

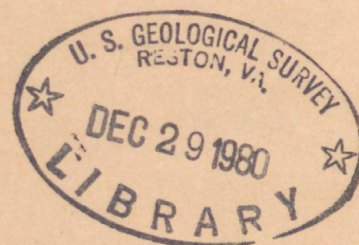
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THREE-DIMENSIONAL DIGITAL-COMPUTER MODEL OF THE
FERRON SANDSTONE AQUIFER NEAR EMERY, UTAH

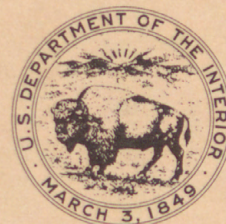
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October 1980

UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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CONVERSION FACTORS

Numbers in this report are given in inch-pound units. For those readers who may prefer to use metric units rather than inch-pound units, the conversion factors for the terms used in the report are listed below. Multiply the inch-pound unit by the conversion factor to obtain the equivalent metric unit.

Inch-pound		Conversion factor	Metric
<u>Unit</u>	<u>Abbreviation</u>		<u>Unit</u>
Cubic foot per second	ft ³ /s	0.02832	Cubic meter per second
Foot	ft	0.3048	Meter
Foot per second	ft/s	0.3048	Meter per second
Foot squared per day	ft ² /d	0.0929	Meter squared per day
Mile	mi	1.609	Kilometer
Square foot	ft ²	0.0929	Square meter
Square mile	mi ²	2.590	Square kilometer

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and Scott D. Bartholoma

ABSTRACT

A three-dimensional finite-difference computer model of the Ferron sandstone aquifer was used to simulate ground-water flow in the Emery coal field in east-central Utah. The model also was used to predict the effects of proposed surface mining and the resulting mine dewatering on potentiometric surfaces of the aquifer. The model was calibrated in a steady-state simulation using water levels and manmade discharges from the aquifer that were measured during 1979. Too few data were available to verify the calibrated model in a transient-state simulation with historical aquifer response to manmade discharges. Predictions made with the model are considered to be semiquantitative. Discharge from the proposed surface mine was predicted to average 0.3 cubic foot per second during the 15 years of operation. Drawdowns of 5 feet in the potentiometric surface of the aquifer were predicted to extend as much as 3 miles from the proposed mine after 15 years of operation.

INTRODUCTION

This report describes the design, construction, and calibration of a three-dimensional finite-difference computer model of the Ferron sandstone aquifer near Emery, Utah (fig. 1). The calibrated model was used to predict the effects of proposed surface mining and the resulting mine dewatering on potentiometric surfaces of the aquifer. The aquifer is in the Ferron Sandstone Member of the Mancos Shale of Late Cretaceous age and is herein called the Ferron sandstone aquifer. The study was done in cooperation with the U.S. Bureau of Land Management.

Predictions made with the model are viewed by the authors as semiquantitative for three reasons. The first of these is a lack of historical ground-water data in the modeled area. Few data exist with regard to manmade discharge of water from the Ferron, and few data exist to define trends in water levels through time. This results in an inability to verify the model with historical data on aquifer response to manmade discharges.

The second reason related to the first, is the assumption made in calibrating the model that the aquifer was in a steady-state condition during 1979. Water-level data indicate that the aquifer was not in a true steady-state condition during 1979. However, the assumption of steady-state is reasonable as water-level changes were small during the year. The average water-level change was 4 ft at eight wells where monthly measurements were made during 1979. At three wells where water-level measurements were made in 1976, the average water-level decline through 1979 was 9 ft.

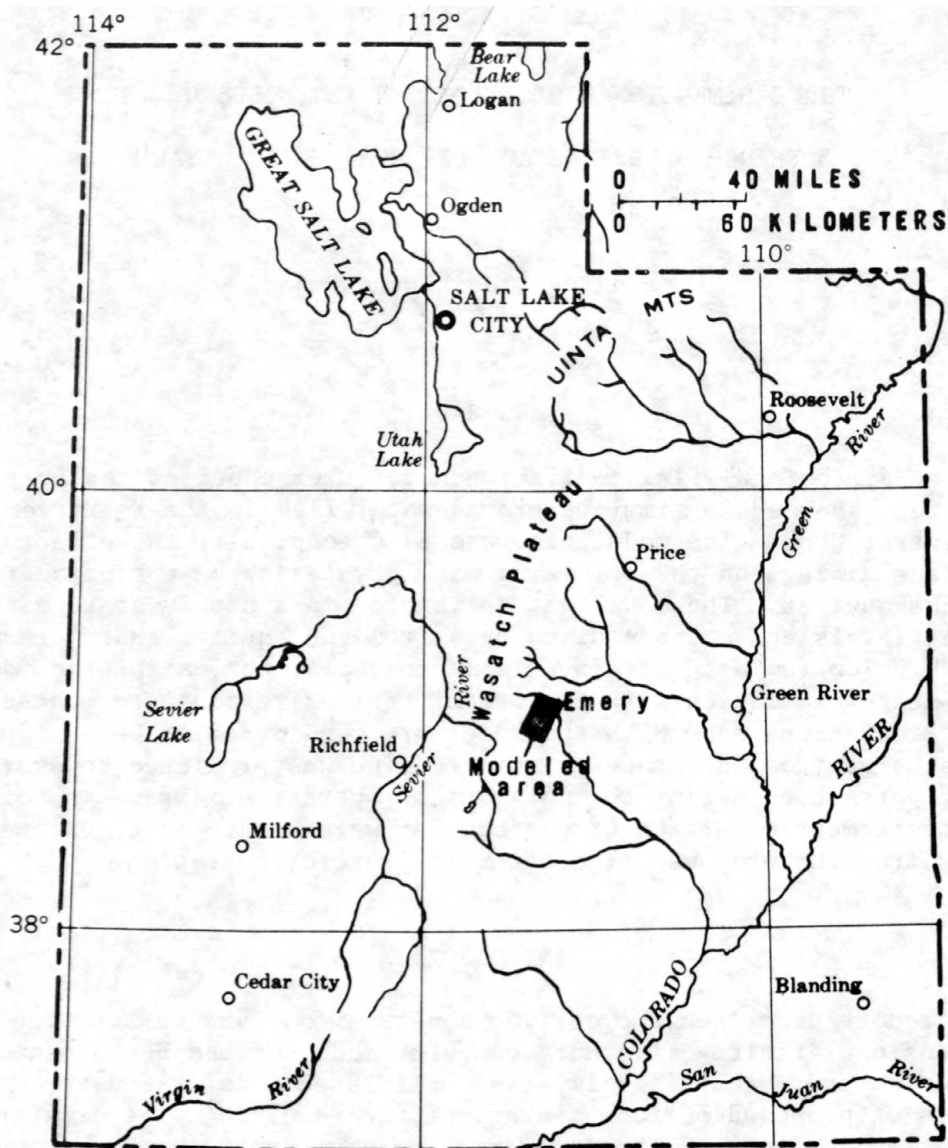


Figure 1.—Map of Utah showing modeled area.

The third reason involves an assumption inherent in the model that flows in the aquifer is through pore spaces. Aquifer tests indicate that in some areas fractures are the major conduits through which water moves through the aquifer. This assumption probably does not seriously affect the predictions, however, because even though water moves through fractures, the aquifer on a large scale probably acts as a porous medium.

Despite these limiting assumptions, the digital model provides the most realistic available way to analyze the effects of mine dewatering on the aquifer. The alternative approach, using an analytical method of analysis, would require more simplifying assumptions than those associated with the digital model. Thus, results of an analytical method could be used with less confidence than those obtained with the digital model.

This report presents the modeling results of: (1) A steady-state simulation of hydrologic conditions in 1979, (2) a steady-state simulation of the surface-mine operation imposed upon the 1979 conditions, and (3) a transient simulation of the surface-mine operation.

CONCEPTUALIZATION OF THE FERRON SANDSTONE AQUIFER

Sources of recharge and discharge for the Ferron sandstone aquifer, which is 400 to 500 ft thick in the Emery area, are shown diagrammatically in figure 2. Recharge to the aquifer is mostly subsurface inflow from the Wasatch Plateau. A negligible amount of recharge occurs on the outcrop area of the Ferron from precipitation and from downward leakage from the Blue Gate Member of the Mancos Shale.

Major manmade discharges from the aquifer occur at the underground Emery Mine and at the municipal well in Emery. Natural discharge from the aquifer includes leakage to alluvium along streams, leakage to the underlying Tununk Member of the Mancos Shale in the outcrop area of the Ferron (Williams and Hackman, 1971), upward leakage to the Blue Gate Member of the Mancos Shale, a negligible amount of transpiration by phreatophytes, and discharge by springs and seeps. Generally downdip from the Ferron outcrop area, altitudes of potentiometric surfaces of the aquifer increase with depth, and in the outcrop area they decrease with depth.

DESCRIPTION OF THE MODEL

The model used for this study is documented in reports by Trescott (1975) and Trescott and Larson (1976). In modeling the Ferron sandstone aquifer, changes were made to the computational procedures of the original Trescott-Larson three-dimensional model. These changes allow simulation of leakage along streams from all layers of the model and simulation of recharge from the land surface to all layers. All changes made to the original model are indicated by an asterisk in column 80 of the program listing in table 1.

Approximately 60 mi² of the Ferron sandstone aquifer in the Emery area have been modeled. The modeled area is shown in figure 3.

Model grid

The grid used to model the aquifer is shown in figure 3. The rectangular grid has variable-sized nodes ranging from 0.25 to 0.75 mi on a side. The grid is finest where coal mining exists or is proposed.

The aquifer and enclosing confining shales are divided vertically into five layers as shown in figure 4. Layer 1 represents the Tununk Member of the Mancos Shale that underlies the Ferron. The Tununk is about 600 ft thick.

The Ferron sandstone aquifer is divided into three layers of about equal thickness. Layer 2 of the model represents massive sandstones in the basal part of the Ferron. Layers 3 and 4 represent the lower and upper coal-bearing sections. Layer 3 represents rocks from the A coal seam upward to the base of the I-J seam. Layer 4 represents the upper one-third of the Ferron from the base of the I-J seam, the seam that is presently being mined and that is proposed to be surface mined upward to the base of the Blue Gate Member of the Mancos Shale.

Layer 5 of the model represents the Blue Gate Member of the Mancos Shale that overlies the Ferron. The Blue Gate ranges in thickness from a featheredge to about 1,200 ft along the western boundary of the modeled area.

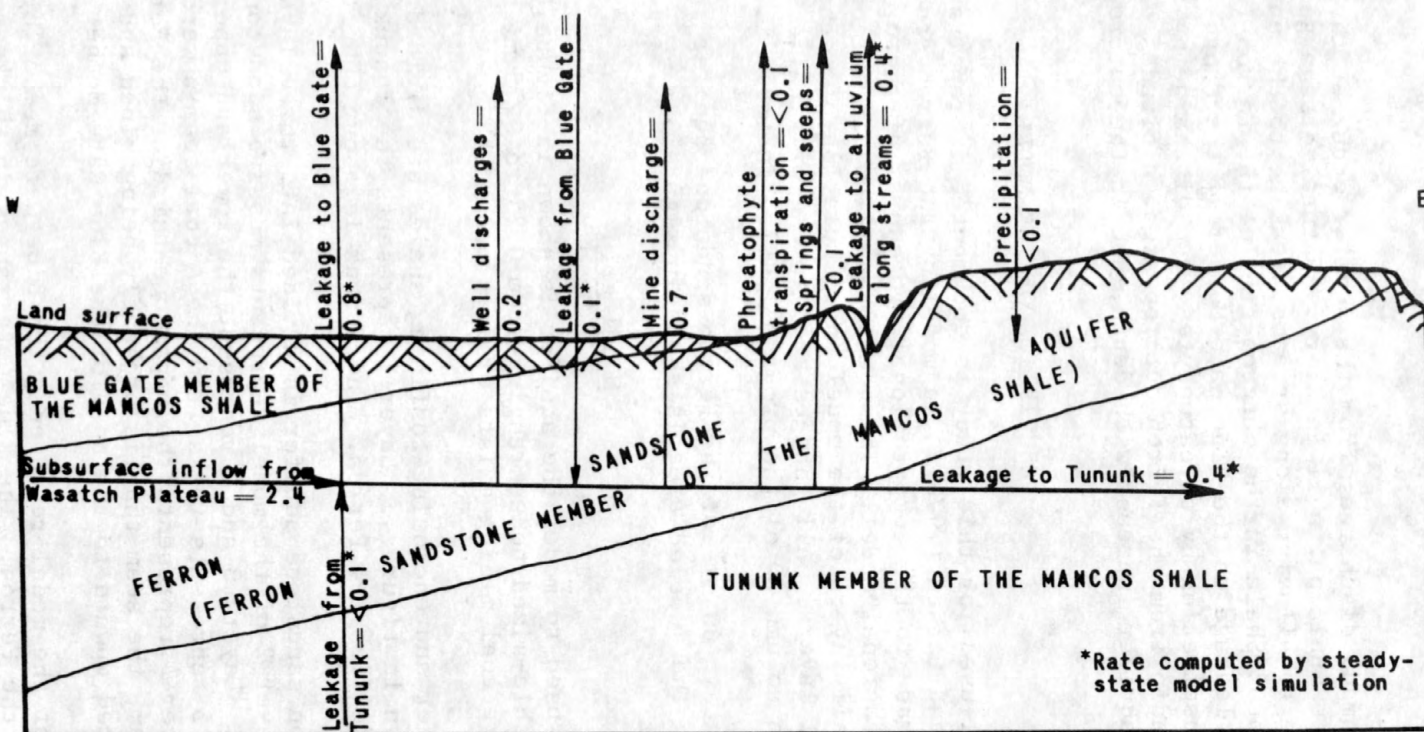
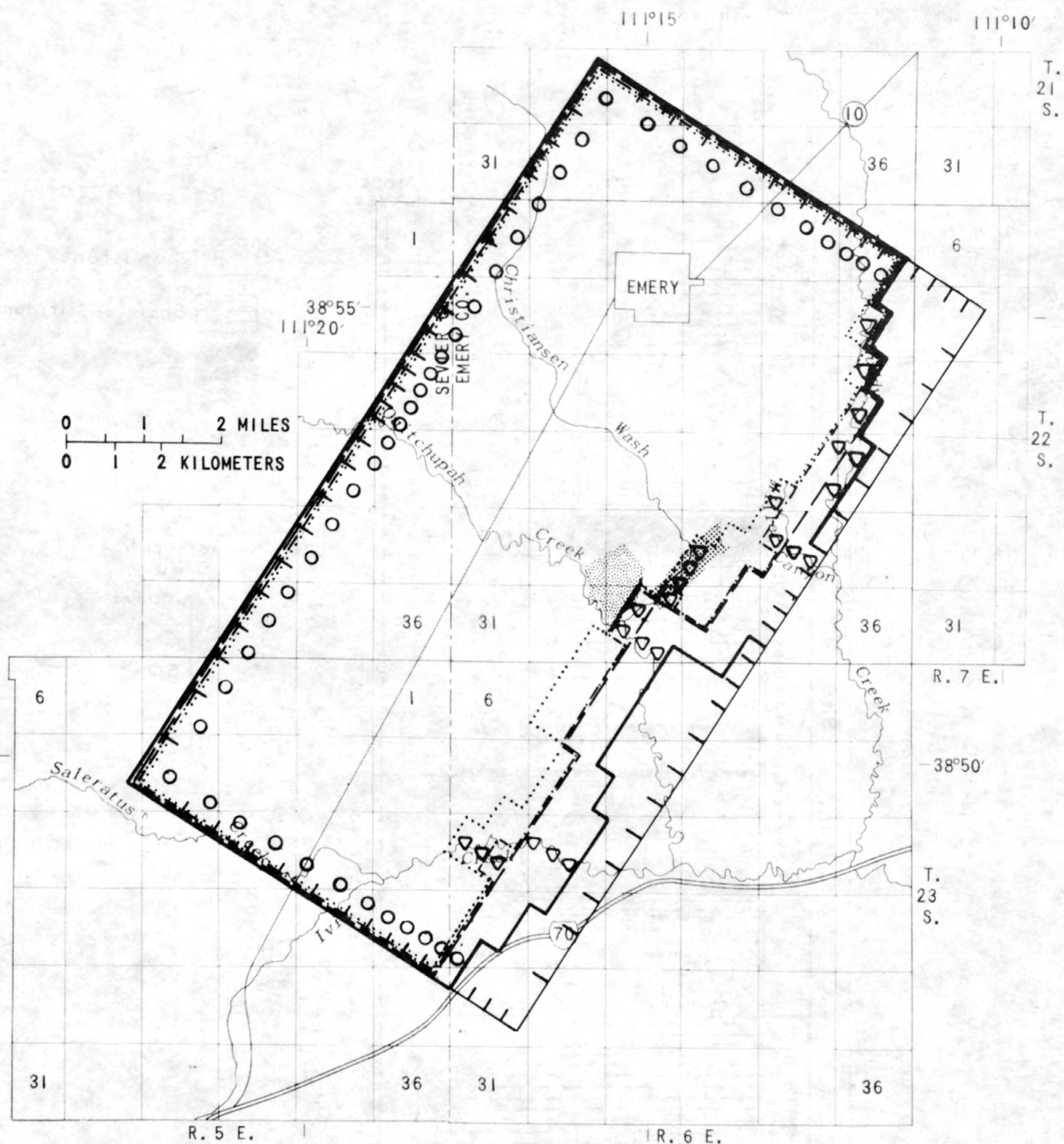


Figure 2.— Diagrammatic section showing sources of recharge to and discharge from the Ferron sandstone aquifer in the modeled area, 1979. Recharge and discharge values are in cubic feet per second.



EXPLANATION

MODEL BOUNDARIES

- Layers 1 and 2 - Tununk Member and basal section of Ferron Sandstone Member of the Mancos Shale
- Layer 3 - Middle section of Ferron Sandstone Member of the Mancos Shale
- Layer 4 - Upper part of Ferron Sandstone Member of the Mancos Shale
- Layer 5 - Blue Gate Member of the Mancos Shale

- CONSTANT-HEAD NODES IN ALL FIVE LAYERS DURING STEADY-STATE SIMULATIONS; CONSTANT HEAD IN LAYERS 1 AND 5 AND CONSTANT FLOW IN LAYERS 2, 3, AND 4 DURING TRANSIENT-PREDICTIVE SIMULATIONS

- △ NODE WHERE LEAKAGE ALONG A STREAM IS SIMULATED FROM LAYER 2, 3, OR 4

- EMERY MINE (underground)

- PROPOSED SURFACE MINE

Figure 3.— Variable grid pattern and boundaries used in model, and the location of existing and proposed coal mines.

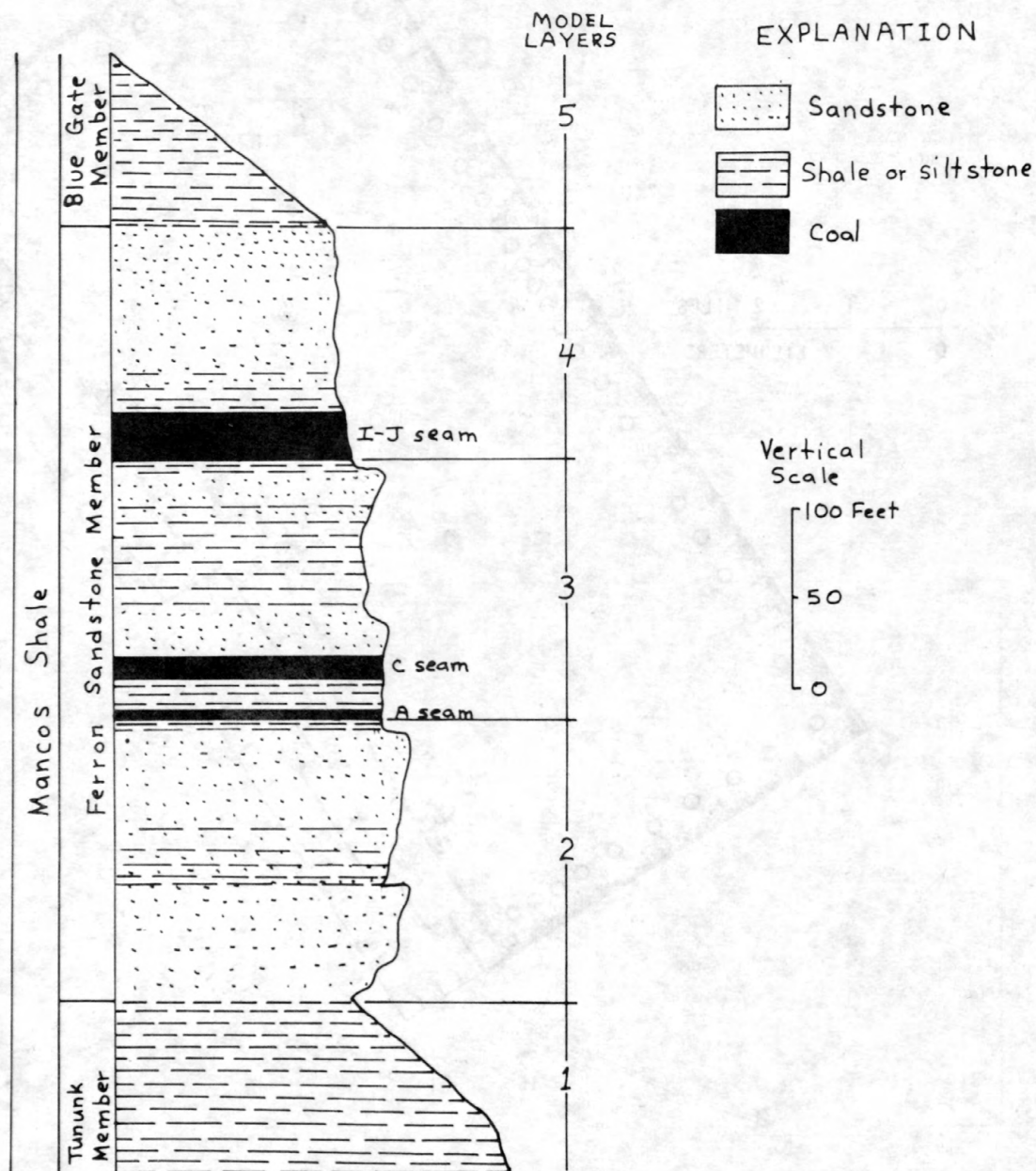


Figure 4.— Generalized geologic column showing lithology of the five model layers.

Boundaries

The western boundary of each layer of the model terminates near the Paradise Valley-Joes Valley fault zone (Williams and Hackman, 1971). All layers are believed to receive subsurface inflow from the Wasatch Plateau to the west, and this recharge during steady-state simulations is approximated by constant-head nodes. During transient predictive model simulations, flow across the western boundary in layers 2, 3, and 4 was simulated by constant-flow nodes.

The eastern model boundaries of layers 2, 3, and 4 were simulated as no-flow boundaries. The eastern boundaries of layers 2, 3, and 4 are either along lines of zero transmissivity, at right angles to potentiometric contours, or along Mud-dy Creek.

The northern boundaries of all model layers terminate approximately where the upper coal-bearing section of the Ferron, layer 4 in the model, pinches out. For layer 4 this is a natural boundary and for the other layers it is an arbitrary termination.

The southern boundary is an arbitrary determination for all layers. It should be noted, however, that in the southeastern corner of the model the southern boundary is approximately at right angles to potentiometric contours of layers 2, 3, and 4 and closely approximates a no-flow boundary in the aquifer.

Like the western boundary, the northern and southern boundaries of all layers were simulated by constant-head nodes during steady-state simulations. Likewise, during transient-predictive simulations, flow across the northern and southern boundaries in layers 2, 3, and 4 was simulated by constant-flow nodes.

Constant-head nodes were used along boundaries during steady-state simulations because they are the most accurate way to simulate the aquifer. The computed flow to and from constant-head nodes also served as a check of estimates of subsurface inflow obtained by applying Darcy's Law using actual potentiometric-surface and transmissivity data. During transient-predictive simulations, constant-flow nodes were used along boundaries in layers 2, 3, and 4 so that drawdowns along boundaries could be computed.

During early model simulations it was assumed that there was no significant exchange of water between the Ferron and the enclosing shales in the Blue Gate and Tununk, and the upper and lower boundaries of the Ferron were simulated as being impermeable. Even though the exchange of water is small, these original model simulations indicated that the flow would have to be simulated in the model, particularly in the Ferron outcrop area where water leaks to the Tununk. To simulate flow of water between the Ferron and the shales, the Blue Gate and Tununk (layers 5 and 1) were simulated in all model runs by layers of constant-head nodes. By simulating the shale layers this way, it is assumed that there is unlimited storage of water in the two layers. This of course is not true, but the assumption is reasonable during the time frame and stresses applied because large quantities of water are stored in the shales as compared to flow rates to and from the two layers.

The existing underground coal mine was simulated by six constant-head nodes in layer 4. Potentiometric surfaces at the six nodes were estimated from altitudes of wet and dry areas in the mine.

In the modeled area, water leaks from the aquifer to alluvium along five streams that cross the outcrop area of the Ferron. The leakage rate is dependent upon the difference in altitude between the potentiometric of the aquifer and altitude of water in the alluvium and stream. Nodes where leakage along streams was simulated in the model are shown in figure 3.

