH MAX FLOW OCCURS = 2

```
*****
**** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW INTO (GPD) *
*****
*      1      *      0.0      *
*      2      *      0.0      *
*      3      *      0.0      *
*      4      *      0.0      *
*      5      *      0.0      *
*      6      *      0.0      *
*      7      *      0.0      *
*      8      *      0.0      *
*      9      *      0.0      *
*     10      *      0.0      *
*     11      *      0.0      *
*     12      *      0.0      *
*****
```

```
*****
**** STORAGE WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*      1      *      0.0      *
*      2      *      0.0      *
*      3      *      0.0      *
*      4      *      0.0      *
*      5      *      0.0      *
*      6      *      0.0      *
*      7      *      0.0      *
*      8      *      0.0      *
*      9      *      0.0      *
*     10      *      0.0      *
*     11      *      0.0      *
*     12      *      0.0      *
*****
```

3D WATER BALANCE IS WITHIN -100. %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

***** TOTAL RESISTIVE LAYER FLOW = 0.

NO CONNECTION BETWEEN DREPODY AND GLACIAL MODELS

*****ENTERING 2D MODEL*****

INPUT THE INDUCED INFIL DRIVING HEAD 0.

INPUT THE INDUCED INFIL DEPTH LIMIT -3.

INDUCED INFILTRATION RR = .004926666666667

ITER = 1 ERROR = 0. WBAL = 0. %

ITER = 2 ERROR = 0. WBAL = 0. %

ITER = 3 ERROR = 0. WBAL = 0. %

ITER = 4 ERROR = 0. WBAL = 0. %

ITER = 5 ERROR = 0. WBAL = 0. %

LOOP AGAIN TO CHANGE 2D PARAMETERS F

* EXXON CRANDON MINE REGION *

* FLOWS FROM 2D MODEL (GPD) *

* NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

* 0.* 0.* 0.* 0.*

* LOCAL INFIL * LOCAL STORE * IMPACT FLOW * WATER BAL *

* 0.* 0.* 0.* 0.*

THIS REPRESENTS A % ERROR OF 0.

IMPACTED FLOW TO SWAMP CREEK (GPD) = 0.

IMPACTED FLOW TO HEMLOCK CREEK (GPD) = 0.

2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ACC % ERROR FROM OBSERVED 0. %
DO YOU WANT TO TERMINATE THE SIMULATION

```

INPUT DELTA 15.1
TIME = 285. 15.1
ENTER 3D MODEL T

```

```
DO 3D FINITE DIFFERENCE COMPUTATIONS = T
ITER = 1 ERROR = 2985.982353767 NORM ERROR = 37.32477942209
ITER = 5 ERROR = 1468.635126534 NORM ERROR = 18.35793908167
ITER = 10 ERROR = 1047.800860281 NORM ERROR = 13.09751075352
ITER = 15 ERROR = 755.1060560112 NORM ERROR = 9.43332570014
ITER = 20 ERROR = 542.2096369438 NORM ERROR = 6.777620486797
ITER = 25 ERROR = 389.2525047338 NORM ERROR = 4.855636309173
```

ITER = 30 ERROR = 272.473386817 NORM ERROR = 3.405917356521
 ITER = 35 ERROR = 191.0739621654 NORM ERROR = 2.388424527067
 ITER = 40 ERROR = 133.1269004628 NORM ERROR = 1.664086255785
 ITER = 45 ERROR = 92.50091407536 NORM ERROR = 1.156261425942
 ITER = 50 ERROR = 66.2957106504 NORM ERROR = .8286963831299
 INCREASE MAX NO. OF ITERATIONS TO 55 T
 ITER = 55 ERROR = 44.61942576269 NORM ERROR = .5577428220336
 INCREASE MAX NO. OF ITERATIONS TO 60 T
 ITER = 60 ERROR = 30.87365001305 NORM ERROR = .3859206251631
 INCREASE MAX NO. OF ITERATIONS TO 65 T
 ITER = 65 ERROR = 21.38169687725 NORM ERROR = .2672712109656
 INCREASE MAX NO. OF ITERATIONS TO 70 T
 ITER = 70 ERROR = 14.78630901266 NORM ERROR = .1848288626582
 INCREASE MAX NO. OF ITERATIONS TO 75 T
 ITER = 75 ERROR = 10.26499893928 NORM ERROR = .1283124867409
 INCREASE MAX NO. OF ITERATIONS TO 80 T
 3D DRAWDOWN MAPS T

LEVEL = RESIST(1)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = SURCROP(2)

0	0	0	0	0	0	0	1	2	9	6	0	37	6	2	1
0	0	0	0	0	0	0	1	3	15	53	64	39	13	4	1
0	0	0	0	0	0	1	1	6	17	62	68	59	24	8	4
0	0	0	0	0	0	1	3	9	26	82	87	91	34	22	12
0	0	0	0	0	1	2	6	14	30	50	55	52	21	11	5

LEVEL = 95 METERS(3)

0	0	0	0	0	0	0	1	2	9	0	0	11	6	2	1
0	0	0	0	0	0	0	1	3	13	0	40	37	13	4	1
0	0	0	0	0	0	1	4	16	38	66	82	95	45	8	4
0	0	0	0	0	0	1	4	14	33	94	89	99	45	41	32
0	0	0	0	0	1	2	6	14	30	58	60	54	29	24	7

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	452	0	0	0	0
0	0	0	0	0	1	2	0	0	0	0	452	0	0	0	0
0	0	0	0	0	1	2	7	28	73	173	480	124	62	0	0
0	0	0	0	0	2	2	8	21	45	145	243	124	62	57	46
0	0	0	0	0	0	0	8	0	0	144	0	96	33	44	46

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	3	10	0	0	0	0	0	0	0	0
0	0	0	0	0	1	3	10	39	96	243	486	165	72	0	0
0	0	0	0	0	2	3	12	28	53	201	323	157	72	62	49
0	0	0	0	0	0	0	12	0	0	200	0	151	49	60	48

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	63	107	0	0	0	600	0	0	0	0
0	0	0	0	0	1	63	107	168	197	365	586	261	120	0	0
0	0	0	0	0	1	63	88	165	180	360	389	245	120	84	84
0	0	0	0	0	0	0	0	0	0	0	0	113	118	84	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	72	119	0	0	0	0	0	0	0	0
0	0	0	0	0	1	72	119	177	214	390	623	290	133	0	0
0	0	0	0	0	1	72	107	176	206	388	412	268	133	91	90
0	0	0	0	0	0	0	0	0	0	0	0	112	132	91	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	0	0	0	0	1	89	133	184	246	465	741	669	0	0	0
0	0	0	0	0	0	0	0	0	0	467	527	378	197	197	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	93	134	185	250	482	649	622	0	0	0
0	0	0	0	0	0	0	0	0	0	484	575	432	204	203	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	961	0	0	0	0
0	0	0	0	0	1	0	133	185	249	514	586	0	0	0	0
0	0	0	0	0	0	0	0	0	0	515	582	581	203	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	133	184	249	518	582	0	0	0	0
0	0	0	0	0	0	0	0	0	0	518	581	577	203	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	01134	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2 !	0	0	0	0	0	0	1	2	7	19	51	55	56	20	9	5
3 !	0	0	0	0	0	0	1	3	10	28	54	58	59	28	16	9
4 !	0	0	0	0	0	1	2	6	17	39	115	392	86	39	34	31
5 !	0	0	0	0	0	1	2	9	22	50	161	270	118	48	40	32
6 !	0	0	0	0	0	1	47	75	111	126	242	325	169	90	56	0
7 !	0	0	0	0	0	1	54	86	118	140	260	345	186	100	61	0
8 !	0	0	0	0	0	0	45	66	92	123	311	672	189	99	98	0
9 !	0	0	0	0	0	0	46	67	93	125	322	408	216	102	101	0
10 !	0	0	0	0	0	0	0	67	92	125	343	389	291	102	0	0
11 !	0	0	0	0	0	0	0	67	92	125	345	388	0	102	0	0
12 !	0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

A	A	A	A	A	A	A	A	A	A	0	0	0	A	W	A
A	A	A	A	A	A	A	A	A	A	0	0	0	A	A	A
A	A	A	A	A	A	A	A	A	A	A	A	W	A	W	W
A	A	A	A	A	A	A	A	A	A	A	A	A	W	A	A
W	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER 2 WHICH MAX FLOW OCCURS = 7

```

*****
**** VERTICAL WATER BALANCE FOR 3D DREBODY MODEL ****
*****
* MODEL LAYER * FLOW INTO (GPD) *
*****
*      1      *      922017.5      *
*      2      *      922017.5      *
*      3      *      924932.9      *
*      4      *      929086.2      *
*      5      *      931697.5      *
*      6      *      933519.4      *
*      7      *      936788.9      *
*      8      *      822164.7      *
*      9      *      -4114.2      *
*     10      *      -2456.2      *
*     11      *      -914.4      *
*     12      *           0.0      *
*****

```

ITER = 15 ERROR = 8.99206596933 WBAL = 7.317910073818 %
 ITER = 18 ERROR = 4.561572649889 WBAL = 3.901436901126 %
 ITER = 19 ERROR = 4.054320294125 WBAL = 3.225605186329 %
 ITER = 20 ERROR = 3.068506503077 WBAL = 2.606853133049 %
 INCREASE MAX NO OF ITERS TO 25 T
 ITER = 21 ERROR = 2.72774236064 WBAL = 2.159383106181 %
 ITER = 22 ERROR = 2.065394342759 WBAL = 1.747354795489 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

```

*****
* EXXON CRANDON MINE REGION *
* FLOWS FROM 2D MODEL (GPD) *
*****
* NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *
*****
* 38168.* 458234.* 101981.* 19168.*
*****
* LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *
*****
* 129218.* 169587.* 617551.* 5662.*
*****
  
```

THIS REPRESENTS A % ERROR OF .6140842839402
 IMPACTED FLOW TO SWAMP CREEK (GPD) = -1917.647478693
 IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -1909.410248894
 2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9!	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
10!	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	3	4	5	6	7	9	5	0	0	0	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0
11!	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	3	4	6	8	10	14	8	0	0	0	5	5	4	3	2	1	1	0	0	0	0	0	0	0	0
12!	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	3	5	6	9	12	18	25	11	12	12	11	8	6	4	3	1	1	0	0	0	0	0	0	0	0
13!	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	3	5	6	8	12	17	21	16	13	13	14	9	6	5	3	1	1	0	0	0	0	0	0	0	0
14!	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	3	4	5	7	8	10	12	11	10	10	10	8	6	4	3	1	1	0	0	0	0	0	0	0	0
15!	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	3	4	4	5	6	6	6	6	6	5	5	4	3	2	1	1	0	0	0	0	0	0	0	
16!	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2	3	3	3	3	3	3	3	3	3	2	2	2	1	1	0	0	0	0	0	0	0	
17!	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
18!	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	
19!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
21!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

DO YOU WANT TO TERMINATE THE SIMULATION

INFUT DELTA 30.

TIME = 315. 30.

ENTER 3D MODEL T

*****ENTERING 3D MODEL*****

DO 3D FINITE DIFFERENCE COMPUTATIONS = T

ITER = 1 ERROR = 2318.174781008 NORM ERROR = 28.9771847626

ITER = 5 ERROR = 734.7261172736 NORM ERROR = 9.18407646592

ITER = 10 ERROR = 425.9078923439 NORM ERROR = 5.323848654362

ITER = 15 ERROR = 274.6547779411 NORM ERROR = 3.433184724264

ITER = 20 ERROR = 192.0441496766 NORM ERROR = 2.400551870958

ITER = 25 ERROR = 135.0618358274 NORM ERROR = 1.688272947843

ITER = 30 ERROR = 95.33217545233 NORM ERROR = 1.191652193154

ITER = 35 ERROR = 67.40033475297 NORM ERROR = .8425041844121

ITER = 40 ERROR = 47.62232753065 NORM ERROR = .5952790941361

ITER = 45 ERROR = 33.79566144507 NORM ERROR = .4224451 30634

ITER = 50 ERROR = 24.02923689107 NORM ERROR = .3003654611384

INCREASE MAX NO. OF ITERATIONS TO 55 T

ITER = 55 ERROR = 17.13736599286 NORM ERROR = .2142170749107

INCREASE MAX NO. OF ITERATIONS TO 60 T

ITER = 60 ERROR = 12.26707589966 NORM ERROR = .1533384487457

INCREASE MAX NO. OF ITERATIONS TO 65 T

ITER = 65 ERROR = 8.818520285814 NORM ERROR = .1102315035727

INCREASE MAX NO. OF ITERATIONS TO 70 T

ITER = 70 ERROR = 6.370422320012 NORM ERROR = .07963027900015

INCREASE MAX NO. OF ITERATIONS TO 75 T

ITER = 74 ERROR = 4.930425211516 NORM ERROR = .06163031514395

3D DRAWDOWN MAPS T

LEVEL = RESIST(1)

1	1	2	3	4	5	6	7	9	5	0	0	0	2	2	2
1	2	2	3	4	6	8	10	14	8	0	0	0	5	5	4
1	2	2	3	5	6	9	12	18	25	11	12	12	11	8	6
1	2	2	3	5	6	8	12	17	21	16	13	13	14	9	6
1	2	2	3	4	5	7	8	10	12	11	10	10	10	8	6

LEVEL = SUBCROP(2)

1	2	2	3	4	5	8	13	32	76	63	0	84	32	10	5
2	3	3	4	5	6	9	14	28	88	122	126	86	47	16	8
3	3	4	4	5	7	10	14	30	103	129	131	115	65	24	13
3	3	4	4	5	7	10	17	31	61	137	141	140	72	46	25
3	3	4	4	5	7	12	22	39	62	92	97	90	42	24	14

LEVEL = 95 METERS(3)

1	2	2	3	4	5	8	13	32	74	0	0	43	32	10	5
3	3	4	4	5	7	9	14	28	82	0	105	85	47	16	8
3	3	4	4	5	7	11	19	47	108	131	139	145	82	24	13
3	3	4	4	5	7	10	19	40	76	153	142	149	82	69	53
3	3	4	4	5	7	12	22	40	62	102	105	91	54	44	17

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	452	0	0	0	0
3	3	4	4	5	8	12	0	0	0	0	452	0	0	0	0
3	3	4	4	5	8	12	24	67	147	271	554	176	100	0	0
3	0	4	4	5	12	12	26	53	93	216	321	175	100	89	74
3	0	0	0	0	0	0	26	0	0	216	0	142	60	71	74

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3	4	4	5	8	13	29	0	0	0	0	0	0	0	0
3	3	4	4	5	8	13	29	83	176	358	554	220	111	0	0
3	0	4	4	5	12	13	33	64	106	291	407	212	111	94	77
3	0	0	0	0	0	0	33	0	0	291	0	205	80	92	77

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	4	4	4	5	8	113	182	0	0	0	600	0	0	0	0
3	4	4	4	5	8	113	182	276	317	533	638	324	164	0	0
3	0	0	0	5	8	113	152	271	292	519	476	308	164	121	121
0	0	0	0	0	0	0	0	0	0	0	0	161	162	121	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	4	4	4	5	7	128	202	0	0	0	0	0	0	0	0
3	4	4	4	5	7	128	202	289	342	576	665	354	178	0	0
3	0	0	0	5	7	128	182	288	330	569	499	333	178	129	129
0	0	0	0	0	0	0	0	0	0	0	0	172	178	129	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	4	4	4	0	0	0	0	0	0	0	742	747	0	0	0	0
0	0	4	4	5	6	156	223	300	393	740	741	737	0	0	0	0
0	0	0	0	0	0	0	0	0	0	732	609	448	249	249	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	4	4	5	6	162	225	302	398	724	695	693	0	0	0	0
0	0	0	0	0	0	0	0	0	0	722	651	503	256	256	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	4	4	4	0	0	0	0	0	0	0	961	0	0	0	0	0
0	0	4	4	5	6	0	225	302	398	708	678	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	708	677	676	256	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	4	4	5	6	0	225	302	398	707	678	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	707	678	678	256	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	011331134	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	1	2	2	3	4	6	7	10	13	14	9	9	9	8	6	5
2 !	3	3	3	4	5	6	10	16	32	78	108	99	103	52	24	13
3 !	3	3	3	4	5	7	10	17	37	80	96	96	103	59	32	19
4 !	2	2	3	3	4	7	9	19	40	80	176	442	123	65	54	49
5 !	2	2	3	3	4	7	10	25	49	94	235	320	159	76	62	51
6 !	2	2	3	3	4	6	85	129	182	203	351	371	211	122	81	0
7 !	2	2	3	3	4	5	96	146	192	224	381	388	229	134	86	0
8 !	0	2	3	3	3	3	78	112	150	196	491	699	224	125	125	0
9 !	0	2	3	3	2	3	81	112	151	199	482	449	252	128	128	0
10 !	0	2	3	3	2	3	0	112	151	199	472	451	338	128	0	0
11 !	0	2	3	3	2	3	0	112	151	199	471	452	0	128	0	0
12 !	0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

A W W W W W W W W D 0 0 0 W W W

```

A W W A A A A W W D O O O D W W
W A W A A A A A W W D D W W W W
W A A A A A A A A W W W W W A
W A A A A A A A A A W A A A

```

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER @ WHICH MAX FLOW OCCURS = 7

```

*****
**** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW INTO (GPD) *
*****
*      1      *      1142337.4      *
*      2      *      1142337.4      *
*      3      *      1144654.4      *
*      4      *      1147816.8      *
*      5      *      1148687.7      *
*      6      *      1149119.1      *
*      7      *      1150271.7      *
*      8      *      875896.8      *
*      9      *      -918.1      *
*     10      *      -514.8      *
*     11      *      -154.5      *
*     12      *           0.0      *
*****

```

```

*****
**** STORAGE WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*      1      *           0.0      *
*      2      *      1319.1      *
*      3      *      2333.7      *
*      4      *      368.4      *
*      5      *      184.1      *
*      6      *      512.5      *
*      7      *      224.1      *
*      8      *      489.3      *

```

*	9	*	186.6	*
*	10	*	146.3	*
*	11	*	134.4	*
*	12	*	0.0	*

3D WATER BALANCE IS WITHIN -100.0312363616 %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	115	113	98	77	88	156	364	1208	1543	0	0	0	0	259	1751	657
2 !	284	324	246	98	65	139	229	734	3076	0	0	0	0	0	2231	813
3 !	394	316	238	2032	1565	7181	6437	28753	120674	9674	0	0	1624	2746	3522	1547
4 !	384	314	242	2123	2995	5709	16601	46722	164895	278540	5979	5928	6973	159051	7879	4092
5 !	389	335	291	253	1867	5600	8237	2888	6050	10948	13182	12133	10991	91599	56154	11589

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-32.36501209312

3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-76.12485143015

3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-63.38612157916

3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-83.50669916932

3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-32.47987094699

3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-87.89544267349

3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-121.6583251259

3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-126.025747382

3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-86.07136835576

3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-47.04887922954

3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-102.5577438063

3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-128.6010989003

3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-131.2753952278

3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-114.8373017408

3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-64.74468484171

3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-136.8425694583

3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-140.5731549313

3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-140.4680214371

3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-71.72393255905

3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-91.54715851455

3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-97.33022694959

3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-89.50042078542

***** TOTAL RESISTIVE LAYER FLOW = 1142337.409771

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 174.8774972129 WBAL = 88.13004741716 %

ITER = 5 ERROR = 45.87686354388 WBAL = 40.58586597739 %

ITER = 10 ERROR = 24.24589247209 WBAL = 17.29141297397 %

ITER = 15 ERROR = 10.52054261539 WBAL = 7.678948301304 %

ITER = 20 ERROR = 5.541087366526 WBAL = 3.650815958302 %

INCREASE MAX NO OF ITERS TO 25 T

ITER = 21 ERROR = 4.379568719115 WBAL = 3.113153627201 %

ITER = 22 ERROR = 4.139593932784 WBAL = 2.712835378267 %

ITER = 23 ERROR = 3.273263227613 WBAL = 2.314726807045 %

ITER = 24 ERROR = 3.092096233576 WBAL = 2.017812333358 %

ITER = 25 ERROR = 2.4452707191 WBAL = 1.72245787757 %

INCREASE MAX NO OF ITERS TO 30 T

ITER = 26 ERROR = 2.309054667386 WRAL = 1.501930001425 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

```
*****
* EXXON CRANDON MINE REGION *
* FLOWS FROM 2D MODEL (GPD) *
*****
*NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *
*****
* 63210.* 696827.* 141554.* 44981.*
*****
*LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *
*****
* 140427.* 50240.* 946572.* 5098.*
*****
```

THIS REPRESENTS A % ERROR OF .4463170433707

IMPACTED FLOW TO SWAMP CREEK (GPD) = -6770.151856797

IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -5542.140585059

2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40		
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8!	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9!	0	0	0	0	0	0	0	0	0	0	1	1	2	2	3	4	5	6	6	5	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
10!	0	0	0	0	0	0	0	0	0	0	1	2	2	3	5	6	8	9	11	13	15	1	0	0	0	2	4	4	3	3	2	1	0	0	0	0	0	0	0	0	0	0
11!	0	0	0	0	0	0	0	0	0	1	1	2	3	4	6	7	9	11	14	18	22	2	0	0	0	1	8	7	5	4	2	1	1	0	0	0	0	0	0	0	0	0
12!	0	0	0	0	0	0	0	0	0	1	1	2	3	4	6	7	10	12	16	21	29	26	2	2	18	17	12	9	7	5	3	1	1	0	0	0	0	0	0	0	0	0
13!	0	0	0	0	0	0	0	0	0	1	1	2	3	4	6	7	9	12	15	20	28	32	24	19	19	21	14	10	8	5	3	1	1	0	0	0	0	0	0	0	0	0
14!	0	0	0	0	0	0	0	0	0	1	1	2	3	4	5	7	8	10	13	15	18	19	17	16	15	16	13	10	7	5	3	1	1	0	0	0	0	0	0	0	0	0
15!	0	0	0	0	0	0	0	0	0	1	1	2	3	3	4	5	6	7	9	10	11	11	11	10	10	9	8	7	6	4	3	1	1	0	0	0	0	0	0	0	0	0
16!	0	0	0	0	0	0	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	6	6	6	6	5	5	4	4	3	2	1	1	0	0	0	0	0	0	0	0	0
17!	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	1	0	0	0	0	0	0	0	0	
18!	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0
19!	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	
20!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
21!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ACC Z ERROR FROM OBSERVED 0. Z

\$\$\$\$\$\$\$\$\$\$

TIME = 345.30.

*****ENTERING 3D MODEL*****

ITER = 1 ERROR = 1262.077834587 NORM ERROR = 15.77597293233

ITER = 5 ERROR = 172.0691424876 NORM ERROR = 2.150864281095

ITER = 10 ERROR = 103.5011816968 NORM ERROR = 1.29376477121

ITER = 15 ERROR = 73.13414178549 NORM ERROR = .9141767723186

ITER = 20 ERROR = 53.36764656604 NORM ERROR = .6670955820755

ITER = 25 ERROR = 39.37346943885 NORM ERROR = .4921683679857

ITER = 30 ERROR = 29.46660764092 NORM ERROR = .3683325955115

ITER = 35 ERROR = 21.98158794961 NORM ERROR = .2747698493701

ITER = 40 ERROR = 16.45413294806 NORM ERROR = .20567666618508

ITER = 45 ERROR = 12.35979317377 NORM ERROR = .1544974146721

ITER = 50 ERROR = 9.320309500692 NORM ERROR = .1165038687587

INCREASE MAX NO. OF ITERATIONS TO 55 T

ITER = 55 ERROR = 7.05819425724 NORM ERROR = .0882274282155

INCREASE MAX NO. OF ITERATIONS TO 60 T

ITER = 60 ERROR = 5.369618537408 NORM ERROR = .0671202317176

INCREASE MAX NO. OF ITERATIONS TO 65 T

ITER = 62 ERROR = 4.81978130332 NORM ERROR = .0602472662915

3D DRAWDOWN MAPS T

2	3	5	6	8	9	11	13	15	1	0	0	0	2	4	4
3	4	6	7	9	11	14	18	22	2	0	0	0	1	8	7
3	4	6	7	10	12	16	21	29	26	2	2	18	17	12	9
3	4	6	7	9	12	15	20	28	32	24	19	19	21	14	10
3	4	5	7	8	10	13	15	18	19	17	16	15	16	13	10

0-17

3	4	5	7	8	11	14	22	53	91	86	0	99	41	14	8
5	7	7	8	9	12	16	23	47	104	139	141	102	57	23	12
6	7	8	8	10	13	17	23	42	122	146	145	134	84	33	18
7	7	8	8	10	13	17	26	44	84	156	159	159	94	60	33
7	7	8	9	10	13	19	32	52	80	110	115	106	52	31	19

LEVEL = 95 METERS(3)

3	4	5	7	8	11	14	22	52	91	0	0	68	41	14	8
6	7	7	8	10	13	16	23	47	102	0	132	102	57	23	12
6	7	8	8	10	13	18	28	60	126	149	156	163	102	33	18
6	7	8	8	10	13	17	29	54	96	171	160	167	102	82	63
7	7	8	9	10	13	19	31	53	80	120	122	106	66	53	23

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	452	0	0	0	0
6	7	8	8	10	14	19	0	0	0	0	452	0	0	0	0
6	7	8	9	10	14	19	33	80	163	284	560	193	117	0	0
6	0	8	9	10	19	19	36	67	112	232	334	192	118	104	86
6	0	0	0	0	0	0	36	0	0	231	0	158	72	84	86

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	7	8	8	10	14	21	38	0	0	0	0	0	0	0	0
6	7	8	9	10	14	21	38	97	191	369	560	235	128	0	0
6	0	8	9	10	18	20	42	78	125	304	417	228	128	109	89
6	0	0	0	0	0	0	42	0	0	304	0	221	94	106	89

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	8	8	9	10	13	122	193	0	0	0	600	0	0	0	0
6	8	8	9	10	13	122	193	287	329	539	641	336	179	0	0
6	0	0	0	10	13	123	163	282	304	525	484	320	179	135	135
0	0	0	0	0	0	0	0	0	0	0	0	177	177	135	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	8	8	9	10	13	137	213	0	0	0	0	0	0	0	0
6	8	8	9	10	13	137	213	300	352	581	667	365	193	0	0
6	0	0	0	10	13	138	193	299	341	574	506	345	193	144	144
0	0	0	0	0	0	0	0	0	0	0	0	191	192	144	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	8	8	9	0	0	0	0	0	739	742	747	0	0	0	0
0	0	8	9	10	11	166	234	311	402	740	741	740	0	0	0
0	0	0	0	0	0	0	0	0	0	733	613	457	262	262	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	8	8	9	0	0	0	0	0	0	0	0	0	0	0	0
0	0	8	9	10	11	172	236	313	407	725	696	696	0	0	0

0	0	0	0	0	0	0	0	0	0	0	723	654	510	269	269	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	8	8	9	0	0	0	0	951	0	0	961	0	0	0	0	0
0	0	8	9	9	10	0	236	313	407	709	680	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	709	678	678	269	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	8	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	8	9	9	10	0	236	313	407	708	680	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	708	680	680	269	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	0	0	0	1141	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1141	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	113311341135	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	3	4	5	7	9	11	14	17	22	16	11	9	13	11	10	8
2 !	6	6	7	8	9	12	17	25	48	96	127	112	120	66	32	18
3 !	6	6	7	8	10	13	17	27	53	98	110	110	121	73	41	25
4 !	5	5	6	6	7	12	14	26	49	92	187	449	136	77	63	57
5 !	5	5	6	6	8	12	15	32	58	105	244	326	171	88	72	60
6 !	4	5	5	6	8	10	92	137	190	211	355	375	219	134	90	0
7 !	4	5	5	6	8	9	103	154	200	231	385	391	237	144	96	0
8 !	0	4	5	6	5	6	83	117	156	201	491	700	228	131	131	0
9 !	0	4	5	6	5	6	86	118	156	203	482	450	255	135	135	0
10 !	0	4	5	6	5	5	0	118	156	203	473	453	339	135	0	0
11 !	0	4	5	6	5	5	0	118	156	203	472	453	0	135	0	0
12 !	0	0	0	0	0	0	0	0	0	0	0	1141	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	W	W	W	A	0	0	0	W	W	W	
W	W	W	A	A	A	A	W	W	W	0	0	0	A	W	W	
W	W	W	A	A	A	A	A	W	D	A	W	W	W	W	W	
W	W	A	A	A	A	A	A	A	W	W	W	W	W	W	W	
W	A	A	A	A	A	A	A	A	A	A	W	W	A	A		

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473

[illegible]

```
*****
**** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW INTO (GPD) *
*****
*           1           *           1111730.5           *
*           2           *           1111730.5           *
*           3           *           1113464.0           *
*           4           *           1115351.2           *
*           5           *           1115994.5           *
*           6           *           1116301.8           *
*           7           *           1117022.4           *
*           8           *           850621.9           *
*           9           *           -627.9           *
*          10           *           -313.8           *
*          11           *           -37.8           *
*          12           *           0.0           *
*****
```

```

*****
***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL *****
*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*          1          *          0.0          *
*          2          *          521.6         *
*          3          *          966.3         *
*          4          *          85.8          *
*          5          *          45.1          *
*          6          *          45.8          *
*          7          *          33.2          *
*          8          *          17.7          *
*          9          *          16.0          *
*         10          *          10.8          *
*         11          *           9.9          *
*         12          *           0.0          *
*****

```

3D WATER BALANCE IS WITHIN -100.0331109649 %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	233	212	167	122	132	229	557	1904	140	859	0	0	0	204	2321	895
2 !	544	578	394	135	75	176	338	1213	1518	1288	0	0	0	841	1812	1123
3 !	751	559	382	2694	1407	7760	6917	31176	128770	0	1907	2079	417	1496	4485	1919
4 !	737	566	407	3141	3709	6651	19048	53041	191241	202360	4234	4548	5667	128800	9048	4810
5 !	762	630	519	425	2837	7604	10522	3581	7361	13125	11789	10892	9808	105204	64375	13530

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-52.72400084687
 3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-91.37179042003
 3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-86.25635378609
 3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-99.32452047933
 3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-41.10716243598
 3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-47.06060272487
 3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-103.8718543573
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-138.8435260269
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-140.8377578787
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-102.0749304475
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-57.30824884408
 3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-23.48387760216
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-121.6312191541
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-145.8918385467
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-145.161641173
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-134.3326567299
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-83.9007001211
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-84.4984641113
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-155.6839381562
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-158.7601155216
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-158.6116277573
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-93.74242762982
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-59.63706879104
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-109.5470634718
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-115.1002120017
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-105.6346688264

***** TOTAL RESISTIVE LAYER FLOW = 1111730.460031

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 129.6043462082 WBAL = 11.90339499711 %
 ITER = 5 ERROR = 9.032477067511 WBAL = 5.869819182859 %
 ITER = 9 ERROR = 4.980707364756 WBAL = 3.235712702371 %
 ITER = 10 ERROR = 3.881303697214 WBAL = 2.775675634833 %
 ITER = 11 ERROR = 3.738953179557 WBAL = 2.422744731152 %
 ITER = 12 ERROR = 2.917609468639 WBAL = 2.078837872991 %
 ITER = 13 ERROR = 2.808686106552 WBAL = 1.816006089022 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 60390.* 696482.* 137634.* 50595.*

```

*****
*LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *
*****
* 146058.* 14672.* 945103.* 5898.*
*****

```

THIS REPRESENTS A % ERROR OF .5305196598151

IMPACTED FLOW TO SWAMP CREEK (GPD) = -8766.483350509

IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -6792.124575142

2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40		
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8!	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	
9!	0	0	0	0	0	0	0	0	0	0	1	1	2	3	3	4	5	6	6	5	0	0	0	0	0	1	1	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0
10!	0	0	0	0	0	0	0	0	0	1	1	2	3	4	5	7	9	10	12	14	14	5	0	0	0	3	4	4	3	3	2	1	1	0	0	0	0	0	0	0	0	0
11!	0	0	0	0	0	0	0	0	0	1	1	2	3	5	6	8	10	12	15	18	23	8	0	0	0	5	8	7	5	4	2	1	1	0	0	0	0	0	0	0	0	0
12!	0	0	0	0	0	0	0	0	0	1	1	2	4	5	7	8	11	13	17	22	32	14	11	12	17	15	11	9	7	5	3	1	1	0	0	0	0	0	0	0	0	0
13!	0	0	0	0	0	0	0	0	0	1	2	2	4	5	6	8	10	13	16	22	29	31	22	19	18	20	14	10	8	5	3	1	1	0	0	0	0	0	0	0	0	0
14!	0	0	0	0	0	0	0	0	0	1	2	3	3	5	6	7	9	11	13	16	18	19	17	16	15	16	13	10	8	5	3	2	1	0	0	0	0	0	0	0	0	0
15!	0	0	0	0	0	0	0	0	0	1	1	2	2	3	4	5	6	7	8	9	10	11	11	11	10	10	9	8	7	6	4	3	2	1	1	0	0	0	0	0	0	0
16!	0	0	0	0	0	0	0	0	0	1	1	1	2	3	3	4	4	5	5	6	6	7	7	7	6	6	6	5	5	4	3	2	1	1	1	0	0	0	0	0	0	0
17!	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	4	3	3	3	3	3	2	2	1	1	0	0	0	0	0	0	0	0
18!	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0
19!	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	
20!	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	
21!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
32!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
37!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
38!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
39!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
40!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
41!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

ACC % ERROR FROM OBSERVED 0. %

\$ \$

TIME = 375. 30.

*****ENTERING 3D MODEL*****

ITER = 1 ERROR = 1445.867144939 NORM ERROR = 18.07333931174

ITER = 5 ERROR = 253.8417464583 NORM ERROR = 3.173021830729

ITER = 10 ERROR = 154.4911373548 NORM ERROR = 1.931139216935

ITER = 15 ERROR = 106.9427274006 NORM ERROR = 1.336784092508

ITER = 20 ERROR = 74.25804840599 NORM ERROR = .9282256050749

ITER = 25 ERROR = 51.32624506459 NORM ERROR = .6415780633073

ITER = 30 ERROR = 35.50418698469 NORM ERROR = .4438023373087

ITER = 35 ERROR = 24.69473669482 NORM ERROR = .3066842086853

```
ITER = 40 ERROR = 17.32626910613 NORM ERROR = .2165783638266
```

ITER = 45 ERROR = 12.30704278282 NORM ERROR = .1538380347853

ITER = 50 ERROR = 8.872825059916 NORM ERROR = .110910313249

INCREASE MAX NO. OF ITERATIONS TO 55 T

ITER = 55 ERROR = 6.512961001874 NORM ERROR = .08141201252342

INCREASE MAX NO. OF ITERATIONS TO 60 T

ITER = 60 ERROR = 4.882696209579 NORM ERROR = .06103370261974

INCREASE MAX NO. OF ITERATIONS TO 65 T

ITER = 61 ERROR = 4.622234702631 NORM ERROR = .05777793378288

3D DRAWDOWN MAPS T

```
LEVEL = RESIST(1)
```

3	4	5	7	9	10	12	14	14	5	0	0	0	3	4	4
3	5	6	8	10	12	15	18	23	8	0	0	0	5	8	7
4	5	7	8	11	13	17	22	32	14	11	12	17	15	11	9
4	5	6	8	10	13	16	22	29	31	22	19	18	20	14	10
3	5	6	7	9	11	13	16	18	19	17	16	15	16	13	10

```
LEVEL = SUBCROP(2)
```

4	5	6	7	9	11	14	22	51	88	87	0	104	46	16	8
6	8	8	9	10	13	17	24	47	97	136	147	107	63	26	12
7	8	9	9	11	14	19	24	45	105	144	152	137	86	33	18
7	8	8	9	11	14	18	28	46	86	158	161	161	95	61	33
7	8	9	9	11	14	20	33	54	81	111	117	107	53	32	20

LEVEL = 95 METERS(3)

4	5	6	7	9	11	14	22	51	88	0	0	84	46	16	8
7	8	9	9	11	15	17	24	47	97	0	144	107	63	26	12
7	8	9	9	11	15	20	30	63	123	148	158	165	103	33	18
7	8	8	9	11	14	19	31	57	98	173	163	169	103	83	64
7	8	9	9	11	14	20	33	55	81	122	124	108	67	54	23

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	452	0	0	0	0
7	8	9	9	11	15	21	0	0	0	0	452	0	0	0	0
7	8	9	10	11	15	21	37	87	174	295	564	195	119	0	0
7	0	9	10	11	20	21	40	71	117	236	338	194	119	105	87
7	0	0	0	0	0	0	40	0	0	235	0	160	73	85	87

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	8	9	10	11	15	23	44	0	0	0	0	0	0	0	0
7	8	9	10	11	15	23	44	109	214	379	564	237	130	0	0
7	0	9	10	11	21	23	49	84	133	311	421	230	130	110	90
7	0	0	0	0	0	0	49	0	0	311	0	223	95	107	90

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	9	9	10	12	15	165	263	0	0	0	600	0	0	0	0
7	9	9	10	12	15	165	263	388	416	553	645	338	180	0	0
7	0	0	0	12	15	165	220	381	383	536	488	323	180	137	137
0	0	0	0	0	0	0	0	0	0	0	0	179	179	137	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	9	9	10	12	14	186	291	0	0	0	0	0	0	0	0
7	9	9	10	12	14	186	291	410	459	592	670	367	195	0	0
7	0	0	0	12	14	186	262	409	441	584	510	348	195	145	145
0	0	0	0	0	0	0	0	0	0	0	0	194	194	145	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	9	10	10	0	0	0	0	738	739	742	747	0	0	0	0
0	0	10	10	11	13	226	322	434	588	740	741	742	0	0	0
0	0	0	0	0	0	0	0	0	0	733	615	459	264	264	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0
0	0	10	10	11	13	234	324	438	647	727	697	697	0	0	0
0	0	0	0	0	0	0	0	0	0	725	655	512	271	271	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	10	10	10	0	0	0	0	951	953	0	961	0	0	0	0
0	0	10	10	11	12	0	324	438	952	712	681	0	0	0	0
0	0	0	0	0	0	0	0	0	0	711	680	680	271	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

0	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0
0	0	10	10	11	12	0	324	438	951	710	681	0	0	0	0
0	0	0	0	0	0	0	0	0	0	710	681	681	271	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1132	1133	1134	1135	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	3	5	6	8	10	12	15	18	23	15	13	12	13	12	10	8
2 !	6	7	8	9	10	13	18	26	48	91	127	115	123	69	34	18
3 !	7	7	8	9	11	14	18	28	55	97	111	111	127	76	43	25
4 !	6	5	7	7	8	13	16	29	53	97	191	451	137	78	63	58
5 !	6	5	7	7	9	13	17	37	65	116	250	328	173	89	72	60
6 !	5	6	6	7	9	11	124	186	256	266	363	377	220	135	91	0
7 !	5	6	6	7	9	11	140	211	273	300	392	393	238	146	97	0
8 !	0	5	6	7	6	7	113	161	217	294	491	701	230	132	132	0
9 !	0	5	6	7	6	6	117	162	219	323	484	451	256	136	136	0
10 !	0	5	7	7	6	6	0	162	219	476	474	454	340	136	0	0
11 !	0	5	7	7	6	6	0	162	219	476	473	454	0	136	0	0
12 !	0	0	0	0	0	0	0	0	0	0	0	0	1141	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	W	W	W	D	0	0	0	W	W	W
W	W	W	A	A	A	A	W	W	D	0	0	0	D	W	W
W	W	W	A	A	A	A	A	W	W	D	D	W	W	W	W
W	W	A	A	A	A	A	A	W	W	W	W	W	W	W	W
W	A	A	A	A	A	A	A	A	A	A	W	W	A	A	

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER @ WHICH MAX FLOW OCCURS = 7

 ***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL *****

 * MODEL LAYER * FLOW INTO (G P D) *

```

*****
*      1      *      1233854.8      *
*      2      *      1233854.8      *
*      3      *      1234558.6      *
*      4      *      1235183.3      *
*      5      *      1235512.1      *
*      6      *      1235676.5      *
*      7      *      1236194.2      *
*      8      *      986283.7      *
*      9      *      230320.7      *
*     10      *      114011.4      *
*     11      *      -106.2      *
*     12      *      0.0      *
*****

```

```

*****
**** STORAGE WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*      1      *      0.0      *
*      2      *      34.6      *
*      3      *      130.6      *
*      4      *      26.7      *
*      5      *      18.4      *
*      6      *      99.4      *
*      7      *      98.4      *
*      8      *      58.2      *
*      9      *      77.5      *
*     10      *      31.2      *
*     11      *      94.5      *
*     12      *      0.0      *
*****

```

3D WATER BALANCE IS WITHIN -100.0184320783 %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	266	244	190	135	139	232	551	1856	402	0	0	0	0	66	2591	977
2 !	615	656	444	145	80	187	343	1180	1284	0	0	0	0	0	1782	1239
3 !	840	622	425	2972	1727	8824	7982	34756	123409	104448	0	0	496	1782	4702	1994
4 !	824	626	447	3378	3933	6979	20002	56205	196156	208036	4531	4728	5744	130122	9072	4902
5 !	857	702	575	465	3033	7983	11008	3746	7640	13535	11897	10965	9824	106531	65105	13685