Aquifer properties

Transmissivity

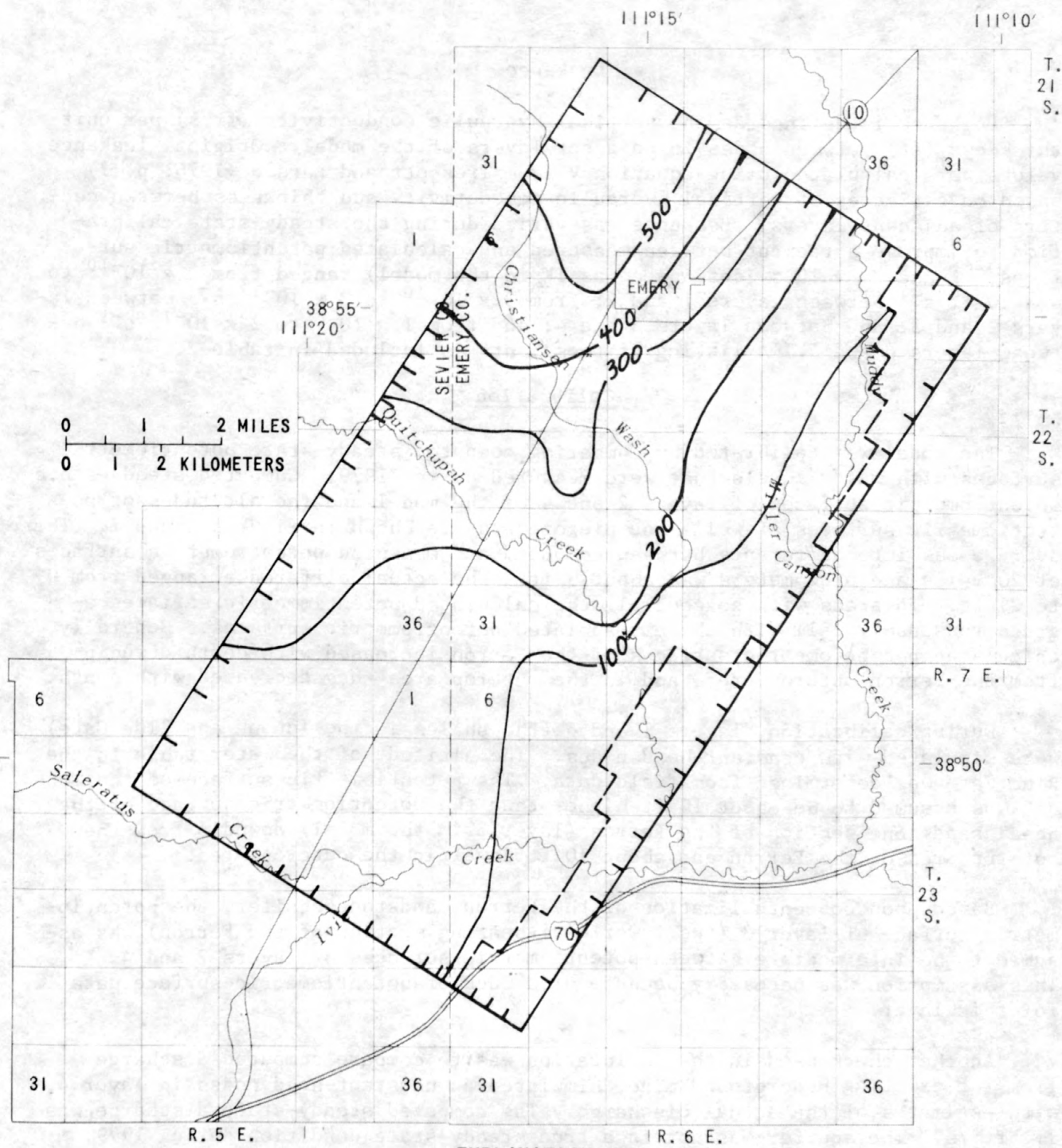
Transmissivity of the Ferron sandstone aquifer, estimated from aquifer tests and from the steady-state calibration, is shown in figure 5. Based on lithology and aquifer tests, transmissivities of layers 2, 3, and 4 (the three layers of the Ferron) are assumed to be approximately 40, 20, and 40 percent of the total aquifer transmissivity in areas where all layers are saturated. Two exceptions to this general distribution of transmissivity exist: (1) Layer 4 has a larger proportion of the transmissivity near the underground mine where the I-J coal seam is thickest, and (2) the northern part of layer 3 has a larger proportion of the transmissivity than the rest of that layer due to the presence of a thick sandstone.

It should be noted that the maximum difference between transmissivities that resulted from model calibration and transmissivities calculated from aquifer tests was about 30 percent, and in most of the model area the difference was less than 10 percent. Laboratory tests on representative cores from the Blue Gate and Tununk indicate that the shales have a hydraulic conductivity of about 1×10^{-5} ft/d. The Blue Gate varies in thickness from a featheredge to 1,200 ft in the modeled area, resulting in a maximum transmissivity of about 1×10^{-2} ft²/d. The Tununk, about 600 ft thick in the modeled area, has a transmissivity of about 6×10^{-3} ft²/d.

Storage coefficient

Aquifer tests on confined parts of the Ferron sandstone aquifer indicate that the storage coefficient ranges from 3×10^{-6} to 2×10^{-3} and averages approximately 1×10^{-4} . During the 15-year transient-predictive simulation, the average value (1×10^{-4}) was assigned to all layers of the Ferron where they are confined either by overlying shale or another layer of the Ferron. In areas where the aquifer is unconfined, a value of 5×10^{-2} was assigned. Storage coefficients for layers 1 and 5 (the shales in the Tununk and Blue Gate) were not estimated for modeling purposes because these layers were simulated by constant-head nodes.

To check the sensitivity of the model to variations in storage coefficient, two additional simulations were made. In one simulation, the storage coefficients in confined areas were set at 1×10^{-5} and in unconfined areas at 1×10^{-2} . In the second run, storage coefficients were set at a 1×10^{-3} in confined areas and at 1×10^{-1} in unconfined areas. The results of these two simulations as compared with the results of the 15-year transient-predictive simulation show that these variations in storage did not seriously change model predictions.



EXPLANATION

—/100— LINE OF EQUAL TRANSMISSIVITY—
Developed from steady-state
model calibration. Interval
100 feet squared per day

— — — — — EASTERN MODEL BOUNDARY FOR
LAYER 2 (BASAL SECTION OF
FERRON)— Except for areas
east of Muddy Creek and
south of Ivie Creek, the
boundary closely approx-
imates line of zero trans-
missivity

Figure 5.— Transmissivity of the Ferron sandstone aquifer resulting from steady-state calibration of the model.

Leakance

Leakance is defined as the vertical hydraulic conductivity (ft/s) per unit thickness (ft) between nodes in adjacent layers of the model. Original leakance values were calculated using equation V from Trescott and Larson (1976, p. 7) based on estimates of vertical hydraulic conductivity and thickness between centers of adjacent layers. Leakance was varied during the steady-state calibration to improve agreement between measured and calculated potentiometric surfaces. Leakance values (designated as TK in the model) ranged from 2×10^{-10} to $4 \times 10^{-14} \text{ s}^{-1}$ between layers 1 and 2; from 3×10^{-10} to $3 \times 10^{-12} \text{ s}^{-1}$ between layers 2 and 3, and between layers 3 and 4; and from 1×10^{-8} to $2 \times 10^{-13} \text{ s}^{-1}$ between layers 4 and 5. A listing of these data is included in table 2.

Calibration

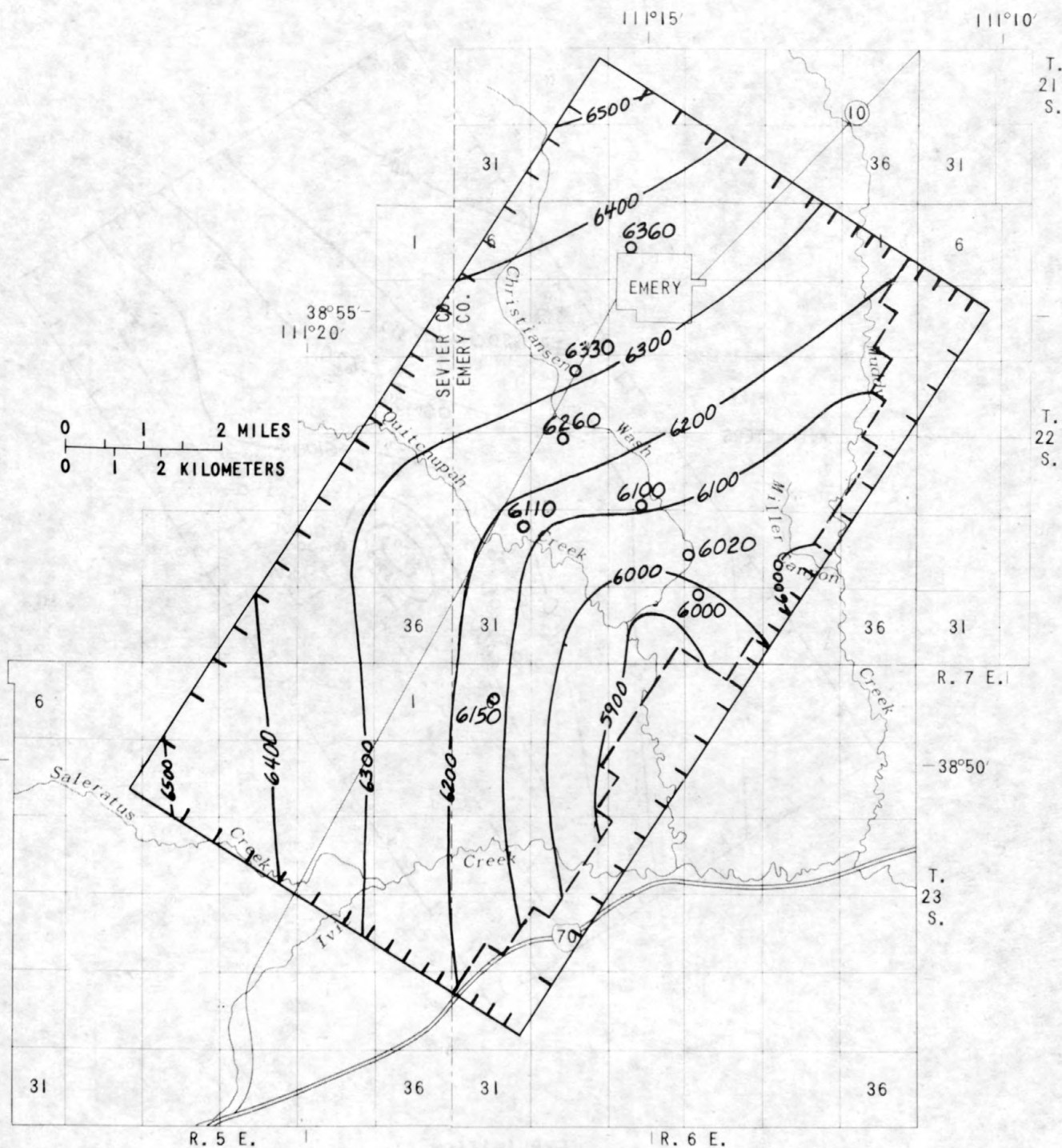
The model was calibrated by comparing computed steady-state potentiometric surfaces with water levels that were measured during 1979. Computed steady-state potentiometric surfaces of layers 2 and 4 of the model and the altitudes of potentiometric surfaces at wells and piezometers are shown in figures 6 and 7. The average absolute difference between computed and measured potentiometric surfaces at 20 wells and piezometers was about 9 ft. The actual difference ranged from 0 to 21 ft. In areas with no control, the calculated potentiometric surfaces agreed reasonably well with the extrapolated potentiometric surfaces. Generally, calculated potentiometric surfaces of the Ferron increased with depth downdip from the Ferron outcrop area, and in the outcrop area they decreased with depth.

During calibration, layers 1 and 5 (the shales in the Tununk and Blue Gate) were simulated with constant-head nodes. The altitude of the water table in the Blue Gate was determined from field data. The potentiometric surface of the Tununk was assumed to be about 10 ft higher than the potentiometric surface of the basal sandstone section of the Ferron (layer 2 in the model) downdip from the outcrop area of the Ferron and about 10 ft lower in the outcrop area.

Based upon conceptualization of the Ferron sandstone aquifer, the potentiometric surface of layer 3 (the lower coal-bearing section of the Ferron) was assumed to be intermediate between potentiometric surfaces of layers 2 and 4. This assumption was necessary because of a lack of potentiometric-surface data for this layer.

Another check used in the calibration was to compare computed discharge from the existing underground mine, simulated as constant-head nodes in layer 4, with estimates of the actual discharge. The computed steady-state discharge was $1.1 \text{ ft}^3/\text{s}$. The aquifer was not in a true steady-state condition during 1979. During the year, mine discharge increased from about $0.6 \text{ ft}^3/\text{s}$ during the first half of the year to about $0.8 \text{ ft}^3/\text{s}$ during the second half.

Transmissivity, leakance, and stream-leakage coefficients were parameters that were varied during the model calibration. Computed steady-state potentiometric surfaces were most sensitive to changes made in transmissivity and leakance. The input data used for the steady-state calibration are listed in table 2.



EXPLANATION

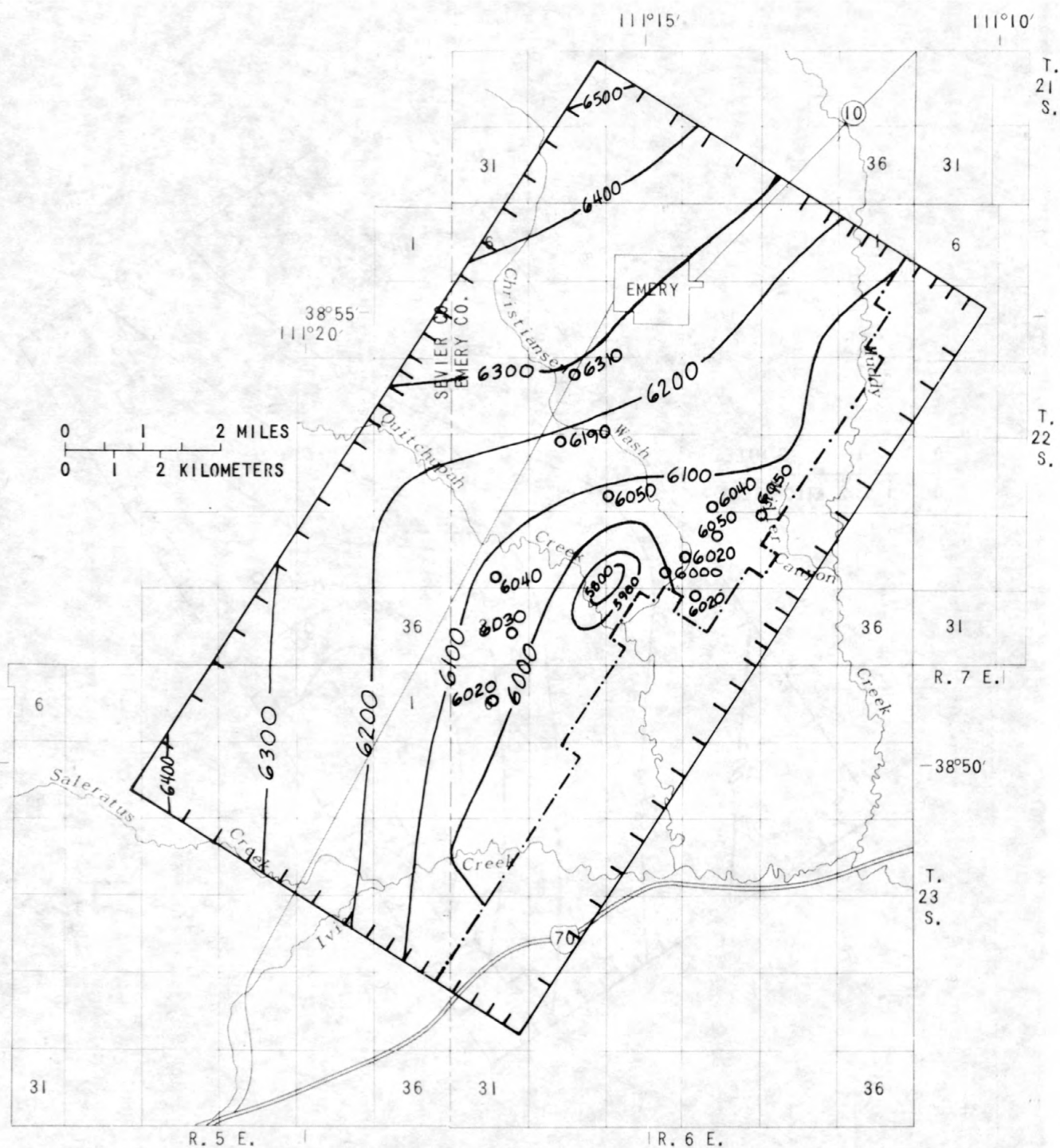
— 6400 — POTENTIOMETRIC CONTOUR — Shows altitude at which water levels would have stood in tightly cased wells that tap the basal section of the Ferron sandstone aquifer (layer 2), 1979, as computed by steady-state model simulation. Contour interval 100 feet. National Geodetic Vertical Datum of 1929

— — — — — EASTERN MODEL BOUNDARY FOR LAYER 2

○
6000

WELL OR PIEZOMETER — Number indicates altitude of potentiometric surface, in feet. National Geodetic Vertical Datum of 1929

Figure 6.— Computed steady-state potentiometric surface of layer 2 and the measured altitude of the potentiometric surface in wells and piezometers.



EXPLANATION

—6300— POTENTIOMETRIC CONTOUR - Shows altitude at which water levels would have stood in tightly cased wells that tap the upper part of the Ferron sandstone aquifer (layer 4), 1979, as computed by steady-state model simulation. Contour interval 100 feet. National Geodetic Vertical Datum of 1929

----- EASTERN MODEL BOUNDARY FOR LAYER 4

6190 WELL OR PIEZOMETER - Number indicates altitude of potentiometric surface, in feet. National Geodetic Vertical Datum of 1929

Figure 7.— Computed steady-state potentiometric surface of layer 4 and the measured altitude of the potentiometric surface in wells and piezometers.

Prediction

Transient analysis

According to the proposed plan for the surface mine, on file with the U.S. Geological Survey in Salt Lake City (March 1980), mining is expected to last for 15 years. Mining will start on the east side of Christiansen Wash and generally proceed northwestward along northeast trending strips, with backfilling of the previously mined strips. It is assumed that the pit will be dewatered, and this was simulated in the transient runs by constant-head nodes in the mine area that were held at the altitude of the mined coal seam. Grid spacing did not permit a precise simulation of the "moving" pit, and an average mine location was simulated. Results of the simulation for 15 years of mine operation show that the system will not reach a true steady-state condition. The predicted drawdowns at the end of 15 years in layer 4, as a result of the mine dewatering, are shown in figure 8. Drawdowns of 5 ft in the potentiometric surface of this layer are predicted to extend as much as 3 mi from the proposed mine after 15 years of operation.

After 15 years of simulated mine dewatering, maximum calculated drawdowns in layers 2 and 3 under the surface mine are 14 and 38 ft. Drawdowns of 5 ft in the potentiometric surfaces of layers 2 and 3 are predicted to extend approximately 2 mi from the mine.

Calculated flow to constant-head nodes that were used to simulate the mine area indicate that discharge from the mine should decrease slightly with time, and it should average about $0.3 \text{ ft}^3/\text{s}$ during the 15 years of operation.

It should be noted that for reasons stated earlier in this report, the model has not been verified with historical data. As a result, predictions made with the model are considered by the authors to be semiquantitative.

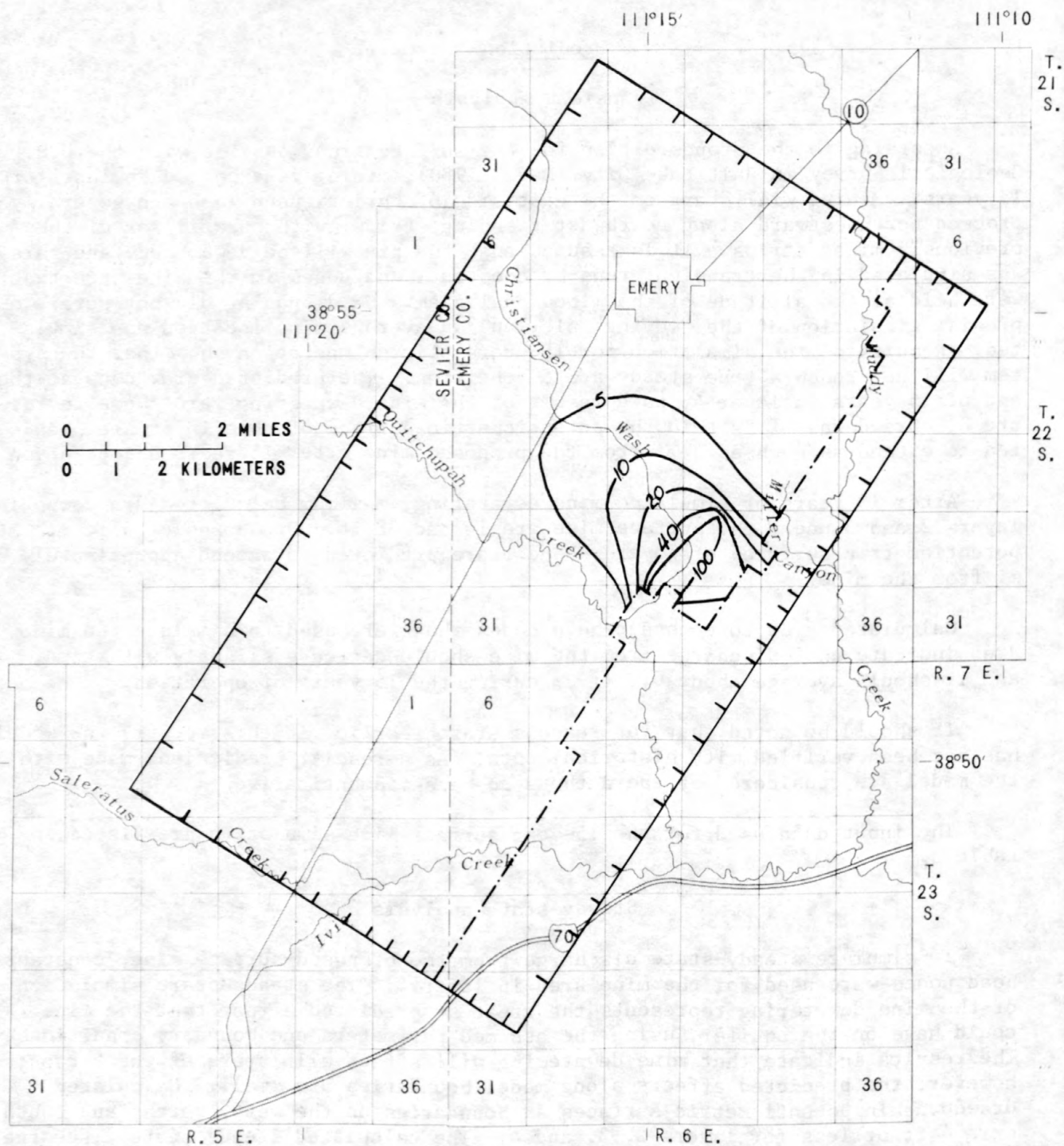
The input data used for the 15-year surface-mine simulation are listed in table 3.

Steady-state analysis

To simulate steady-state discharge from the proposed surface mine, constant-head nodes were used for the mine area in layer 4. The steady-state simulation of the mine dewatering represents the greatest predicted effect that the mine could have on the aquifer, using the assumed parameters and boundary conditions. The results indicate that minedewatering will affect all layers of the Ferron; however, the predicted effects along model boundaries are small. Calculated drawdowns in potentiometric surfaces at boundaries on the west, north, and south were 4 ft or less for layers 2, 3, and 4. The calculated steady-state discharge from the mine was $0.3 \text{ ft}^3/\text{s}$.

NEED FOR FUTURE STUDY

To verify the model and improve model predictions, an observation-well network needs to be established where water levels could be measured semiannually in three or four wells in each layer. Discharge from the Emery municipal well, the Emery Mine, and the surface mine (when operational) also would need to be monitored. After 5 years, the additional data could be used to recalibrate and to verify the model.



EXPLANATION

—20— LINE OF EQUAL PREDICTED DRAWDOWN OF POTENTIOMETRIC SURFACE OF LAYER 4 AROUND PROPOSED SURFACE MINE AFTER 15 YEARS OF OPERATION — Hydraulic heads at beginning of predictive simulation are those calculated by steady-state model calibration. Interval, in feet, is variable

--- EASTERN MODEL BOUNDARY FOR LAYER 4

Figure 8.— Predicted changes in the potentiometric surface of layer 4 after 15 years of operation of proposed surface mine.

SUMMARY

A three-dimensional finite-difference computer model was used to simulate flow in the Ferron sandstone aquifer near Emery, Utah. The model was calibrated by comparing computed potentiometric surfaces from steady-state model simulations with potentiometric surfaces measured during 1979. No transient calibration of the model was possible owing to a lack of historical data.