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-50.63960029959

3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-87.54742678262

3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-87.31143449167

3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-104.2439485795

3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-45.87193179431

3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-47.01544881716

3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-96.7462468471
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-136.4238102507
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.5999999999999 H=-147.3701572987
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-106.9178504315
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.9000000000001 H=-63.38939952083
 3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-25.82106112978
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-104.956198137
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-144.3581842337
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-151.6078846725
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-137.4940455083
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-85.69320933519
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-85.75508063895
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-157.8330937257
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-160.9608831482
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-160.6095571003
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-95.04227547714
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-60.64647189383
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-111.3643492795
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-116.9163946867
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-107.2107217639
 ***** TOTAL RESISTIVE LAYER FLOW = 1233854.842982

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 155.9005997659 WBAL = 16.28424454624 %
 ITER = 5 ERROR = 17.11064448368 WBAL = 10.9392319546 %
 ITER = 10 ERROR = 10.07607893123 WBAL = 5.965897566112 %
 ITER = 15 ERROR = 4.618735610341 WBAL = 3.011074779756 %
 ITER = 16 ERROR = 4.454001615147 WBAL = 2.651093513082 %
 ITER = 17 ERROR = 3.50972095529 WBAL = 2.285824185403 %
 ITER = 18 ERROR = 3.378057368588 WBAL = 2.010483342816 %
 ITER = 19 ERROR = 2.662831157188 WBAL = 1.732403392342 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 67617.* 789569.* 146960.* 60766.*

 * LOCAL INFIL * LOCAL STORE * IMPACT FLOW * WATER FAL *

 * 141100.* 21533.* 1064912.* 6310.*

THIS REPRESENTS A % ERROR OF .5113955334973
 IMPACTED FLOW TO SWAMP CREEK (GPD) = -10495.76308874
 IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -7662.088662263
 2D DRAWDOWN MAP T

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

*****ENTERING 3D MODEL*****

DO 3D FINITE DIFFERENCE COMPUTATIONS = T

ITER = 1 ERROR = 1317.280241229 NORM ERROR = 16.46600301537
 ITER = 5 ERROR = 325.2957239407 NORM ERROR = 4.066196549259
 ITER = 10 ERROR = 205.7778109834 NORM ERROR = 2.572222637293
 ITER = 15 ERROR = 137.1768577157 NORM ERROR = 1.714710721447
 ITER = 20 ERROR = 93.67429670265 NORM ERROR = 1.170928708783
 ITER = 25 ERROR = 64.79504965529 NORM ERROR = .8099381206911
 ITER = 30 ERROR = 46.91427093316 NORM ERROR = .5864283866645
 ITER = 35 ERROR = 32.36663236667 NORM ERROR = .4045829045834
 ITER = 40 ERROR = 23.07722358948 NORM ERROR = .2884652948685
 ITER = 45 ERROR = 16.6609031249 NORM ERROR = .2082612890612
 ITER = 50 ERROR = 12.17690008003 NORM ERROR = .1522112510004

INCREASE MAX NO. OF ITERATIONS TO 55 T

ITER = 55 ERROR = 9.021791615500 NORM ERROR = .1127723951938

INCREASE MAX NO. OF ITERATIONS TO 60 T

ITER = 60 ERROR = 6.787491364218 NORM ERROR = .08484364205272

INCREASE MAX NO. OF ITERATIONS TO 65 T

ITER = 65 ERROR = 5.195382251249 NORM ERROR = .06494227814062

INCREASE MAX NO. OF ITERATIONS TO 70 T

ITER = 66 ERROR = 4.935990961753 NORM ERROR = .06169988702191

3D DRAWDOWN MAPS T

LEVEL = RESIST(1)

3	5	6	8	10	12	14	16	16	1	0	0	0	2	4	4
4	6	8	10	12	15	18	22	28	2	0	0	0	1	9	7
4	6	8	10	13	16	20	26	40	26	2	2	19	18	13	10
4	6	8	10	12	15	19	25	34	38	27	21	20	22	15	11
4	5	7	9	11	13	16	19	21	22	20	18	17	18	14	11

LEVEL = SUBCROP(2)

5	6	7	9	11	14	19	36	84	132	124	0	117	49	17	9
7	9	10	10	12	16	21	35	85	148	179	168	120	69	30	14
9	9	10	11	13	17	23	31	92	170	185	173	156	99	40	21
9	9	10	11	13	16	22	35	61	119	187	186	181	111	72	37
9	9	10	11	13	17	25	43	71	106	136	140	125	60	36	22

LEVEL = 95 METERS(3)

5	6	7	9	11	14	19	36	84	131	0	0	99	49	17	9
8	9	10	11	13	18	21	35	84	144	0	162	120	69	30	14
9	9	10	11	13	18	25	40	103	176	187	185	185	118	40	21
9	9	10	11	13	16	23	39	77	134	202	187	186	118	93	71
9	9	10	11	13	17	25	42	75	106	147	147	124	75	61	26

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	452	0	0	0	0
9	9	10	11	13	18	27	0	0	0	0	452	0	0	0	0
9	9	10	11	13	18	27	49	127	227	333	575	213	133	0	0
9	0	10	11	13	25	26	51	98	155	263	360	212	133	116	96
9	0	0	0	0	0	0	51	0	0	263	0	178	83	94	96

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	10	11	11	14	18	29	58	0	0	0	0	0	0	0	0
9	10	11	12	14	18	29	58	151	269	407	575	254	144	0	0
9	0	11	12	14	26	29	62	115	173	337	438	247	144	121	100
9	0	0	0	0	0	0	62	0	0	337	0	240	106	118	100

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	11	11	12	14	18	205	326	0	0	0	600	0	0	0	0
9	11	11	12	14	18	205	326	479	503	573	651	353	193	0	0
9	0	0	0	14	18	205	273	470	466	555	501	338	193	148	148
0	0	0	0	0	0	0	0	0	0	0	0	191	191	148	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	11	11	12	14	17	231	361	0	0	0	0	0	0	0	0
9	11	11	12	14	17	231	361	506	557	609	675	381	207	0	0
9	0	0	0	14	17	231	325	504	536	601	522	362	207	157	157
0	0	0	0	0	0	0	0	0	0	0	0	206	207	157	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	11	12	12	0	0	0	0	738	739	742	747	0	0	0	0
0	0	12	12	13	16	280	399	536	738	740	741	742	0	0	0
0	0	0	0	0	0	0	0	0	0	734	621	469	276	276	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	11	12	12	0	0	0	0	0	0	0	0	0	0	0	0
0	0	12	12	13	15	291	402	540	769	729	699	699	0	0	0
0	0	0	0	0	0	0	0	0	0	727	659	520	283	283	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	12	12	12	0	0	0	0	951	953	955	961	0	0	0	0
0	0	12	12	13	15	0	402	540	952	714	684	0	0	0	0
0	0	0	0	0	0	0	0	0	0	713	683	683	283	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	12	12	12	0	0	0	0	0	0	0	0	0	0	0	0
0	0	12	12	13	15	0	402	540	952	712	684	0	0	0	0
0	0	0	0	0	0	0	0	0	0	712	684	684	283	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0
0	0	0	0	0	0	0	0	0113111321133113411351136	0	0	0	0	0	0	0

```

0 0 0 0 0 0 0 0 0 0 0 011331134 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

```

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	4	6	7	9	12	14	17	22	28	18	12	10	14	12	11	9
2 !	8	9	10	11	12	16	22	36	78	135	162	133	140	78	39	21
3 !	8	9	10	11	12	16	23	38	85	137	134	130	143	86	48	28
4 !	7	6	8	9	10	15	20	38	75	127	215	462	151	87	70	64
5 !	7	6	8	9	10	16	22	48	89	148	270	338	185	98	80	67
6 !	6	7	8	8	10	13	154	231	317	323	376	384	230	145	99	0
7 !	6	7	8	8	10	13	173	262	337	364	403	399	247	155	105	0
8 !	0	6	8	8	7	8	140	199	268	369	491	703	235	138	138	0
9 !	0	6	8	8	7	8	145	201	270	385	485	453	260	141	141	0
10 !	0	6	8	8	7	7	0	201	270	476	476	456	341	141	0	0
11 !	0	6	8	8	7	7	0	201	270	476	475	456	0	141	0	0
12 !	0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	W	W	D	A	0	0	0	W	W	W
W	W	W	A	A	A	A	W	W	W	0	0	0	A	W	W
W	W	W	A	A	A	A	A	W	D	A	W	W	W	W	W
W	W	A	A	A	A	A	A	W	W	W	W	W	W	W	W
W	A	A	A	A	A	A	A	A	W	W	W	W	A	A	

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER 8 WHICH MAX FLOW OCCURS = 7

***** VERTICAL WATER BALANCE FOR 3D GROUNDWATER MODEL *****

* MODEL LAYER * FLOW INTO (GPD) *

*	1	*	1256173.6	*
*	2	*	1256173.6	*
*	3	*	1256143.2	*
*	4	*	1256127.0	*
*	5	*	1261072.9	*
*	6	*	1261353.8	*
*	7	*	1261967.2	*
*	8	*	893226.3	*


```

*      9      *      137586.0      *
*     10      *      68178.9      *
*     11      *      -41.7      *
*     12      *       0.0      *
*****

```

```

*****
***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL *****
*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*      1      *      0.0      *
*      2      *     855.9      *
*      3      *    1429.8      *
*      4      *     168.9      *
*      5      *      61.1      *
*      6      *     125.2      *
*      7      *     124.5      *
*      8      *      35.5      *
*      9      *     217.1      *
*     10      *      29.0      *
*     11      *      26.6      *
*     12      *       0.0      *
*****
3D WATER BALANCE IS WITHIN -100.0277557706 %

```

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	316	286	221	159	179	363	1098	2353	0	859	0	0	0	256	2886	1101
2 !	725	769	515	169	104	285	727	2792	192	1288	0	0	0	841	1686	1470
3 !	990	729	496	3517	2292	12805	13195	77984	48689	0	1907	2079	194	1316	5056	2381
4 !	973	736	525	4049	5086	9746	29192	84403	307237	163118	3589	4135	5336	123383	8832	5611
5 !	1013	829	681	557	3749	10364	14818	5152	10659	14146	11292	10487	9452	122354	73978	15389

3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-36.3337578084
 3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-84.02871795073
 3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-132.3385454642
 3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-124.1081424569
 3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-116.8997801773
 3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-49.34750982313
 3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-84.70252799226
 3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-147.5713806218
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-178.7252416775
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-168.2098093844
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-119.9943120452
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-68.96855380764
 3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-29.98118022753
 3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-91.98036532183
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-170.2365182471

3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-185.0784453914
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-173.4152515452
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-155.7904255139
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-99.25950694272
 3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-40.09052597259
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-119.3791470302
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-187.0062271421
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-185.5229452961
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-180.5407810543
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-110.8313774851
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-71.87647311188
 3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-105.8470201417
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-136.1012403539
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-139.6704727092
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-124.6029980718
 ***** TOTAL RESISTIVE LAYER FLOW = 1256173.611415

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 141.5507631655 WRAL = 7.586780063778 %
 ITER = 5 ERROR = 8.887833623053 WRAL = 4.614882034401 %
 ITER = 10 ERROR = 3.982454071347 WRAL = 2.456854176656 %
 ITER = 11 ERROR = 3.884587999527 WRAL = 2.173955221097 %
 ITER = 12 ERROR = 3.041939701092 WRAL = 1.891446305964 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 68999.* 807934.* 149515.* 65920.*

 * LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *

 * 146436.* 9984.* 1092368.* 7386.*

THIS REPRESENTS A % ERROR OF .5879948300837
 IMPACTED FLOW TO SWAMP CREEK (GPD) = -11578.23445719
 IMPACTED FLOW TO HEMLock CREEK (GPD) = -8123.710479637
 2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40		
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8!	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0

ITER = 30 ERROR = 55.83235493965 NORM ERROR = .6979044367456
 ITER = 35 ERROR = 40.27694988168 NORM ERROR = .503461873521
 ITER = 40 ERROR = 29.47298474627 NORM ERROR = .3684123093283
 ITER = 45 ERROR = 21.82859898266 NORM ERROR = .2728574872832
 ITER = 50 ERROR = 16.33947132363 NORM ERROR = .2042433915454
 INCREASE MAX NO. OF ITERATIONS TO 55 T
 ITER = 55 ERROR = 12.35275452158 NORM ERROR = .1544094315197
 INCREASE MAX NO. OF ITERATIONS TO 60 T
 ITER = 60 ERROR = 9.431982512306 NORM ERROR = .1178997814038
 INCREASE MAX NO. OF ITERATIONS TO 65 T
 ITER = 65 ERROR = 7.27799665934 NORM ERROR = .09097495824175
 INCREASE MAX NO. OF ITERATIONS TO 70 T
 ITER = 70 ERROR = 5.681480457693 NORM ERROR = .07101850572116
 INCREASE MAX NO. OF ITERATIONS TO 75 T
 ITER = 73 ERROR = 4.927318534315 NORM ERROR = .06159148167894
 3D DRAWDOWN MAPS T

LEVEL = RESIST(1)
 4 5 7 9 11 13 15 17 4 5 0 0 0 3 4 4
 4 6 8 11 13 16 19 22 23 8 0 0 0 5 9 7
 5 7 9 11 14 17 21 27 37 14 11 12 19 17 13 10
 5 6 8 11 13 16 21 27 36 35 25 21 20 22 15 11
 5 6 8 9 12 14 17 20 22 21 19 18 17 18 15 12

LEVEL = SUBCROP(2)
 5 6 8 10 12 15 18 28 63 120 121 0 147 71 29 13
 8 10 11 11 13 17 21 32 70 134 180 197 151 96 46 19
 10 10 11 12 14 18 24 32 84 148 189 202 191 131 61 27
 10 10 11 12 14 17 24 37 63 122 202 213 220 148 100 48
 10 10 11 12 14 18 27 45 74 113 150 159 150 79 44 26

LEVEL = 95 METERS(3)
 5 6 8 10 12 15 18 28 63 120 0 0 120 71 29 13
 9 10 11 12 14 19 21 32 70 135 0 188 150 96 46 19
 10 10 11 12 14 19 26 42 99 166 192 209 226 155 60 27
 10 10 11 12 14 18 24 42 79 135 218 214 230 155 124 93
 10 10 11 12 14 18 27 44 77 113 162 168 151 98 79 32

LEVEL = 140 METERS(4)
 0 0 0 0 0 0 0 0 0 0 0 452 0 0 0 0
 10 10 11 12 15 20 29 0 0 0 0 452 0 0 0 0
 10 10 11 13 15 20 29 52 128 225 340 596 266 175 0 0
 10 0 11 13 15 28 28 56 100 157 282 391 265 175 153 127
 10 0 0 0 0 0 0 56 0 0 281 0 221 108 124 127

LEVEL = 163 METERS(5)
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 10 11 12 13 15 20 32 64 0 0 0 0 0 0 0 0
 10 11 12 13 15 20 32 64 158 271 421 596 321 189 0 0
 10 0 12 13 15 28 32 72 119 176 356 479 313 189 161 132
 10 0 0 0 0 0 0 72 0 0 356 0 304 139 157 132

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	12	13	13	15	20	272	435	0	0	0	600	0	0	0	0
10	12	13	13	15	20	272	435	613	520	585	665	450	261	0	0
10	0	0	0	15	20	272	361	601	481	572	553	440	261	199	199
0	0	0	0	0	0	0	0	0	0	0	0	257	259	199	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	12	13	13	15	20	307	483	0	0	0	0	0	0	0	0
10	12	13	13	15	20	307	483	662	574	620	685	493	283	0	0
10	0	0	0	15	20	307	434	659	553	614	576	481	283	211	211
0	0	0	0	0	0	0	0	0	0	0	0	276	282	211	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	13	13	13	0	0	0	0	738	739	742	747	0	0	0	0
0	0	13	14	15	18	375	538	737	738	740	741	742	742	0	0
0	0	0	0	0	0	0	0	0	0	736	680	741	397	397	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	13	13	14	0	0	0	0	0	0	0	0	0	0	0	0
0	0	13	14	15	17	390	542	735	773	735	722	721	0	0	0
0	0	0	0	0	0	0	0	0	0	734	704	722	406	406	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	953	0	0	0	0	0	0
0	13	13	14	0	0	0	0	951	953	955	961	0	0	0	0
0	0	13	14	15	17	0	542	735	952	728	715	0	0	0	0
0	0	0	0	0	0	0	0	0	0	728	714	714	406	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	13	13	14	0	0	0	0	0	0	0	0	0	0	0	0
0	0	13	14	15	16	0	542	735	952	727	715	0	0	0	0
0	0	0	0	0	0	0	0	0	0	727	715	715	406	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	01141	0	0	0	0	0
0	0	0	0	0	0	0	0	01131113211331134113511361135	0						
0	0	0	0	0	0	0	0	01131113311331134	0	0	0				
0	0	0	0	0	0	0	0	0	0	01134	0	0	0		

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	4	6	8	10	13	15	18	23	24	17	14	13	14	13	11	9
2 !	3	9	10	11	13	17	23	35	71	127	168	154	172	105	56	27

3 !	9	9	11	12	14	18	23	37	78	134	143	148	176	115	68	37
4 !	8	7	9	9	11	17	21	41	76	127	226	480	188	114	92	85
5 !	8	7	9	10	11	17	24	54	92	149	283	358	234	129	106	88
6 !	6	8	8	9	12	15	204	308	405	334	386	406	297	195	133	0
7 !	6	8	8	9	12	15	231	350	440	376	411	420	325	212	141	0
8 !	0	6	9	9	8	9	188	269	368	369	492	723	370	198	198	0
9 !	0	6	9	9	7	9	195	271	368	386	490	475	341	203	203	0
10 !	0	6	9	9	7	8	0	271	367	952	485	476	357	203	0	0
11 !	0	6	9	9	7	8	0	271	367	476	485	477	0	203	0	0
12 !	0	0	0	0	0	0	0	0	0	1134	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	W	W	W	D	0	0	0	D	W	W
W	W	W	A	A	A	A	W	W	D	0	0	0	D	W	W
W	W	W	A	A	A	A	A	W	W	D	D	W	W	W	W
W	W	A	A	A	A	A	A	W	W	W	W	W	W	W	W
W	A	A	A	A	A	A	A	A	A	W	W	W	A	A	A

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER 2 WHICH MAX FLOW OCCURS = 7

***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL *****

* MODEL LAYER * FLOW INTO (GPD) *

*	1	*	1467989.5	*
*	2	*	1467989.5	*
*	3	*	1469860.9	*
*	4	*	1472004.8	*
*	5	*	1472726.2	*
*	6	*	1473090.5	*
*	7	*	1474010.2	*
*	8	*	942446.1	*
*	9	*	134997.9	*
*	10	*	66818.7	*
*	11	*	-79.4	*
*	12	*	0.0	*

```

*****
**** STORAGE WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*      1      *      0.0      *
*      2      *      472.8    *
*      3      *     1018.0    *
*      4      *      158.1    *
*      5      *      120.4    *
*      6      *      488.8    *
*      7      *      479.2    *
*      8      *      132.5    *
*      9      *      147.4    *
*     10      *      78.1     *
*     11      *      71.6     *
*     12      *      0.0     *
*****
3D WATER BALANCE IS WITHIN -100.0307888804 %

```

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	347	316	244	171	175	296	709	2395	2552	0	0	0	0	0	3318	1871
2 !	796	845	565	183	109	273	548	2036	1280	0	0	0	0	0	1617	2465
3 !	1084	797	541	3844	2549	13481	13534	72959	79458	104448	0	0	191	1536	5063	3754
4 !	1065	803	572	4380	5365	10010	29817	86761	303214	181229	4033	4323	5369	122937	8788	7896
5 !	1111	908	746	610	4057	11037	15661	5433	11194	14245	11414	10550	9432	144912	102917	20818

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-62.57486222558
 3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-119.8429497011
 3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-120.6225745654
 3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-147.2301440753
 3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-71.35801601427
 3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-29.48140180483
 3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-70.18644566017
 3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-134.0403399912
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-179.837988965
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-196.6054189452
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-150.7841459129
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-96.35215346852
 3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-46.25435459094
 3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-83.52305180774
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-148.0807332815
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-189.0112900051
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-201.7194284901
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-191.3094382382
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-131.3977756746
 3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-60.61603146718
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-122.0305821603

3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-202.4174849453
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-212.8015429903
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-220.3816947971
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-148.0632446481
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-99.69500742174
 3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-112.6306382575
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-149.7756239901
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-159.002078602
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-150.0364726597
 3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-79.44627354363

***** TOTAL RESISTIVE LAYER FLOW = 1467989.489944

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 223.1924303245 WBAL = 20.37995530525 %
 ITER = 5 ERROR = 25.33983983802 WBAL = 13.56620803537 %
 ITER = 10 ERROR = 14.60929538832 WBAL = 7.353428394219 %
 ITER = 15 ERROR = 6.7993342986 WBAL = 3.753220678043 %
 ITER = 19 ERROR = 3.996354726673 WBAL = 2.20261048896 %
 ITER = 20 ERROR = 3.849478134701 WBAL = 1.946974108196 %
 INCREASE MAX NO OF ITERs TO 25 T
 ITER = 21 ERROR = 3.061224265804 WBAL = 1.685470021631 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 80044.* 947866.* 179406.* 78670.*

 * LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *

 * 139703.* 35532.* 1285986.* 6768.*

THIS REPRESENTS A % ERROR OF .4610629068524
 IMPACTED FLOW TO SWAMP CREEK (GPD) = -13791.41273685
 IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -9665.192250592
 2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40		
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8!	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
9!	0	0	0	0	0	0	0	0	0	1	1	2	3	4	5	7	8	10	10	9	0	0	0	0	1	1	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0
10!	0	0	0	0	0	0	0	0	0	1	2	3	4	6	8	11	13	16	18	21	16	1	0	0	0	1	5	5	5	4	2	1	1	0	0	0	0	0	0	0	0	0

ITER = 40 ERROR = 17.76075506183 NORM ERROR = .2220094382729
 ITER = 45 ERROR = 13.6070205471 NORM ERROR = .1700877568388
 ITER = 50 ERROR = 10.52056398544 NORM ERROR = .131507049818
 INCREASE MAX NO. OF ITERATIONS TO 55 T
 ITER = 55 ERROR = 8.204063131411 NORM ERROR = .1025507891426
 INCREASE MAX NO. OF ITERATIONS TO 60 T
 ITER = 60 ERROR = 6.459685978146 NORM ERROR = .08074607472683
 INCREASE MAX NO. OF ITERATIONS TO 65 T
 ITER = 65 ERROR = 5.142886477764 NORM ERROR = .06428608097205
 INCREASE MAX NO. OF ITERATIONS TO 70 T
 ITER = 66 ERROR = 4.92088359457 NORM ERROR = .06151104493212
 3D DRAWDOWN MAPS T

LEVEL = RESIST(1)

4	6	8	11	13	16	18	21	16	1	0	0	0	1	5	5
5	7	10	13	16	19	22	27	29	2	0	0	0	1	10	9
6	8	10	13	16	20	25	32	45	26	2	2	20	20	15	12
6	8	10	13	16	19	24	31	42	43	30	25	23	25	18	14
6	7	9	11	14	17	20	23	26	26	23	21	20	22	18	14

LEVEL = SUBCROP(2)

6	8	10	12	15	19	27	57	110	163	156	0	163	79	38	16
10	12	13	14	16	21	28	50	112	180	216	217	167	107	57	23
12	12	13	14	17	21	29	39	126	203	223	222	212	152	76	33
12	12	13	14	16	21	28	44	77	152	228	236	242	170	117	56
12	12	13	15	17	21	32	54	90	135	173	182	171	99	53	30

LEVEL = 95 METERS(3)

6	8	10	12	15	19	27	56	109	162	0	0	140	79	38	16
11	12	13	14	17	23	28	50	111	177	0	210	167	107	57	23
12	12	13	15	17	23	32	52	133	208	226	233	247	176	76	33
12	12	13	14	16	21	29	50	97	165	244	238	251	176	139	104
12	12	13	15	17	21	32	54	94	135	185	191	172	117	91	37

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	452	0	0	0	0
11	12	14	15	17	24	35	0	0	0	0	452	0	0	0	0
12	12	14	15	17	24	35	66	159	259	364	603	285	194	0	0
12	0	14	15	17	33	35	69	122	186	304	407	284	194	170	141
12	0	0	0	0	0	0	69	0	0	303	0	240	127	139	141

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	13	14	15	18	24	39	81	0	0	0	0	0	0	0	0
12	13	14	15	18	24	39	81	187	301	438	603	337	208	0	0
12	0	14	15	18	35	39	89	143	205	375	491	330	208	177	146
12	0	0	0	0	0	0	89	0	0	375	0	321	158	173	146

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	14	15	16	19	25	361	572	0	0	0	600	0	0	0	0
11	14	15	16	19	25	361	572	624	534	594	669	462	277	0	0

11	0	0	0	19	25	361	469	615	497	580	561	452	277	215	215
0	0	0	0	0	0	0	0	0	0	0	0	274	275	215	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	14	15	16	19	24	410	639	0	0	0	0	0	0	0	0
11	14	15	16	19	24	410	639	670	585	626	688	503	298	0	0
11	0	0	0	19	24	410	569	669	565	621	584	492	298	227	227
0	0	0	0	0	0	0	0	0	0	0	0	295	297	227	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	15	15	16	0	0	0	0	738	739	742	747	0	0	0	0
0	0	15	16	18	21	505	736	737	738	740	741	742	742	742	0
0	0	0	0	0	0	0	0	0	0	736	683	741	408	408	0
0	0	0	0	0	0	0	0	0	0	0	740	0	0	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	15	15	16	0	0	0	0	0	0	0	0	0	0	0	0
0	0	15	16	18	21	525	735	738	773	735	723	723	0	0	0
0	0	0	0	0	0	0	0	0	0	734	706	722	417	417	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	953	0	0	0	0	0	0
0	15	15	16	0	0	0	0	951	953	955	961	0	0	0	0
0	0	15	16	18	20	0	735	738	952	729	716	0	0	0	0
0	0	0	0	0	0	0	0	0	0	728	716	716	417	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	15	15	16	0	0	0	0	0	0	0	0	0	0	0	0
0	0	15	16	18	20	0	735	738	952	728	716	0	0	0	0
0	0	0	0	0	0	0	0	0	0	728	716	716	417	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0
0	0	0	0	0	0	0	0	011311133	01141	0	0	0	0	0	0
0	0	0	0	0	0	0	0	01131113211331134113511361135		0					
0	0	0	0	0	0	0	0	0112911301131113311331134	0	0	0				
0	0	0	0	0	0	0	0	0	0	0	01134	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	5	7	10	12	15	18	22	27	31	20	14	12	16	14	13	11
2 !	10	11	12	14	16	20	29	49	103	167	199	171	191	121	68	32
3 !	10	11	13	14	16	21	29	52	109	168	164	165	195	131	80	43
4 !	9	8	10	11	13	20	26	51	94	148	243	488	202	129	103	94
5 !	9	8	10	11	13	21	29	68	110	169	297	365	247	143	117	97
6 !	8	10	10	11	14	18	271	403	413	344	391	410	305	207	143	0

7 !	8	10	10	11	14	18	307	462	446	383	416	424	332	223	152	0
8 !	0	7	10	11	9	11	253	368	368	369	492	724	370	204	204	0
9 !	0	8	10	11	9	10	262	368	369	386	490	476	361	209	209	0
10 !	0	8	10	11	9	10	0	367	369	952	486	477	358	209	0	0
11 !	0	8	10	11	9	10	0	367	369	476	485	477	0	209	0	0
12 !	0	0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	W	W	W	D	A	0	0	0	W	W	W
W	W	W	W	A	A	A	W	D	W	0	0	0	A	W	W	W
W	W	W	A	A	A	A	A	D	D	A	W	D	W	W	W	W
W	W	A	A	A	A	A	A	W	W	W	W	W	W	W	W	W
W	A	A	A	A	A	A	A	A	W	W	W	W	W	A	A	A

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER @ WHICH MAX FLOW OCCURS = 7

```

*****
**** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW INTO (GPD) *
*****
*      1      *      1413590.3      *
*      2      *      1413590.3      *
*      3      *      1415880.6      *
*      4      *      1418612.8      *
*      5      *      1419358.8      *
*      6      *      1419664.8      *
*      7      *      1420531.7      *
*      8      *      892662.5      *
*      9      *      135007.0      *
*     10      *      66829.8      *
*     11      *      -41.9      *
*     12      *      0.0      *
*****

```

```

*****
**** STORAGE WATER BALANCE FOR 3D OREBODY MODEL ****
*****

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```

*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*      1      *      0.0      *
*      2      *     956.1     *
*      3      *    1678.8     *
*      4      *     196.9     *
*      5      *      66.3     *
*      6      *     395.1     *
*      7      *     407.1     *
*      8      *      24.4     *
*      9      *      57.6     *
*     10      *      30.4     *
*     11      *      27.9     *
*     12      *      0.0      *
*****
3D WATER BALANCE IS WITHIN -100.0302635844 %

```

3D RESISTIVE LAYER VERT. 0

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	409	368	282	203	241	547	1843	1296	0	859	0	0	0	567	3076	2355
2 !	929	979	642	206	139	420	1235	2878	0	1288	0	0	0	841	1275	3044
3 !	1265	924	622	4411	3096	17692	18659	111016	0	0	1907	2079	0	721	4516	4550
4 !	1245	934	664	5133	6559	12718	38242	112330	393439	125127	2763	3422	4626	108432	8190	8991
5 !	1300	1060	872	717	4824	13353	19153	6683	13776	13320	10567	9801	8729	134877	120287	24044

3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-56.75286362724
 3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-110.0752848126
 3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-163.3357129059
 3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-155.528275683
 3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-163.4177478299
 3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-78.7246478215
 3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-37.66026711593
 3D HEAD BELOW ELEV. AT NODE 8 2 2 -41.3 H=-50.05905024525
 3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-111.9608460591
 3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-179.7864728893
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-215.8182778653
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-216.6575676689
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-167.3039613099
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-107.2994992965
 3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-57.02269644922
 3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-126.484549575
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-203.2958351346
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-223.1306177211
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-222.0093857683
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-211.5199314146
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-151.5248768708
 3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-75.92580930193
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-151.9043630404
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-228.1324323208
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-236.1702494561

3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-241.5929157339
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-170.3417851447
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-117.4109845945
 3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-135.2659794908
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-173.2404832651
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-182.0344692544
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-171.4528890191
 3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-98.76555292476
 ***** TOTAL RESISTIVE LAYER FLOW = 1413590.267081

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 163.1747851191 WBAL = 4.323647964642 Z
 ITER = 5 ERROR = 5.311659181328 WBAL = 2.279496016568 Z
 ITER = 6 ERROR = 3.894735682759 WBAL = 2.004525901948 Z
 ITER = 7 ERROR = 3.750277766194 WBAL = 1.7633598389 Z
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 75718.* 931764.* 173458.* 80981.*

 * LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *

 * 144017.* -1004.* 1261921.* 8656.*

THIS REPRESENTS A % ERROR OF .6123452832893
 IMPACTED FLOW TO SWAMP CREEK (GPD) = -14647.36086491
 IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -10196.24651752
 2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40		
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8!	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
9!	0	0	0	0	0	0	0	0	0	0	1	1	2	3	4	5	7	8	9	10	8	0	0	0	0	1	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0
10!	0	0	0	0	0	0	0	0	0	1	2	3	4	6	9	11	14	16	18	20	4	1	0	0	0	3	5	5	4	4	2	1	1	0	0	0	0	0	0	0	0	0
11!	0	0	0	0	0	0	0	0	1	1	2	4	5	8	11	13	16	19	23	27	17	2	0	0	0	5	10	9	7	5	3	2	1	1	0	0	0	0	0	0	0	0
12!	0	0	0	0	0	0	0	1	1	2	4	6	8	11	14	17	21	25	32	33	14	11	10	8	18	14	12	9	6	4	2	1	1	0	0	0	0	0	0	0	0	0
13!	0	0	0	0	0	0	0	1	1	3	4	6	8	11	13	16	20	25	33	44	40	27	23	23	25	17	14	10	7	4	2	1	1	0	0	0	0	0	0	0	0	0
14!	0	0	0	0	0	0	0	1	2	3	4	6	8	9	12	14	17	20	24	26	24	22	20	20	21	18	14	11	7	4	2	1	1	0	0	0	0	0	0	0	0	0
15!	0	0	0	0	0	0	0	1	1	2	3	4	5	6	8	9	11	12	14	15	16	16	15	14	13	13	11	10	8	6	4	2	1	1	0	0	0	0	0	0	0	0
16!	0	0	0	0	0	0	0	1	1	2	2	3	4	5	6	7	8	8	9	9	10	10	9	9	9	8	7	7	6	5	3	2	1	1	0	0	0	0	0	0	0	0

DO YOU WANT TO TERMINATE THE SIMULATION

4 6 9 11 14 16 18 20 4 1 0 0 0 3 5 5

5	8	11	13	16	19	23	27	17	2	0	0	0	5	10	9
6	8	11	14	17	21	25	32	33	14	11	12	8	18	14	12
6	8	11	13	16	20	25	33	44	40	27	23	23	25	17	14
6	8	9	12	14	17	20	24	26	24	22	20	20	21	18	14

LEVEL = SUBCROP(2)

6	8	10	12	15	18	23	39	73	134	138	0	228	147	94	57
10	13	14	14	17	21	26	37	75	151	212	261	232	183	120	69
12	13	14	15	17	22	29	37	89	171	225	264	275	250	152	85
12	13	14	15	17	21	29	45	76	151	247	278	311	290	213	119
12	13	14	15	17	22	32	55	90	143	194	217	230	181	88	46

LEVEL = 95 METERS(3)

6	8	10	12	15	18	23	39	73	135	0	0	179	146	93	56
11	13	14	15	17	23	26	37	76	153	0	248	231	182	119	68
12	13	14	15	17	23	32	48	109	189	229	268	315	306	151	85
12	13	14	15	17	22	29	50	93	162	263	279	319	306	243	191
12	13	14	15	17	22	32	54	92	143	206	227	238	204	157	58

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	452	0	0	0	0
12	13	14	15	18	24	35	0	0	0	0	452	0	0	0	0
12	13	14	16	18	24	35	62	140	245	362	612	355	447	0	0
12	0	14	16	18	34	34	68	115	182	321	425	355	344	296	248
12	0	0	0	0	0	0	68	0	0	320	0	308	221	241	248

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	13	14	16	18	25	39	77	0	0	0	0	0	0	0	0
12	13	14	16	18	25	39	77	171	290	445	612	404	361	0	0
12	0	14	16	18	35	39	88	135	200	388	509	398	361	308	257
12	0	0	0	0	0	0	88	0	0	388	0	390	273	301	257

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	15	15	16	19	25	362	572	0	0	0	600	0	0	0	0
12	15	16	17	19	25	362	572	621	530	598	674	514	595	0	0
12	0	0	0	19	25	362	469	613	493	587	579	506	493	373	373
0	0	0	0	0	0	0	0	0	0	0	0	482	487	373	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	15	16	17	19	24	411	640	0	0	0	0	0	0	0	0
12	15	16	17	19	24	411	640	669	582	630	692	548	495	0	0
12	0	0	0	19	24	411	569	667	562	625	600	540	495	391	390
0	0	0	0	0	0	0	0	0	0	0	0	478	494	391	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	16	16	17	0	0	734	0	738	739	742	747	0	0	0	0
0	0	16	17	19	22	507	736	737	738	740	741	742	742	742	0
0	0	0	0	0	0	0	0	0	0	736	689	741	555	555	0

0 0 0 0 0 0 0 0 0 0 0 0 0 740 741 0 0

LEVEL = 263 METERS(9)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 16 16 17 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 16 17 19 22 526 735 738 773 736 725 724 0 0 0
0 0 0 0 0 0 0 0 0 0 0 735 709 727 560 560 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 295 METERS(10)

0 0 0 0 0 0 0 0 0 953 0 0 0 0 0 0
0 16 16 17 0 0 0 0 951 953 955 961 0 0 0 0
0 0 16 17 18 20 0 735 738 952 730 719 0 0 0 0
0 0 0 0 0 0 0 0 0 0 730 718 718 560 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 322 METERS(11)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 16 16 17 0 0 0 0 0 0 0 0 0 0 0 0
0 0 16 17 18 20 0 735 738 952 729 719 0 0 0 0
0 0 0 0 0 0 0 0 0 0 729 719 719 560 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 350 METERS(12)

0 0 0 0 0 0 0 0 0 01134 01141 0 0 0 0
0 0 0 0 0 0 01128 01131113311351141 0 0 0 0
0 0 0 0 0 0 011291131113211331134113511361135 0
0 0 0 0 0 01128112911301131113311331134 0 0 0
0 0 0 0 0 0 0 0 0 0 01134 0 0 0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	6	8	10	13	16	19	22	27	25	16	15	14	13	14	13	11
2 !	11	12	13	14	17	21	28	42	81	150	203	204	255	210	133	75
3 !	11	12	13	14	17	22	28	46	89	157	174	194	256	229	153	92
4 !	10	9	11	12	13	21	26	50	85	142	251	496	255	253	179	165
5 !	10	9	11	12	14	21	29	66	102	163	305	374	298	249	203	171
6 !	8	10	10	11	14	19	271	403	411	341	395	418	340	394	249	0
7 !	8	10	10	11	14	18	308	462	445	381	418	431	363	371	261	0
8 !	0	8	11	11	9	11	253	368	368	369	492	726	370	278	278	0
9 !	0	8	11	11	9	11	263	368	369	386	490	478	364	280	280	0
10 !	0	8	11	11	9	10	0	368	369	952	487	479	359	280	0	0
11 !	0	8	11	11	9	10	0	368	369	476	486	479	0	280	0	0
12 !	0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	W	W	W	A	0	0	0	0	W	W
W	W	W	W	A	A	A	W	W	W	0	0	0	0	W	W
W	W	W	A	A	A	A	A	W	W	D	D	W	W	W	W
W	W	A	A	A	A	A	A	W	W	W	W	W	W	W	W
W	A	A	A	A	A	A	A	A	W	W	W	W	A	A	

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER @ WHICH MAX FLOW OCCURS = 2

 ***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL *****

 * MODEL LAYER * FLOW INTO (GPD) *

*	1	*	1714410.9	*
*	2	*	1714410.9	*
*	3	*	1712570.0	*
*	4	*	1626557.2	*
*	5	*	1488609.0	*
*	6	*	1488956.7	*
*	7	*	1306345.0	*
*	8	*	809022.7	*
*	9	*	135095.0	*
*	10	*	66870.4	*
*	11	*	-32.0	*
*	12	*	0.0	*

 ***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL *****

 * MODEL LAYER * FLOW FROM (GPD) *

*	1	*	0.0	*
*	2	*	1399.5	*
*	3	*	2619.4	*
*	4	*	692.2	*
*	5	*	140.7	*
*	6	*	145.9	*
*	7	*	160.5	*
*	8	*	44.2	*
*	9	*	43.8	*
*	10	*	21.0	*
*	11	*	19.2	*
*	12	*	0.0	*

3D WATER BALANCE IS WITHIN -100.0261336075 %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	429	389	297	206	213	381	1034	1504	2552	813	0	0	0	0	3171	3892
2 !	972	1020	659	202	120	319	659	2281	2552	1252	0	0	0	0	1360	4472
3 !	1319	956	633	4353	2833	15491	15459	78927	117185	104448	0	0	2552	1198	4668	6677
4 !	1296	966	680	5194	6386	11953	35907	105255	356358	149884	3433	3788	4812	111073	8261	10479
5 !	1355	1102	905	743	4950	13478	19199	6696	13909	13587	10864	10037	8891	136118	222259	47109

3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-38.57045276413

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-72.75084180108

3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-133.9078188704

3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-137.8597729026

3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-228.1948296576

3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-147.0333550197

3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-93.74847074812

3D HEAD BELOW ELEV. AT NODE 16 1 2 -24. H=-56.78887495143

3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-75.33366871348

3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-151.338665041

3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-212.4139348326

3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-260.513130131

3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-232.1829448606

3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-183.2258053454

3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-119.6672498839

3D HEAD BELOW ELEV. AT NODE 16 2 2 -30.5 H=-68.61960884089

3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-88.55578322603

3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-170.5228783204

3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-224.6388432086

3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-264.1407334269

3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-274.7034710595

3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-249.6415636296

3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-152.0167436821

3D HEAD BELOW ELEV. AT NODE 16 3 2 -43.7 H=-85.40049141435

3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-151.1841853832

3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-247.0449986044

3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-278.4690091569

3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-310.8714023305

3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-290.3050568306

3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-212.898104584

3D HEAD BELOW ELEV. AT NODE 16 4 2 -63.3 H=-118.5494547848

3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-142.8128895625

3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-194.1875595929

3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-217.2223634595

3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-230.4992604311

3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-181.3257324696

3D HEAD BELOW ELEV. AT NODE 15 5 2 -83. H=-87.89792216089

***** TOTAL RESISTIVE LAYER FLOW = 1714410.892002

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 274.5632801267 WBAL = 21.25261349509 %

ITER = 5 ERROR = 32.76255376928 WBAL = 13.83517741368 Z
 ITER = 10 ERROR = 17.99010167257 WBAL = 7.625754985304 Z
 ITER = 15 ERROR = 8.502887414331 WBAL = 3.990690093673 Z
 ITER = 20 ERROR = 4.890170620552 WBAL = 2.123134041887 Z
 INCREASE MAX NO OF ITES TO 25 T
 ITER = 21 ERROR = 3.927914913445 WBAL = 1.847721373422 Z
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

```

*****
* EXXON CRANDON MINE REGION *
* FLOWS FROM 2D MODEL (GPD) *
*****
*NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *
*****
* 90020.* 1086867.* 231529.* 93280.*
*****
*LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *
*****
* 142416.* 62208.* 1501697.* 8091.*
*****
  
```

THIS REPRESENTS A % ERROR OF .4719272005621
 IMPACTED FLOW TO SWAMP CREEK (GPD) = -17037.86351096
 IMPACTED FLOW TO WENLOCK CREEK (GPD) = -12563.82463414-
 2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8!	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
9!	0	0	0	0	0	0	0	0	0	1	2	3	4	5	6	8	10	11	12	10	0	0	0	0	1	2	2	3	3	2	2	1	1	0	0	0	0	0	0	
10!	0	0	0	0	0	0	0	0	1	1	2	4	5	7	10	13	16	20	23	27	16	5	0	0	0	1	7	7	6	5	3	2	1	1	0	0	0	0	0	
11!	0	0	0	0	0	0	0	0	1	1	3	4	6	9	12	16	19	23	27	33	29	8	0	0	0	1	13	11	10	7	4	2	1	1	0	0	0	0	0	
12!	0	0	0	0	0	0	0	0	1	1	3	5	7	10	13	16	20	24	30	38	45	26	2	2	20	24	19	15	12	9	5	3	1	1	0	0	0	0	0	
13!	0	0	0	0	0	0	0	0	1	2	3	5	7	10	12	15	19	23	29	37	48	47	33	27	27	29	22	18	14	10	6	3	1	1	0	0	0	0	0	
14!	0	0	0	0	0	0	0	1	1	2	3	5	7	9	11	13	16	20	23	27	29	28	26	24	24	26	24	19	14	10	6	3	2	1	1	0	0	0	0	
15!	0	0	0	0	0	0	0	1	1	2	3	5	6	7	9	11	12	14	16	17	18	18	17	16	16	14	13	11	8	5	3	2	1	1	0	0	0	0	0	
16!	0	0	0	0	0	0	0	1	1	2	3	4	5	6	7	8	9	10	10	11	11	11	11	10	10	9	8	7	6	4	3	2	1	1	0	0	0	0	0	
17!	0	0	0	0	0	0	0	1	1	2	2	3	4	4	5	5	6	6	7	7	7	7	7	6	6	6	5	5	4	3	2	1	1	0	0	0	0	0		
18!	0	0	0	0	0	0	0	1	1	1	2	2	2	3	3	3	3	4	4	4	4	4	4	4	4	4	3	3	3	3	2	1	1	1	0	0	0	0		
19!	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	0	0	0	0	0		
20!	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0		
21!	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
22!	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0		
23!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
24!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

ACC Z ERROR FROM OBSERVED 0. Z

\$\$\$\$\$

TIME = 525.30.