The model was used to predict changes in the potentiometric surfaces of the aquifer in response to a proposed surface coal mine. A 15-year transient simulation of the mine indicated that true steady-state conditions will not be reached during that time. Drawdown of potentiometric surfaces of as much as 5 ft, caused by the mine dewatering, will not extend more than about 3 mi from the surface mine during the 15 years of expected operation.

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- Trescott, P. C., and Larson, S. P., 1976, Documentation of finite-difference model for simulation of three-dimensional ground-water flow, supplement to Open-File Report 75-438: U.S. Geological Survey Open-File Report 76-591, 21 p.
- Williams, P. L., and Hackman, R. J., 1971, Geology, structure, and uranium deposits of the Salina Quadrangle, Utah: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-591, scale 1:250,000, 2 sheets.

Table 1.--Listing of the model computer program

C	*****	MAN	10*
C	FINITE-DIFFERENCE MODEL	MAN	20*
C	FOR	MAN	30*
C	SIMULATION OF GROUND-WATER FLOW	MAN	40*
C	IN THREE DIMENSIONS	MAN	50*
C		MAN	60*
C	BY P.C. THESCOTT	MAN	70*
C	WITH CONTRIBUTIONS TO MAIN, DATAI, AND SOLVE BY S.P. LARSON	MAN	80*
C	AND MODIFICATIONS THROUGHOUT BY S.D. BARTHOLOMA	MAN	90*
C	U. S. GEOLOGICAL SURVEY	MAN	100*
C		MAN	110*
C	ORIGINAL PROGRAM - SEPTEMBER, 1975	MAN	120*
C	MODIFICATIONS - FEBRUARY, 1979	MAN	130*
C		MAN	140*
C	CHANGES TO THE PROGRAM AS LISTED IN OPEN FILE REPORTS 75-438 AND	MAN	150*
C	76-591 ARE INDICATED BY AN ASTERISK (*) IN COLUMN 80. CHANGES TO	MAN	160*
C	SIMULATE DRAINS AND LEAKAGE TO STREAMS WERE ADAPTED FROM OPEN	MAN	170*
C	FILE REPORT 78-99. THE INPUT AND OUTPUT ROUTINES WERE MODIFIED.	MAN	180*
C	THE COMPUTATIONAL CHANGES WERE COPIED UNCHANGED. THE RECHARGE	MAN	190*
C	FUNCTION OF THE ORIGINAL PROGRAM WAS MODIFIED TO ALLOW RECHARGE	MAN	200*
C	FROM THE LAND SURFACE TO ALL LAYERS.	MAN	210*
C		MAN	220*
C	*** WARNING ***	MAN	230*
C	THIS DECK HAS BEEN RENUMBERED THROUGHOUT. IF YOU WANT TO MAKE	MAN	240*
C	THE MODIFICATIONS INDICATED, CARE WILL BE REQUIRED TO PLACE THE	MAN	250*
C	CHANGES IN THEIR PROPER SEQUENCE.	MAN	260*
C		MAN	270*
C	ALL CHANGES ARE EITHER REPLACEMENTS OR ADDITIONS TO THE ORIGINAL	MAN	280*
C	DECK.	MAN	290*
C		MAN	300*
C	*****	MAN	310*
C	MAIN PROGRAM TO DIMENSION DIGITAL MODEL AND CONTROL SEQUENCE	MAN	320*
C	OF COMPUTATIONS	MAN	330*
C	-----	MAN	340*
C	SPECIFICATIONS:	MAN	350
C	REAL*8 YSTR,TITL	MAN	360*
C		MAN	370
C	DIMENSION Y(50000), L(41), HEADNG(33), NAME(90), INFT(2,5), IOFT(9	MAN	380*
C	1,7), DUM(3)	MAN	390*
C		MAN	400
C	EQUIVALENCE (YSTR,Y(1))	MAN	410
C		MAN	420
C	COMMON /INTEGR/ IO,J0,K0,I1,J1,K1,I,J,K,NPER,KTH,ITMAX,LENGTH,KP,NMAN	MAN	430
C	1WEL,NUMT,IFINAL,IT,KT,IHEAD,IDRAW,IFLO,IERR,I2,J2,K2,IMAX,ITMX1,NCMAN	MAN	440
C	2H,IDK1,IDK2,IWATER,IQRE,IP,JP,IQ,JQ,KQ,IK,JK,K5,IPU1,IPU2,ITK,IEUNMAN	MAN	450*
C	COMMON /SPARAM/ TMAX,CDLT,DELT,ERR,TEST,SUM,SUMP,QR	MAN	460
C	COMMON /SARRAY/ ICHK(13),LEVEL1(9),LEVEL2(9)	MAN	470
C	COMMON /GROUND/ TITL(3),IGRND	MAN	480*
C		MAN	490
C	DATA NAME/2*4H ,4H S,4HTART,4HING ,4HHEAD,4H ,4H STO,4HHRAGMAN	MAN	500
C	1E,4H COE,4HFFIC,4HIENT,2*4H ,4H TR,4HANSM,4HISSI,4HVITY,5*4H	MAN	510


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2  ,4H TK,4H HY,4HDRAU,4MLIC ,4HCOND,4HUCTI,4HVITY,2*4H      ,4HBOTMAN 520
3T,4HOM E,4HLEVA,4HTION,2*4H      ,4H R,4HECHA,4HRGE ,4HHRATE,4H      MAN 530*
4,4HDRAI,4HN NO,4HDE L,4HOCAT,4HIONS,2*4H      ,4H D,4HRAIN,4H LEV,MAN 540*
54HGTHS,2*4H      ,4HDRAI,4HN EL,4HEVAT,4HIONS,4H      ,4HRIVE,4HR NO,4MAN 550*
6HDE L,4HOCAT,4HIONS,3*4H      ,4H RIV,4HER H,4HEADS,3*4H      ,4HRIVE,MAN 560*
74HR BO,4HTTOM,4H      ,4H RI,4HVER ,4HCOEF,4HFICI,4HENTS,2*4H      ,4MAN 570*
8HGROU,4HND E,4HLEVA,4HTION/      MAN 580*
DATA INFT/4H(20F,4H4.0),4H(15F,4H5.0),4H(20F,4H4.2),4H(80I,4H1)      ,MAN 590*
14H(40F,4H2.0)/      MAN 600*
DATA IOFT/4H(1H0,4H,I2,,4H2X,1,4H0F12,4H.0/((,4H5X,1,4H0F12,4H.0)),MAN 610*
14H      ,4H(1H0,4H,IS,,4H10F1,4H2.5/4H(1H ,4H,5X,,4H10F1,4H2.5),4H)MAN 620*
2      ,4H(1H0,4H,IS,,4H10E1,4H2.5/4H(1H ,4H,5X,,4H10E1,4H2.5),4H)      MAN 630*
3,4H(1H0,4H,IS,,4H10E1,4H2.3/4H(1H ,4H,5X,,4H10E1,4H2.3),4H)      ,4HMAN 640*
4(1H0,4H,5X,,4H10F1,4H2.5/4H(1H ,4H,5X,,4H10F1,4H2.5),4H)      ,4H(1HMAN 650*
50,4H,5X,,4H10E1,4H2.5/4H(1H ,4H,5X,,4H10E1,4H2.5),4H)      ,4H(1H0,4HMAN 660*
6H,IS,,4H20I6,4H/(1H,4H ,5X,4H,20I,4H6)) ,2*4H      MAN 670*
C      MAN 680
      DEFINE FILE 2(50,650,U,KKK)      MAN 690*
C      .....MAN 700
C      MAN 710
C      ---READ TITLE, PROGRAM SIZE AND OPTIONS---      MAN 720
      READ (5,200) HEADNG      MAN 730
      WRITE (6,190) HEADNG      MAN 740
      READ (5,160) IO,J0,K0,ITMAX,NCH,ND,NRIV,NRIVN      MAN 750*
      WRITE(6,180) IO,J0,K0,ITMAX,NCH,ND,NRIV,NRIVN      MAN 760*
      READ (5,210) IDRAW,IHEAD,IFLU,IDK1,IDK2,IWATER,IQRE,IPU1,IPU2,ITK      MAN 770
1,IEQN,IGRND      MAN 780*
      WRITE (6,220) IDRAW,IHEAD,IFLU,IDK1,IDK2,IWATER,IQRE,IPU1,IPU2,ITKMAN 790
1,IEQN,IGRND      MAN 800*
      IERR=0      MAN 810
C      MAN 820
C      ---COMPUTE DIMENSIONS FOR ARRAYS---      MAN 830
      J1=J0-1      MAN 840
      I1=I0-1      MAN 850
      K1=K0-1      MAN 860
      I2=I0-2      MAN 870
      J2=J0-2      MAN 880
      K2=K0-2      MAN 890
      IMAX=MAX0(I0,J0)      MAN 900
      NCD=MAX0(1,NCH)      MAN 910
      ITMX1=ITMAX+1      MAN 920
      ISIZ=I0*J0*K0      MAN 930
      IK1=I0*J0      MAN 940
      IK2=MAX0(IK1*K1,1)      MAN 950
      ISUM=2*ISIZ+1      MAN 960
      L(1)=1      MAN 970
      DO 30 I=2,14      MAN 980
      IF (I.NE.8) GO TO 20      MAN 990
      L(8)=ISUM      MAN1000
      ISUM=ISUM+IK2      MAN1010
      IF (IK2.EQ.1) GO TO 10      MAN1020

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IK=I0	MAN1030
JK=J0	MAN1040
KS=K1	MAN1050
GO TO 30	MAN1060
10 IK=1	MAN1070
JK=1	MAN1080
KS=1	MAN1090
GO TO 30	MAN1100
20 L(I)=ISUM	MAN1110
ISUM=ISUM+ISIZ	MAN1120
30 CONTINUE	MAN1130
L(15)=ISUM	MAN1140
ISUM=ISUM+J0	MAN1150
L(16)=ISUM	MAN1160
ISUM=ISUM+I0	MAN1170
L(17)=ISUM	MAN1180
ISUM=ISUM+K0	MAN1190
L(18)=ISUM	MAN1200
ISUM=ISUM+IMAX	MAN1210
L(19)=ISUM	MAN1220
ISUM=ISUM+K0*3	MAN1230
L(20)=ISUM	MAN1240
ISUM=ISUM+ITMX1	MAN1250
L(21)=ISUM	MAN1260
ISUM=ISUM+3*NCD	MAN1270
L(22)=ISUM	MAN1280
ISUM=ISUM+NCD	MAN1290
L(40)=ISUM	MAN1300*
ISUM=ISUM+NCD*2	MAN1310*
L(23)=ISUM	MAN1320
IF (I*ATER.NE.ICHK(6)) GO TO 40	MAN1330
ISUM=ISUM+IK1	MAN1340
L(24)=ISUM	MAN1350
ISUM=ISUM+IK1	MAN1360
IP=I0	MAN1370
JP=J0	MAN1380
GO TO 50	MAN1390
40 ISUM=ISUM+1	MAN1400
L(24)=ISUM	MAN1410
ISUM=ISUM+1	MAN1420
IP=1	MAN1430
JP=1	MAN1440
50 L(25)=ISUM	MAN1450
IF (IQRE.NE.ICHK(7)) GO TO 60	MAN1460
ISUM=ISUM+ISIZ	MAN1470*
IQ=I0	MAN1480
JQ=J0	MAN1490
KQ=K0	MAN1500*
GO TO 70	MAN1510
60 ISUM=ISUM+1	MAN1520
IQ=1	MAN1530

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      JQ=1
      KQ=1
70  IF (ND.EQ.0) GO TO 75
      L(26)=ISUM
      ISUM=ISUM+ISIZ
      L(27)=ISUM
      ISUM=ISUM+ND
      L(28)=ISUM
      ISUM=ISUM+ND
      L(29)=ISUM
      ISUM=ISUM+ND*3
      L(30)=ISUM
      ISUM=ISUM+ND
      L(31)=ISUM
      ISUM=ISUM+ND*2
      GO TO 76
75  L(26)=ISUM
      L(27)=ISUM+1
      L(28)=ISUM+2
      L(29)=ISUM+3
      L(30)=ISUM+4
      L(31)=ISUM+5
      ISUM=ISUM+6
76  IF (NRIV.EQ.0) GO TO 77
      L(32)=ISUM
      ISUM=ISUM+ISIZ
      L(33)=ISUM
      ISUM=ISUM+NRIV
      L(34)=ISUM
      ISUM=ISUM+NRIV
      L(35)=ISUM
      ISUM=ISUM+NRIV
      L(36)=ISUM
      ISUM=ISUM+NRIV*4
      L(37)=ISUM
      ISUM=ISUM+NRIV
      L(38)=ISUM
      ISUM=ISUM+NRIV*2
      L(39)=ISUM
      ISUM=ISUM+NRIV*20
      GO TO 78
77  L(32)=ISUM
      L(33)=ISUM+1
      L(34)=ISUM+2
      L(35)=ISUM+3
      L(36)=ISUM+4
      L(37)=ISUM+5
      L(38)=ISUM+6
      L(39)=ISUM+7
      ISUM=ISUM+8
78  L(41)=ISUM

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MAN1540
MAN1550*
MAN1560*
MAN1570*
MAN1580*
MAN1590*
MAN1600*
MAN1610*
MAN1620*
MAN1630*
MAN1640*
MAN1650*
MAN1660*
MAN1670*
MAN1680*
MAN1690*
MAN1700*
MAN1710*
MAN1720*
MAN1730*
MAN1740*
MAN1750*
MAN1760*
MAN1770*
MAN1780*
MAN1790*
MAN1800*
MAN1810*
MAN1820*
MAN1830*
MAN1840*
MAN1850*
MAN1860*
MAN1870*
MAN1880*
MAN1890*
MAN1900*
MAN1910*
MAN1920*
MAN1930*
MAN1940*
MAN1950*
MAN1960*
MAN1970*
MAN1980*
MAN1990*
MAN2000*
MAN2010*
MAN2020*
MAN2030*
MAN2040*

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	LOC=L(8)*(K-1)*NIJ	MAN2560
110	CALL ARRAY(Y(LOC),INFT(1,1),IOFT(1,3),NAME(19),IRN,DUM)	MAN2570
120	IF (IWATER.NE.ICHK(6)) GO TO 130	MAN2580
	K=K0	MAN2590
	CALL ARRAY(Y(L(23)),INFT(1,1),IOFT(1,4),NAME(25),IRN,DUM)	MAN2600
	CALL ARRAY(Y(L(24)),INFT(1,1),IOFT(1,1),NAME(31),IRN,DUM)	MAN2610
130	IF (IGRND.EQ.ICHK(12))CALL ARRAY(Y(L(41)),INFT(1,2),IOFT(1,1),NAME(185),IRN,DUM)	MAN2620*
	IF (IQRE.NE.ICHK(7)) GO TO 132	MAN2630*
	DO 131 K=1,K0	MAN2640*
	LOC=L(25)*(K-1)*NIJ	MAN2650*
131	CALL ARRAY (Y(LOC),INFT(1,1),IOFT(1,4),NAME(37),IRN,DUM)	MAN2660*
132	CALL MDAT(IRN)	MAN2670*
	IF(ND.EQ.0) GO TO 136	MAN2680*
	NK=0	MAN2690*
	DO 133 K=1,K0	MAN2700*
	LOC=L(26)*(K-1)*NIJ	MAN2710*
133	CALL IARRAY (Y(LOC),INFT(1,4),IOFT(1,7),NAME(43),IRN,DUM,NK,1)	MAN2720*
	IF (NK.EQ.ND) GO TO 134	MAN2730*
	WRITE(6,240)NK,ND	MAN2740*
	STOP	MAN2750*
134	CALL DVECTR (Y(L(27)),INFT(1,5),IOFT(1,6),NAME(49),IRN,DUM)	MAN2760*
	CALL LDCALC	MAN2770*
	CALL DVECTR (Y(L(28)),INFT(1,1),IOFT(1,5),NAME(55),IRN,DUM)	MAN2780*
136	IF(NRIV.EQ.0)GO TO 139	MAN2790*
	CALL RNAME	MAN2800*
	NK=0	MAN2810*
	DO 137 K=1,K0	MAN2820*
	LOC=L(32)*(K-1)*NIJ	MAN2830*
137	CALL IARRAY (Y(LOC),INFT(1,4),IOFT(1,7),NAME(61),IRN,DUM,NK,0)	MAN2840*
	IF(NK.EQ.NRIV) GO TO 138	MAN2850*
	WRITE(6,250)NK,NRIV	MAN2860*
	STOP	MAN2870*
138	CALL RVECTR (Y(L(33)),INFT(1,1),IOFT(1,5),NAME(67),IRN,DUM)	MAN2880*
	CALL RVECTR (Y(L(34)),INFT(1,1),IOFT(1,5),NAME(73),IRN,DUM)	MAN2890*
	CALL RVECTR (Y(L(35)),INFT(1,1),IOFT(1,6),NAME(79),IRN,DUM)	MAN2900*
C		MAN2910*
C	---COMPUTE TRANSMISSIVITY FOR UNCONFINED LAYER---	MAN2920
139	IF (IWATER.EQ.ICHK(6)) CALL TRANS(1)	MAN2930
C		MAN2940*
C	---COMPUTE T COEFFICIENTS---	MAN2950
C	CALL TCOF	MAN2960
C		MAN2970
C	---COMPUTE ITERATION PARAMETERS---	MAN2980
C	CALL ITER	MAN2990
C		MAN3000
C		MAN3010
C	---READ TIME PARAMETERS AND PUMPING DATA FOR A NEW PUMPING PERIOD---	MAN3020
140	CALL NEWPER	MAN3030
C		MAN3040
	KT=0	MAN3050
	IFINAL=0	MAN3060

C		MAN3070
C	---START NEW TIME STEP COMPUTATIONS---	MAN3080
C	150 CALL NEWSTP	MAN3090
C		MAN3100
C	---START NEW ITERATION IF MAXIMUM NO. ITERATIONS NOT EXCEEDED---	MAN3110
C	CALL NEWITA	MAN3120
C		MAN3130
C	---PRINT OUTPUT AT DESIGNATED TIME STEPS---	MAN3140
C	CALL OUTPUT	MAN3150
C		MAN3160
C	---LAST TIME STEP IN PUMPING PERIOD ?---	MAN3170
C	IF (IFINAL.NE.1) GO TO 150	MAN3180
C		MAN3190
C	---CHECK FOR NEW PUMPING PERIOD---	MAN3200
C	IF (KP.LT.NPER) GO TO 140	MAN3210
C		MAN3220
C	STOP	MAN3230
C		MAN3240
C	---FORMATS---	MAN3250
C		MAN3260
C		MAN3270
C		MAN3280
C		MAN3290
	160 FORMAT (8I10)	MAN3300
	170 FORMAT ('0',54X,'WORDS OF VECTOR Y USED =',I7)	MAN3310
	180 FORMAT ('0',62X,'NUMBER OF ROWS =',I5//60X,'NUMBER OF COLUMNS =',I5MAN3320	
	1//61X,'NUMBER OF LAYERS =',I5//39X,'MAXIMUM PERMITTED NUMBER OF ITEMAN3320	
	2RATIONS =',I5//48X,'NUMBER OF CONSTANT HEAD NODES =',I5,/,56X,'NUMMAN3330*	
	3BER OF DRAIN NODES =',I5,/,56X,'NUMBER OF RIVER NODES =',I5,/,56X,MAN3340*	
	4NUMBER OF RIVERS =',I5)	MAN3350*
	190 FORMAT ('1',33A4)	MAN3360
	200 FORMAT (20A4)	MAN3370
	210 FORMAT (16(A4,1X))	MAN3380
	220 FORMAT ('-SIMULATION OPTIONS: ',12('>',A4,'<'))	MAN3390*
	230 FORMAT (1H0,44X,'DIRECTIONAL TRANSMISSIVITY MULTIPLICATION FACTORSMAN3400	
	1 FOR LAYER',I3,/,76X,'X =',G15.7/76X,'Y =',G15.7/76X,'Z =',G15.7)	MAN3410
	240 FORMAT(' ERROR*****NK IS NOT EQUAL TO ND NK=',I5,' ND=',I5)	MAN3420*
	250 FORMAT(' ERROR*****NK IS NOT EQUAL TO NRIV. NK=',I5,' NRIV=',MAN3430*	
	1,I5)	MAN3440*
	END	MAN3450-

	SUBROUTINE DATAI(PHI,STRT,OLD,T,S,TR,TC,TK,WELL,DELX,DELY,DELZ,FACDAT	10
	1,PERM,BOTTOM,QRE,IO,LD,ELD,VDR,IDR,RH,RB,RC,JRV,VRV,NRV,CVOL,GRND	20*
	2,ND,NRIV,NRIVN)	DAT 30*
C	-----	DAT 40
C	READ AND WRITE DATA	DAT 50
C	-----	DAT 60
C		DAT 70
C	SPECIFICATIONS:	DAT 80
	REAL*8 PHI, VDR, VRV, CVOL	DAT 90*
	REAL *8XLABEL,YLABEL,TITLE,XN1,MESUR	DAT 100
	REAL*4 LD	DAT 110*
C		DAT 120
	DIMENSION PHI(IO,J0,K0), STRT(IO,J0,K0), OLD(IO,J0,K0), T(IO,J0,K0	DAT 130
	1), S(IO,J0,K0), TR(IO,J0,K0), TC(IO,J0,K0), TK(IK,JK,K5), WELL(IO,	DAT 140
	2J0,K0), DELX(J0), DELY(IO), DELZ(K0), FACT(K0,3), PERM(IP,JP),	DAT 150
	3TOM(IP,JP),QRE(IQ,JQ,KQ),TF(3),A(IO,J0), IN(6), IOFT(9), INFT(2)	DAT 160*
	4,ID(IO,J0,K0),LD(1),ELD(1),IDH(IO,J0,K0),RH(1),RC(1),RB(1),Q(ND),	DAT 170*
	5R(NRIV), INDEX(IO,J0), JRV(NRIV,4), NRV(NRIVN,20), VDR(ND),	DAT 180*
	6VRV(NRIV), CVOL(NCH), GRND(IO,K0)	DAT 190*
C		DAT 200
	COMMON /INTEGR/ IO,J0,K0,I1,J1,K1,I,J,K,NPER,KTH,ITMAX,LENGTH,KP,ND	DAT 210
	1WEL,NUMT,IFINAL,IT,KT,IHEAD,IDRAW,IFLO,IERR,I2,J2,K2,IMAX,ITMX1,NCD	DAT 220
	2H,IDK1,IDK2,IWATER,IQRE,IP,JP,IQ,JQ,KQ,IK,JK,K5,IPU1,IPU2,ITK,IEUN	DAT 230*
	COMMON /SPARAM/ TMAX,CDLT,DELT,ERR,TEST,SUM,SUMP,QR	DAT 240
	COMMON /SARRAY/ ICHK(13),LEVEL1(9),LEVEL2(9)	DAT 250
	COMMON /CK/ ETFLXT,STORT,QRET,CHST,CHOT,FLUXT,PUMPT,CFLUXT,FLXNT	DAT 260
	COMMON /PR/ XLABEL(3),YLABEL(6),TITLE(6),XN1,MESUR,PRNT(122),BLANK	DAT 270
	1(60),DIGIT(122),VF1(6),VF2(6),VF3(7),XSCALE,DINCH,SYM(17),XN(100),	DAT 280
	2YN(13),NA(4),N1,N2,N3,YSCALE,FACT1,FACT2	DAT 290
	RETURN	DAT 300
C		DAT 310
C	*****	DAT 320
	ENTRY DATAIN	DAT 330
C	*****	DAT 340
C		DAT 350
C	---READ AND WRITE SCALAR PARAMETERS---	DAT 360
	READ (5,330) NPER,KTH,ERR,LENGTH	DAT 370
	WRITE (6,340) NPER,KTH,ERR	DAT 380
	READ (5,460) XSCALE,YSCALE,DINCH,FACT1,(LEVEL1(I),I=1,9),FACT2,(	DAT 390
	LEVEL2(I),I=1,9),MESUR	DAT 400
	IF (XSCALE.NE.0.) WRITE (6,470) XSCALE,YSCALE,MESUR,MESUR,DINCH,	DAT 410
	FACT1,LEVEL1,FACT2,LEVEL2	DAT 420
C		DAT 430
C	---READ CUMULATIVE MASS BALANCE PARAMETERS---	DAT 440
	READ (5,450) SUM,SUMP,PUMPT,CFLUXT,QRET,CHST,CHOT,FLUXT,STORT,ETFL	DAT 450
	XT,FLXNT	DAT 460
	IF (IDK1.EQ.ICHK(4)) GO TO 20	DAT 470
	IF (IPU1.NE.ICHK(8)) GO TO 50	DAT 480
C		DAT 490
C	---READ INITIAL HEAD VALUES FROM CARDS---	DAT 500
	DO 10 K=1,K0	DAT 510

	DO 10 I=1,I0	DAT 520
	10 READ (5,360) (PHI(I,J,K),J=1,J0)	DAT 530
	GO TO 30	DAT 540
C		DAT 550
C	---READ INITIAL HEAD AND MASS BALANCE PARAMETERS FROM DISK---	DAT 560
	20 READ (4) PHI,SUM,SUMP,PUMPT,CFLUXT,QRET,CHST,CHOT,FLUXT,STORT,ETFLD	DAT 570
	1XT,FLXNT	DAT 580
	REWIND 4	DAT 590
	30 WRITE (6,430) SUM	DAT 600
	DO 40 K=1,K0	DAT 610
	WRITE (6,440) K	DAT 620
	DO 40 I=1,I0	DAT 630
	40 WRITE (6,350) I,(PHI(I,J,K),J=1,J0)	DAT 640
C		DAT 650
	50 DO 60 K=1,K0	DAT 660
	DO 60 I=1,I0	DAT 670
	DO 60 J=1,J0	DAT 680
	WELL(I,J,K)=0.	DAT 690
	TR(I,J,K)=0.	DAT 700
	TC(I,J,K)=0.	DAT 710
	IF (K.NE.K0) TK(I,J,K)=0.	DAT 720
	60 CONTINUE	DAT 730
	RETURN	DAT 740
C	*****	DAT 750
	ENTRY ARRAY(A,INFT,IOFT,IN,IRN,TF)	DAT 760
C	*****	DAT 770
	READ (5,330) FAC,IVAR,IPRN,TF,IREFS,IREFD	DAT 780
	IC=4*[IREFS+2*IVAR+IPRN+1	DAT 790
	GO TO (70,70,90,90,120,120), IC	DAT 800
	70 DO 80 I=1,I0	DAT 810
	DO 80 J=1,J0	DAT 820
	80 A(I,J)=FAC	DAT 830
	WRITE (6,280) IN,FAC,K	DAT 840
	GO TO 140	DAT 850
	90 IF (IC.EQ.3) WRITE (6,290) IN,K	DAT 860
	DO 110 I=1,I0	DAT 870
	READ (5,INFT) (A(I,J),J=1,J0)	DAT 880
	DO 100 J=1,J0	DAT 890
	100 A(I,J)=A(I,J)*FAC	DAT 900
	110 IF (IC.EQ.3) WRITE (6,IOFT) I,(A(I,J),J=1,J0)	DAT 910
	GO TO 140	DAT 920
	120 READ (2,IRN) A	DAT 930
	IF (IC.EQ.6) GO TO 140	DAT 940
	WRITE (6,290) IN,K	DAT 950
	DO 130 I=1,I0	DAT 960
	130 WRITE (6,IOFT) I,(A(I,J),J=1,J0)	DAT 970
	140 IF (IREFD.EQ.1) WRITE (2,IRN) A	DAT 980
	IRN=IRN+1	DAT 990
	RETURN	DAT1000
C	*****	DAT1010
	ENTRY MDAT(IRN)	DAT1020*

C	*****	DAT1030
	DO 150 K=1,K0	DAT1040
	DO 150 I=1,I0	DAT1050
	DO 150 J=1,J0	DAT1060
	IF (I.EQ.1.OR.I.EQ.I0.OR.J.EQ.1.OR.J.EQ.J0) T(I,J,K)=0.	DAT1070
	IF (IDK1.NE.ICHK(4).AND.IPU1.NE.ICHK(8)) PHI(I,J,K)=STRT(I,J,K)	DAT1080
	IF (K.NE.K0.OR.IWATER.NE.ICHK(6)) GO TO 150	DAT1090
	IF (I.EQ.1.OR.I.EQ.I0.OR.J.EQ.1.OR.J.EQ.J0) PERM(I,J)=0.	DAT1100
150	CONTINUE	DAT1110
C	 DELX	DAT1120
	READ (5,330) FAC,IVAR,IPRN,TF,IRECS,IRECD	DAT1130*
	IF(IRECS.NE.1) GO TO 155	DAT1140*
	READ (2*IRN) DELX	DAT1150*
	GO TO 175	DAT1160*
155	IF (IVAR.EQ.1) READ (5,480) (DELX(J),J=1,J0)	DAT1170*
	DO 170 J=1,J0	DAT1180
	IF (IVAR.NE.1) GO TO 160	DAT1190
	DELX(J)=DELX(J)*FAC	DAT1200
	GO TO 170	DAT1210
160	DELX(J)=FAC	DAT1220
170	CONTINUE	DAT1230
175	IF(IPRN.NE.1.AND.(IVAR.EQ.1.OR.IRECS.EQ.1)) WRITE(6,370) (DELX(J),	DAT1240*
	1J=1,J0)	DAT1250*
	IF(IVAR.EQ.0.AND.IRECS.NE.1) WRITE(6,300) FAC	DAT1260*
	IF (IRECD.EQ.1) WRITE (2*IRN) DELX	DAT1270*
	IRN=IRN+1	DAT1280*
C	 DELY	DAT1290
	READ (5,330) FAC,IVAR,IPRN,TF,IRECS,IRECD	DAT1300*
	IF(IRECS.NE.1) GO TO 178	DAT1310*
	READ (2*IRN) DELY	DAT1320*
	GO TO 195	DAT1330*
178	IF (IVAR.EQ.1) READ (5,480) (DELY(I),I=1,I0)	DAT1340*
	DO 190 I=1,I0	DAT1350
	IF (IVAR.NE.1) GO TO 180	DAT1360
	DELY(I)=DELY(I)*FAC	DAT1370
	GO TO 190	DAT1380
180	DELY(I)=FAC	DAT1390
190	CONTINUE	DAT1400
195	IF(IPRN.NE.1.AND.(IVAR.EQ.1.OR.IRECS.EQ.1)) WRITE(6,380) (DELY(I),	DAT1410*
	1I=1,I0)	DAT1420*
	IF(IVAR.EQ.0.AND.IRECS.NE.1) WRITE(6,310) FAC	DAT1430*
	IF (IRECD.EQ.1) WRITE (2*IRN) DELY	DAT1440*
	IRN=IRN+1	DAT1450*
C	 DELZ	DAT1460
	READ (5,330) FAC,IVAR,IPRN,TF,IRECS,IRECD	DAT1470*
	IF(IRECS.NE.1) GO TO 198	DAT1480*
	READ (2*IRN) DELZ	DAT1490*
	GO TO 215	DAT1500*
198	IF (IVAR.EQ.1) READ (5,480) (DELZ(K),K=1,K0)	DAT1510*
	DO 210 K=1,K0	DAT1520
	IF (IVAR.NE.1) GO TO 200	DAT1530

DELZ(K)=DELZ(K)*FAC	DAT1540
GO TO 210	DAT1550
200 DELZ(K)=FAC	DAT1560
210 CONTINUE	DAT1570
215 IF (IPRN.NE.1.AND.(IVAR.EQ.1.OR.IRECS.EQ.1)) WRITE(6,390) (DELZ(K),	DAT1580*
1K=1,K0)	DAT1590*
IF (IVAR.EQ.0.AND.IRECS.NE.1) WRITE(6,320) FAC	DAT1600*
IF (IRECD.EQ.1) WRITE (2,IRN) DELZ	DAT1610*
IRN=IRN+1	DAT1620*
C	DAT1630
C ---INITIALIZE VARIABLES---	DAT1640
B=0.	DAT1650
D=0.	DAT1660
F=0.	DAT1670
H=0.	DAT1680
SU=0.	DAT1690
Z=0.	DAT1700
IF (XSCALE.NE.0.) CALL MAP	DAT1710
RETURN	DAT1720
C *****	DAT1730*
ENTRY IARRAY (INDEX,INFT,IOFT,IN,IRN,TF,NK,IFLAG)	DAT1740*
C *****	DAT1750*
READ (5,330) FAC,IVAR,IPRN,TF,IRECS,IRECD	DAT1760*
IC=4*IRECS+2*IVAR+IPRN+1	DAT1770*
GO TO (5070,5070,5090,5090,5120,5120), IC	DAT1780*
5070 DO 5080 I=1,I0	DAT1790*
DO 5080 J=1,J0	DAT1800*
5080 INDEX(I,J)=FAC	DAT1810*
WRITE (6,280) IN,FAC,K	DAT1820*
GO TO 5140	DAT1830*
5090 IF (IC.EQ.3) WRITE (6,290) IN,K	DAT1840*
DO 5110 I=1,I0	DAT1850*
READ (5,INFT) (INDEX(I,J),J=1,J0)	DAT1860*
DO 5100 J=1,J0	DAT1870*
IF (INDEX(I,J).EQ.0) GO TO 5100	DAT1880*
NK=NK+1	DAT1890*
IF (IFLAG.EQ.1) GO TO 5095	DAT1900*
JRV(NK,1)=K	DAT1910*
JRV(NK,2)=I	DAT1920*
JRV(NK,3)=J	DAT1930*
JRV(NK,4)=INDEX(I,J)	DAT1940*
IF (INDEX(I,J).LE.NRIVN) GO TO 5095	DAT1950*
WRITE(6,550) INDEX(I,J),NRIVN	DAT1960*
STOP	DAT1970*
5095 INDEX(I,J)=NK	DAT1980*
5100 CONTINUE	DAT1990*
5110 IF (IC.EQ.3) WRITE (6,IOFT) I,(INDEX(I,J),J=1,J0)	DAT2000*
GO TO 5140	DAT2010*
5120 READ (2,IRN) INDEX	DAT2020*
IF (IFLAG.EQ.1) GO TO 5121	DAT2030*
IRN1=IRN+1	DAT2040*

READ(2,IRN1) JRV	DAT2050*
5121 DO 5125 I=1,I0	DAT2060*
DO 5125 J=1,J0	DAT2070*
IF (INDEX(I,J).EQ.0) GO TO 5125	DAT2080*
NK=NK+1	DAT2090*
INDEX(I,J)=NK	DAT2100*
5125 CONTINUE	DAT2110*
IF (IC.EQ.6) GO TO 5140	DAT2120*
WRITE (6,290) IN,K	DAT2130*
DO 5130 I=1,I0	DAT2140*
5130 WRITE (6,IOFT) I,(INDEX(I,J),J=1,J0)	DAT2150*
5140 IF (IRECD.NE.1) GO TO 5150	DAT2160*
WRITE(2,IRN) INDEX	DAT2170*
IF(IFLAG.EQ.1)GO TO 5150	DAT2180*
IRN1=IRN+1	DAT2190*
WRITE(2,IRN1) JRV	DAT2200*
5150 IRN=IRN+1	DAT2210*
IF(IFLAG.NE.1)IRN=IRN+1	DAT2220*
RETURN	DAT2230*
C *****	DAT2240*
ENTRY RNAME	DAT2250*
C *****	DAT2260*
WRITE(6,540)	DAT2270*
DO 6010 I=1,NRIVN	DAT2280*
READ(5,520) (NRV(I,J),J=1,20)	DAT2290*
WRITE(6,530) I,(NRV(I,J),J=1,20)	DAT2300*
6010 CONTINUE	DAT2310*
RETURN	DAT2320*
C *****	DAT2330*
ENTRY LDCALC	DAT2340*
C *****	DAT2350*
DO 2000 K=1,K0	DAT2360*
DO 2000 I=1,I0	DAT2370*
DO 2000 J=1,J0	DAT2380*
L=ID(I,J,K)	DAT2390*
IF (L.EQ.0)GO TO 2000	DAT2400*
LD(L)=LD(L)*T(I,J,K)/(DELX(J)*DELY(I))	DAT2410*
2000 CONTINUE	DAT2420*
RETURN	DAT2430*
C *****	DAT2440*
ENTRY DVECTR (Q,INFT,IOFT,IN,IRN,TF)	DAT2450*
C *****	DAT2460*
READ(5,330) FAC,IVAR,IPRN,TF,IRECS,IRECD	DAT2470*
IC=4*IRECS+2*IVAR+IPRN+1	DAT2480*
GO TO (3070,3070,3090,3090,3120,3120), IC	DAT2490*
3070 DO 3080 I=1,NO	DAT2500*
3080 Q(I)=FAC	DAT2510*
WRITE (6,500) IN,FAC	DAT2520*
GO TO 3140	DAT2530*
3090 IF (IC.EQ.3) WRITE (6,510) IN	DAT2540*
READ (5,INFT) (Q(I),I=1,NO)	DAT2550*

DO 3100 I=1,ND	DAT2560*
3100 Q(I)=Q(I)*FAC	DAT2570*
IF (IC.EQ.3) WRITE(6,IOFT) (Q(I),I=1,ND)	DAT2580*
GO TO 3140	DAT2590*
3120 READ (2*IRN) Q	DAT2600*
IF (IC.EQ.6) GO TO 3140	DAT2610*
WRITE(6,510) IN	DAT2620*
WRITE(6,IOFT) (Q(I),I=1,ND)	DAT2630*
3140 IF (IRECD.EQ.1) WRITE (2*IRN) Q	DAT2640*
IRN=IRN+1	DAT2650*
RETURN	DAT2660*
C *****	DAT2670*
ENTRY RVECTR (R,INFT,IOFT,IN,IRN,TF)	DAT2680*
C *****	DAT2690*
READ(5,330) FAC,IVAR,IPRN,TF,IRECS,IRECD	DAT2700*
IC=4*IRECS+2*IVAR+IPRN+1	DAT2710*
GO TO (4070,4070,4090,4090,4120,4120), IC	DAT2720*
4070 DO 4080 I=1,NRIV	DAT2730*
4080 R(I)=FAC	DAT2740*
WRITE (6,500) IN,FAC	DAT2750*
GO TO 4140	DAT2760*
4090 IF (IC.EQ.3) WRITE(6,510) IN	DAT2770*
READ (5,INFT) (R(I),I=1,NRIV)	DAT2780*
DO 4100 I=1,NRIV	DAT2790*
4100 R(I)=R(I)*FAC	DAT2800*
IF (IC.EQ.3) WRITE(6,IOFT) (R(I),I=1,NRIV)	DAT2810*
GO TO 4140	DAT2820*
4120 READ(2*IRN) R	DAT2830*
IF (IC.EQ.6) GO TO 4140	DAT2840*
WRITE(6,510) IN	DAT2850*
WRITE(6,IOFT) (R(I),I=1,NRIV)	DAT2860*
4140 IF (IRECD.EQ.1) WRITE (2*IRN) R	DAT2870*
IRN=IRN+1	DAT2880*
RETURN	DAT2890*
C *****	DAT2900*
C ---READ TIME PARAMETERS AND PUMPING DATA FOR A NEW PUMPING PERIOD	DAT2910*
C *****	DAT2920*
ENTRY NEWPER	DAT2930*
C *****	DAT2940*
C *****	DAT2950*
READ(5,330) KP,KPM1,NWEL,TMAX,NUMT,CDLT,DELT,IRECH	DAT2960*
IF (IRECH.EQ.1) READ(3) QRE	DAT2970*
C *****	DAT2980*
C ---COMPUTE ACTUAL DELT AND NUMT---	DAT2990*
DT=DELT/24.	DAT3000*
TM=0.0	DAT3010*
DO 220 I=1,NUMT	DAT3020*
DT=CDLT*DT	DAT3030*
TM=TM+DT	DAT3040*
IF (TM.GE.TMAX) GO TO 230	DAT3050*
220 CONTINUE	DAT3060*

	GO TO 240	DAT3070
230	DELT=TMX/TM*DELT	DAT3080
	NUMT=I	DAT3090
240	WRITE (6,400) KP,TMAX,NUMT,DELT,CDLT	DAT3100
	DELT=DELT*3600.	DAT3110
	TMAX=TMAX*86400.	DAT3120
	SUMP=0.0	DAT3130
C		DAT3140
C	---READ AND WRITE WELL PUMPING RATES---	DAT3150
	WRITE (6,410) NWEL	DAT3160
	IF (NWEL.EQ.0) GO TO 260	DAT3170
	DO 245 K=1,K0	DAT3180
	DO 245 I=1,I0	DAT3190
	DO 245 J=1,J0	DAT3200
245	WELL(I,J,K)=0.0	DAT3210
	DO 250 II=1,NWEL	DAT3220
	READ (5,330) K,I,J,WELL(I,J,K)	DAT3230
	WRITE (6,420) K,I,J,WELL(I,J,K)	DAT3240
250	WELL(I,J,K)=WELL(I,J,K)/(DELT(J)*DELT(I))	DAT3250
	IF(NCH.LE.0)GO TO 253	DAT3260*
	DO 252 I=1,NCH	DAT3270*
252	CVOL(I)=0.000	DAT3280*
253	IF (ND.LE.0) GO TO 255	DAT3290*
	DO 254 I=1,ND	DAT3300*
254	VDR(I)=0.000	DAT3310*
255	IF (NRIV.LE.0)GO TO 260	DAT3320*
	DO 256 I=1,NRIV	DAT3330*
256	VRV(I)=0.000	DAT3340*
260	RETURN	DAT3350
C		DAT3360
C	---FORMATS---	DAT3370
C		DAT3380
C		DAT3390
C		DAT3400
280	FORMAT (1H0,52X,6A4,' =',G15.7,' FOR LAYER',I3)	DAT3410
290	FORMAT (1H1,45X,6A4,' MATRIX: LAYER',I3/46X,41(' - '))	DAT3420
300	FORMAT ('0',72X,'DELX =',G15.7)	DAT3430
310	FORMAT ('0',72X,'DELY =',G15.7)	DAT3440
320	FORMAT ('0',72X,'DELZ =',G15.7)	DAT3450
330	FORMAT (8G10.0)	DAT3460
340	FORMAT ('0',51X,'NUMBER OF PUMPING PERIODS =',I5/49X,'TIME STEPS BETWEEN PRINTOUTS =',I5/51X,'ERROR CRITERIA FOR CLOSURE =',G15.7/)	DAT3470
350	FORMAT ('0',I2,2X,20F6.1/(5X,20F6.1))	DAT3490
360	FORMAT (8F10.4)	DAT3500
370	FORMAT (1H1,46X,40HGRID SPACING IN PROTOTYPE IN X DIRECTION/47X,40D12F10.0)	DAT3510
	1(' - ')/(10',12F10.0))	DAT3520
380	FORMAT (1H-,46X,40HGRID SPACING IN PROTOTYPE IN Y DIRECTION/47X,40D12F10.0)	DAT3530
	1(' - ')/(10',12F10.0))	DAT3540
390	FORMAT (1H-,46X,40HGRID SPACING IN PROTOTYPE IN Z DIRECTION/47X,40D12F10.0)	DAT3550
	1(' - ')/(10',12F10.0))	DAT3560
400	FORMAT ('-',50X,'PUMPING PERIOD NO.',I4,':',F10.2,' DAYS'/51X,38(' DAT3570	

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1-')//53X,'NUMBER OF TIME STEPS=',I6//59X,'DELT IN HOURS =',F10.3//DAT3580
253X,'MULTIPLIER FOR DELT =',F10.3) DAT3590
410 FORMAT ('-',63X,I4,' WELLS'/65X,9(')-')//50X,'K',9X,'I',9X,'J PUDAT3600
IMPING RATE'/) DAT3610
420 FORMAT (41X,3I10.2F13.2) DAT3620
430 FORMAT ('-',40X,' CONTINUATION - HEAD AFTER ',G20.7,' SEC PUMPING DAT3630
1'/42X,58(')-')) DAT3640
440 FORMAT ('1',55X,'INITIAL HEAD MATRIX, LAYER',I3/56X,30(')-')) DAT3650
450 FORMAT (4G20.10) DAT3660
460 FORMAT (3G10.0,2(G10.0,9I1,1X),A8) DAT3670
470 FORMAT ('0',30X,'ON ALPHAMERIC MAP:'/40X,'MULTIPLICATION FACTOR FOR DAT3680
1R X DIMENSION =',G15.7/40X,'MULTIPLICATION FACTOR FOR Y DIMENSION DAT3690
2=',G15.7/55X,'MAP SCALE IN UNITS OF ',A11/50X,'NUMBER OF ',A8,' PDAT3700
3ER INCH =',G15.7/43X,'MULTIPLICATION FACTOR FOR DRAWDOWN =',G15.7,DAT3710
4' PRINTED FOR LAYERS',9I2/47X,'MULTIPLICATION FACTOR FOR HEAD =',G0AT3720
515.7,' PRINTED FOR LAYERS',9I2) DAT3730
480 FORMAT (16F5.4) DAT3740*
500 FORMAT (1H0,52X,6A4,' =',G15.7) DAT3750*
510 FORMAT (1H0,45X,6A4,' MATRIX'/46X,41(')-')) DAT3760*
520 FORMAT(20A4) DAT3770*
530 FORMAT(' RIVER NUMBER',I5,5X,20A4) DAT3780*
540 FORMAT(' RIVER NAMES FOLLOW: ',/) DAT3790*
550 FORMAT(' TOO HIGH A RIVER NUMBER ENCOUNTERED. PROGRAM HALTS. RIV DAT3800*
1ER NUMBER IS',I5,' NUMBER OF RIVERS IS',I5) DAT3810*
END DAT3820-

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SUBROUTINE STEP(PHI,STRT,OLD,T,S,TR,TC,TK,WELL,DELX,DELY,DELZ,FACTSTP 10
1,DDN,TEST3) STP 20
C -----STP 30
C INITIALIZE DATA FOR A NEW TIME STEP AND PRINT RESULTS STP 40
C -----STP 50
C STP 60
C SPECIFICATIONS: STP 70
C REAL *8PHI STP 80
C REAL *8XLABEL,YLABEL,TITLE,XN1,MESUR,TITL STP 90
C STP 100
C DIMENSION PHI(I0,J0,K0), STRT(I0,J0,K0), OLD(I0,J0,K0), T(I0,J0,K0)STP 110
1), S(I0,J0,K0), TR(I0,J0,K0), TC(I0,J0,K0), TK(IK,JK,K5), WELL(I0,STP 120
2J0,K0), DELX(J0), DELY(I0), DELZ(K0), FACT(K0,3), DDN(IMAX), TEST3STP 130
3(ITMX1), ITTO(50) STP 140
C STP 150
C COMMON /INTEGR/ I0,J0,K0,I1,J1,K1,I,J,K,NPER,KTH,ITMAX,LENGTH,KP,NSTP 160
1WEL,NUMT,IFINAL,IT,KT,IHEAD,IDRAW,IFLO,IERR,I2,J2,K2,IMAX,ITMX1,NCSTP 170
2H,IDX1,IDX2,IWATER,IQRE,IP,JP,IQ,JQ,KQ,IK,JK,K5,IPU1,IPU2,ITK,IEQNSTP 180*
COMMON /SPARAM/ TMAX,CDLT,DELT,ERR,TEST,SUM,SUMP,QR STP 190
COMMON /SARRAY/ ICHK(13),LEVEL1(9),LEVEL2(9) STP 200
COMMON /CK/ ETFLXT,STORT,QRET,CHST,CHDT,FLUXT,PUMPT,CFLUXT,FLXNT STP 210
COMMON /PR/ XLABEL(3),YLABEL(6),TITLE(6),XN1,MESUR,PRNT(122),BLANKSTP 220
1(60),DIGIT(122),VF1(6),VF2(6),VF3(7),XSCALE,DINCH,SYM(17),XN(100),STP 230
2YN(13),NA(4),N1,N2,N3,YSCALE,FACT1,FACT2 STP 240
COMMON /GROUND/ TITL(3),IGRNU STP 250*
RETURN STP 260
C .....STP 270
C *****STP 280
C ENTRY NEWSTP STP 290
C *****STP 300
KT=KT+1 STP 310
IT=0 STP 320
DO 10 K=1,K0 STP 330
DO 10 I=1,I0 STP 340
DO 10 J=1,J0 STP 350
10 OLD(I,J,K)=PHI(I,J,K) STP 360
DELT=CDLT*DELT STP 370
SUM=SUM+DELT STP 380
SUMP=SUMP+DELT STP 390
DAYSP=SUMP/86400. STP 400
YRSP=DAYSP/365. STP 410
HRS=SUM/3600. STP 420
SMIN=HRS*60. STP 430
DAYS=HRS/24. STP 440
YRS=DAYS/365. STP 450
RETURN STP 460
C STP 470
C ---PRINT OUTPUT AT DESIGNATED TIME STEPS--- STP 480
C *****STP 490
C ENTRY OUTPUT STP 500
C *****STP 510