*****ENTERING 3D MODEL*****

ITER = 1 ERROR = 2401.205698176 NORM ERROR = 30.0150712272

ITER = 10 ERROR = 132.9101935464 NORM ERROR = 1.661377419329

ITER = 20 ERROR = 49.56784886142 NORM ERROR = .6195981107677

ITER = 30 ERROR = 20.99445027039 NORM ERROR = .2624306283798

ITER = 40 ERROR = 9.736993821683 NORM ERROR = .121712422771

ITER = 50 ERROR = 5.052278519376 NORM ERROR = .0631534814922

ITER = 51 ERROR = 4.76600322482 NORM ERROR = .05957504031025

```
LEVEL = RESIST(1)
```

6 9 12 16 19 23 27 33 29 8 0 0 0 1 13 11

7 10 12 15 19 23 29 37 48 47 33 27 27 29 22 18

Q-52

LEVEL = SUBCROP(2)

8	10	12	14	18	23	35	80	137	197	186	0	251	170	125	92
12	14	16	17	20	25	36	70	136	213	254	281	255	204	150	102
14	15	16	17	20	25	34	46	147	233	263	285	297	264	177	114
14	15	16	17	20	24	33	53	99	186	274	299	325	295	226	136
14	15	16	17	20	25	38	66	113	170	220	240	249	197	108	56

LEVEL = 95 METERS(3)

8	10	12	14	18	23	35	79	136	196	0	0	211	170	125	91
13	15	16	17	20	27	36	69	135	209	0	274	254	203	149	102
14	15	16	17	20	27	38	61	154	237	265	292	330	306	176	114
14	15	16	17	20	25	34	60	120	197	289	300	333	306	253	205
14	15	16	17	20	25	38	66	117	170	232	250	255	218	173	68

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	0	452	0	0	0
14	15	16	18	21	28	41	0	0	0	0	452	0	0	0	0
14	15	16	18	21	28	41	75	180	285	390	619	367	447	0	0
14	0	16	18	21	39	40	79	145	216	344	442	367	346	304	258
14	0	0	0	0	0	0	79	0	0	344	0	323	233	253	258

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	15	16	18	21	29	45	90	0	0	0	0	0	0	0	0
14	15	16	18	21	29	45	90	208	325	463	619	414	365	0	0
14	0	16	18	21	40	45	99	166	234	408	521	408	365	316	266
14	0	0	0	0	0	0	99	0	0	408	0	401	283	309	266

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	17	18	19	22	28	365	576	0	0	0	600	0	0	0	0
14	17	18	19	22	28	365	576	629	546	607	678	521	595	0	0
14	0	0	0	22	28	365	474	620	510	596	587	514	496	379	379
0	0	0	0	0	0	0	0	0	0	0	0	489	490	379	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	17	18	19	22	28	414	642	0	0	0	0	0	0	0	0
14	17	18	19	22	28	414	642	673	594	637	694	554	498	0	0
14	0	0	0	22	28	414	572	672	575	632	607	546	498	397	397
0	0	0	0	0	0	0	0	0	0	0	0	496	497	397	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	18	18	19	0	733	734	0	738	739	742	747	0	0	0	0
0	0	18	19	21	25	509	736	737	738	740	741	742	742	742	0
0	0	0	0	0	0	0	0	0	738	736	691	741	558	558	0
0	0	0	0	0	0	0	0	0	0	0	0	740	741	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	18	18	19	0	0	0	0	0	0	0	0	0	0	0	0

0	0	18	19	21	24	528	735	738	773	736	725	725	0	0	0
0	0	0	0	0	0	0	0	0	0	0	735	711	728	563	563
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	953	0	0	0	0	0	0
0	18	18	19	0	0	0	0	951	953	955	961	0	0	0	0
0	0	18	19	21	23	0	735	738	952	730	720	0	0	0	0
0	0	0	0	0	0	0	0	0	0	730	719	719	563	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	18	18	19	0	0	0	0	0	0	0	0	0	0	0	0
0	0	18	19	21	23	0	735	738	952	730	720	0	0	0	0
0	0	0	0	0	0	0	0	0	0	730	720	720	563	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0
0	0	0	0112611271128	01131113311351141	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	011291131113211331134113511361135	0	0	0	0	0	0	0	0	0
0	0	0	0	011271128112911301131113311331134	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	01134	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	7	9	12	15	18	22	26	32	33	23	15	13	17	16	17	14
2 !	12	14	15	17	19	25	35	63	126	200	239	221	275	226	157	100
3 !	12	14	15	17	19	25	36	67	133	200	197	210	277	241	175	116
4 !	11	10	12	13	15	24	30	58	108	167	269	504	264	257	185	172
5 !	11	10	12	14	16	24	34	76	125	186	320	380	306	253	208	178
6 !	9	11	12	12	16	21	274	406	416	352	401	421	345	395	253	0
7 !	9	11	12	13	16	21	310	464	448	389	423	434	367	373	264	0
8 !	0	9	12	13	11	12	254	368	368	369	492	726	370	279	279	0
9 !	0	9	12	13	10	12	264	368	369	386	490	479	364	281	281	0
10 !	0	9	12	13	10	12	0	368	369	952	487	480	360	281	0	0
11 !	0	9	12	13	10	11	0	368	369	476	487	480	0	281	0	0
12 !	0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	W	W	D	D	0	0	0	W	W	W
W	W	W	W	A	A	A	W	D	D	0	0	0	A	W	W
W	W	W	A	A	A	A	W	D	D	A	W	D	D	W	W
W	W	A	A	A	A	A	A	W	W	W	W	W	W	W	W
W	A	A	A	A	A	A	A	W	W	W	W	W	A	A	A

2D STORAGE ABOVE RESIST

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----

THE LAYER @ WHICH MAX FLOW OCCURS = 2

XX

$$\begin{array}{ccccccc} \text{+} & & 12 & & \text{+} & & 0.0 & & \text{+} \\ & & & & & & & & \end{array}$$

3D WATER BALANCE IS WITHIN -100.0241108777 Y

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	487	436	329	239	297	740	2693	39	0	0	0	0	0	567	2768	3511
2 !	1095	1135	711	212	147	522	1852	1487	0	0	0	0	0	841	716	3877
3 !	1490	1071	698	4689	3067	19462	20910	126727	0	0	1907	2079	0	0	3746	5910
4 !	1466	1089	766	5941	7817	15594	48363	146859	398517	102384	2214	2843	3952	90829	7259	9615
5 !	1536	1249	1030	857	5876	16631	24300	8597	15210	12741	10024	9223	8043	122765	201329	54937

3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-79.93850337045

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-136.9450113998

3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-197.1879588473

3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-186.343494935

3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-250.887265844

3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-170.0902482679

3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-125.0791050486

3D HEAD BELOW ELEV. AT NODE 16 1 2 -24. H=-91.77994762801

3D HEAD BELOW ELEV. AT NODE 8 2 2 -41.3 H=-69.65399530418

3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-136.1844478681

3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-213.015711081

3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-254.1490364543

3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-281.4974422509

3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-254.6899878045

3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-203.6249627371

3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-149.5153800031

3D HEAD BELOW ELEV. AT NODE 16 2 2 -30.5 H=-102.4205480514

3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-146.679119783

3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-232.7175117387

3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-262.5038582588

3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-284.6466313099

3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-296.8192160804

3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-264.2294514015

3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-176.7990193834

3D HEAD BELOW ELEV. AT NODE 16 3 2 -43.7 H=-114.2923952252

3D HEAD BELOW ELEV. AT NODE 9 4 2 -84.7 H=-99.08138193239

3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-185.8416845332

3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-274.032441889

3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-299.4895376213

3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-325.2178690222

3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-295.1460863402

3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-225.5592719764

3D HEAD BELOW ELEV. AT NODE 16 4 2 -63.3 H=-136.4470065604

3D HEAD BELOW ELEV. AT NODE 9 5 2 -100.8 H=-112.8135671146

3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-169.7927396942

3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-219.5458015705

3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-240.0943119393

3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-248.9834440353

3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-197.2058814653

3D HEAD BELOW ELEV. AT NODE 15 5 2 -83. H=-108.1248383775

***** TOTAL RESISTIVE LAYER FLOW = 1556346.913641

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 230.3071592526 WBAL = 1.083925738772 %

ITER = 5 ERROR = 5.770614452544 WBAL = .1070547306178 %

ITER = 6 ERROR = 4.048846734899 WBAL = .09178794090303 %

LOOP AGAIN TO CHANGE 2D PARAMETERS F

```
*****
* EXXON CRANDON MINE REGION *
* FLOWS FROM 2D MODEL (GPD) *
*****
*NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *
*****
* 76298.* 1044516.* 206730.* 93502.*
*****
*LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *
*****
* 143723.* -9951.* 1421046.* 1529.*
*****
```

THIS REPRESENTS A % ERROR OF .09821326224094

IMPACTED FLOW TO SWAMP CREEK (GPD) = -17641.79462998

IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -13117.2052174

2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40			
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8!	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
9!	0	0	0	0	0	0	0	0	0	0	1	2	3	4	5	6	8	9	10	10	6	0	0	0	0	1	2	2	2	2	2	2	1	1	0	0	0	0	0	0	0		
10!	0	0	0	0	0	0	0	0	0	1	1	2	4	5	7	10	13	16	19	21	22	4	1	0	0	0	3	5	6	5	4	3	2	1	1	0	0	0	0	0	0		
11!	0	0	0	0	0	0	0	0	0	1	1	3	4	7	9	13	16	19	23	26	32	17	2	0	0	0	5	11	10	9	7	4	2	1	1	0	0	0	0	0	0		
12!	0	0	0	0	0	0	0	0	0	1	2	3	5	7	10	13	16	20	24	30	38	33	14	11	12	8	12	17	14	11	8	5	3	1	1	0	0	0	0	0	0		
13!	0	0	0	0	0	0	0	0	0	1	2	3	5	7	10	13	16	19	24	29	38	50	43	30	25	26	29	21	17	13	9	5	3	1	1	0	0	0	0	0	0		
14!	0	0	0	0	0	0	0	0	0	1	1	2	3	5	7	9	11	14	17	20	24	27	29	27	24	22	22	25	23	18	14	9	6	3	2	1	1	0	0	0	0	0	
15!	0	0	0	0	0	0	0	0	0	1	1	2	3	5	6	8	9	11	13	14	16	17	18	18	17	16	16	15	14	12	10	8	5	3	2	1	1	0	0	0	0	0	
16!	0	0	0	0	0	0	0	0	0	1	1	2	3	4	5	6	7	8	9	10	11	11	11	11	11	10	10	9	8	7	6	4	3	2	1	1	0	0	0	0	0	0	
17!	0	0	0	0	0	0	0	0	0	1	1	2	2	3	4	4	5	5	6	6	7	7	7	7	7	6	6	6	5	5	4	3	2	1	1	0	0	0	0	0	0	0	
18!	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2	3	3	3	3	4	4	4	4	4	4	4	4	3	3	3	3	2	1	1	1	0	0	0	0	0	0	0	
19!	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	
20!	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
21!	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	
22!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[illegible]

DO YOU WANT TO TERMINATE THE SIMULATION

INPUT DELTA 30.

ENTER 3D MODEL T

110 3D FINITE DIFFERENCE COMPUTATIONS = T

ITER = 5 ERROR = 260.147772751 NORM ERROR = 3.251847159388

ITER = 15 ERROR = 32.97935556714 NORM ERROR = .4122419445892

ITER = 25 ERROR = 4.852057485734 NORM ERROR = .06065071857167

```
LEVEL = RESIST(1)
```

```
LEVEL = SUBCROP(2)
```

LEVEL = 95 METERS(3)

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	0	452	0	0	0	0
14	15	17	18	21	28	39	0	0	0	0	0	452	0	0	0	0
14	15	17	18	21	28	39	68	148	256	378	649	367	447	0	0	0
14	0	17	18	21	38	39	74	124	193	338	451	366	346	303	256	0
14	0	0	0	0	0	0	74	0	0	337	0	321	230	251	256	0

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	16	17	18	21	28	43	83	0	0	0	0	0	0	0	0	0
14	16	17	19	21	28	43	83	179	301	463	649	417	364	0	0	0
14	0	17	19	21	39	43	94	143	211	407	543	410	364	315	265	0
14	0	0	0	0	0	0	94	0	0	407	0	402	281	308	265	0

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	17	18	19	22	28	364	574	0	0	0	600	0	0	0	0	0
14	17	18	19	22	28	364	574	624	538	618	714	530	595	0	0	0
14	0	0	0	22	28	364	471	615	501	609	621	522	496	379	379	0
0	0	0	0	0	0	0	0	0	0	0	0	490	490	379	0	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	18	18	19	22	28	413	641	0	0	0	0	0	0	0	0	0
14	18	18	19	22	28	413	641	671	588	650	734	565	499	0	0	0
14	0	0	0	22	28	413	571	669	568	646	646	555	499	397	397	0
0	0	0	0	0	0	0	0	0	0	0	0	498	498	397	0	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0	0
0	18	18	19	732	733	734	0	738	739	742	747	0	0	0	0	0
0	0	19	19	21	25	508	736	737	738	755	788	783	742	742	0	0
0	0	0	0	0	0	0	0	0	738	756	767	741	560	560	0	0
0	0	0	0	0	0	0	0	0	0	0	0	740	741	742	0	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	18	19	19	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	19	19	21	25	528	735	738	774	797	814	798	0	0	0	0
0	0	0	0	0	0	0	0	0	0	801	809	756	566	566	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	953	0	0	0	0	0	0	0
0	18	19	19	0	0	0	0	951	953	955	961	0	0	0	0	0
0	0	19	19	21	23	0	735	738	952	953	954	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	948	941	939	566	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

0	19	19	19	0	0	0	0	0	0	0	0	0	0	0	0
0	0	19	19	21	23	0	735	738	952	950	946	0	0	0	0
0	0	0	0	0	0	0	0	0	0	950	945	945	566	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0
0	0	0	0112611271128	01131113311351141	0	0	0	0	0	0	0	0	0	0	0
0	0	0	01126	0	011291131113211331134113511361135	0	0	0	0	0	0	0	0	0	0
0	0	0	0112611271128112911301131113311331134	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	01134	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	7	9	12	15	18	22	26	31	26	17	16	15	14	15	15	13
2 !	12	14	15	17	20	24	32	50	89	161	217	215	269	223	151	95
3 !	13	14	15	17	20	25	33	53	98	169	184	203	276	239	170	111
4 !	11	10	12	14	16	23	29	54	91	150	263	517	263	256	184	171
5 !	11	10	13	14	16	24	32	71	107	171	319	397	307	252	207	177
6 !	9	12	12	13	17	21	273	405	413	346	409	445	351	395	253	0
7 !	9	12	12	13	17	21	310	463	446	385	432	460	373	374	264	0
8 !	0	9	12	13	11	13	254	368	368	369	504	767	370	280	280	0
9 !	0	9	12	13	11	12	264	368	369	387	533	541	378	283	283	0
10 !	0	9	13	13	11	12	0	368	369	952	634	632	469	283	0	0
11 !	0	9	13	13	11	12	0	368	369	476	633	631	0	283	0	0
12 !	0	0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	W	W	W	A	0	0	0	D	W	W
W	W	W	W	A	A	A	W	W	W	0	0	0	D	W	W
W	W	W	A	A	A	A	W	W	W	D	D	W	W	W	W
W	W	A	A	A	A	A	W	W	W	W	W	W	W	W	W
W	A	A	A	A	A	A	A	W	W	W	W	W	A	A	A

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER 2 WHICH MAX FLOW OCCURS = 2

 ***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL *****

 * MODEL LAYER * FLOW INTO (GPD) *

```

*****
*      1      *      1685926.1      *
*      2      *      1685926.1      *
*      3      *      1678561.4      *
*      4      *      1650394.7      *
*      5      *      1514317.9      *
*      6      *      1514364.4      *
*      7      *      1337710.9      *
*      8      *      838067.4      *
*      9      *      880290.5      *
*     10      *      644865.5      *
*     11      *       -148.8      *
*     12      *        0.0      *
*****

```

```

*****
*****  STORAGE WATER BALANCE FOR 3D OREBODY MODEL  *****
*****
* MODEL LAYER* FLOW FROM (GPD) *
*****
*      1      *        0.0      *
*      2      *       -726.7      *
*      3      *      -1076.5      *
*      4      *        -5.1      *
*      5      *        38.3      *
*      6      *        90.3      *
*      7      *       100.0      *
*      8      *       239.7      *
*      9      *       599.7      *
*     10      *       870.4      *
*     11      *       136.1      *
*     12      *        0.0      *
*****
3D WATER BALANCE IS WITHIN -100.0010320195 %

```

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	503	458	348	242	249	465	1375	1140	2552	859	0	0	0	0	3110	3745
2 !	1127	1172	733	206	115	356	873	1838	2552	1288	0	0	0	0	1212	4157
3 !	1524	1088	698	4559	2718	16053	16096	79754	117185	104448	0	0	2552	2552	4176	6185
4 !	1493	1098	764	5762	6887	12556	37126	108759	377152	129140	2956	3277	4168	93252	7496	9815
5 !	1561	1262	1034	847	5577	14842	20830	7219	14963	13074	10388	9538	8305	126011	205315	53161