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	IF (KT.EQ.NUMT) IFINAL=1	STP 520
	ITTO(KT)=IT	STP 530
	IF (IT.LE.ITMAX) GO TO 20	STP 540
	IT=IT-1	STP 550
	ITTO(KT)=IT	STP 560
	IERR=2	STP 570
C		STP 580
C	---IF MAXIMUM ITERATIONS EXCEEDED,WRITE RESULTS ON DISK OR CARDS---	STP 590
	IF (IDK2.EQ.ICHK(5)) WRITE (4) PHI,SUM,SUMP,PUMPT,CFLUXT,QRET,CHST	STP 600
	1,CHDT,FLUXT,STORT,ETFLXT,FLXNT	STP 610
	IF (IPU2.EQ.ICHK(9)) WRITE (7,230) SUM,SUMP,PUMPT,CFLUXT,QRET,CHST	STP 620
	1,CHDT,FLUXT,STORT,ETFLXT,FLXNT	STP 630
C		STP 640
	20 IF (IFLO.EQ.ICHK(3)) CALL CHECK	STP 650
	IF (IERR.EQ.2) GO TO 30	STP 660
	IF (MOD(KT,KTH).NE.0.AND.IFINAL.NE.1) RETURN	STP 670
	30 WRITE (6,210) KT,DELT,SUM,SMIN,HRS,DAYS,YRS,DAYSP,YRSP	STP 680
	IF (IFLO.EQ.ICHK(3)) CALL CWRITE	STP 690
	IT=IT+1	STP 700
	WRITE (6,130) (TEST3(J),J=1,IT)	STP 710
	I3=1	STP 720
	I5=0	STP 730
	352 IS=IS+40	STP 740
	I4=MIN0(KT,IS)	STP 750
	WRITE (6,240) (I,I=I3,I4)	STP 760
	WRITE (6,260)	STP 770
	WRITE (6,250) (ITTO(I),I=I3,I4)	STP 780
	WRITE (6,260)	STP 790
	IF (KT.LE.IS) GO TO 353	STP 800
	I3=I3+40	STP 810
	GO TO 352	STP 820
C		STP 830
C	---PRINT MAPS---	STP 840
	353 IF (XSCALE.EQ.0.) GO TO 61	STP 850*
	IF (FACT1.EQ.0.) GO TO 50	STP 860
	DO 40 IA=1,9	STP 870
	II=LEVEL1(IA)	STP 880
	IF (II.EQ.0) GO TO 50	STP 890
	40 CALL PRNTA(1,II)	STP 900
	50 IF (FACT2.EQ.0.) GO TO 61	STP 910*
	DO 60 IA=1,9	STP 920
	II=LEVEL2(IA)	STP 930
	IF (II.EQ.0) GO TO 61	STP 940*
	60 CALL PRNTA(2,II)	STP 950
	61 IF (IGRND.NE.ICHK(12)) GO TO 70	STP 960*
	DO 62 II=1,K0	STP 970*
	62 CALL PRNTA(3,II)	STP 980*
	70 IF (IDRAW.NE.ICHK(1)) GO TO 100	STP 990
C		STP1000
C	---PRINT DRAWDOWN---	STP1010
	DO 90 K=1,K0	STP1020

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      WRITE (6,200) K                                STP1030
      DO 90 I=1,I0                                    STP1040
      DO 80 J=1,J0                                    STP1050
      80 DDN(J)=STRT(I,J,K)-PHI(I,J,K)                STP1060
      90 WRITE (6,170) I,(DDN(J),J=1,J0)             STP1070
      100 IF (IHEAD.NE.ICHK(2)) GO TO 120             STP1080
C                                                    STP1090
C      ---PRINT HEAD MATRIX---                        STP1100
      DO 110 K=1,K0                                    STP1110
      WRITE (6,190) K                                  STP1120
      DO 110 I=1,I0                                    STP1130
      110 WRITE (6,170) I,(PHI(I,J,K),J=1,J0)         STP1140
C                                                    STP1150
C      ---WRITE ON DISK---                            STP1160
      120 IF (IERR.EQ.2) GO TO 130                    STP1170
      IF (KP.LT.NPER.OR.IFINAL.NE.1) RETURN           STP1180
      IF (IDK2.EQ.ICHK(5)) WRITE (4) PHI,SUM,SUMP,PUMPT,CFLUXT,QRET,CHST STP1190
      1,CHDT,FLUXT,STORT,ETFLXT,FLXNT                STP1200
C                                                    STP1210
C      ---PUNCHED OUTPUT---                          STP1220
      130 IF (IPU2.NE.ICHK(9)) GO TO 160              STP1230
      IF (IERR.EQ.2) GO TO 140                        STP1240
      WRITE (7,230) SUM,SUMP,PUMPT,CFLUXT,QRET,CHST,CHDT,FLUXT,STORT,ETFL STP1250
      1LXT,FLXNT                                      STP1260
      140 DO 150 K=1,K0                                STP1270
      DO 150 I=1,I0                                    STP1280
      150 WRITE (7,220) (PHI(I,J,K),J=1,J0)           STP1290
      160 IF (IERR.EQ.2) STOP                          STP1300
      RETURN                                           STP1310
C                                                    STP1320
C      ---FORMATS---                                  STP1330
C                                                    STP1340
C                                                    STP1350
C                                                    STP1360
      170 FORMAT ('0',I4,10F12.2/(5X,10F12.2))       STP1370*
      180 FORMAT ('0MAXIMUM HEAD CHANGE FOR EACH ITERATION:',' ',39(' ') / ('0 STP1380
      1',10F12.4))                                     STP1390
      190 FORMAT ('1',55X,'HEAD MATRIX, LAYER',I3/56X,21(' ')) STP1400
      200 FORMAT ('1',55X,' DRAWDOWN, LAYER',I3/59X,18(' ')) STP1410
      210 FORMAT (1H1,44X,57(' ')/45X,' ',14X,'TIME STEP NUMBER =',I9,14X,' ' STP1420
      1'/45X,57(' ')/50X,29HSIZE OF TIME STEP IN SECONDS=F14.2//55X,' ' STP1430
      2TAL SIMULATION TIME IN SECONDS=F14.2/80X,8HMINUTES=F14.2/82X,8H STP1440
      3HOURS=F14.2/83X,5HDAYS=F14.2/82X,'YEARS=F14.2///45X,'DURATION STP1450
      4OF CURRENT PUMPING PERIOD IN DAYS=F14.2/82X,'YEARS=F14.2//) STP1460
      220 FORMAT (16F5.0)                             STP1470*
      230 FORMAT (4G20.10)                             STP1480
      240 FORMAT ('0TIME STEP :',40I3)                 STP1490
      250 FORMAT ('0ITERATIONS:',40I3)                 STP1500
      260 FORMAT (' ',10(' '))                         STP1510
      END                                               STP1520-

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SUBROUTINE SOLVE(PHI,STRT,OLD,T,S,TR,TC,TK,WELL,DELX,DELY,DELZ,FACSP3 10
1T,EL,FL,GL,V,XI,TEST3,QRE,IO,FLD,ELD,IDR,RH,RB,RC,IDRAIN,IRIV) SP3 20*
-----SP3 30
C SOLUTION BY THE STRONGLY IMPLICIT PROCEDURE SP3 40
C -----SP3 50
C SP3 60
C SPECIFICATIONS: SP3 70
REAL *8PHI,RHO,B,D,F,H,Z,SU,RHOP,W,WMIN,RHO1,RHO2,RHO3,XPART,YPARTSP3 40
1,ZPART,DMIN1,WMAX,XT,YT,ZT,DABS,DMAX1,DEN,TXM,TYM,TZM,UX,UXR SP3 90
REAL *8E,AL,BL,CL,A,C,G,WU,TU,U,DL,RES,SUPH,GLXI,ZPHI SP3 100
C SP3 110
DIMENSION PHI(1),STRT(1),OLD(1),T(1),S(1),TR(1),TC(1),TK(1)SP3 120
1,WELL(1),DELX(1),DELY(1),DELZ(1),FACT(K0,3),RHOP(20),TEST3(SP3 130
21),EL(1),FL(1),GL(1),V(1),XI(1),QRE(1),IO(1),FLD(1), SP3 140*
3ELD(1),IDR(1),RH(1),RC(1),RB(1) SP3 150*
C SP3 160
COMMON /INTEGR/ IO,J0,K0,I1,J1,K1,I,J,K,NPER,KTH,ITMAX,LENGTH,KP,NSP3 170
1,WEL,NUMT,IFINAL,IT,KT,IHEAD,IDRAW,IFLO,IERR,I2,J2,K2,IMAX,ITMX1,NCSP3 180
2H,IOK1,IOK2,IWATER,IQRE,IP,JP,IQ,JQ,KQ,IK,JK,K5,IPU1,IPU2,ITK,IEUNSP3 190*
COMMON /SPARAM/ TMAX,CDLT,DELT,ERR,TEST,SUM,SUMP,QR SP3 200
COMMON /SARRAY/ ICHK(13),LEVEL1(9),LEVEL2(9) SP3 210
RETURN SP3 220
C .....SP3 230
C ***** SP3 240
ENTRY ITER SP3 250
C ***** SP3 260
C ---COMPUTE AND PRINT ITERATION PARAMETERS--- SP3 270
WRITE (6,240) SP3 280
*MIN=1.00 SP3 290
DELT=1. SP3 300
P2=LENGTH-1 SP3 310
NT=IO*J0*K0 SP3 320
NIJ=IO*J0 SP3 330
XT=3.141593**2/(2.*J2*J2) SP3 340
YT=3.141593**2/(2.*I2*I2) SP3 350
ZT=3.141593**2/(2.*K0*K0) SP3 360
RH01=0.00 SP3 370
RH02=0.00 SP3 380
RH03=0.00 SP3 390
DO 40 K=1,K0 SP3 400
DO 40 I=2,I1 SP3 410
DO 40 J=2,J1 SP3 420
N=I*(J-1)*IO+(K-1)*NIJ SP3 430
IF (T(N).EQ.0.) GO TO 40 SP3 440
D=TR(N-IO)/DELX(J) SP3 450
F=TR(N)/DELX(J) SP3 460
B=TC(N-1)/DELY(I) SP3 470
H=TC(N)/DELY(I) SP3 480
SU=0.00 SP3 490
Z=0.00 SP3 500
IF (K.NE.1) Z=TK(N-NIJ)/DELZ(K) SP3 510

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	IF (K.NE.K0) SU=TK(N)/DELZ(K)	SP3 520
10	CONTINUE	SP3 530
	TXM=OMAX1(D,F)	SP3 540
	TYM=OMAX1(B,H)	SP3 550
	TZM=OMAX1(SU,Z)	SP3 560
	DEN=DMIN1(D,F)	SP3 570
	IF (DEN.EQ.0.D0) DEN=TXM	SP3 580
	IF (DEN.EQ.0.D0) GO TO 20	SP3 590
	RHO1=OMAX1(RHO1,TYM/DEN)	SP3 600
20	DEN=DMIN1(B,H)	SP3 610
	IF (DEN.EQ.0.D0) DEN=TYM	SP3 620
	IF (DEN.EQ.0.D0) GO TO 30	SP3 630
	RHO2=OMAX1(RHO2,TXM/DEN)	SP3 640
30	DEN=DMIN1(SU,Z)	SP3 650
	IF (DEN.EQ.0.D0) DEN=TZM	SP3 660
	IF (DEN.EQ.0.D0) GO TO 40	SP3 670
	RHO3=OMAX1(RHO3,TXM/DEN)	SP3 680
40	CONTINUE	SP3 690
	XPART=XT/(1.D0+RHO1)	SP3 700
	YPART=YT/(1.D0+RHO2)	SP3 710
	ZPART=ZT/(1.D0+RHO3)	SP3 720
	WMIN=DMIN1(WMIN,XPART,YPART,ZPART)	SP3 730
	WMAX=1.D0-WMIN	SP3 740
	PJ=-1.	SP3 750
	READ(5,250) WMAXT	SP3 760*
250	FORMAT(F10.0)	SP3 770*
	IF(WMAXT.NE.0.) WMAX=WMAXT	SP3 780*
	DO 50 I=1,LENGTH	SP3 790
	PJ=PJ+1.	SP3 800
50	RHOP(I)=1.D0-(1.D0-WMAX)**(PJ/P2)	SP3 810
	WRITE(6,230) LENGTH,(RHOP(J),J=1,LENGTH)	SP3 820
	RETURN	SP3 830
C		SP3 840
C		SP3 850
C	---INITIALIZE DATA FOR A NEW ITERATION---	SP3 860
60	IT=IT+1	SP3 870
	IF (IT.LE.ITMAX) GO TO 70	SP3 880
	WRITE(6,220)	SP3 890
	CALL OUTPUT	SP3 900
70	IF (MOD(IT,LENGTH)) 80,80,90	SP3 910
C	*****	SP3 920
	ENTRY NEWITA	SP3 930
C	*****	SP3 940
80	NTH=0	SP3 950
90	NTH=NTH+1	SP3 960
	W=RHOP(NTH)	SP3 970
	TEST3(IT+1)=0.	SP3 980
	TEST=0.0	SP3 990
	BIG=0.	SP31000
	DO 100 I=1,NT	SP31010
	EL(I)=0.	SP31020

FL(I)=0.	SP31030
GL(I)=0.	SP31040
V(I)=0.	SP31050
100 XI(I)=0.	SP31060
C	SP31070
C ---COMPUTE TRANSMISSIVITY AND T COEFFICIENTS FOR UPPER	SP31080
C HYDROLOGIC UNIT WHEN IT IS UNCONFINED---	SP31090
IF (IWATER.NE.ICHK(5)) GO TO 110	SP31100
CALL TRANS(0)	SP31110
C	SP31120
C ---CHOOSE SIP NORMAL OR REVERSE ALGORITHM---	SP31130
110 IF (MOD(IT,2)) 120,120,170	SP31140
120 DO 150 K=1,K0	SP31150
DO 150 I=2,I1	SP31160
DO 150 J=2,J1	SP31170
N=I+(J-1)*I0+(K-1)*NIJ	SP31180
NIA=N+1	SP31190
NIB=N-1	SP31200
NJA=N+I0	SP31210
NJB=N-I0	SP31220
NKA=N+NIJ	SP31230
NKB=N-NIJ	SP31240
C	SP31250
C ---SKIP COMPUTATIONS IF NODE OUTSIDE MODEL---	SP31260
IF (T(N).EQ.0..OR.S(N).LT.0.) GO TO 150	SP31270
C	SP31280
C ---COMPUTE COEFFICIENTS---	SP31290
D=TR(NJB)/DELT(J)	SP31300
F=TR(N)/DELT(J)	SP31310
G=TC(NIB)/DELT(I)	SP31320
H=TC(N)/DELT(I)	SP31330
SU=0.00	SP31340
Z=0.00	SP31350
IF(K.EQ.1) GO TO 124	SP31360
Z=TK(NKB)	SP31370
IF(IEQN.EQ.ICHK(11)) Z=Z/DELT(K)	SP31380
124 IF(K.EQ.K0) GO TO 125	SP31390
SU=TK(N)	SP31400
IF(IEQN.EQ.ICHK(11)) SU=SU/DELT(K)	SP31410
125 RHO=S(N)/DELT	SP31420
QR=0.	SP31430
UXH=0.	SP31440*
UX=0.	SP31450*
IF(IQRE.EQ.ICHK(7)) QR=QRE(I+(J-1)*I0+(K-1)*I0*J0)	SP31460*
IF(IRIV.LE.0) GO TO 127	SP31470*
ND=IDR(I+(J-1)*I0+(K-1)*I0*J0)	SP31480*
IF(ND.EQ.0) GO TO 127	SP31490*
IF(PHI(N).GT.RB(ND)) GO TO 126	SP31500*
QR=QR+RC(ND)*(RH(ND)-RB(ND))	SP31510*
GO TO 127	SP31520*
126 UXH=RC(ND)	SP31530*

	QR=QR+RC(ND)*RH(ND)	SP31540*
127	IF (IDRAIN.LE.0) GO TO 130	SP31550*
	ND=ID(I+(J-1)*I0+(K-1)*I0*J0)	SP31560*
	IF (ND.EQ.0) GO TO 130	SP31570*
	IF (ELD(ND).GT.PHI(N)) GO TO 130	SP31580*
	UX=FLD(ND)	SP31590*
	QR=QR+FLD(ND)*ELD(ND)	SP31600*
C		SP31610
C	---SIP NORMAL ALGORITHM---	SP31620
C	---FORWARD SUBSTITUTE, COMPUTING INTERMEDIATE VECTOR V---	SP31630
130	E=-B-D-F-H-SU-Z-RHO-UX-UXR	SP31640*
	BL=B/(1.+W*(EL(NIB)*GL(NIB)))	SP31650
	CL=D/(1.+W*(FL(NJB)*GL(NJB)))	SP31660
	C=BL*EL(NIB)	SP31670
	G=CL*FL(NJB)	SP31680
	WU=CL*GL(NJB)	SP31690
	U=BL*GL(NIB)	SP31700
	IF (K.EQ.1) GO TO 140	SP31710
	AL=Z/(1.+W*(EL(NKB)*FL(NKB)))	SP31720
	A=AL*EL(NKB)	SP31730
	TU=AL*FL(NKB)	SP31740
	DL=E+W*(A+C+G+WU+TU+U)-CL*EL(NJB)-BL*FL(NIB)-AL*GL(NKB)	SP31750
	EL(N)=(F-W*(A+C))/DL	SP31760
	FL(N)=(H-W*(G+TU))/DL	SP31770
	GL(N)=(SU-W*(WU+U))/DL	SP31780
	SUPH=0.D0	SP31790
	IF (K.NE.K0) SUPH=SU*PHI(NKA)	SP31800
	RES=-B*PHI(NIB)-D*PHI(NJB)-E*PHI(N)-F*PHI(NJA)-H*PHI(NIA)-SUPH-Z*P	SP31810
	PHI(NKB)-WELL(N)-RHO*OLD(N)-QR	SP31820
	V(N)=(RES-AL*V(NKB)-BL*V(NIB)-CL*V(NJB))/DL	SP31830
	GO TO 150	SP31840
140	DL=E+W*(C+G+WU+U)-CL*EL(NJB)-BL*FL(NIB)	SP31850
	EL(N)=(F-W*C)/DL	SP31860
	FL(N)=(H-W*G)/DL	SP31870
	GL(N)=(SU-W*(WU+U))/DL	SP31880
	SUPH=0.D0	SP31890
	IF (K.NE.K0) SUPH=SU*PHI(NKA)	SP31900
	RES=-B*PHI(NIB)-D*PHI(NJB)-E*PHI(N)-F*PHI(NJA)-H*PHI(NIA)-SUPH-W*EL	SP31910
	PHI(N)-RHO*OLD(N)-QR	SP31920
	V(N)=(RES-BL*V(NIB)-CL*V(NJB))/DL	SP31930
150	CONTINUE	SP31940
C		SP31950
C	---BACK SUBSTITUTE FOR VECTOR XI---	SP31960
	DO 160 K=1,K0	SP31970
	K3=K0-K+1	SP31980
	DO 160 I=1,I2	SP31990
	I3=I0-I	SP32000
	DO 160 J=1,J2	SP32010
	J3=J0-J	SP32020
	N=I3+(J3-1)*I0+(K3-1)*NIJ+I-I	SP32030
	IF (T(N).EQ.0..OR.S(N).LT.0.) GO TO 160	SP32040

	GLXI=0.00	SP32050
	IF (K3.NE.K0) GLXI=GL(N)*XI(N+NIJ)	SP32060
	XI(N)=V(N)-EL(N)*XI(N+I0)-FL(N)*XI(N+1)-GLXI	SP32070
C		SP32080
C	---COMPARE MAGNITUDE OF CHANGE WITH CLOSURE CRITERIA---	SP32090
	TCHK=ABS(XI(N))	SP32100
	IF (TCHK.GT.BIG) BIG=TCHK	SP32110
	PHI(N)=PHI(N)+XI(N)	SP32120
160	CONTINUE	SP32130
	IF (BIG.GT.ERR) TEST=1.	SP32140
	TEST3(IT+1)=BIG	SP32150
	IF (TEST.EQ.0.) RETURN	SP32160
	GO TO 60	SP32170
C		SP32180
170	DO 200 KK=1,K0	SP32190
	K=K0-KK+1	SP32200
	DO 200 II=1,I2	SP32210
	I=I0-II	SP32220
	DO 200 J=2,J1	SP32230
	N=I+(J-1)*I0+(K-1)*NIJ	SP32240
	NIA=N+1	SP32250
	NIB=N-1	SP32260
	NJA=N+I0	SP32270
	NJB=N-I0	SP32280
	NKA=N+NIJ	SP32290
	NKB=N-NIJ	SP32300
C		SP32310
C	---SKIP COMPUTATIONS IF NODE OUTSIDE AQUIFER---	SP32320
	IF (T(N).EQ.0..OR.S(N).LT.0.) GO TO 200	SP32330
C		SP32340
C	---COMPUTE COEFFICIENTS---	SP32350
	D=TR(NJB)/DELT(J)	SP32360
	F=TR(N)/DELT(J)	SP32370
	B=TC(NIB)/DELT(I)	SP32380
	H=TC(N)/DELT(I)	SP32390
	SU=0.00	SP32400
	Z=0.00	SP32410
	IF (K.EQ.1) GO TO 174	SP32420
	Z=TK(NKB)	SP32430
	IF (IEQN.EQ.ICHK(11)) Z=Z/DELT(Z(K))	SP32440
174	IF (K.EQ.K0) GO TO 175	SP32450
	SU=TK(N)	SP32460
	IF (IEQN.EQ.ICHK(11)) SU=SU/DELT(Z(K))	SP32470
175	RHO=S(N)/DELT	SP32480
	QR=0.	SP32490
	UXR=0.	SP32500*
	UX=0.	SP32510*
	IF (IQRE.EQ.ICHK(7)) QR=QRE(I+(J-1)*I0+(K-1)*I0*J0)	SP32520*
	IF (IRIV.LE.0) GO TO 177	SP32530*
	ND=IDR(I+(J-1)*I0+(K-1)*I0*J0)	SP32540*
	IF (ND.EQ.0) GO TO 177	SP32550*

	IF (PHI(N).GT.RB(ND)) GO TO 175	SP32560*
	QR=QR+RC(ND)*(RH(ND)-RB(ND))	SP32570*
	GO TO 177	SP32580*
175	UXR=RC(ND)	SP32590*
	QR=QR+RC(ND)*RH(ND)	SP32600*
177	IF (IDRAIN.LE.0) GO TO 180	SP32610*
	ND=ID(I+(J-1)*I0+(K-1)*I0*J0)	SP32620*
	IF (ND.EQ.0) GO TO 180	SP32630*
	IF (ELD(ND).GT.PHI(N)) GO TO 180	SP32640*
	UX=FLD(ND)	SP32650*
	QR=QR+FLD(ND)*ELD(ND)	SP32660*
C		SP32670
C	---SIP REVERSE ALGORITHM---	SP32680
C	---FORWARD SUBSTITUTE, COMPUTING INTERMEDIATE VECTOR V---	SP32690
180	E=-B-H-D-F-SU-Z-RHO-UX-UXR	SP32700*
	BL=H/(1.+W*(EL(NIA)*GL(NIA)))	SP32710
	CL=D/(1.+W*(FL(NJB)*GL(NJB)))	SP32720
	C=BL*EL(NIA)	SP32730
	G=CL*FL(NJB)	SP32740
	WU=CL*GL(NJB)	SP32750
	U=BL*GL(NIA)	SP32760
	IF (K.EQ.K0) GO TO 190	SP32770
	AL=SU/(1.+W*(EL(NKA)*FL(NKA)))	SP32780
	A=AL*EL(NKA)	SP32790
	TU=AL*FL(NKA)	SP32800
	DL=E+W*(C+G+A+WU+TU+U)-AL*GL(NKA)-BL*FL(NIA)-CL*EL(NJB)	SP32810
	EL(N)=(F-W*(C+A))/DL	SP32820
	FL(N)=(R-W*(G+TU))/DL	SP32830
	GL(N)=(Z-W*(WU+U))/DL	SP32840
	ZPHI=0.D0	SP32850
	IF (K.NE.1) ZPHI=Z*PHI(NKB)	SP32860
	RES=-B*PHI(NIB)-D*PHI(NJB)-E*PHI(N)-F*PHI(NJA)-H*PHI(NIA)-SU*PHI(NIA)-ZPHI-WELL(N)-RHO*OLD(N)-QR	SP32870
	V(N)=(RES-AL*V(NKA)-BL*V(NIA)-CL*V(NJB))/DL	SP32880
	GO TO 200	SP32890
190	DL=E+W*(C+G+WU+U)-BL*FL(NIA)-CL*EL(NJB)	SP32900
	EL(N)=(F-W*C)/DL	SP32910
	FL(N)=(R-W*G)/DL	SP32920
	GL(N)=(Z-W*(WU+U))/DL	SP32930
	ZPHI=0.D0	SP32940
	IF (K.NE.1) ZPHI=Z*PHI(NKB)	SP32950
	RES=-B*PHI(NIB)-D*PHI(NJB)-E*PHI(N)-F*PHI(NJA)-H*PHI(NIA)-ZPHI-WELL(N)-RHO*OLD(N)-QR	SP32960
	V(N)=(RES-AL*V(NKA)-BL*V(NIA)-CL*V(NJB))/DL	SP32970
200	CONTINUE	SP32980
C		SP32990
C	---BACK SUBSTITUTE FOR VECTOR XI---	SP33000
	DO 210 K=1,K0	SP33010
	DO 210 I=2,I1	SP33020
	DO 210 J=1,J2	SP33030
	J3=J0-J	SP33040
		SP33050
		SP33060

	N=I+(J3-1)*I0+(K-1)*NIJ	SP33070
	IF (T(N).EQ.0..OR.S(N).LT.0.) GO TO 210	SP33080
	GLXI=0.00	SP33090
	IF (K.NE.1) GLXI=GL(N)*XI(N-NIJ)	SP33100
	XI(N)=V(N)-EL(N)*XI(N+I0)-FL(N)*XI(N-1)-GLXI	SP33110
C		SP33120
C	---COMPARE MAGNITUDE OF CHANGE WITH CLOSURE CRITERIA---	SP33130
	TCHK=ABS(XI(N))	SP33140
	IF (TCHK.GT.BIG) BIG=TCHK	SP33150
	PHI(N)=PHI(N)+XI(N)	SP33160
210	CONTINUE	SP33170
	IF (BIG.GT.ERR) TEST=1.	SP33180
	143(' ')	SP33190
	TEST3(IT+1)=BIG	SP33200
	IF (TEST.EQ.0.) RETURN	SP33210
	GO TO 60	SP33220
C		SP33230
C		SP33240
C	---FORMATS---	SP33250
C		SP33260
C		SP33270
C		SP33280
220	FORMAT ('0EXCEEDED PERMITTED NUMBER OF ITERATIONS'/ ' ',39(' '))	SP33290
230	FORMAT (///1H0,I5,22H ITERATION PARAMETERS:,6E15.7/(/28X,6E15.7/))	SP33300
240	FORMAT ('-',44X,'SOLUTION BY THE STRONGLY IMPLICIT PROCEDURE'/45X,SP33310	SP33310
	END	SP33320-

	SUBROUTINE COEF(PHI,STRT,OLD,T,S,TR,TC,TK,WELL,DELX,DELY,DELZ,FACTCOF	10
	1,PERM,BOTTOM,QRE)	COF 20
C	-----COF	30
C	COMPUTE COEFFICIENTS	COF 40
C	-----COF	50
C		COF 60
C	SPECIFICATIONS:	COF 70
	REAL *8PHI	COF 80
C		COF 90
	DIMENSION PHI(I0,J0,K0), STRT(I0,J0,K0), OLD(I0,J0,K0), T(I0,J0,K0)COF	100
	1), S(I0,J0,K0), TR(I0,J0,K0), TC(I0,J0,K0), TK(IK,JK,K5), WELL(I0,COF	110
	2J0,K0), DELX(J0), DELY(I0), DELZ(K0), FACT(K0,3), PERM(IP,JP), BUTCOF	120
	3TOM(IP,JP), QRE(IQ,JQ,KQ)	COF 130*
C		COF 140
	COMMON /INTEGR/ I0,J0,K0,I1,J1,K1,I,J,K,NPER,KTH,ITMAX,LENGTH,KP,NCOF	150
	1WEL,NUMT,IFINAL,IT,KT,IHEAD,IURAW,IFLO,IERR,I2,J2,K2,IMAX,ITMX1,NCCOF	160
	2H,IDX1,IDX2,IWATER,IQRE,IP,JP,IQ,JQ,KQ,IK,JK,K5,IPU1,IPU2,ITK,LEVNCOF	170*
	COMMON /SPARAM/ TMAX,CDLT,DELT,ERR,TEST,SUM,SUMP,QR	COF 180
	COMMON /SARRAY/ ICHK(13),LEVEL1(9),LEVEL2(9)	COF 190
	RETURN	COF 200
C	COF	210
C	---COMPUTE TRANSMISSIVITY FOR UPPER HYDROLOGIC UNIT WHEN	COF 220
C	IT IS UNCONFINED---	COF 230
C	*****	COF 240
	ENTRY TRANS(N3)	COF 250
C	*****	COF 260
	DO 10 I=2,I1	COF 270
	DO 10 J=2,J1	COF 280
	IF (PERM(I,J).EQ.0.) GO TO 10	COF 290
	T(I,J,K0)=PERM(I,J)*(PHI(I,J,K0)-BOTTOM(I,J))	COF 300
	IF (T(I,J,K0).GT.0.) GO TO 10	COF 310
	IF (WELL(I,J,K0).LT.0.) WRITE (6,60) I,J,K0	COF 320
	IF (WELL(I,J,K0).GE.0.) WRITE (6,70) I,J,K0	COF 330
	PERM(I,J)=0.	COF 340
	T(I,J,K0)=0.	COF 350
	TR(I,J-1,K0)=0.	COF 360
	TR(I,J,K0)=0.	COF 370
	TC(I,J,K0)=0.	COF 380
	TC(I-1,J,K0)=0.	COF 390
	IF (K0.NE.1) TK(I,J,K1)=0.	COF 400
	PHI(I,J,K0)=1.D30	COF 410
10	CONTINUE	COF 420
	IF (N3.EQ.1) RETURN	COF 430
	N1=K0	COF 440
	N2=K0	COF 450
	N4=K1	COF 460
	GO TO 20	COF 470
C	---COMPUTE T COEFFICIENTS---	COF 480
C	*****	COF 490
	ENTRY TCOF	COF 500
C	*****	COF 510

N1=1	COF 520
N2=N0	COF 530
N3=1	COF 540*
N4=1	COF 550
20 DO 40 K=N1,N2	COF 560
DO 40 I=1,I1	COF 570
DO 40 J=1,J1	COF 580
IF (T(I,J,K).EQ.0.) GO TO 40	COF 590
IF (T(I,J+1,K).EQ.0.) GO TO 30	COF 600
TR(I,J,K)=(2.*T(I,J+1,K)*T(I,J,K))/(T(I,J,K)*DELX(J+1)+T(I,J+1,K)*	COF 610
DELX(J))*FACT(K,1)	COF 620
30 IF (T(I+1,J,K).EQ.0.) GO TO 40	COF 630
TC(I,J,K)=(2.*T(I+1,J,K)*T(I,J,K))/(T(I,J,K)*DELY(I+1)+T(I+1,J,K)*	COF 640
DELY(I))*FACT(K,2)	COF 650
40 CONTINUE	COF 660
IF (K0.EQ.1.OR.ITK.EQ.ICLK(10).OR.N3.EQ.0) RETURN	COF 670
DO 50 K=N4,K1	COF 680
DO 50 I=2,I1	COF 690
DO 50 J=2,J1	COF 700
IF (T(I,J,K).EQ.0. .OR. T(I,J,K+1).EQ.0.) GO TO 50	COF 710*
T1=T(I,J,K)*FACT(K,3)	COF 720
T2=T(I,J,K+1)*FACT(K+1,3)	COF 730
TK(I,J,K)=(2.*T2*T1)/(T1*DELZ(K+1)+T2*DELZ(K))	COF 740
50 CONTINUE	COF 750
RETURN	COF 760
	COF 770
	COF 780
60 FORMAT ('-',20('*'),'WELL',2I3,' IN LAYER',I3,' GOES DRY',20('*'))	COF 790
70 FORMAT ('-',20('*'),'NODE',2I3,' IN LAYER',I3,' GOES DRY',20('*'))	COF 800
END	COF 810-

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SUBROUTINE CHECKI(PHI,STRT,OLD,T,S,TR,TC,TK,WELL,DELX,DELY,DELZ,FACHK 10
1CT,JFLO,FLOW,CVOL,QHE,ID,FLD,ELD,JDR,QDR,VDR,IDR,RH,RR,RC,JRV,QRV,CHK 20*
2VRV,NRV,IDRAIN,IRIV,IRIVN) CHK 30*
C -----CHK 40
C COMPUTE A VOLUMETRIC BALANCE CHK 50
C -----CHK 60
C CHK 70
C SPECIFICATIONS: CHK 80
C REAL *8 PHI,VDR,VRV,VRIVER,CVOL CHK 90*
C CHK 100
C DIMENSION PHI(I0,J0,K0), STWT(I0,J0,K0), OLD(I0,J0,K0), T(I0,J0,K0)CHK 110
1), S(I0,J0,K0), TR(I0,J0,K0), TC(I0,J0,K0), TK(IK,JK,K5), WELL(I0,CHK 120
2J0,K0), DELX(J0), DELY(I0), DELZ(K0), FACT(K0,3), JFLO(NCH,3), FLUCHK 130
3W(NCH), QRE(IQ,JQ,KQ), ID(I0,J0,K0), FLD(IDRAIN), ELD(IDRAIN), CHK 140*
4JDR(IDRAIN,3), QDR(IDRAIN), VDR(IDRAIN), IDR(I0,J0,K0), RH(IRIV), CHK 150*
5RH(IRIV), RC(IRIV), JRV(IRIV,4), QRV(IRIV), VRV(IRIV), CHK 160*
6NRV(IRIVN,20), JRIVER(3,3), QRIVER(3), VRIVER(3), CVOL(NCH) CHK 170*
C CHK 180
C COMMON /INTEGR/ I0,J0,K0,I1,J1,K1,I,J,K,NPER,KTH,ITMAX,LENGTH,KP,NCHK 190
1WEL,NUMT,IFINAL,IT,KT,IHEAD,IURAW,IFLO,IERR,I2,J2,K2,IMAX,ITMX1,NCCHK 200
2H>IDK1,IDK2,IWATER,IQRE,IP,JP,IQ,JQ,KQ,IK,JK,K5,IPU1,IPU2,ITK,IEUNCHK 210*
COMMON /SPARAM/ TMAX,CDLT,DELT,ERR,TEST,SUM,SUMP,GR CHK 220
COMMON /SARRAY/ ICHK(13),LEVEL1(9),LEVEL2(9) CHK 230
COMMON /CK/ ETFLXT,STORT,QRET,CHST,CHDT,FLUXT,PUMPT,CFLUXT,FLXNT CHK 240
RETURN CHK 250
C .....CHK 260
C *****CHK 270
C ENTRY CHECK CHK 280
C *****CHK 290
C ---INITIALIZE VARIABLES--- CHK 300
C PUMP=0. CHK 310
C STOP=0. CHK 320
C FLUXS=0.0 CHK 330
C CHD1=0.0 CHK 340
C CHD2=0.0 CHK 350
C QREFLX=0. CHK 360
C CFLUX=0. CHK 370
C FLUX=0. CHK 380
C ETFLUX=0. CHK 390
C FLXN=0.0 CHK 400
C IT=0 CHK 410
C .....CHK 420
C .....CHK 430
C ---COMPUTE RATES,STORAGE AND PUMPAGE FOR THIS STEP--- CHK 440
C DO 220 K=1,K0 CHK 450
C DO 220 I=2,I1 CHK 460
C DO 220 J=2,J1 CHK 470
C IF (T(I,J,K).EQ.0.) GO TO 220 CHK 480
C AREA=DELX(J)*DELY(I) CHK 490
C VOLUME=AREA*DELZ(K) CHK 500
C IF (S(I,J,K).GE.0.) GO TO 180 CHK 510

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C	---	COMPUTE FLOW RATES TO AND FROM CONSTANT HEAD BOUNDARIES---	CHK 520
C	II=II+1		CHK 530
	FLOW(II)=0.		CHK 540
	JFLOW(II,1)=K		CHK 550
	JFLOW(II,2)=I		CHK 560
	JFLOW(II,3)=J		CHK 570
	IF (S(I,J-1,K).LT.0..OR.T(I,J-1,K).EQ.0.) GO TO 30		CHK 580
	X=(PHI(I,J,K)-PHI(I,J-1,K))*TR(I,J-1,K)*DELY(I)		CHK 590
	IF(IEQN.EQ.ICHK(11)) X=X*DELZ(K)		CHK 600
	FLOW(II)=FLOW(II)+X		CHK 610
	IF (X) 10,30,20		CHK 620
10	CHD1=CHD1+X		CHK 630
	GO TO 30		CHK 640
20	CHD2=CHD2+X		CHK 650
30	IF (S(I,J+1,K).LT.0..OR.T(I,J+1,K).EQ.0.) GO TO 60		CHK 660
	X=(PHI(I,J,K)-PHI(I,J+1,K))*DELY(I)*TR(I,J,K)		CHK 670
	IF(IEQN.EQ.ICHK(11)) X=X*DELZ(K)		CHK 680
	FLOW(II)=FLOW(II)+X		CHK 690
	IF (X) 40,60,50		CHK 700
40	CHD1=CHD1+X		CHK 710
	GO TO 60		CHK 720
50	CHD2=CHD2+X		CHK 730
60	IF (K.EQ.1) GO TO 90		CHK 740
	IF (S(I,J,K-1).LT.0..OR.T(I,J,K-1).EQ.0.) GO TO 90		CHK 750
	X=(PHI(I,J,K)-PHI(I,J,K-1))*TK(I,J,K-1)*AREA		CHK 760
	FLOW(II)=FLOW(II)+X		CHK 770
	IF (X) 70,90,80		CHK 780
70	CHD1=CHD1+X		CHK 790
	GO TO 90		CHK 800
80	CHD2=CHD2+X		CHK 810
90	IF (K.EQ.K0) GO TO 120		CHK 820
	IF (S(I,J,K+1).LT.0..OR.T(I,J,K+1).EQ.0.) GO TO 120		CHK 830
	X=(PHI(I,J,K)-PHI(I,J,K+1))*TK(I,J,K)*AREA		CHK 840
	FLOW(II)=FLOW(II)+X		CHK 850
	IF (X) 100,120,110		CHK 860
100	CHD1=CHD1+X		CHK 870
	GO TO 120		CHK 880
110	CHD2=CHD2+X		CHK 890
120	IF (S(I-1,J,K).LT.0..OR.T(I-1,J,K).EQ.0.) GO TO 150		CHK 900
	X=(PHI(I,J,K)-PHI(I-1,J,K))*TC(I-1,J,K)*DELX(J)		CHK 910
	IF(IEQN.EQ.ICHK(11)) X=X*DELZ(K)		CHK 920
	FLOW(II)=FLOW(II)+X		CHK 930
	IF (X) 130,150,140		CHK 940
130	CHD1=CHD1+X		CHK 950
	GO TO 150		CHK 960
140	CHD2=CHD2+X		CHK 970
150	IF (S(I+1,J,K).LT.0..OR.T(I+1,J,K).EQ.0.) GO TO 175		CHK 980
	X=(PHI(I,J,K)-PHI(I+1,J,K))*TC(I,J,K)*DELX(J)		CHK 990*
	IF(IEQN.EQ.ICHK(11)) X=X*DELZ(K)		CHK1000
	FLOW(II)=FLOW(II)+X		CHK1010
			CHK1020

	IF (X) 160,175,170	CHK1030*
160	CH01=CH01+X	CHK1040
	GO TO 175	CHK1050*
170	CH02=CH02+X	CHK1060
175	CVOL(II)=CVOL(II)+FLOW(II)*DELT	CHK1070*
	GO TO 220	CHK1080
C		CHK1090
C	----CHECK FOR EQUATION BEING SOLVED----	CHK1100
180	IF(IEQN.EQ.ICHK(11)) GO TO 211	CHK1110
C		CHK1120
C	----EQUATION 4----	CHK1130
C	----RECHARGE AND WELLS----	CHK1140
	IF(IQRE.EQ.ICHK(7)) QREFLX=QREFLX+QRE(I,J,K)*AREA	CHK1150*
	IF (WELL(I,J,K)) 190,210,200	CHK1160
190	PUMP=PUMP+WELL(I,J,K)*AREA	CHK1170
	GO TO 210	CHK1180
200	CFLUX=CFLUX+WELL(I,J,K)*AREA	CHK1190
C		CHK1200
C	----COMPUTE VOLUME FROM STORAGE----	CHK1210
210	STOR=STOR+S(I,J,K)*(OLD(I,J,K)-PHI(I,J,K))*AREA	CHK1220
	GO TO 215	CHK1230*
C		CHK1240
C	----EQUATION 3----	CHK1250
C	----RECHARGE AND WELLS----	CHK1260
211	IF(IQRE.EQ.ICHK(7)) QREFLX=QREFLX+QRE(I,J,K)*VOLUME	CHK1270*
	IF (WELL(I,J,K)) 212,214,213	CHK1280
212	PUMP=PUMP+WELL(I,J,K)*VOLUME	CHK1290
	GO TO 214	CHK1300
213	CFLUX=CFLUX+WELL(I,J,K)*VOLUME	CHK1310
C		CHK1320
C	----COMPUTE VOLUME FROM STORAGE----	CHK1330
214	STOR=STOR+S(I,J,K)*(OLD(I,J,K)-PHI(I,J,K))*VOLUME	CHK1340
215	IF(IRIV.LE.0)GO TO 218	CHK1350*
C	COMPUTE LEAKAGE TO RIVER	CHK1360*
	ND=IDR(I,J,K)	CHK1370*
	IF(ND.EQ.0)GO TO 218	CHK1380*
	IF(PHI(I,J,K).GT.RB(ND))GO TO 216	CHK1390*
	QRV(ND)=RC(ND)*(RH(ND)-RB(ND))*AREA	CHK1400*
	GO TO 217	CHK1410*
216	QRV(ND)=RC(ND)*(RH(ND)-PHI(I,J,K))*AREA	CHK1420*
217	ETFLUX=ETFLUX+QRV(ND)	CHK1430*
	VRV(ND)=VRV(ND)+QRV(ND)*DELT	CHK1440*
218	IF(IDRAIN.LE.0)GO TO 220	CHK1450*
C	COMPUTE LEAKAGE TO DRAIN	CHK1460*
	ND=ID(I,J,K)	CHK1470*
	IF(ND.EQ.0)GO TO 220	CHK1480*
	JDR(ND,1)=K	CHK1490*
	JDR(ND,2)=I	CHK1500*
	JDR(ND,3)=J	CHK1510*
	IF(ELD(ND).GT.PHI(I,J,K))GO TO 219	CHK1520*
	QDR(ND)=FLD(ND)*AREA*(ELD(ND)-PHI(I,J,K))	CHK1530*

	VDR(ND)=VDR(ND)+QDR(ND)*DELT	CHK1540*
	FLXN=FLXN+QDR(ND)	CHK1550*
	FLUX=FLUX+FLO(ND)*AREA*(ELD(ND)-STRT(I,J,K))	CHK1560*
	FLUXS=FLXN	CHK1570*
	GO TO 220	CHK1580*
219	QDR(ND)=0.	CHK1590*
220	CONTINUE	CHK1600
C		CHK1610
C	---	CHK1620
C	COMPUTE CUMULATIVE VOLUMES, TOTALS, AND DIFFERENCES---	CHK1630
	FLXPT=0.0	CHK1640
	FLXNT=FLXNT-FLXN*DELT	CHK1650*
	ETFLXT=ETFLXT-ETFLUX*DELT	CHK1660*
	STORT=STORT+STOR	CHK1670
	STOR=STOR/DELT	CHK1680
	QRET=QRET+QREFLX*DELT	CHK1690
	CHDT=CHDT-CHD1*DELT	CHK1700
	CHST=CHST+CHD2*DELT	CHK1710
	PUMPT=PUMPT-PUMP*DELT	CHK1720
	CFLUXT=CFLUXT+CFLUX*DELT	CHK1730
	TOTL1=STORT+QRET+CFLUXT+CHST+FLXPT	CHK1740
	TOTL2=CHDT+PUMPT+ETFLXT+FLXNT	CHK1750
	SUMR=QREFLX+CFLUX+CHD2+CHD1+PUMP+ETFLUX+FLUXS+STOR	CHK1760
	DIFF=TOTL2-TOTL1	CHK1770
	PERCNT=0.0	CHK1780
	IF (TOTL2.EQ.0.) GO TO 230	CHK1790
	PERCNT=DIFF/TOTL2*100.	CHK1800
230	RETURN	CHK1810
C		CHK1820
C	---	CHK1830
C	PRINT RESULTS---	CHK1840
C	*****	CHK1850
	ENTRY CWRITE	CHK1860
C	*****	CHK1870
C		CHK1880
	WRITE (6,260) STOR,QREFLX,STORT,CFLUX,QRET,PUMP,CFLUXT,ETFLUX,CHST	CHK1890
	1,FLXPT,CHD2,TOTL1,CHD1,FLUX,FLUXS,ETFLXT,CHDT,SUMR,PUMPT,FLXNT,TOTL2,DIFF,PERCNT	CHK1900
	IF (NCH.EQ.0) GO TO 240	CHK1910
	WRITE (6,270)	CHK1920
	WRITE (6,330)	CHK1930
	WRITE (6,320) ((JFLO(I,J),J=1,3),FLOW(I),CVOL(I),I=1,NCH)	CHK1940*
240	IF (IRIV.LE.0) GO TO 245	CHK1950*
	DO 244 L=1,IRIV	CHK1960*
	WRITE (6,300) (NRV(L,J),J=1,20)	CHK1970*
	WRITE (6,330)	CHK1980*
	K=0	CHK1990*
	DO 243 I=1,IRIV	CHK2000*
	IF (JRV(I,4).NE.L) GO TO 243	CHK2010*
	K=K+1	CHK2020*
	JRIVER(K,1)=JRV(I,1)	CHK2030*
		CHK2040*

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JRIVER(K,2)=JRV(I,2)                                CHK2050*
JRIVER(K,3)=JRV(I,3)                                CHK2060*
QRIVER(K)=QRV(I)                                    CHK2070*
VRIVER(K)=VRV(I)                                    CHK2080*
IF(K.LT.3)GO TO 243                                  CHK2090*
WRITE(6,320) ((JRIVER(M,N),N=1,3),QRIVER(M),VRIVER(M),M=1,3)  CHK2100*
K=0                                                    CHK2110*
243 CONTINUE                                          CHK2120*
IF(K.NE.0)WRITE(6,320) ((JRIVER(M,N),N=1,3),QRIVER(M),VRIVER(M),M=CHK2130*
11,K)                                                CHK2140*
244 CONTINUE                                          CHK2150*
245 IF(IDRAIN.LE.0)GO TO 249                          CHK2160*
WRITE(6,310)                                          CHK2170*
WRITE(6,330)                                          CHK2180*
WRITE(6,320) ((JDR(I,J),J=1,3),QDR(I),VDR(I),I=1,IDRAIN)  CHK2190*
C                                                    CHK2200
C ---COMPUTE VERTICAL FLOW---                        CHK2210
249 X=0.                                              CHK2220*
Y=0.                                                  CHK2230
IF (K0.EQ.1) RETURN                                CHK2240
DO 250 I=2,I1                                       CHK2250
DO 250 J=2,J1                                       CHK2260
X=X+(PHI(I,J,1)-PHI(I,J,2))*TK(I,J,1)*DELX(J)*DELY(I)  CHK2270
250 Y=Y+(PHI(I,J,K1)-PHI(I,J,K0))*TK(I,J,K1)*DELX(J)*DELY(I)  CHK2280
WRITE (6,290) Y,X                                    CHK2290
RETURN                                              CHK2300
C                                                    CHK2310
C ---FORMATS---                                     CHK2320
C                                                    CHK2330
C -----CHK2340
C                                                    CHK2350
C                                                    CHK2360
C                                                    CHK2370
260 FORMAT ('0',10X,'CUMULATIVE MASS BALANCE:',16X,'L**3',23X,'RATES FCHK2380
FOR THIS TIME STEP:',16X,'L**3/T',11X,24(' '),43X,25(' ')/20X,'SUUCHK2390
2RCES:',69X,'STORAGE =',F20.4/20X,8(' '),68X,'RECHARGE =',F20.4/27XCHK2400
3,'STORAGE =',F20.2/35X,'CONSTANT FLUX =',F20.4/26X,'RECHARGE =',F2CHK2410
40.2,41X,'PUMPING =',F20.4/21X,'CONSTANT FLUX =',F20.2,30X,' RICHK2420*
5VER LEAKAGE =',F20.4/21X,'CONSTANT HEAD =',F20.2,34X,'CONSTANT HEACHK2430*
60:'/27X,'LEAKAGE =',F20.2,46X,'IN =',F20.4/21X,'TOTAL SOURCES =',FCHK2440
720.2,45X,'OUT =',F20.4/96X,'LEAKAGE:',1/20X,'DISCHARGES:',45X,'FROM CHK2450
8PREVIOUS PUMPING PERIOD =',F20.4/20X,11(' '),68X,'TOTAL =',F20.4/1CHK2460
96X,' RIVER LEAKAGE =',F20.2/21X,'CONSTANT HEAD =',F20.2,36X,'SCHK2470*
SUM OF RATES =',F20.4/19X'QUANTITY PUMPED =',F20.2/27X,'LEAKAGE =',CHK2480
9F20.2/19X,'TOTAL DISCHARGE =',F20.2//17X,'DISCHARGE-SOURCES =',F20CHK2490
5.2/15X,'PER CENT DIFFERENCE =',F20.2//)          CHK2500
270 FORMAT ('0',56X,'CONSTANT HEAD NODES')          CHK2510*
290 FORMAT ('0FLOW TO TOP LAYER =',G15.7,' FLOW TO BOTTOM LAYER =',GCHK2520
115.7,' POSITIVE UPWARD')                          CHK2530
300 FORMAT ('0',60X,'RIVER NODES'/27X,20A4)          CHK2540*
310 FORMAT ('0',60X,'DRAIN NODES')                  CHK2550*

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320 FORMAT(1X,I6,2I4,2G15.7,I6,2I4,2G15.7,I6,2I4,2G15.7)          CHK2560*
330 FORMAT (51X,'FLOW RATES AND CUMULATIVE VOLUMES'/51X,33('-'))/' '3(CHK2570*
15X,'K',3X,'I',3X,'J',2X,'RATE (L**3/T)',2X,'VOLUME (L**3)')/' '3(CHK2580*
25X,'-',3X,'-',3X,'-',2X,13('-'),2X,13('-'))          CHK2590*
END                                                    CHK2600*