3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-48.29984058816

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-83.33185189506

3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-145.2834867567

3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-152.7887520845

3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-245.167799591

3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-169.1393012956

3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-118.9300651059
 3D HEAD BELOW ELEV. AT NODE 16 1 2 -24. H=-84.23322673185
 3D HEAD BELOW ELEV. AT NODE 8 2 2 -41.3 H=-46.3546757516
 3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-85.25221018543
 3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-162.7619800762
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-225.1996365692
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-274.7014591733
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-248.5951521229
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-200.9099033122
 3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-142.3778822952
 3D HEAD BELOW ELEV. AT NODE 16 2 2 -30.5 H=-94.63318298757
 3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-96.8878510734
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-181.8087832093
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-237.5790395765
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-277.2570688801
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-286.369028824
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-255.5660419731
 3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-169.4414612513
 3D HEAD BELOW ELEV. AT NODE 16 3 2 -43.7 H=-107.3836633059
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-163.6670525923
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-260.9503337965
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-291.0693081886
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-321.3716781282
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-294.1628953162
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-222.7767582334
 3D HEAD BELOW ELEV. AT NODE 16 4 2 -63.3 H=-132.7939326868
 3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-153.6273112603
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-206.4547025403
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-229.6273570581
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-242.3648829031
 3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-193.3538867975
 3D HEAD BELOW ELEV. AT NODE 15 5 2 -83. H=-103.9534130619
 ***** TOTAL RESISTIVE LAYER FLOW = 1685926.086764

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 304.3264491165 WRAL = 6.029137992292 %
 ITER = 5 ERROR = 11.88792456222 WRAL = 3.923312382336 %
 ITER = 10 ERROR = 6.347308294938 WBAL = 2.489035649441 %
 ITER = 12 ERROR = 4.930107820296 WRAL = 2.009721713205 %
 ITER = 13 ERROR = 3.929005486851 WBAL = 1.782378729578 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 86263.* 1084832.* 220692.* 96249.*

 * LOCAL INFIL * LOCAL STORE * IMPACT FLOW * WATER BAL *

XXXXXXXXXXXXXXXXXXXXX

2D DRAWDOWN MAP T

0-63

67 85 100 91 59 42 45 66 165 251 280 306 341 311 183 120
 65 64 60 40 29 29 37 65 133 212 305 314 345 311 259 210
 65 57 51 39 29 30 42 72 130 183 245 262 264 224 178 69

LEVEL = 140 METERS(4)

0 0 0 0 0 0 0 0 0 0 0 452 0 0 0 0
 72 114 141 134 93 60 52 0 0 0 0 452 0 0 0 0
 71 109 137 132 93 60 52 81 191 298 408 659 380 447 0 0
 66 0 137 132 93 57 57 85 157 230 363 470 379 352 310 264
 66 0 0 0 0 0 0 85 0 0 362 0 335 239 259 263

LEVEL = 163 METERS(5)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 72 138 179 172 126 80 59 97 0 0 0 0 0 0 0 0
 72 138 178 170 126 80 59 97 219 338 485 659 429 371 0 0
 70 0 178 170 126 72 70 106 178 248 430 557 422 371 323 272
 70 0 0 0 0 0 0 106 0 0 430 0 414 289 316 272

LEVEL = 185 METERS(6)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 341 380 501 263 204 398 579 0 0 0 600 0 0 0 0
 71 341 381 378 263 204 398 579 632 555 631 721 539 595 0 0
 71 0 0 0 263 204 398 478 624 520 622 630 531 506 388 388
 0 0 0 0 0 0 0 0 0 0 0 0 500 500 388 0

LEVEL = 207 METERS(7)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 367 410 594 297 230 443 644 0 0 0 0 0 0 0 0
 70 367 411 424 297 230 443 644 675 601 661 740 573 515 0 0
 70 0 0 0 297 230 444 576 674 582 658 655 563 515 407 407
 0 0 0 0 0 0 0 0 0 0 0 0 513 514 407 0

LEVEL = 230 METERS(8)

0 0 0 0 0 0 0 0 0 0 0 747 0 0 0 0
 0 426 468 731 732 733 734 0 738 739 742 747 0 0 0 0
 0 0 466 552 419 313 530 736 737 738 761 792 791 742 742 0
 0 0 0 0 0 0 0 0 0 738 763 769 741 618 742 0
 0 0 0 0 0 0 0 0 0 0 0 0 740 741 742 0

LEVEL = 263 METERS(9)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 440 477 608 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 478 588 443 334 547 735 748 774 802 817 814 0 0 0
 0 0 0 0 0 0 0 0 0 0 806 812 759 622 622 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 295 METERS(10)

0 0 0 0 0 0 0 0 0 953 0 0 0 0 0 0
 0 464 490 540 0 0 0 0 951 953 955 961 0 0 0 0
 0 0 490 540 460 374 0 735 950 952 953 954 955 0 0 0
 0 0 0 0 0 0 0 0 0 0 948 941 941 622 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	466	491	535	0	0	0	0	0	0	0	0	0	0	0	0
0	0	491	535	462	379	0	735	950	952	950	947	0	0	0	0
0	0	0	0	0	0	0	0	0	0	950	946	946	622	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0
0	0	01125112611271128	01131113311351141	0	0	0	0	0	0	0	0	0	0	0	0
0	0	011251126	0	011291131113211331134113511361135	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0112611271128112911301131113311331134	0	0	0	0	0	0	01134	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	7	9	12	16	19	23	27	34	34	23	15	13	17	16	17	14
2 !	56	68	70	47	32	30	39	69	137	213	253	232	286	233	163	105
3 !	58	70	73	58	40	34	40	73	144	213	208	221	291	247	182	121
4 !	55	74	104	100	69	44	40	63	116	176	283	527	273	259	190	176
5 !	57	92	134	128	95	58	47	81	132	195	336	405	316	258	213	182
6 !	47	228	254	293	197	153	298	409	419	358	418	451	357	400	259	0
7 !	47	245	274	340	223	173	333	466	450	394	440	465	379	386	271	0
8 !	0	213	311	428	209	157	265	368	368	369	508	770	370	309	371	0
9 !	0	220	318	399	222	167	274	368	374	387	536	543	379	311	311	0
10 !	0	232	326	360	230	187	0	368	475	952	634	632	470	311	0	0
11 !	0	233	327	357	231	189	0	368	475	476	633	631	0	311	0	0
12 !	0	0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	D	D	D	0	0	0	W	W	W		
W	W	W	A	A	A	W	D	D	0	0	0	A	W	W		
W	W	W	A	A	A	A	W	D	D	A	W	D	D	W	W	
W	W	A	A	A	A	A	W	W	W	W	W	W	W	W	W	
W	A	A	A	A	A	A	A	W	W	W	W	W	A	A		

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER 2 WHICH MAX FLOW OCCURS = 4

***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL *****

* MODEL LAYER * FLOW INTO (GPD) *

* 1 * 2351596.2 *
* 2 * 2351596.2 *
* 3 * 2357772.8 *
* 4 * 2366437.5 *
* 5 * 2241522.9 *
* 6 * 2242683.9 *
* 7 * 2084782.9 *
* 8 * 1409296.9 *
* 9 * 890660.6 *
* 10 * 644852.4 *
* 11 * -510.7 *
* 12 * 0.0 *

***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL *****

* MODEL LAYER * FLOW FROM (GPD) *

* 1 * 0.0 *
* 2 * 1966.9 *
* 3 * 3670.8 *
* 4 * 493.7 *
* 5 * 268.7 *
* 6 * 492.4 *
* 7 * 996.9 *
* 8 * 347.8 *
* 9 * 542.3 *
* 10 * 435.9 *
* 11 * 422.4 *
* 12 * 0.0 *

3D WATER BALANCE IS WITHIN -100.1126679219 %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	4225	3329	3603	3150	1552	1288	3112	0	0	0	0	0	0	567	2816	3553
2 !	5383	3708	4575	7595	3701	1917	2459	1119	0	0	0	0	0	841	777	3936
3 !	5476	4975	6631	192596	154811	110644	38005	143961	0	0	1907	2079	0	0	3766	5975
4 !	7572	8537	10136	88333	82277	41129	63218	172442	366703	93988	2187	2925	4119	95910	7390	9705
5 !	11172	10346	8498	5444	19707	26305	28818	9756	15052	12668	10020	9278	8154	124829	203802	57112

3D HEAD BELOW ELEV. AT NODE 2 1 2 -24.3 H=-41.84869547549

3D HEAD BELOW ELEV. AT NODE 3 1 2 -28.6 H=-44.17262513369

3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-86.58435898626

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-146.3437083003
 3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-209.0694694788
 3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-198.7820453983
 3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-261.1589013764
 3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-178.3748859095
 3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-132.6311899642
 3D HEAD BELOW ELEV. AT NODE 16 1 2 -24. H=-99.00938053525
 3D HEAD BELOW ELEV. AT NODE 1 2 2 -32.8 H=-59.91270012122
 3D HEAD BELOW ELEV. AT NODE 2 2 2 -27.9 H=-97.98481789382
 3D HEAD BELOW ELEV. AT NODE 3 2 2 -35.4 H=-107.0666005089
 3D HEAD BELOW ELEV. AT NODE 4 2 2 -52.8 H=-55.59935668838
 3D HEAD BELOW ELEV. AT NODE 8 2 2 -41.3 H=-76.58829024583
 3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-145.7862603978
 3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-225.5068476434
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-268.2564816813
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-294.5921681426
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-264.9388396104
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-211.6820202736
 3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-156.5771352401
 3D HEAD BELOW ELEV. AT NODE 16 2 2 -30.5 H=-109.0563528698
 3D HEAD BELOW ELEV. AT NODE 1 3 2 -33.8 H=-67.51007951911
 3D HEAD BELOW ELEV. AT NODE 2 3 2 -34.4 H=-77.80349782073
 3D HEAD BELOW ELEV. AT NODE 3 3 2 -45.3 H=-89.12824386308
 3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-156.9513948081
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-245.9187278707
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-276.9301560838
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-297.89186401
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-307.6795699248
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-270.9525652797
 3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-182.9283436791
 3D HEAD BELOW ELEV. AT NODE 16 3 2 -43.7 H=-119.8715225737
 3D HEAD BELOW ELEV. AT NODE 1 4 2 -43.7 H=-64.1838528433
 3D HEAD BELOW ELEV. AT NODE 2 4 2 -50.8 H=-63.90661803174
 3D HEAD BELOW ELEV. AT NODE 9 4 2 -84.7 H=-112.5013158896
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-200.3455205445
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-289.3771565793
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-313.085128483
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-336.7081161458
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-300.4896487593
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-230.5108431249
 3D HEAD BELOW ELEV. AT NODE 16 4 2 -63.3 H=-140.5592198612
 3D HEAD BELOW ELEV. AT NODE 1 5 2 -60.1 H=-61.51034543814
 3D HEAD BELOW ELEV. AT NODE 9 5 2 -100.8 H=-124.2372262658
 3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-182.7770255894
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-232.8706053539
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-252.5558838769
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-259.0052233513
 3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-202.5444187523
 3D HEAD BELOW ELEV. AT NODE 15 5 2 -83. H=-111.6612035498
 ***** TOTAL RESISTIVE LAYER FLOW = 2351596.187565

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 354.9943488386 WRAL = 45.32225376607 %

ITER = 5 ERROR = 95.1206835688 WBAL = 31.42419445838 Z
 ITER = 10 ERROR = 46.17189418223 WBAL = 18.00650576443 Z
 ITER = 15 ERROR = 29.2510291781 WBAL = 10.04945005997 Z
 ITER = 20 ERROR = 14.86878183058 WBAL = 5.55986344322 Z
 INCREASE MAX NO OF ITERS TO 25 T
 ITER = 25 ERROR = 9.267904945275 WBAL = 3.137025323452 Z
 INCREASE MAX NO OF ITERS TO 30 T
 ITER = 30 ERROR = 4.72897160973 WBAL = 1.737349612016 Z
 INCREASE MAX NO OF ITERS TO 35 T
 ITER = 31 ERROR = 4.631433775649 WBAL = 1.559582106457 Z
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 147958.* 1505938.* 223188.* 217733.*

 * LOCAL INFIL * LOCAL STORE * IMPACT FLOW * WATER BAL *

 * 143723.* 105620.* 2094816.* 7437.*

THIS REPRESENTS A % ERROR OF .3162439769303
 IMPACTED FLOW TO SWAMP CREEK (GPD) = -36044.91334354
 IMPACTED FLOW TO HEKLOCK CREEK (GPD) = -14976.05422272
 2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7!	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8!	0	0	0	0	0	0	0	0	1	1	2	3	3	4	4	4	4	3	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
9!	0	0	0	0	0	0	0	1	1	2	4	7	10	12	15	17	16	15	13	11	0	0	0	0	1	2	2	3	3	3	2	1	1	0	0	0	0	0	0	0	0
10!	0	0	0	0	0	0	0	1	1	3	6	9	14	18	25	30	35	38	38	15	4	1	0	0	0	3	6	6	6	5	4	2	1	1	0	0	0	0	0	0	0
11!	0	0	0	0	0	0	1	1	2	3	7	11	16	23	31	38	42	44	46	40	17	2	0	0	0	5	12	11	10	7	5	3	1	1	0	0	0	0	0	0	0
12!	0	0	0	0	0	0	1	1	2	4	7	12	17	24	33	43	47	48	49	56	33	14	11	12	8	20	18	15	12	9	6	3	2	1	0	0	0	0	0	0	0
13!	0	0	0	0	0	0	1	1	2	4	7	12	17	23	29	37	41	43	46	53	60	51	35	30	29	31	23	18	14	10	6	3	2	1	1	0	0	0	0	0	0
14!	0	0	0	0	0	0	1	1	2	4	7	11	15	20	24	28	31	34	36	38	38	34	30	27	26	28	25	20	15	11	7	3	2	1	1	0	0	0	0	0	0
15!	0	0	0	0	0	0	1	1	2	4	7	10	13	15	17	20	22	23	25	25	25	23	22	20	19	18	16	14	12	9	6	4	2	1	1	0	0	0	0	0	0
16!	0	0	0	0	0	0	1	1	2	4	6	8	10	11	13	14	15	16	16	16	16	15	14	13	12	11	10	9	7	5	3	2	1	1	0	0	0	0	0	0	
17!	0	0	0	0	0	0	1	1	2	3	5	6	7	8	9	9	10	10	10	10	10	10	9	9	8	7	7	6	5	4	3	2	1	1	0	0	0	0	0	0	
18!	0	0	0	0	0	0	1	1	2	3	3	4	5	5	5	5	6	6	6	6	6	6	6	5	5	5	4	4	3	3	2	1	1	0	0	0	0	0	0	0	
19!	0	0	0	0	0	0	1	1	1	2	2	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	2	2	1	1	1	0	0	0	0	0	0	
20!	0	0	0	0	0	0	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0	

ACC % ERROR FROM OBSERVED 0. %
DO YOU WANT TO TERMINATE THE SIMULATION

```

INPUT DELTA 30.
TIME = 615. 30.
  ENTER 3D MODEL T

```

Q-70

ITER = 70 ERROR = 23.92849072163 NORM ERROR = .2991061340204
 INCREASE MAX NO. OF ITERATIONS TO 75 T
 ITER = 75 ERROR = 21.61198226736 NORM ERROR = .270149778342
 INCREASE MAX NO. OF ITERATIONS TO 80 T
 3D DRAWDOWN MAPS T

LEVEL = RESIST(1)

14	18	25	30	35	38	38	15	4	1	0	0	0	3	6	6
16	23	31	38	42	44	46	40	17	2	0	0	0	5	12	11
17	24	33	43	47	48	49	56	33	14	11	12	8	20	18	15
17	23	29	37	41	43	46	53	60	51	35	30	29	31	23	18
15	20	24	28	31	34	36	38	38	34	30	27	26	28	25	20

LEVEL = SUBCROP(2)

99	121	125	102	77	64	65	74	111	175	179	0	266	191	142	108
118	155	164	119	73	58	57	77	115	193	254	298	270	222	165	118
119	130	142	122	74	56	59	63	127	213	266	301	307	276	191	128
115	112	104	73	52	48	52	72	125	202	290	315	341	309	239	148
111	103	90	71	52	47	57	85	134	188	237	257	265	212	122	62

LEVEL = 95 METERS(3)

98	120	124	101	76	63	65	75	112	175	0	0	253	191	142	108
122	156	166	145	93	67	57	77	115	195	0	296	269	222	165	118
118	138	155	145	96	67	64	77	149	231	270	306	345	318	190	128
115	112	104	73	54	49	54	78	140	210	305	316	349	318	266	217
115	103	90	71	52	47	57	85	137	188	249	267	271	233	187	74

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	0	452	0	0	0
124	171	199	193	137	89	72	0	0	0	0	0	452	0	0	0
123	165	194	192	137	89	72	93	179	284	400	659	383	447	0	0
117	0	194	192	137	79	79	98	160	227	362	469	383	357	316	270
117	0	0	0	0	0	0	98	0	0	362	0	339	247	266	270

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	196	239	236	177	112	79	108	0	0	0	0	0	0	0	0
124	196	238	236	177	112	79	108	209	327	481	659	432	376	0	0
122	0	238	236	177	98	93	118	177	244	428	557	425	376	328	279
122	0	0	0	0	0	0	118	0	0	428	0	418	296	322	279

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	411	451	565	339	263	414	582	0	0	0	600	0	0	0	0
123	411	452	479	339	263	414	582	630	550	629	721	541	595	0	0
123	0	0	0	339	263	414	483	622	515	620	630	533	508	393	393
0	0	0	0	0	0	0	0	0	0	0	0	502	502	393	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	438	482	637	390	295	458	646	0	0	0	0	0	0	0	0
123	438	483	537	360	295	458	646	674	598	660	740	574	517	0	0

123	0	0	0	380	295	458	579	673	579	656	655	564	517	411	411
0	0	0	0	0	0	0	0	0	0	0	0	516	516	411	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	500	541	731	732	733	734	0	738	739	742	747	0	0	0	0
0	0	549	731	525	394	540	736	737	738	761	792	791	742	742	0
0	0	0	0	0	0	0	0	737	738	762	769	741	619	742	742
0	0	0	0	0	0	0	0	0	0	0	0	740	741	742	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	516	555	701	0	0	0	0	0	0	0	0	0	0	0	0
0	0	556	701	548	418	557	735	748	774	802	817	816	0	0	0
0	0	0	0	0	0	0	0	0	0	805	812	759	623	623	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	953	0	0	0	0	0	0
0	543	572	639	0	0	0	0	951	953	955	961	0	0	0	0
0	0	573	639	561	464	0	735	950	952	953	954	955	956	0	0
0	0	0	0	0	0	0	0	0	0	948	941	954	623	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	546	574	633	0	0	0	0	0	0	0	0	0	0	0	0
0	0	574	633	562	469	0	735	950	952	950	947	0	0	0	0
0	0	0	0	0	0	0	0	0	0	950	946	946	623	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0
0	011241125112611271128	011311113311351141	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0112411251126	0	011291131113211331134113511361135	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0112611271128112911301131113311331134	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	01134	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	16	22	28	35	39	41	43	40	30	20	19	17	16	17	17	14
2 !	112	124	125	97	65	55	58	74	122	194	245	234	290	242	172	113
3 !	114	126	128	107	74	59	59	78	131	201	206	222	297	256	190	129
4 !	96	112	147	144	102	64	55	72	113	171	281	527	276	263	194	180
5 !	99	131	179	177	132	81	63	90	129	190	334	405	319	262	217	186
6 !	82	274	301	348	255	197	311	412	418	355	417	450	358	401	262	0
7 !	82	292	322	391	285	221	344	468	449	392	439	465	380	387	274	0
8 !	0	250	363	487	263	197	270	368	368	369	507	769	370	309	371	0
9 !	0	258	370	467	274	209	278	368	374	387	536	543	379	311	311	0
10 !	0	272	382	426	281	232	0	368	475	952	634	632	477	311	0	0
11 !	0	273	383	422	281	234	0	368	475	476	633	631	0	311	0	0
12 !	0	0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE O-ZERO THICKNESS

D-DRY NODE

W	W	W	W	W	W	D	W	W	A	O	O	O	D	W	W
W	W	W	W	A	A	W	D	W	W	O	O	O	D	W	W
W	W	W	W	A	A	W	W	W	W	D	D	W	W	W	W
W	W	W	A	A	A	A	W	W	W	W	W	W	W	W	W
W	W	A	A	A	A	A	A	W	W	W	W	W	W	A	A

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	54
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	300
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	300
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	300
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	451

THE LAYER 2 WHICH MAX FLOW OCCURS = 4

```

*****
**** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW INTO (GPD) *
*****
*      1      *      2466692.2      *
*      2      *      2466692.2      *
*      3      *      2469242.5      *
*      4      *      2474809.7      *
*      5      *      2355672.2      *
*      6      *      2356252.3      *
*      7      *      2200932.7      *
*      8      *      1360285.1      *
*      9      *      894691.9      *
*     10      *      647442.9      *
*     11      *      -104.1      *
*     12      *           0.0      *
*****
    
```

```

*****
**** STORAGE WATER BALANCE FOR 3D OREBODY MODEL ****
*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*      1      *           0.0      *
*      2      *      1203.2      *
*      3      *      2369.6      *
*      4      *      165.1      *
*****
    
```