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	SUBROUTINE PRNTAI(PHI,STRT,T,S,WELL,DELX,DELY,GRND)	PRN 10*
C	-----PRN 20	
C	PRINT MAPS OF DRAWDOWN AND HYDRAULIC HEAD	PRN 30
C	-----PRN 40	
C		PRN 50
C	SPECIFICATIONS:	PRN 60
	REAL*8 PHI,Z,XLABEL,YLABEL,TITLE,TITL,XN1,MESUR	PRN 70*
	REAL *4K	PRN 80
C		PRN 90
	DIMENSION PHI(I0,J0,K0),STRT(I0,J0,K0),S(I0,J0,K0),WELL(I0,J0,K0),DELX(I0,J0,K0),DELY(I0,J0,K0),T(I0,J0,K0),GRND(I0,J0,K0)	PRN 100
	DATA A/'A'/,B/'B'/	PRN 110*
C		PRN 120*
		PRN 130
	COMMON /INTEGR/ I0,J0,K0,I1,J1,K1,I,J,K,NPER,KTH,ITMAX,LENGTH,KP,NPRN	PRN 140
	1WEL,NUMT,IFINAL,IT,KT,IHEAD,IDRAW,IFLO,IERR,I2,J2,K2,IMAX,ITMX1,NCPRN	PRN 150
	2H,IDK1,IDK2,IWATER,IQHE,IP,JP,IQ,JQ,KQ,IK,JK,K5,IPU1,IPU2,ITK,IEGNPRN	PRN 160*
	COMMON /PR/ XLABEL(3),YLABEL(6),TITLE(6),XN1,MESUR,PRNT(122),BLANKPRN	PRN 170
	1(60),DIGIT(122),VF1(6),VF2(6),VF3(7),XSCALE,DINCH,SYM(17),XN(100),	PRN 180
	2YN(13),NA(4),N1,N2,N3,YSCALE,FACT1,FACT2	PRN 190
	COMMON /GROUND/ TITL(3),IGRND	PRN 200*
	RETURN	PRN 210
C	PRN 220	
C		PRN 230
C	---INITIALIZE VARIABLES FOR PLOT---	PRN 240
C	*****	PRN 250
	ENTRY MAP	PRN 260
C	*****	PRN 270
	YDIM=0.	PRN 280
	WIDTH=0.	PRN 290
	DO 10 J=2,J1	PRN 300
	10 WIDTH=WIDTH+DELX(J)	PRN 310
	DO 20 I=2,I1	PRN 320
	20 YDIM=YDIM+DELY(I)	PRN 330
	30 XSF=DINCH*XSCALE	PRN 340
	YSF=DINCH*YSCALE	PRN 350
	NYD=YDIM/YSF	PRN 360
	IF (NYD*YSF.LE.YDIM-DELY(I1)/2.) NYD=NYD+1	PRN 370
	IF (NYD.LE.12) GO TO 40	PRN 380
	DINCH=YDIM/(12.*YSCALE)	PRN 390
	WRITE (6,330) DINCH	PRN 400
	IF (YSCALE.LT.1.0) WRITE (6,340)	PRN 410
	GO TO 30	PRN 420
	40 NXD=WIDTH/XSF	PRN 430
	IF (NXD*XSF.LE.WIDTH-DELX(J1)/2.) NXD=NXD+1	PRN 440
	N4=NXD*N1+1	PRN 450
	N5=NXD+1	PRN 460
	N6=NYD+1	PRN 470
	N8=N2*NYD+1	PRN 480
	NA(1)=N4/2-1	PRN 490
	NA(2)=N4/2	PRN 500
	NA(3)=N4/2+3	PRN 510

	NC=(N3-N8-10)/2	PRN 520
	ND=NC*N8	PRN 530
	NE=MAX0(N5,N6)	PRN 540
	VF1(3)=DIGIT(ND)	PRN 550
	VF2(3)=DIGIT(ND)	PRN 560
	VF3(3)=DIGIT(ND)	PRN 570
	XLABEL(3)=MESUR	PRN 580
	YLABEL(6)=MESUR	PRN 590
	DO 60 I=1,NE	PRN 600
	NNX=N5-I	PRN 610
	NNY=I-1	PRN 620
	IF (NNY.GE.N6) GO TO 50	PRN 630
	YN(I)=YSF*NNY/YSCALE	PRN 640
50	IF (NNX.LT.0) GO TO 60	PRN 650
	XN(I)=XSF*NNX/YSCALE	PRN 660
60	CONTINUE	PRN 670
	FACT3=99999999.	PRN 680*
	RETURN	PRN 690
C		PRN 700
C		PRN 710
C	*****	PRN 720
	ENTRY PRNTA(NG,LA)	PRN 730
C	*****	PRN 740
C	---VARIABLES INITIALIZED EACH TIME A PLOT IS REQUESTED---	PRN 750
	DIST=WIDTH-DELX(J1)/2.	PRN 760
	JJ=J1	PRN 770
	LL=1	PRN 780
	Z=NXD*XSF	PRN 790
	IF (NG.EQ.1) WRITE (6,300) (TITLE(I),I=1,3),LA	PRN 800
	IF (NG.EQ.2) WRITE (6,300) (TITLE(I),I=4,6),LA	PRN 810
	IF (NG.EQ.3) WRITE (6,300) (TITLE(I),I=1,3),LA	PRN 820*
	DO 290 I=1,N4	PRN 830
C		PRN 840
C	---LOCATE X AXES---	PRN 850
	IF (I.EQ.1.OR.I.EQ.N4) GO TO 70	PRN 860
	PRNT(1)=SYM(12)	PRN 870
	PRNT(N8)=SYM(12)	PRN 880
	IF ((I-1)/N1*N1.NE.I-1) GO TO 90	PRN 890
	PRNT(1)=SYM(14)	PRN 900
	PRNT(N8)=SYM(14)	PRN 910
	GO TO 90	PRN 920
C		PRN 930
C	---LOCATE Y AXES---	PRN 940
70	DO 80 J=1,N8	PRN 950
	IF ((J-1)/N2*N2.EQ.J-1) PRNT(J)=SYM(14)	PRN 960
80	IF ((J-1)/N2*N2.NE.J-1) PRNT(J)=SYM(13)	PRN 970
C		PRN 980
C	---COMPUTE LOCATION OF NODES AND DETERMINE APPROPRIATE SYMBOL---	PRN 990
90	IF (DIST.LT.0..OR.DIST.LT.Z-XN1*XSF) GO TO 240	PRN1000
	YLEN=DELY(2)/2.	PRN1010
	DO 220 L=2,I1	PRN1020

J=YLEN*N2/YSF+1.5	PRN1030
IF (T(L,JJ,LA).EQ.0.) GO TO 100	PRN1040
IF (S(L,JJ,LA).LT.0.) GO TO 210	PRN1050
IF (NG.NE.3) GO TO 95	PRN1060*
PRNT(J)=B	PRN1070*
IF (GRND(L,JJ).LT.PHI(L,JJ,LA)) PRNT(J)=A	PRN1080*
GO TO 220	PRN1090*
95 INDV3=0	PRN1100*
GO TO (100,110), NG	PRN1110
100 K=(STRT(L,JJ,LA)-PHI(L,JJ,LA))*FACT1	PRN1120
C -TO CYCLE SYMBOLS FOR DRAWDOWN, REMOVE C FROM COL. 1 OF NEXT CARD-	PRN1130
C K=AMOD(K,10.)	PRN1140
GO TO 120	PRN1150
110 K=PHI(L,JJ,LA)*FACT2	PRN1160
120 IF (K) 130,160,140	PRN1170
130 IF (J-2.GT.0) PRNT(J-2)=SYM(13)	PRN1180
N=-K+.5	PRN1190
IF (N.LT.100) GO TO 150	PRN1200
GO TO 190	PRN1210
140 N=K+.5	PRN1220
IF (N.LT.100) GO TO 150	PRN1230
IF (N.GT.999) GO TO 190	PRN1240
INDX3=N/100	PRN1250
IF (J-2.GT.0) PRNT(J-2)=SYM(INDX3)	PRN1260
N=N-INDX3*100	PRN1270
150 INDX1=MOD(N,10)	PRN1280
IF (INDX1.EQ.0) INDX1=10	PRN1290
C -TO CYCLE SYMBOLS FOR DRAWDOWN, REMOVE C FROM COL. 1 OF NEXT CARD-	PRN1300
C IF (NG.EQ.1) GO TO 170	PRN1310
INDX2=N/10	PRN1320
IF (INDX2.GT.0) GO TO 180	PRN1330
INDX2=10	PRN1340
IF (INDX3.EQ.0) INDX2=15	PRN1350
GO TO 180	PRN1360
160 INDX1=15	PRN1370
170 INDX2=15	PRN1380
180 IF (J-1.GT.0) PRNT(J-1)=SYM(INDX2)	PRN1390
PRNT(J)=SYM(INDX1)	PRN1400
GO TO 220	PRN1410
190 00 200 II=1,3	PRN1420
JI=J-3+II	PRN1430
200 IF (JI.GT.0) PRNT(JI)=SYM(11)	PRN1440
210 IF (S(L,JJ,LA).LT.0.) PRNT(J)=SYM(16)	PRN1450
220 YLEN=YLEN+(DELY(L)+DELY(L+1))/2.	PRN1460
230 DIST=DIST-(DELX(JJ)+DELX(JJ-1))/2.	PRN1470
JJ=JJ-1	PRN1480
IF (JJ.EQ.0) GO TO 240	PRN1490
IF (DIST.GT.Z-XN1*XSF) GO TO 230	PRN1500
240 CONTINUE	PRN1510
C	PRN1520
C ---PRINT AXES,LABELS, AND SYMBOLS---	PRN1530

IF (I-NA(LL).EQ.0) GO TO 260	PRN1540
IF ((I-1)/N1*N1-(I-1)) 270,250,270	PRN1550
250 WRITE (6,VF1) (BLANK(J),J=1,NC),(PRNT(J),J=1,N8),XN(1+(I-1)/6)	PRN1560
GO TO 280	PRN1570
260 WRITE (6,VF2) (BLANK(J),J=1,NC),(PRNT(J),J=1,N8),XLABEL(LL)	PRN1580
LL=LL+1	PRN1590
GO TO 280	PRN1600
270 WRITE (6,VF2) (BLANK(J),J=1,NC),(PRNT(J),J=1,N8)	PRN1610
C	PRN1620
C ---COMPUTE NEW VALUE FOR Z AND INITIALIZE PRNT---	PRN1630
280 Z=Z-2.*XN1*XSF	PRN1640
DO 290 J=1,N8	PRN1650
290 PRNT(J)=SYM(15)	PRN1660
C	PRN1670
C ---NUMBER AND LABEL Y AXIS AND PRINT LEGEND---	PRN1680
WRITE (6,VF3) (BLANK(J),J=1,NC),(YN(I),I=1,N6)	PRN1690
WRITE (6,320) (YLABEL(I),I=1,6)	PRN1700
IF (NG.EQ.1) WRITE (6,310) FACT1	PRN1710
IF (NG.EQ.2) WRITE (6,310) FACT2	PRN1720
IF (NG.EQ.3) WRITE (6,310) FACT3	PRN1730*
RETURN	PRN1740
C	PRN1750
C ---FORMATS---	PRN1760
C	PRN1770
C -----	PRN1780
C	PRN1790
C	PRN1800
300 FORMAT ('1',49X,3A8,'LAYER',I4//)	PRN1810
310 FORMAT ('0EXPLANATION'/' ',11(' '))/' R = CONSTANT HEAD BOUNDARY'/'PRN1820	
1' *** = VALUE EXCEEDED 3 FIGURES'/' MULTIPLICATION FACTOR ='F8.3)PRN1830	
320 FORMAT ('0',39X,6A8)	PRN1840
330 FORMAT ('0',25X,10(' '),' TO FIT MAP WITHIN 12 INCHES. DINCH REVISPRN1850	
LED TO',G15.7,1X,10(' '))	PRN1860
340 FORMAT ('0',45X,'NOTE: GENERALLY SCALE SHOULD BE > OR = 1.0')	PRN1870
END	PRN1880-

	BLOCK DATA	RLK 10
C	-----	RLK 20
C		RLK 30
C	SPECIFICATIONS:	RLK 40
	REAL*8 XLABEL,YLABEL,TITLE,TITL,XN1,MESUR	RLK 50*
C		RLK 60
	COMMON /SARRAY/ ICHK(13),LEVEL1(9),LEVEL2(9)	RLK 70
	COMMON /PR/ XLABEL(3),YLABEL(6),TITLE(6),XN1,MESUR,PRNT(122),BLANK	RLK 80
	1(60),DIGIT(122),VF1(6),VF2(6),VF3(7),XSCALE,DINCH,SYM(17),XN(100),	RLK 90
	2YN(13),NA(4),N1,N2,N3,YSCALE,FACT1,FACT2	RLK 100
	COMMON /GROUND/ TITL(3),IGRND	RLK 110*
C	*****	RLK 120
C		RLK 130
	DATA ICHK/'DRAW','HEAD','MASS','DK1','DK2','WATE','RECH','PUN1','	RLK 140
	1UN2','ITKR','EQN3','GRND',0/	RLK 150*
	DATA SYM/'1','2','3','4','5','6','7','8','9','0','+',',','-','*','/	RLK 160
	1','R','W'/	RLK 170
	DATA PRNT/122*' /,N1,N2,N3,XN1/6.10,133..8333333333D-1/,BLANK/50*	RLK 180
	1' /,NA(4)/1000/	RLK 190
	DATA XLABEL/' X DIS- ',TANCE IN', ' MILES /,YLABEL/'DISTANCE', '	RLK 200
	1FROM OR','IGIN IN ',Y DIRECT', 'ION. IN ',MILES ' /,TITLE/'PLOT	RLK 210
	2OF ',DRAWDOWN', ' ',PLOT OF ',HYDRAULI',C HEAD'/	RLK 220
	DATA DIGIT/'1','2','3','4','5','6','7','8','9','10','11','12','13'	RLK 230
	1,'14','15','16','17','18','19','20','21','22','23','24','25','26',	RLK 240
	2,'27','28','29','30','31','32','33','34','35','36','37','38','39',	RLK 250
	3,'40','41','42','43','44','45','46','47','48','49','50','51','52',	RLK 260
	4,'53','54','55','56','57','58','59','60','61','62','63','64','65',	RLK 270
	5,'66','67','68','69','70','71','72','73','74','75','76','77','78',	RLK 280
	6,'79','80','81','82','83','84','85','86','87','88','89','90','91',	RLK 290
	7,'92','93','94','95','96','97','98','99','100','101','102','103',	RLK 300
	8,'104','105','106','107','108','109','110','111','112','113',	RLK 310
	9,'114','115','116','117','118','119','120','121','122'/	RLK 320
	DATA VF1/'(1H ',',', ' ',A1,F',10.2',')'/	RLK 330
	DATA VF2/'(1H ',',', ' ',A1,1',X,A8',')'/	RLK 340
	DATA VF3/'(1H0',',', ' ',A1,F',3.1',',12F1',10.2')'/	RLK 350
	DATA TITL/'PLOT OF ',ARTESIAN', ' QUALITY'/	RLK 360*
C	*****	RLK 370
	END	RLK 380-

Table 2.--Listing of the model input data for the steady-state calibration

CARD NUMBER	GROUP I: TITLE, SIMULATION OPTIONS, AND PROBLEM DIMENSIONS									
1		----THREE-DIMENSIONAL GROUND-WATER FLOW MODEL OF THE FERRON SI								
2		LANDSTONE NEAR EMERY, UTAH----								
3		15	26	5	75	755	24	5		
4		DRAW HEAD MASS								ITKR

CARD NUMBER	GROUP II: SCALAR PARAMETERS							
5		1	1	.01	5			
6		5280	5280	.60	1234	.1234	MILES	
7								
8								
9								

CARD
NUMBER

55

CARD
NUMBER

56

CARD
NUMBER

57

CARD
NUMBER

58

CARD
NUMBER

59

GROUP III: ARRAY DATA
STORAGE COEFFICIENT
LAYER 1
(DIMENSIONLESS)

CARD
NUMBER

195 | -1.0

11

GROUP III: ARRAY DATA
STORAGE COEFFICIENT
LAYER 2
(DIMENSIONLESS)

CARD
NUMBER

196	-1	1																		11
197																				
198																				
199	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
200	1	1	1	1	1	0														
201		1																		
202					1															
203		1																		
204					1															
205		1																		
206					1															
207		1																		
208					1															
209		1																		
210					1															
211		1																		
212					1															
213		1																		
214					1															
215		1																		
216					1															
217		1																		
218					1															
219		1																		
220					1															
221		1																		
222																				
223																				
224																				
225		1																		
226																				
227		1																		
228																				
229																				
230																				
231																				
232																				

CARD
NUMBER

61

GROUP III: ARRAY DATA
STORAGE COEFFICIENT
LAYER 4
(DIMENSIONLESS)

CARD
NUMBER

270	-1	1																		1
271																				
272																				
273	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
274	1	1	1	1	1	0														
275		1																		
276					1															
277		1																		
278					1															
279		1																		
280					1															
281		1																		
282					1															
283		1																		
284					1															
285		1																		
286					1															
287		1								1	1	1								
288					1															
289		1								1	1	1								
290					1															
291		1																		
292					1															
293		1																		
294					1															
295																				
296																				
297																				
298																				
299																				
300																				
301																				
302																				
303																				
304																				
305																				
306																				

GROUP III: ARRAY DATA
STORAGE COEFFICIENT
LAYER 5
(DIMENSIONLESS)

CARD
NUMBER

307	-1.0																			1
-----	------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---

GROUP III: ARRAY DATA
TRANSMISSIVITY
LAYER 1
(FT /SEC)

CARD
NUMBER

308	6.94E-08	1	1	1															
309																			
310																			
311	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
312	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
313	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
314	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
315	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
316	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
317	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
318	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
319	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
320	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
321	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
322	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
323	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
324	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
325	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
326	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
327	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
328	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
329	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
330	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
331	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
332	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
333	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
334	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
335		1.	1.	1.	1.	1.	1.					1.	1.	1.	1.	1.	1.	1.	1.
336	1.	1.	1.									1.	1.	1.	1.	1.	1.	1.	1.
337				1.	1.	1.						1.	1.	1.	1.	1.	1.	1.	1.
338	1.	1.										1.	1.	1.	1.	1.	1.	1.	1.
339												1.	1.	1.	1.	1.	1.	1.	1.
340	1.											1.	1.	1.	1.	1.	1.	1.	1.
341												1.	1.	1.	1.	1.			
342																			
343																			
344																			

CARD
NUMBER

64

GROUP III: ARRAY DATA
TRANSMISSIVITY
LAYER 3
(FT /SEC)

CARD
NUMBER

382	5.787E-06	1	1	1	11
383					
384					
385	072.5 75. 75.78.881.383.887.591.396.3100.104.108.112.119.125.131.138.150.150.				
386	169.263.263.263.263.				
387	70.71.372.573.8 75. 75.78.881.387.593.8100.103.106.112.119.125.131.138.150.				
388	1254.263.263.263.263.				
389	067.568.868.868.868.8 70.72.5 75.81.387.592.597.5100.103.110.112.125.131.144.				
390	1243.263.263.263.263.				
391	65. 65. 65. 65. 65. 65.67.568.871.3 75.81.387.592.597.5100.106.112.125.147.				
392	1207.225.243.243.243.				
393	062.5 60. 60. 60. 60.57.557.562.562.567.572.5 75.81.387.587.593.8100.112.168.				
394	179.188.207.207.207.				
395	0 60.57.556.353.8 50. 50. 50. 50.56.3 60.62.568.868.872.5 75.81.387.5141.150.				
396	150.168.168.168.168.				
397	057.553.851.3 50. 45.43.843.843.847.552.556.362.5 65.68.868.872.5 75.117.123.				
398	132.132.132.132.132.				
399	0 55.51.3 50.43.841.337.537.537.537.5 45. 50.56.357.562.562.567.5104.105.108.				
400	110.110.104.104. 95.				
401	052.5 50.43.8 40.37.5 35.32.531.331.337.543.8 50.52.556.357.5 60. 95. 95. 95.				
402	87. 87. 75. 75. 75.				
403	0 50. 45.42.537.532.5 30.27.526.3 25. 25.33.8 40.43.8 50.52.5 83. 80. 80. 85.				
404	75. 75. 75. 75. 75.				
405	0 45.43.837.531.327.5 25.			31.337.543.8 50. 75. 75. 68. 65.	
406	60. 60. 60. 60. 60.				
407				25.31.332.5 57. 57. 57. 57. 57.	
408	53. 50. 53. 57.				
409				18.8 25. 38. 38. 40. 45. 45. 45.	
410	38. 38. 45.				
411				29. 29. 29. 29.	
412	29. 29.				
413					
414					
415					
416					
417					
418					

GROUP III: ARRAY DATA
TRANSMISSIVITY
LAYER 4
(FT /SEC)

CAHO
NUMBER

419	1.157E-05	1	1	1	1
420					
421					
422	072.5	75.	75.78.881.383.887.591.3	90.	90. 95. 95.125.135.140.150.160.165.170.
423	175.175.175.175.175.				
424	70.71.372.573.8	75.	75.78.881.3	80.	85. 90.105.125.135.150.165.175.175.175.
425	175.175.175.175.175.				
426	68. 69. 69. 69. 69.	70.	73. 75. 75. 80. 80. 85. 90.110.120.150.155.160.165.		
427	165.175.175.175.175.				
428	65. 65. 65. 65. 65.	65. 65.67.568.871.3	75.81.387.592.	90.110.115.120.125.130.	
429	140.150.162.162.162.				
430	62.5 60. 60. 60. 60.	57.557.5	70.140.150.160.165.180.185.175.188.100.112.112.		
431	119.125.138.138.138.				
432	60.57.556.353.8	50. 50. 50. 50.113.130.135.158.158.165.170.163.87.593.8100.			
433	100.112.112.112.112.				
434	57.553.851.3 50.	45.43.843.843.8	95.120.133.145.150.158.138.145. 75.77.581.3		
435	87.587.587.587.587.5				
436	55.51.3 50.43.841.337.537.537.5	75.150.150.150.115.125.125.135.68.8	70.71.3		
437	72.572.568.868.862.5				
438	52.5 50.43.8 40.37.5 35.32.531.3	65.150.150.150.105.113.115.120.62.562.562.5			
439	57.556.3 50. 50. 50.				
440	0 50. 45.42.537.532.5 30.27.526.3	25.	40.43.8 50.52.5 55.52.552.5 50.		
441	50.47.5 45. 45. 45.				
442	0 45.43.8 31.327.5	25.	37.543.8 50. 50. 50. 45.42.5		
443	40. 40. 40. 40.43.8				
444			25.31.332.537.537.537.537.5 35.		
445	35.32.5 35.37.5	0			
446			18.8 25. 25. 25.27.5 30. 30. 30.		
447	25. 25. 30.	0 0			
448			18.8		
449					
450					
451					
452					
453					
454					
455					

GROUP III: ARRAY DATA
TRANSMISSIVITY
LAYER 5
(FT /SEC)

CARD
NUMBER

456	1.39E-7	1	1	1															
457																			
458																			
459		.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	1.	1.	1.
460	1.	1.	1.	1.	1.														
461		.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.92	.92	1.
462	1.	1.	1.	1.	1.														
463		.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.75	.75	.75	.75	.75	.92
464	1.	1.	1.	1.	1.														
465		.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.75	.75	.75	.75
466	.92	.92	.92	1.	1.														
467		.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.58	.58	.58	.58	.58	.75
468	.75	.75	.92	.92	.92														
469		.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.42	.42	.42	.42	.58	.58	.58
470	.58	.58	.75	.75	.75														
471		.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.25	.25	.42	.42	.42	.42	.42
472	.42	.58	.58	.58	.58														
473		.083	.083	.042	.083	.083	.083	.042	.042	.042	.083	.083	.25	.25	.25	.25	.25	.25	.42
474	.42	.42	.42	.42	.42														
475		.042	.042		.042	.042	.042						.042	.042	.083	.083	.083	.083	.25
476	.25	.25	.25	.25	.25														
477		.042	.042		.042	.042							.042	.042	.083	.083	.083	.083	.083
478	.083	.083	.083	.083	.083														
479		.042	.042														.042	.042	.042
480	.042	.042	.042	.042	.042														
481																		.042	.042
482	.042	.042	.042																
483																			.042
484	.042	.042																	
485																			
486																			
487																			
488																			
489																			
490																			
491																			
492																			

GROUP III: ARRAY DATA

CARD
NUMBERTK
LAYER 1
(1/SEC)

493	4.E-14	1																	1
494																			
495																			
496	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
497	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
498	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
499	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
500	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
501	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
502	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
503	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
504	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
505	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
506	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
507	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
508	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
509	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
510	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
511	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
512	1.	1.	1.	1.	1.	1.	1.500050005000	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
513	1.	1.	1.	1.	1.	1.	1.50005000	1.	1.5000500050005000500050005000500050005000500050005000										
514							1.50005000500050005000500050005000500050005000500050005000												
515	500050005000500050005000																		
516	1.500050005000500050005000500050005000500050005000500050005000																		
517	500050005000500050005000																		
518	1.50005000500050005000500050005000500050005000500050005000																		
519	500050005000500050005000																		
520	500050005000500050005000																		
521	500050005000																		
522	100010001000																		
523	10001000																		
524																			
525	1000																		
526																			
527																			
528																			
529																			

GROUP III: ARRAY DATA

CARD
NUMBERTK
LAYER 2
(1/SEC)