*	5	*	102.6	*
*	6	*	157.2	*
*	7	*	137.2	*
*	8	*	50.3	*
*	9	*	93.0	*
*	10	*	83.7	*
*	11	*	76.7	*
*	12	*	0.0	*

3D WATER BALANCE IS WITHIN -100.0602933556 %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	3154	1043	651	1040	427	591	0	2552	2552	859	0	0	0	0	2976	3612
2 !	3315	826	705	2899	6556	2907	2381	0	2552	1288	0	0	0	0	951	3934
3 !	3320	1931	2480	128344	200564	123285	38386	107787	117185	104448	0	0	2552	721	3824	5887
4 !	5509	5752	8119	133872	113955	49485	63085	167937	264479	76245	1776	2339	3421	81340	7051	9450
5 !	9415	11454	14341	9209	32741	37430	33163	10263	13392	11545	9165	8560	7524	117674	197146	61336

3D HEAD BELOW ELEV. AT NODE 1 1 2 -29.2 H=-99.09913690688

3D HEAD BELOW ELEV. AT NODE 2 1 2 -24.3 H=-121.181926534

3D HEAD BELOW ELEV. AT NODE 3 1 2 -28.6 H=-125.4445774803

3D HEAD BELOW ELEV. AT NODE 4 1 2 -36.1 H=-102.0791128382

3D HEAD BELOW ELEV. AT NODE 5 1 2 -37.7 H=-77.04942078572

3D HEAD BELOW ELEV. AT NODE 6 1 2 -41.7 H=-63.74798683692

3D HEAD BELOW ELEV. AT NODE 7 1 2 -39.4 H=-64.86276843899

3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-74.40276839817

3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-111.4360054266

3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-174.6142744993

3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-179.0318462686

3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-266.1830183345

3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-191.0518107668

3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-142.0577482008

3D HEAD BELOW ELEV. AT NODE 16 1 2 -24. H=-107.8306133146

3D HEAD BELOW ELEV. AT NODE 1 2 2 -32.8 H=-118.2601846014

3D HEAD BELOW ELEV. AT NODE 2 2 2 -27.9 H=-154.8529686882

3D HEAD BELOW ELEV. AT NODE 3 2 2 -35.4 H=-164.2196143618

3D HEAD BELOW ELEV. AT NODE 4 2 2 -52.8 H=-119.2466125003

3D HEAD BELOW ELEV. AT NODE 8 2 2 -41.3 H=-77.40412773901

3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-114.9223544174

3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-192.6294203216

3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-254.0347460542

3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-298.4520047758

3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-269.5645854904

3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-222.3915282088

3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-165.209985889

3D HEAD BELOW ELEV. AT NODE 16 2 2 -30.5 H=-117.7488833594

3D HEAD BELOW ELEV. AT NODE 1 3 2 -33.8 H=-118.9489058947

3D HEAD BELOW ELEV. AT NODE 2 3 2 -34.4 H=-129.9740819612

3D HEAD BELOW ELEV. AT NODE 3 3 2 -45.3 H=-141.9477865152

3D HEAD BELOW ELEV. AT NODE 4 3 2 -79.1 H=-121.8064606072

3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-127.4311569681
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-212.6587190161
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-266.2792161083
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-301.4510423206
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-306.8255293129
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-276.1856719085
 3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-190.5167871342
 3D HEAD BELOW ELEV. AT NODE 16 3 2 -43.7 H=-128.2405273823
 3D HEAD BELOW ELEV. AT NODE 1 4 2 -43.7 H=-114.5616965688
 3D HEAD BELOW ELEV. AT NODE 2 4 2 -50.8 H=-112.1638454376
 3D HEAD BELOW ELEV. AT NODE 3 4 2 -68.2 H=-103.6387771899
 3D HEAD BELOW ELEV. AT NODE 9 4 2 -84.7 H=-124.8048680748
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-202.3718216822
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-289.6984815207
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-315.0905167228
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-340.5385639394
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-308.7223626053
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-239.0945419856
 3D HEAD BELOW ELEV. AT NODE 16 4 2 -63.3 H=-148.1529863597
 3D HEAD BELOW ELEV. AT NODE 1 5 2 -60.1 H=-110.9280021883
 3D HEAD BELOW ELEV. AT NODE 2 5 2 -73.8 H=-102.918633236
 3D HEAD BELOW ELEV. AT NODE 9 5 2 -100.8 H=-133.5450203896
 3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-188.360914207
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-236.99155224
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-256.9783648175
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-265.0254229995
 3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-212.2150778017
 3D HEAD BELOW ELEV. AT NODE 15 5 2 -83. H=-121.6480574619
 ***** TOTAL RESISTIVE LAYER FLOW = 2466692.238132

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 542.9925500381 WBAL = 22.61299158253 %
 ITER = 5 ERROR = 58.62079265884 WBAL = 16.72984672244 %
 ITER = 10 ERROR = 34.33384624468 WBAL = 10.68833363621 %
 ITER = 15 ERROR = 17.78774381339 WBAL = 6.241792883486 %
 ITER = 20 ERROR = 11.18724871595 WBAL = 3.596692663252 %
 INCREASE MAX NO OF ITES TO 25 T
 ITER = 25 ERROR = 5.785889377294 WBAL = 2.014361655903 %
 INCREASE MAX NO OF ITES TO 30 T
 ITER = 27 ERROR = 4.606580596011 WBAL = 1.600789835883 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 63248.* 1708011.* 231309.* 189982.*

 * LOCAL INFIL * LOCAL STORE * IMPACT FLOW * WATER BAL *

```

*****
* 142416.* 124221.* 2192550.* 7506.*
*****
THIS REPRESENTS A % ERROR OF .3042789928629
IMPACTED FLOW TO SWAMP CREEK (GPD) = -39764.62129762
IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -17065.40881498
2D DRAWDOWN MAP T

```

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7!	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0
8!	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0
9!	0	0	0	0	0	0	0	1	1	2	4	5	7	8	10	12	4	3	3	2	0	0	0	0	1	2	3	3	3	3	2	1	1	1	0	0	0
10!	0	0	0	0	0	0	1	1	2	3	5	8	11	15	25	35	37	41	27	27	16	5	0	0	0	1	7	7	7	5	4	2	1	1	0	0	0
11!	0	0	0	0	0	0	1	1	2	4	7	11	15	24	34	52	59	60	61	28	29	8	0	0	0	1	14	12	10	8	5	3	2	1	0	0	0
12!	0	0	0	0	0	0	1	1	2	4	8	12	18	29	43	57	62	62	63	71	45	26	2	2	20	24	20	17	13	10	6	3	2	1	1	0	0
13!	0	0	0	0	0	0	1	1	2	5	9	13	20	28	38	49	53	55	57	63	70	62	41	33	30	32	24	19	15	11	7	4	2	1	1	0	0
14!	0	0	0	0	0	0	1	1	3	5	9	13	19	25	30	36	40	43	44	45	43	39	34	30	28	29	27	21	16	12	7	4	2	1	1	0	0
15!	0	0	0	0	0	1	1	2	3	5	9	13	16	19	22	25	28	29	30	30	29	27	25	23	21	20	18	16	13	10	7	4	2	1	1	0	0
16!	0	0	0	0	0	1	1	2	3	5	8	11	13	14	16	18	19	20	20	20	19	18	17	15	14	13	11	10	8	6	4	2	1	1	0	0	0
17!	0	0	0	0	0	1	1	2	3	4	6	8	9	10	11	12	12	13	13	13	12	12	11	10	9	9	8	7	6	5	3	2	1	1	0	0	0
18!	0	0	0	0	0	1	1	1	2	3	5	5	6	6	7	7	8	8	8	8	8	7	7	6	6	6	5	5	4	3	2	1	1	1	0	0	0
19!	0	0	0	0	0	0	1	1	2	2	3	4	4	4	4	4	4	4	5	5	5	4	4	4	4	4	3	3	3	2	1	1	1	0	0	0	0
20!	0	0	0	0	0	0	1	1	1	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	1	1	1	0	0	0	0	0
21!	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	0	0	0	0	0
22!	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
23!	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
24!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

158 181 198 180 117 82 81 102 220 306 332 351 378 341 217 153
 154 149 137 96 69 62 68 103 201 277 355 358 381 341 286 235
 154 138 121 93 68 61 74 113 195 245 299 311 304 257 208 83

LEVEL = 140 METERS(4)

0 0 0 0 0 0 0 0 0 0 0 452 0 0 0 0
 165 222 253 230 160 106 89 0 0 0 0 452 0 0 0 0
 164 215 248 225 160 106 89 119 245 348 448 677 412 447 0 0
 156 0 248 225 160 96 96 124 221 291 407 504 412 375 334 287
 156 0 0 0 0 0 0 124 0 0 407 0 369 271 285 287

LEVEL = 163 METERS(5)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 166 254 305 275 200 130 97 134 0 0 0 0 0 0 0 0
 166 254 303 268 200 130 97 134 271 384 518 677 457 393 0 0
 163 0 303 268 200 116 111 144 237 306 468 582 451 393 345 295
 163 0 0 0 0 0 0 144 0 0 468 0 443 317 339 295

LEVEL = 185 METERS(6)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 532 576 599 362 283 426 589 0 0 0 600 0 0 0 0
 164 532 576 504 362 283 426 589 644 577 652 735 559 595 0 0
 164 0 0 0 362 283 425 494 636 546 643 649 551 516 407 407
 0 0 0 0 0 0 0 0 0 0 0 0 511 511 407 0

LEVEL = 207 METERS(7)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 568 620 659 402 316 468 650 0 0 0 0 0 0 0 0
 164 568 621 559 402 316 468 650 682 618 679 752 590 525 0 0
 164 0 0 0 402 316 468 586 681 601 676 671 580 525 424 424
 0 0 0 0 0 0 0 0 0 0 0 0 524 524 424 0

LEVEL = 230 METERS(8)

0 0 0 0 0 0 0 0 0 0 0 747 0 0 0 0
 0 651 730 731 732 733 734 0 738 739 742 747 0 0 0 0
 0 0 694 731 546 417 547 736 737 738 772 800 799 742 742 0
 0 0 0 731 0 0 0 736 737 738 773 778 741 623 742 742
 0 0 0 0 0 0 0 0 0 0 0 0 740 741 742 0

LEVEL = 263 METERS(9)

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 668 720 720 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 718 719 571 441 563 735 748 774 811 824 823 0 0 0
 0 0 0 0 0 0 0 0 0 0 814 819 761 627 627 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

LEVEL = 295 METERS(10)

0 0 0 0 0 0 0 0 0 953 0 0 0 0 0 0
 0 688 710 696 0 0 0 0 951 953 955 961 0 0 0 0
 0 0 710 696 595 491 0 735 950 952 953 954 955 956 955 0
 0 0 0 0 0 0 0 0 0 0 948 942 954 627 0 0
 0 0 0 0 0 0 0 0 0 0 0 954 0 0 0 0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	690	709	693	0	0	0	0	0	0	0	0	0	0	0	0
0	0	709	693	597	496	0	735	950	952	950	947	0	0	0	0
0	0	0	0	0	0	0	0	0	0	950	946	946	627	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0
0112311241125112611271128	01131113311351141	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0112411251126	0	011291131113211331134113511361135	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0112611271128112911301131113311331134	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	01134	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	16	24	34	46	50	52	50	47	41	28	19	16	19	17	18	15
2 !	151	164	164	131	87	72	76	107	194	271	305	268	324	267	197	134
3 !	153	167	168	139	96	76	78	112	200	271	246	255	327	280	214	150
4 !	129	146	187	170	120	77	69	92	155	213	316	544	298	273	206	191
5 !	132	170	228	203	150	94	76	111	169	230	363	420	338	276	228	197
6 !	109	354	384	368	272	213	319	418	426	374	432	461	370	405	271	0
7 !	109	378	414	406	301	237	351	471	454	406	452	474	390	394	283	0
8 !	0	326	475	487	273	208	273	368	368	369	515	775	370	312	371	0
9 !	0	334	479	480	286	221	282	368	374	387	541	547	380	314	314	0
10 !	0	344	473	464	297	245	0	368	475	952	634	632	477	314	0	0
11 !	0	345	473	462	298	248	0	368	475	476	634	631	0	314	0	0
12 !	0	0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

I-DRY NODE

W	W	W	D	D	D	W	D	D	D	0	0	0	W	W	W
W	W	D	D	A	W	W	W	D	D	0	0	0	A	W	W
W	W	W	W	A	W	W	W	D	D	A	W	D	D	W	W
W	W	W	W	A	A	W	W	W	D	W	W	W	W	W	W
W	W	A	A	A	A	A	A	W	W	W	W	W	W	W	A

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	6338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER 2 WHICH MAX FLOW OCCURS = 4

XX

***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL *****

```
*****
* MODEL LAYER * FLOW INTO (GPD) *
*****
*      1      *      2374302.2      *
*      2      *      2374302.2      *
*      3      *      2379161.2      *
*      4      *      2387558.3      *
*      5      *      2292740.5      *
*      6      *      2293554.7      *
*      7      *      2153103.2      *
*      8      *      1270305.3      *
*      9      *      856525.7      *
*     10      *      618102.2      *
*     11      *       -75.8      *
*     12      *        0.0      *
*****
```

***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL *****

```
*****
* MODEL LAYER * FLOW FROM (GPD) *
*****
*      1      *        0.0      *
*      2      *      2932.8      *
*      3      *      5162.2      *
*      4      *      716.5      *
*      5      *      333.0      *
*      6      *      763.3      *
*      7      *      491.3      *
*      8      *      259.4      *
*      9      *      139.2      *
*     10      *       80.3      *
*     11      *       73.1      *
*     12      *        0.0      *
*****
```

3D WATER BALANCE IS WITHIN -100.0607561969 %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	3775	1845	623	0	0	0	2552	0	0	0	0	0	0	567	2707	3418
2 !	3586	730	0	0	7949	3456	3495	2552	0	0	0	0	0	841	546	3688
3 !	3143	1043	239	78196	230554	135301	48863	176512	0	0	1907	2079	0	0	3423	5622
4 !	4980	4630	6288	173073	141473	63389	95434	273865	154934	0	431	1703	3169	79526	6843	9227
5 !	8709	10379	13564	12274	43269	50642	47401	15175	12149	10433	8303	7946	7114	113935	193274	71530

3D HEAD BELOW ELEV. AT NODE 1 1 2 -29.2 H=-136.4652661737

3D HEAD BELOW ELEV. AT NODE 2 1 2 -24.3 H=-161.3774435621

3D HEAD BELOW ELEV. AT NODE 3 1 2 -28.6 H=-170.049146838

3D HEAD BELOW ELEV. AT NODE 4 1 2 -36.1 H=-147.034472083
 3D HEAD BELOW ELEV. AT NODE 5 1 2 -37.7 H=-111.2483474043
 3D HEAD BELOW ELEV. AT NODE 6 1 2 -41.7 H=-92.10128875264
 3D HEAD BELOW ELEV. AT NODE 7 1 2 -39.4 H=-89.75760521861
 3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-131.387168083
 3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-193.7206721887
 3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-260.310884773
 3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-245.4540745427
 3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-297.4212313986
 3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-213.8632668162
 3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-169.0587430496
 3D HEAD BELOW ELEV. AT NODE 16 1 2 -24. H=-135.9216715259
 3D HEAD BELOW ELEV. AT NODE 1 2 2 -32.8 H=-158.8927879753
 3D HEAD BELOW ELEV. AT NODE 2 2 2 -27.9 H=-201.6559714914
 3D HEAD BELOW ELEV. AT NODE 3 2 2 -35.4 H=-211.1047018756
 3D HEAD BELOW ELEV. AT NODE 4 2 2 -52.8 H=-161.6006952883
 3D HEAD BELOW ELEV. AT NODE 8 2 2 -41.3 H=-112.8795435139
 3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-192.6307830967
 3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-277.9972328279
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-320.1562927623
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-337.8271262223
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-301.3089586864
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-246.6757273695
 3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-192.6450259083
 3D HEAD BELOW ELEV. AT NODE 16 2 2 -30.5 H=-145.3551593633
 3D HEAD BELOW ELEV. AT NODE 1 3 2 -33.8 H=-158.6406689918
 3D HEAD BELOW ELEV. AT NODE 2 3 2 -34.4 H=-170.841863731
 3D HEAD BELOW ELEV. AT NODE 3 3 2 -45.3 H=-183.1897518532
 3D HEAD BELOW ELEV. AT NODE 4 3 2 -79.1 H=-156.7644200741
 3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-210.2593943157
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-300.9798324313
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-328.7819833234
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-342.1562572363
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-344.6891657021
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-303.8286354787
 3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-217.2266918738
 3D HEAD BELOW ELEV. AT NODE 16 3 2 -43.7 H=-153.3222416296
 3D HEAD BELOW ELEV. AT NODE 1 4 2 -43.7 H=-153.373966412
 3D HEAD BELOW ELEV. AT NODE 2 4 2 -50.8 H=-149.2964522158
 3D HEAD BELOW ELEV. AT NODE 3 4 2 -68.2 H=-136.5688151322
 3D HEAD BELOW ELEV. AT NODE 9 4 2 -84.7 H=-187.2271627484
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-269.6737115536
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-341.6044442465
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-357.5541744378
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-373.4931416045
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-332.6161089058
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-261.6991397783
 3D HEAD BELOW ELEV. AT NODE 16 4 2 -63.3 H=-166.5452270318
 3D HEAD BELOW ELEV. AT NODE 1 5 2 -60.1 H=-149.0342447137
 3D HEAD BELOW ELEV. AT NODE 2 5 2 -73.8 H=-138.2486622038
 3D HEAD BELOW ELEV. AT NODE 3 5 2 -94.5 H=-120.7422499625
 3D HEAD BELOW ELEV. AT NODE 9 5 2 -100.8 H=-186.6121866348

3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-244.7432115511
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-287.8686546983
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-302.2472242277
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-300.7998655407
 3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-237.3817810713
 3D HEAD BELOW ELEV. AT NODE 15 5 2 -83. H=-142.2716859904
 ***** TOTAL RESISTIVE LAYER FLOW = 2374302.225413

*****ENTERING 2D MODEL*****

ITER = 1 ERROR = 529.5615397543 WBAL = 8.674702457247 %
 ITER = 5 ERROR = 27.94920402406 WBAL = 6.69039888812 %
 ITER = 10 ERROR = 12.94560636223 WBAL = 4.619901904078 %
 ITER = 15 ERROR = 8.417311048934 WBAL = 2.900827659129 %
 ITER = 20 ERROR = 4.548774968728 WBAL = 1.701740672501 %
 INCREASE MAX NO OF ITERS TO 25 T
 ITER = 21 ERROR = 4.400156909578 WBAL = 1.540839092777 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON MINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 * NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

 * 79098.* 1752381.* 220232.* 169360.*

 * LOCAL INFIL*LOCAL STORE *IMPACT FLOW* WATER BAL *

 * 143723.* 3827.* 2221070.* 5681.*

THIS REPRESENTS A % ERROR OF .2392824688794
 IMPACTED FLOW TO SWAMP CREEK (GPD) = -39702.5378388
 IMPACTED FLOW TO HEMLOCK CREEK (GPD) = -17705.91639595
 2D DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
1!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7!	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8!	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
9!	0	0	0	0	0	0	0	1	1	2	3	4	4	5	5	6	7	10	13	11	0	0	0	0	1	2	2	3	3	3	2	1	1	1	0	0	0	0
10!	0	0	0	0	0	0	1	1	2	3	5	6	7	8	7	23	25	29	38	15	4	1	0	0	0	3	6	6	6	5	4	2	1	1	0	0	0	0
11!	0	0	0	0	0	0	1	1	2	4	6	9	12	14	23	40	74	73	71	40	17	2	0	0	0	5	12	11	10	8	5	3	2	1	1	0	0	0
12!	0	0	0	0	0	0	1	1	2	4	8	12	16	25	44	69	74	73	74	83	33	14	11	12	8	12	19	16	13	10	6	3	2	1	1	0	0	0
13!	0	0	0	0	0	0	1	1	3	5	9	13	20	30	43	57	63	64	66	72	71	50	29	28	29	32	24	19	15	11	7	4	2	1	1	0	0	0
14!	0	0	0	0	0	1	1	2	3	5	10	14	20	27	34	41	46	49	49	48	43	35	30	27	27	28	26	21	16	11	7	4	2	1	1	0	0	0
15!	0	0	0	0	0	1	1	2	3	6	10	14	17	21	25	28	31	32	33	32	30	27	24	22	21	19	18	15	13	10	7	4	2	1	1	0	0	0

16!	0	0	0	0	0	1	1	2	3	6	9	12	14	16	18	20	21	22	22	21	21	19	18	17	15	14	13	11	10	8	6	4	2	1	1	0
17!	0	0	0	0	0	1	1	2	3	5	7	9	10	11	12	13	14	14	14	14	13	12	11	11	10	9	8	7	6	5	3	2	1	1	0	
18!	0	0	0	0	0	1	1	2	3	4	5	6	7	7	8	8	8	9	9	9	8	8	8	7	7	6	6	5	5	4	3	2	2	1	1	0
19!	0	0	0	0	0	1	1	1	2	3	4	4	4	5	5	5	5	5	5	5	5	5	5	4	4	4	4	3	3	2	1	1	1	0	0	
20!	0	0	0	0	0	0	1	1	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	1	1	0	0	0	
21!	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	0	0	0	0
22!	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
23!	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
24!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ACC % ERROR FROM OBSERVED 0. %

DO YOU WANT TO TERMINATE THE SIMULATION

\$

INPUT DELTA 30.

TIME = 675. 30.

ENTER 3D MODEL T

*****ENTERING 3D MODEL*****

DO 3D FINITE DIFFERENCE COMPUTATIONS = T

ITER = 1 ERROR = 3546.497937554 NORM ERROR = 44.33122421942

ITER = 5 ERROR = 290.5736208115 NORM ERROR = 3.632170260144

ITER = 10 ERROR = 150.7666976663 NORM ERROR = 1.884583720829

ITER = 15 ERROR = 109.3319141541 NORM ERROR = 1.366648926926

ITER = 20 ERROR = 85.63463598517 NORM ERROR = 1.070432949815

ITER = 25 ERROR = 69.13950795063 NORM ERROR = .8642438493829

ITER = 30 ERROR = 55.70492662991 NORM ERROR = .6963115828739

ITER = 35 ERROR = 45.66589370367 NORM ERROR = .5708236712959

ITER = 40 ERROR = 38.04070888798 NORM ERROR = .4755088610998

ITER = 45 ERROR = 32.18984096896 NORM ERROR = .402373012112

ITER = 50 ERROR = 27.70630477195 NORM ERROR = .3463288096493

INCREASE MAX NO. OF ITERATIONS TO 55 T

ITER = 55 ERROR = 24.23091575983 NORM ERROR = .3028864469979

INCREASE MAX NO. OF ITERATIONS TO 60 T
 ITER = 60 ERROR = 21.55846680934 NORM ERROR = .2694808351167
 INCREASE MAX NO. OF ITERATIONS TO 65 T
 ITER = 65 ERROR = 19.4952642581 NORM ERROR = .2436908032262
 INCREASE MAX NO. OF ITERATIONS TO 70 T
 ITER = 70 ERROR = 17.90077868209 NORM ERROR = .2237597335261
 INCREASE MAX NO. OF ITERATIONS TO 75 T
 ITER = 75 ERROR = 16.66702540648 NORM ERROR = .208337817581
 INCREASE MAX NO. OF ITERATIONS TO 80 T
 3D DRAWDOWN MAPS T

LEVEL = RESIST(1)

7	8	7	23	25	29	38	15	4	1	0	0	0	3	6	6
12	14	23	40	74	73	71	40	17	2	0	0	0	5	12	11
16	25	44	69	74	73	74	83	33	14	11	12	8	12	19	16
20	30	43	57	63	64	66	72	71	50	29	28	29	32	24	19
20	27	34	41	46	49	49	48	43	35	30	27	27	28	26	21

LEVEL = SUBCROP(2)

136	154	152	128	95	82	96	112	149	209	216	0	283	206	157	123
172	217	225	167	105	86	93	121	155	226	283	320	286	236	180	133
175	187	200	176	107	83	90	126	170	245	294	323	323	286	203	142
170	166	153	113	78	70	74	98	169	236	315	336	357	321	251	158
166	155	137	107	78	68	79	113	170	221	265	281	284	226	133	66

LEVEL = 95 METERS(3)

136	155	152	128	95	82	96	112	149	210	0	0	277	206	157	124
179	219	228	197	128	95	93	121	155	229	0	322	286	236	180	133
174	197	214	197	131	95	97	129	189	263	298	329	361	330	204	142
171	166	153	113	81	72	77	107	180	243	330	337	365	330	277	227
171	155	137	107	78	68	79	112	176	221	276	290	288	246	198	79

LEVEL = 140 METERS(4)

0	0	0	0	0	0	0	0	0	0	0	0	452	0	0	0
182	239	266	246	173	118	105	0	0	0	0	452	0	0	0	0
181	232	263	241	173	118	105	138	217	313	423	668	398	447	0	0
173	0	263	241	173	108	108	128	198	260	384	487	398	366	326	279
173	0	0	0	0	0	0	128	0	0	384	0	355	260	276	279

LEVEL = 163 METERS(5)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182	273	318	289	213	142	112	150	0	0	0	0	0	0	0	0
182	273	317	282	213	142	112	150	245	353	499	668	444	385	0	0
180	0	317	282	213	129	124	149	214	275	448	569	438	385	338	288
180	0	0	0	0	0	0	149	0	0	448	0	431	307	331	288

LEVEL = 185 METERS(6)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	573	584	604	371	293	438	598	0	0	0	600	0	0	0	0
181	573	584	511	371	293	438	598	638	563	640	728	550	595	0	0
181	0	0	0	371	293	438	502	630	530	632	640	542	512	400	400
0	0	0	0	0	0	0	0	0	0	0	0	507	507	400	0

LEVEL = 207 METERS(7)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	615	626	661	410	325	480	659	0	0	0	0	0	0	0	0
181	615	627	564	410	325	480	659	679	607	670	746	582	521	0	0
181	0	0	0	410	325	481	595	677	590	666	663	572	521	418	418
0	0	0	0	0	0	0	0	0	0	0	0	521	520	418	0

LEVEL = 230 METERS(8)

0	0	0	0	0	0	0	0	0	0	0	747	0	0	0	0
0	729	730	731	732	733	734	0	738	739	742	747	0	0	0	0
0	0	698	731	551	424	561	747	737	738	766	796	796	742	742	0
0	0	730	731	0	0	734	736	737	738	767	774	741	621	742	742
0	0	0	0	0	0	0	0	0	0	0	0	740	741	742	0

LEVEL = 263 METERS(9)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	727	723	721	0	0	0	0	0	0	0	0	0	0	0	0
0	0	721	719	576	448	580	782	749	774	806	820	821	0	0	0
0	0	0	0	0	0	0	0	0	0	809	815	760	625	625	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 295 METERS(10)

0	0	0	0	0	0	0	0	0	953	0	0	0	0	0	0
0	722	717	699	0	0	0	0	951	953	955	961	0	0	0	0
0	0	717	699	599	497	0	949	950	952	953	954	955	956	955	0
0	0	0	0	0	0	0	0	0	0	948	941	954	625	0	0
0	0	0	0	0	0	0	0	0	0	0	954	0	0	0	0

LEVEL = 322 METERS(11)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	722	717	697	0	0	0	0	0	0	0	0	0	0	0	0
0	0	717	697	601	502	0	949	950	952	950	947	0	0	0	0
0	0	0	0	0	0	0	0	0	0	950	946	946	625	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEVEL = 350 METERS(12)

0	0	0	0	0	0	0	0	01134	01141	0	0	0	0	0	0
1121112311241125112611271128	01131113311351141	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01123112411251126	0	011291131113211331134113511361135	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0112611271128112911301131113311331134	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	01134	0	0	0	0

INTEGRATED CROSS-SECTION DRAWDOWN MAP T

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	15	21	30	46	57	58	60	52	33	20	17	17	16	16	17	15
2 !	164	176	173	138	92	78	86	114	162	227	275	252	307	255	185	125
3 !	166	178	177	149	102	82	88	116	170	234	226	239	316	270	203	141
4 !	142	157	198	182	130	86	79	99	138	191	298	536	288	268	201	186
5 !	145	182	238	213	159	103	87	120	153	210	349	413	328	269	223	192
6 !	121	382	389	372	278	220	328	425	423	364	424	456	364	403	267	0
7 !	121	410	418	408	308	244	360	478	452	399	445	470	385	391	279	0
8 !	0	365	476	487	276	212	281	373	368	369	511	772	370	311	371	0

```

9 !   0 364 482 480 288 224 290 391 374 387 538 545 380 313 313 0
10 !  0 361 478 466 300 248 0 474 475 952 634 632 477 313 0 0
11 !  0 361 478 465 301 251 0 474 475 476 633 631 0 313 0 0
12 !  0 0 0 0 0 0 0 0 0 01134 01141 0 0 0 0

```

STORAGE STATE ABOVE RESISTIVE LAYER

A-ARTESIAN W-WATER TABLE 0-ZERO THICKNESS

D-DRY NODE

```

W W W W W W D W A 0 0 0 D W W
W W W W A W W D W W 0 0 0 D W W
W W D W A W W D W W D D W W W W
W W W W A A W W W W W W W W W
W W W A A A A W W W W W W A A

```

2D STORAGE ABOVE RESIST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 !	8338	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	7340	5473
2 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
3 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
4 !	4573	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	4026	3002
5 !	6884	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	6060	4518

THE LAYER # WHICH MAX FLOW OCCURS = 2

 ***** VERTICAL WATER BALANCE FOR 3D OREBODY MODEL *****

* MODEL LAYER * FLOW INTO (GPD) *

```

*      1      *      2455000.4      *
*      2      *      2455000.4      *
*      3      *      2451023.6      *
*      4      *      2450524.3      *
*      5      *      2342111.0      *
*      6      *      2342061.3      *
*      7      *      2193538.0      *
*      8      *      1268006.8      *
*      9      *      939300.9      *
*     10      *      664348.9      *
*     11      *      -33.3      *
*     12      *      0.0      *

```

***** STORAGE WATER BALANCE FOR 3D OREBODY MODEL *****

* MODEL LAYER * FLOW FROM (GPD) *

```

*****
*           1           *           0.0           *
*           2           *          -693.7          *
*           3           *          -900.9          *
*           4           *          -251.2          *
*           5           *          -66.6           *
*           6           *           41.2           *
*           7           *           92.5           *
*           8           *           -7.0           *
*           9           *           54.2           *
*          10           *           7.9            *
*          11           *           33.4           *
*          12           *           0.0            *
*****

```

3D WATER BALANCE IS WITHIN -100.0021315693 %

3D RESISTIVE LAYER VERT. Q

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 !	4494	3391	4353	2552	2552	2552	0	2552	2552	859	0	0	0	0	25
2 !	4296	2709	2552	2552	6655	2847	1539	0	2552	1288	0	0	0	0	9
3 !	3587	1888	0	34128	234591	140596	68981	0	117185	104448	0	0	2552	2552	37
4 !	4951	4302	5275	149152	157749	66595	88022	226792	144588	81475	3163	2773	3464	79867	69
5 !	8419	9835	12735	14235	49722	54967	46774	14097	12261	11269	9054	8462	7399	115786	1945

3D HEAD BELOW ELEV. AT NODE 1 1 2 -29.2 H=-136.0354839289
 3D HEAD BELOW ELEV. AT NODE 2 1 2 -24.3 H=-154.4888605164
 3D HEAD BELOW ELEV. AT NODE 3 1 2 -28.6 H=-151.7114342622
 3D HEAD BELOW ELEV. AT NODE 4 1 2 -36.1 H=-127.5947657681
 3D HEAD BELOW ELEV. AT NODE 5 1 2 -37.7 H=-94.74012563471
 3D HEAD BELOW ELEV. AT NODE 6 1 2 -41.7 H=-82.0330834591
 3D HEAD BELOW ELEV. AT NODE 7 1 2 -39.4 H=-95.70253870684
 3D HEAD BELOW ELEV. AT NODE 8 1 2 -28.2 H=-111.8360434106
 3D HEAD BELOW ELEV. AT NODE 9 1 2 -16.8 H=-148.6736094748
 3D HEAD BELOW ELEV. AT NODE 10 1 2 -6. H=-208.8478941675
 3D HEAD BELOW ELEV. AT NODE 11 1 2 -1. H=-215.5390544604
 3D HEAD BELOW ELEV. AT NODE 13 1 2 -1. H=-282.6226395166
 3D HEAD BELOW ELEV. AT NODE 14 1 2 -4.300000000003 H=-206.1799509901
 3D HEAD BELOW ELEV. AT NODE 15 1 2 -20.7 H=-157.3417142088
 3D HEAD BELOW ELEV. AT NODE 16 1 2 -24. H=-123.4883857213
 3D HEAD BELOW ELEV. AT NODE 1 2 2 -32.8 H=-172.1213829136
 3D HEAD BELOW ELEV. AT NODE 2 2 2 -27.9 H=-216.6364574188
 3D HEAD BELOW ELEV. AT NODE 3 2 2 -35.4 H=-225.1759866203
 3D HEAD BELOW ELEV. AT NODE 4 2 2 -52.8 H=-166.5710157122
 3D HEAD BELOW ELEV. AT NODE 7 2 2 -79.100000000001 H=-93.46992433304
 3D HEAD BELOW ELEV. AT NODE 8 2 2 -41.3 H=-121.3354669363
 3D HEAD BELOW ELEV. AT NODE 9 2 2 -29.9 H=-154.567051504
 3D HEAD BELOW ELEV. AT NODE 10 2 2 -8.5 H=-225.9151507615
 3D HEAD BELOW ELEV. AT NODE 11 2 2 -1. H=-282.9252828215
 3D HEAD BELOW ELEV. AT NODE 12 2 2 -3.599999999999 H=-320.0839122229
 3D HEAD BELOW ELEV. AT NODE 13 2 2 -1. H=-285.9630492762
 3D HEAD BELOW ELEV. AT NODE 14 2 2 -5.900000000001 H=-236.3732952694

3D HEAD BELOW ELEV. AT NODE 15 2 2 -17.4 H=-179.6997253332
 3D HEAD BELOW ELEV. AT NODE 16 2 2 -30.5 H=-132.7806558069
 3D HEAD BELOW ELEV. AT NODE 1 3 2 -33.8 H=-175.0349473777
 3D HEAD BELOW ELEV. AT NODE 2 3 2 -34.4 H=-167.0664191875
 3D HEAD BELOW ELEV. AT NODE 3 3 2 -45.3 H=-199.6321116356
 3D HEAD BELOW ELEV. AT NODE 4 3 2 -79.1 H=-175.9484677856
 3D HEAD BELOW ELEV. AT NODE 8 3 2 -83.7 H=-125.7944675484
 3D HEAD BELOW ELEV. AT NODE 9 3 2 -45.6 H=-169.676731065
 3D HEAD BELOW ELEV. AT NODE 10 3 2 -27.2 H=-244.7760734782
 3D HEAD BELOW ELEV. AT NODE 11 3 2 -12.1 H=-294.2190333925
 3D HEAD BELOW ELEV. AT NODE 12 3 2 -13.1 H=-323.293407443
 3D HEAD BELOW ELEV. AT NODE 13 3 2 -20.7 H=-323.1287867784
 3D HEAD BELOW ELEV. AT NODE 14 3 2 -24.7 H=-285.7348051848
 3D HEAD BELOW ELEV. AT NODE 15 3 2 -37.1 H=-203.4261841531
 3D HEAD BELOW ELEV. AT NODE 16 3 2 -43.7 H=-141.6647927251
 3D HEAD BELOW ELEV. AT NODE 1 4 2 -43.7 H=-169.9127830247
 3D HEAD BELOW ELEV. AT NODE 2 4 2 -50.8 H=-165.8681735359
 3D HEAD BELOW ELEV. AT NODE 3 4 2 -68.2 H=-153.3910096804
 3D HEAD BELOW ELEV. AT NODE 4 4 2 -98.8 H=-113.4897606217
 3D HEAD BELOW ELEV. AT NODE 9 4 2 -84.7 H=-168.5789561823
 3D HEAD BELOW ELEV. AT NODE 10 4 2 -62.7 H=-235.6337253907
 3D HEAD BELOW ELEV. AT NODE 11 4 2 -44.3 H=-315.241156353
 3D HEAD BELOW ELEV. AT NODE 12 4 2 -41.6 H=-336.3064912023
 3D HEAD BELOW ELEV. AT NODE 13 4 2 -45.9 H=-357.2445953179
 3D HEAD BELOW ELEV. AT NODE 14 4 2 -50.2 H=-321.1975909759
 3D HEAD BELOW ELEV. AT NODE 15 4 2 -56.8 H=-251.0643876111
 3D HEAD BELOW ELEV. AT NODE 16 4 2 -63.3 H=-158.3794023541
 3D HEAD BELOW ELEV. AT NODE 1 5 2 -60.1 H=-165.5959691325
 3D HEAD BELOW ELEV. AT NODE 2 5 2 -73.8 H=-154.7307294012
 3D HEAD BELOW ELEV. AT NODE 3 5 2 -94.5 H=-136.7655230058
 3D HEAD BELOW ELEV. AT NODE 9 5 2 -100.8 H=-170.0292376875
 3D HEAD BELOW ELEV. AT NODE 10 5 2 -88.6 H=-220.8230596011
 3D HEAD BELOW ELEV. AT NODE 11 5 2 -73.2 H=-264.6428476396
 3D HEAD BELOW ELEV. AT NODE 12 5 2 -67.6 H=-281.1176334693
 3D HEAD BELOW ELEV. AT NODE 13 5 2 -62. H=-283.9866427041
 3D HEAD BELOW ELEV. AT NODE 14 5 2 -69.2 H=-225.7245182729
 3D HEAD BELOW ELEV. AT NODE 15 5 2 -83. H=-133.0829166652
 ***** TOTAL RESISTIVE LAYER FLOW = 2455000.394416
 *****ENTERING 2D MODEL*****
 ITER = 1 ERROR = 658.4879041387 WBAL = 5.620698285468 %
 ITER = 5 ERROR = 39.80783679454 WBAL = .08146495817627 %
 ITER = 10 ERROR = 5.48292981974 WBAL = .5221100254346 %
 ITER = 11 ERROR = 3.808336963674 WBAL = .5215654851334 %
 LOOP AGAIN TO CHANGE 2D PARAMETERS F

 * EXXON CRANDON KINE REGION *
 * FLOWS FROM 2D MODEL (GPD) *

 *NORTH FLOW * SOUTH FLOW * WEST FLOW * EAST FLOW *

THIS REPRESENTS A % ERROR OF -.1512144563521
IMPACTED FLOW TO SWAMP CREEK (GPD) = -46996.64323221
IMPACTED FLOW TO HEKLOCK CREEK (GPD) = -18485.06270781
2D DRAWDOWN MAP 1

2D DRAWDOWN MAP T

Q-89

ACC % ERROR FROM OBSERVED 0. %

\$\$\$

TIME = 705.30.

*****ENTERING 3D MODEL*****

```

ITER = 1 ERROR = 3439.626413996 NORM ERROR = 42.99533017495
ITER = 5 ERROR = 239.1065410196 NORM ERROR = 2.988831762745
ITER = 10 ERROR = 140.7610750518 NORM ERROR = 1.759513438147
ITER = 15 ERROR = 104.7123607786 NORM ERROR = 1.308904509732
ITER = 20 ERROR = 81.52682170383 NORM ERROR = 1.019085271298
ITER = 25 ERROR = 64.56561769536 NORM ERROR = .807070221192
ITER = 30 ERROR = 51.80606158512 NORM ERROR = .647575769814
ITER = 35 ERROR = 42.16034186438 NORM ERROR = .5270042733048
ITER = 40 ERROR = 34.86263678173 NORM ERROR = .4357829597716
ITER = 45 ERROR = 29.3418430478 NORM ERROR = .3667730380974
ITER = 50 ERROR = 25.16586378766 NORM ERROR = .3145732973458

```

ITER = 55 ERROR = 22.83196898606 NORM ERROR = .2853996123257

ITER = 60 ERROR = 19.69275929934 NORM ERROR = .2461594912417

ITER = 65 ERROR = 17.82256001289 NORM ERROR = .2227820001611

ITER = 70 ERROR = 16.43961206474 NORM ERROR = .2054951508093

ITER = 75 ERROR = 15.45891367974 NORM ERROR = .1932364209968

3D DRAWDOWN MAPS T

14	18	24	32	37	41	27	27	16	5	0	0	0	1	7	7
16	22	31	47	56	58	62	28	29	8	0	0	0	1	15	13
17	22	32	58	64	64	65	71	45	26	2	2	20	24	21	17
19	27	38	51	57	57	59	65	70	62	42	34	31	32	25	20
19	25	31	37	42	45	45	45	43	39	34	30	28	29	27	22

152	175	176	148	113	94	93	135	198	264	255	0	302	221	177	144
168	209	217	163	97	77	80	116	196	281	323	341	306	252	200	153
166	177	189	162	96	74	76	83	212	303	331	345	348	307	223	160
161	156	142	100	70	63	68	96	190	272	344	360	376	335	265	170
156	145	126	97	71	63	76	117	189	247	290	305	303	240	145	71

UW-STEVENSON POINT



3 1775 621774 5