530	2.78E-12	1																		1
531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
532	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
533	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
534	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
535	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
536	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
537	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
538	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
539	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
540	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
541	1	1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1	1
542	1	1	1	1	1	1	0	1	1	1	1	100	100	100	100	100	1	1	1	1
543	1	1	1	1	1	1	1	1	1	1	1	10	10	100	100	100	1	1	1	1
544	1	1	1	1	1	1	0	1	1	1	1	10	10	10	10	10	1	1	1	1
545	1	1	1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
546	1	1	1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
547	1	1	1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
548	1	1	1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
549	1	1	1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
550	1	1	1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
551	1	1	1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
552	1	1	1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
553	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
554	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
555	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
556	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
557	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
558	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
559	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
560	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
561	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
562	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
563	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
565																				
566																				

GROUP III: ARRAY DATA

TK
LAYER 3
(1/SEC)

CAHD
NUMBER

567	3.47E-12	1																	
568																			
569																			
570		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
571	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
572		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
573	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
574		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
575	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
576		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
577	1	1	1	1	1	0													
578		1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
579	1	1	1	1	1	0													
580		1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
581	1	1	1	1	1	0													
582		1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
583	1	1	1	1	1	0													
584		1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
585	1	1	1	1	1	0													
586		1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
587	1	1	1	1	1	0													
588		1	1	1	1	1	1	1	1	1			100	100	100	1	1	1	1
589	1	1	1	1	1	0													
590		1	1	1	1	1	1						1	1	1	1	1	1	1
591	1	1	1	1	1	0													
592													1	1	1	1	1	1	1
593	1	1	1	1															
594													1	1	1	1	1	1	1
595	1	1	1																
596																			
597																1			
598																			
599																			
600																			
601																			
602																			
603																			

TK
LAYER 4
(1/SEC)

[illegible]

CARD
NUMBER

GROUP III: ARRAY DATA
GRID SPACING IN THE X DIRECTION
(FT)

641		5280		1													11
642		.75	.75	.75	.5	.5	.5	.5	.5	.5	.375	.375	.25	.25	.25	.25	11
643		.375	.375	.5	.5	.5	.5	.5	.5	.75	.75						11

CARD
NUMBER

GROUP III: ARRAY DATA
GRID SPACING IN THE Y DIRECTION
(FT)

644		5280		1													11
645		.75	.75	.5	.5	.5	.5	.5	.375	.375	.25	.25	.25	.25	.25	.25	11
646		.25	.25														11

CARD
NUMBER

GROUP III: ARRAY DATA
GRID SPACING IN THE Z DIRECTION
(FT)

647		5280		1													11
648		.19	.019	.019	.019	.0019											11

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER NAMES

649		IVIE CREEK															11
650		QUITCHIPAH CREEK															11
651		CHRISTIENSEN WASH															11
652		MILLER CANYON															11
653		MUDDY CREEK															11

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER NODE LOCATIONS
LAYER 1

654 |

11

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER NODE LOCATIONS
LAYER 2

655 |
656 |
657 |
658 |
659 |
660 |
661 |
662 |
663 |
664 |
665 |
666 |
667 |
668 |
669 |
670 |
671 |
672 |
673 |

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2

4 55
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11
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CARD
NUMBER

1

CARD
NUMBER

1

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER NODE LOCATIONS
LAYER 5

712 |

11

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER HEAD
(FT)

713 | 1 1 1 11
714 | 1587058905850587058505970591059305960588059305920597059905960598059705945600560201
715 | 16040603060606010 1

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER BOTTOM
(FT)

716 | 1 1 1 11
717 | 1586558855845586558455965590559255955587559255915596559855955597559655940600060151
718 | 16035602560556005 1

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER COEFFICIENTS

719 | 1.0E-8 1 11
720 | 1.005 1.001.001 1.001.001 1 1 1.01 1 1 1 1 10 10 1 11
721 | 1 1 10 1 1

CARD
NUMBER

#MAX
MAXIMUM ITERATION PARAMETER

722 | 0.99863

1

CARD
NUMBER

GROUP IV: PARAMETERS THAT CHANGE WITH THE PUMPING PERIOD

723	1	1		1	1	1	24	1
724	1	2	4	22	-0.170			1

Table 3.--Listing of the model input data for the transient predictive model simulations

CARD NUMBER	GROUP I: TITLE, SIMULATION OPTIONS, AND PROBLEM DIMENSIONS							
1		----THREE-DIMENSIONAL GROUND-WATER FLOW MODEL OF THE FERRON SI						
2		LANDSTONE NEAR EMERY, UTAH----						
3		18	26	5	75	605	24	51
4		DRAW HEAD MASS		ITKR				

CARD NUMBER	GROUP II: SCALAR PARAMETERS							
5		1	5	.01	5			
6		5280	5280	.60	1234	.1234	MILES	
7								
8								
9								

CARD
NUMBER

78

GROUP III: ARRAY DATA
STARTING HEAD MATRIX
LAYER 2
(FT)

CARD
NUMBER

47			1		1												1
48		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
49		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
50		0.6500.	0.6456.	0.6440.	0.6420.	0.6395.	0.6370.	0.6345.	0.6330.	0.6320.	0.6315.	0.6315.	0.6330.	0.6340.	0.6355.	0.6365.	0.
51		0.6375.	0.6385.	0.6395.	0.6410.	0.6430.	0.6440.	0.6460.	0.6490.	0.6525.	0.	0.	0.	0.	0.	0.	0.
52		0.6460.	0.6423.	0.6399.	0.6378.	0.6357.	0.6336.	0.6316.	0.6301.	0.6292.	0.6289.	0.6293.	0.6301.	0.6304.	0.6318.	0.6326.	0.
53		0.6337.	0.6349.	0.6361.	0.6374.	0.6387.	0.6397.	0.6418.	0.6441.	0.6465.	0.	0.	0.	0.	0.	0.	0.
54		0.6430.	0.6393.	0.6367.	0.6346.	0.6325.	0.6305.	0.6287.	0.6272.	0.6262.	0.6259.	0.6261.	0.6268.	0.6276.	0.6285.	0.6294.	0.
55		0.6306.	0.6320.	0.6333.	0.6347.	0.6356.	0.6354.	0.6385.	0.6406.	0.6425.	0.	0.	0.	0.	0.	0.	0.
56		0.6400.	0.6362.	0.6333.	0.6312.	0.6291.	0.6272.	0.6254.	0.6237.	0.6223.	0.6214.	0.6216.	0.6224.	0.6233.	0.6245.	0.6254.	0.
57		0.6275.	0.6292.	0.6308.	0.6324.	0.6336.	0.6345.	0.6362.	0.6374.	0.6380.	0.	0.	0.	0.	0.	0.	0.
58		0.6365.	0.6327.	0.6298.	0.6275.	0.6254.	0.6235.	0.6214.	0.6192.	0.6168.	0.6136.	0.6136.	0.6149.	0.6165.	0.6184.	0.6208.	0.
59		0.6232.	0.6255.	0.6276.	0.6295.	0.6310.	0.6322.	0.6334.	0.6343.	0.6350.	0.	0.	0.	0.	0.	0.	0.
60		0.6330.	0.6291.	0.6259.	0.6235.	0.6212.	0.6188.	0.6164.	0.6140.	0.6113.	0.6089.	0.6045.	0.6088.	0.6103.	0.6127.	0.6157.	0.
61		0.6185.	0.6211.	0.6235.	0.6256.	0.6274.	0.6289.	0.6300.	0.6306.	0.6300.	0.	0.	0.	0.	0.	0.	0.
62		0.6300.	0.6258.	0.6223.	0.6196.	0.6167.	0.6139.	0.6113.	0.6086.	0.6062.	0.6037.	0.6036.	0.6051.	0.6067.	0.6091.	0.6116.	0.
63		0.6145.	0.6172.	0.6197.	0.6220.	0.6240.	0.6256.	0.6270.	0.6277.	0.6275.	0.	0.	0.	0.	0.	0.	0.
64		0.6270.	0.6228.	0.6190.	0.6158.	0.6125.	0.6092.	0.6058.	0.6032.	0.6011.	0.5988.	0.5992.	0.6013.	0.6036.	0.6060.	0.6083.	0.
65		0.6111.	0.6138.	0.6164.	0.6187.	0.6206.	0.6224.	0.6239.	0.6249.	0.6250.	0.	0.	0.	0.	0.	0.	0.
66		0.6245.	0.6203.	0.6161.	0.6123.	0.6086.	0.6047.	0.6004.	0.5982.	0.5969.	0.5948.	0.5963.	0.5990.	0.6013.	0.6038.	0.6061.	0.
67		0.6087.	0.6113.	0.6137.	0.6159.	0.6176.	0.6193.	0.6211.	0.6227.	0.6235.	0.	0.	0.	0.	0.	0.	0.
68		0.6230.	0.6183.	0.6135.	0.6092.	0.6049.	0.6006.	0.5968.	0.5947.	0.5934.	0.5900.	0.5935.	0.5968.	0.5993.	0.6020.	0.6043.	0.
69		0.6068.	0.6092.	0.6115.	0.6135.	0.6150.	0.6166.	0.6185.	0.6208.	0.6225.	0.	0.	0.	0.	0.	0.	0.
70		0.6215.	0.6167.	0.6113.	0.6055.	0.6005.	0.5966.	0.5932.	0.5908.	0.5899.	0.5871.	0.5930.	0.5965.	0.5991.	0.6013.	0.6031.	0.
71		0.6052.	0.6074.	0.6093.	0.6111.	0.6126.	0.6142.	0.6163.	0.6191.	0.6215.	0.	0.	0.	0.	0.	0.	0.
72		0.6200.	0.6154.	0.6090.	0.6014.	0.5966.	0.5926.	0.5899.	0.5883.	0.5868.	0.5851.	0.5933.	0.5968.	0.5990.	0.6008.	0.6024.	0.
73		0.6040.	0.6054.	0.6070.	0.6088.	0.6100.	0.6116.	0.6141.	0.6179.	0.	0.	0.	0.	0.	0.	0.	0.
74		0.	0.	0.6143.	0.6067.	0.5996.	0.5929.	0.5893.	0.	0.	0.	0.	0.5945.	0.5973.	0.5991.	0.6005.	0.6017.
75		0.6028.	0.6037.	0.6047.	0.6066.	0.6078.	0.6093.	0.6123.	0.	0.	0.	0.	0.	0.	0.	0.	0.
76		0.	0.	0.	0.6051.	0.5980.	0.5914.	0.	0.	0.	0.	0.	0.5952.	0.5976.	0.5992.	0.6004.	0.6011.
77		0.6016.	0.6016.	0.6033.	0.6048.	0.6062.	0.6082.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
78		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.5957.	0.5978.	0.5993.	0.6001.
79		0.6001.	0.5970.	0.6017.	0.6023.	0.6039.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.5990.	0.5995.	0.5995.
81		0.5990.	0.5960.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
82		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
83		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

CARD
NUMBER

80

GROUP III: ARRAY DATA
STARTING HEAD MATRIX
LAYER 4
(FT)

CARD
NUMBER

121			1		1													1
122		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
123		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
124		0.6396.	6372.	6348.	6323.	6299.	6279.	6249.	6235.	6225.	6235.	6250.	6285.	6305.	6330.	6340.	0.	
125		6360.	6375.	6385.	6400.	6420.	6435.	6450.	6475.	6500.	0.						0.	
126		0.6357.	6333.	6307.	6285.	6264.	6242.	6220.	6202.	6185.	6185.	6197.	6220.	6240.	6259.	6276.	0.	
127		6297.	6318.	6337.	6357.	6375.	6391.	6407.	6425.	6450.	0.						0.	
128		0.6338.	6302.	6274.	6252.	6231.	6210.	6190.	6172.	6159.	6159.	6170.	6188.	6206.	6223.	6240.	0.	
129		6259.	6280.	6301.	6323.	6341.	6356.	6370.	6384.	6400.	0.						0.	
130		0.6308.	6267.	6237.	6215.	6194.	6174.	6154.	6134.	6116.	6113.	6122.	6140.	6150.	6174.	6191.	0.	
131		6210.	6236.	6262.	6285.	6304.	6319.	6332.	6342.	6350.	0.						0.	
132		0.6274.	6226.	6193.	6172.	6153.	6133.	6112.	6091.	6074.	6079.	6089.	6105.	6120.	6133.	6145.	0.	
133		6161.	6188.	6219.	6244.	6263.	6278.	6290.	6297.	6300.	0.						0.	
134		0.6224.	6176.	6140.	6120.	6103.	6085.	6065.	6043.	6024.	6021.	6027.	6046.	6066.	6085.	6100.	0.	
135		6119.	6146.	6178.	6202.	6219.	6231.	6243.	6250.	6250.	0.						0.	
136		0.6189.	6127.	6078.	6066.	6053.	6037.	6016.	5993.	5964.	5932.	5928.	5952.	5994.	6030.	6057.	0.	
137		6083.	6113.	6146.	6171.	6186.	6196.	6204.	6211.	6225.	0.						0.	
138		0.6149.	6080.	6005.	6013.	6004.	5991.	5967.	5953.	5914.	5825.	5800.	5800.	5924.	5992.	6030.	0.	
139		6061.	6091.	6124.	6148.	6160.	6166.	6168.	6171.	6200.	0.						0.	
140		0.6125.	6042.	5970.	5970.	5959.	5950.	5959.	5945.	5916.	5900.	5910.	5960.	5968.	6000.	6027.	0.	
141		6054.	6081.	6111.	6134.	6142.	6142.	6137.	6129.	6170.	0.						0.	
142		0.6100.	6020.	5945.	5963.	5946.	5944.	5955.	5944.	5921.	0.	0.5885.	5912.	6010.	6031.	0.		
143		6053.	6075.	6104.	6125.	6129.	6124.	6112.	6109.	6150.	0.						0.	
144		0.6075.	6012.	5950.	5962.	5950.	5947.	0.	0.	0.	0.	0.6000.	5912.	5900.	5925.	0.		
145		5950.	6068.	6099.	6118.	6115.	6105.	6082.	6076.	6125.	0.						0.	
146		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.6018.	6017.	6026.	6038.	0.	
147		6050.	6060.	6092.	6104.	6100.	6082.	6056.	6031.	0.	0.						0.	
148		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.6019.	6021.	6028.	6037.	0.	
149		6048.	6057.	6060.	6091.	6083.	6063.	6011.	0.	0.	0.						0.	
150		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
151		6048.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
152		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
153		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
154		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
155		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
156		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
157		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	

GROUP III: ARRAY DATA
STARTING HEAD MATRIX
LAYER 5
(FT)

CARD
NUMBER

158	1	1															1
159	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
160	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
161	0.6250.	6230.	6225.	6210.	6200.	6190.	6180.	6175.	6170.	6150.	6140.	6150.	6160.	6175.	6200.		
162	6225.	6250.	6300.	6325.	6350.	6375.	6375.	6375.	6375.	0.							
163	0.6210.	6200.	6190.	6180.	6170.	6165.	6160.	6145.	6125.	6100.	6040.	6105.	6140.	6165.	6190.		
164	6220.	6255.	6305.	6320.	6330.	6350.	6350.	6350.	6350.	0.							
165	0.6190.	6175.	6170.	6155.	6150.	6135.	6120.	6100.	6080.	6050.	6050.	6100.	6155.	6175.	6195.		
166	6230.	6270.	6290.	6310.	6320.	6320.	6320.	6320.	6320.	0.							
167	0.6160.	6145.	6135.	6125.	6115.	6100.	6085.	6055.	6035.	6005.	6025.	6070.	6100.	6170.	6205.		
168	6230.	6250.	6260.	6275.	6300.	6300.	6300.	6300.	6280.	0.							
169	0.6135.	6115.	6100.	6090.	6075.	6060.	6045.	6030.	6010.	5990.	5990.	6100.	6160.	6140.	6200.		
170	6200.	6195.	6210.	6220.	6220.	6210.	6235.	6265.	6235.	0.							
171	0.6100.	6075.	6060.	6045.	6040.	6025.	6015.	6000.	6075.	6060.	6065.	6110.	6150.	6155.	6150.		
172	6150.	6155.	6170.	6170.	6170.	6150.	6185.	6215.	6185.	0.							
173	0.6060.	6035.	6020.	6015.	6010.	6000.	5990.	5975.	5950.	5940.	5955.	6025.	6090.	6100.	6110.		
174	6115.	6125.	6135.	6155.	6155.	6145.	6155.	6150.	6145.	0.							
175	0.6035.	6000.	5990.	5985.	5980.	5975.	5960.	5950.	5935.	5940.	5970.	6000.	6060.	6075.	6080.		
176	6090.	6100.	6115.	6140.	6140.	6135.	6135.	6125.	6110.	0.							
177	0.6010.	5990.	0.5960.	5950.	5940.	0.	0.	0.5930.	5930.	6015.	6050.	6060.	6070.				
178	6075.	6085.	6105.	6130.	6130.	6120.	6105.	5995.	5990.	0.							
179	0.6000.	5960.	0.	0.5940.	5940.	0.	0.	0.	0.	0.5990.	6025.	6050.	6055.				
180	6065.	6075.	6100.	6125.	6125.	6115.	6100.	6085.	6075.	0.							
181	0.5975.	5950.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.6040.				
182	6055.	6065.	6100.	6120.	6115.	6105.	6080.	6075.	6060.	0.							
183	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
184	0.6055.	6100.	6105.	6100.	6080.	6060.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
185	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
186	0.	0.6090.	6090.	6080.	6060.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
187	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
188	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
189	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
190	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
191	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
193	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
194	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

CARD
NUMBER

195 | -1.0

11

GROUP III: ARRAY DATA
STORAGE COEFFICIENT
LAYER 1
(DIMENSIONLESS)

CARD
NUMBER

196 | 1.0E-04

1

11

GROUP III: ARRAY DATA
STORAGE COEFFICIENT
LAYER 2
(DIMENSIONLESS)

197																			
198																			
199	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
200	1.	1.	1.	1.	1.	0													
201	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
202	1.	1.	1.	1.	1.	0													
203	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
204	1.	1.	1.	1.	1.	0													
205	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
206	1.	1.	1.	1.	1.	0													
207	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
208	1.	1.	1.	1.	1.	0													
209	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
210	1.	1.	1.	1.	1.	0													
211	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
212	1.	1.	1.	1.	1.	0													
213	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
214	1.	1.	1.	1.	1.	0													
215	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
216	1.	1.	1.	1.	1.	0													
217	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
218	1.	1.	1.	1.	1.	0													
219	0	1.	1.	1.	1.	1.	1.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500
220	1.	1.	1.	1.	1.	0													
221	0	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500
222	1.	1.	1.	1.	0	0													
223	0	0	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500
224	1.	1.	1.	0	0	0													
225	0	0	0	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500
226	1.	1.	0	0	0	0													
227	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
228	.500	0	0	0	0	0													
229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0													
231																			
232																			

GROUP III: ARRAY DATA
STOPAGE COEFFICIENT
LAYER 3
(DIMENSIONLESS)

CARD
NUMBER

233	1.0E-04	1																	
234																			
235																			
236	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
237	1.	1.	1.	1.	1.	0													
238	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
239	1.	1.	1.	1.	1.	0													
240	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
241	1.	1.	1.	1.	1.	0													
242	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
243	1.	1.	1.	1.	1.	0													
244	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
245	1.	1.	1.	1.	1.	0													
246	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
247	1.	1.	1.	1.	1.	0													
248	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
249	1.	1.	1.	1.	1.	0													
250	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
251	1.	1.	1.	1.	1.	0													
252	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
253	1.	1.	1.	1.	1.	0													
254	0	1.	1.	1.	1.	1.	1.	1.	1.	1.500.500.	1.	1.	1.	1.	1.	1.	1.	1.	1.
255	1.	1.	1.	1.	1.	0													
256	0	1.	1.500.	1.	1.	1.	0	0	0	0	0	0	0	1.	1.	1.	1.	1.	1.
257	1.	1.	1.	1.	1.	0													
258	0	0	0	0	0	0	0	0	0	0	0	0	0	1.	1.	1.	1.	1.	1.
259	1.	1.	1.	1.	0	0													
260	0	0	0	0	0	0	0	0	0	0	0	0	0	1.	1.	1.	1.	1.	1.
261	1.	1.	1.	0	0	0													
262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.500.500.500.	
263	500.500.	0	0	0	0	0													
264																			
265																			
266																			
267																			
268																			
269																			

GROUP III: ARRAY DATA
STORAGE COEFFICIENT
LAYER 4
(DIMENSIONLESS)

CARD
NUMBER

270	1.0E-04	1																	11
271																			
272																			
273	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
274	1.	1.	1.	1.	1.	0													
275	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
276	1.	1.	1.	1.	1.	0													
277	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
278	1.	1.	1.	1.	1.	0													
279	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
280	1.	1.	1.	1.	1.	0													
281	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
282	1.	1.	1.	1.	1.	0													
283	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
284	1.	1.	1.	1.	1.	0													
285	0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
286	1.	1.	1.	1.	1.	0													
287	0	1.	1.	1.	1.	1.	1.	1.	1.	1.-10.	-10.	-10.	1.	1.	1.	1.	1.	1.	1.
288	1.	1.	1.	1.	1.	0													
289	0	1.	1.	1.500.	1.	1.	1.500.	500.	500.	-10.	-10.	-10.	1.	1.	1.	1.	1.	1.	1.
290	1.	1.	1.	1.	1.	0													
291	0	1.	1.	1.500.	500.	1.	1.500.	500.	500.	0	0-10.	-10.	1.	1.	1.	1.	1.	1.	1.
292	1.	1.	1.	1.	1.	0													
293	0	1.	1.	1.	0.500.	500.	500.	0	0	0	0	0	0	0-10.	-10.	-10.	-10.	1.	1.
294	1.	1.	1.	1.	1.	0													
295	0	0	0	0	0	0	0	0	0	0	0	0	0	0.500.	500.	500.	500.	500.	1.
296	1.	1.	1.	1.500.	0	0													
297	0	0	0	0	0	0	0	0	0	0	0	0	0	0.500.	500.	500.	500.	500.	1.
298	1.	1.	1.500.	0	0	0													
299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.500.	0	0
300	0	0	0	0	0	0													
301																			
302																			
303																			
304																			
305																			
306																			

GROUP III: ARRAY DATA
STORAGE COEFFICIENT
LAYER 5
(DIMENSIONLESS)

CARD
NUMBER

307	-1.0																		11
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GROUP III: ARRAY DATA
TRANSMISSIVITY
LAYER 1
(FT /SEC)

CARD
NUMBER

308	6.94E-08	1	1	1															
309																			
310																			
311	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
312	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
313	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
314	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
315	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
316	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
317	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
318	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
319	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
320	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
321	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
322	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
323	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
324	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
325	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
326	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
327	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
328	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
329	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
330	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
331	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
332	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
333	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
334	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
335		1.	1.	1.	1.	1.	1.					1.	1.	1.	1.	1.	1.	1.	1.
336	1.	1.	1.																
337				1.	1.	1.						1.	1.	1.	1.	1.	1.	1.	1.
338	1.	1.																	
339												1.	1.	1.	1.	1.	1.	1.	1.
340	1.																		
341													1.	1.	1.	1.	1.		
342																			
343																			
344																			

CARD
NUMBER

[illegible]

GROUP III: ARRAY DATA
TRANSMISSIVITY
LAYER 3
(FT /SEC)

CARD
NUMBER

382	5.787E-06	1	1	1	1
383					
384					
385	072.5	75.	75.	78.881.383.887.591.395.3100.104.108.112.119.125.131.138.150.160.	
386	169.263.263.263.263.				
387	70.71.372.573.8	75.	75.	78.881.387.593.8100.103.106.112.119.125.131.138.150.	
388	254.263.263.263.263.				
389	067.568.868.868.868.8	70.72.5	75.81.387.592.597.5100.103.110.112.125.131.144.		
390	243.263.263.263.263.				
391	65. 65. 65. 65. 65. 65.67.568.871.3	75.81.387.592.597.5100.106.112.125.197.			
392	207.225.243.243.243.				
393	062.5 60. 60. 60. 60.57.557.562.562.567.572.5	75.81.387.587.593.8100.112.168.			
394	179.188.207.207.207.				
395	0 60.57.556.353.8 50. 50. 50. 50.56.3 60.62.568.868.872.5	75.81.387.5141.150.			
396	150.168.168.168.168.				
397	057.553.851.3 50. 45.43.843.843.847.552.556.362.5 65.64.868.872.5	75.117.123.			
398	132.132.132.132.132.				
399	0 55.51.3 50.43.841.337.537.537.537.5	45. 50.56.357.562.562.567.5104.105.108.			
400	110.110.104.104. 95.				
401	052.5 50.43.8 40.37.5 35.32.531.331.337.543.8	50.52.556.357.5 60. 95. 95. 95.			
402	87. 87. 75. 75. 75.				
403	0 50. 45.42.537.532.5 30.27.526.3 25. 25.33.8 40.43.8 50.52.5	83. 80. 80. 85.			
404	75. 75. 75. 75. 75.				
405	0 45.43.837.531.327.5 25.	31.337.543.8 50. 75. 75. 68. 65.			
406	60. 60. 60. 60. 60.				
407		25.31.332.5 57. 57. 57. 57. 57.			
408	53. 50. 53. 57.				
409		18.8 25. 38. 38. 40. 45. 45. 45.			
410	38. 38. 45.				
411		29. 29. 29. 29.			
412	29. 29.				
413					
414					
415					
416					
417					
418					

GROUP III: ARRAY DATA
TRANSMISSIVITY
LAYER 4
(FT /SEC)

CARD
NUMBER

419	1.157E-05	1	1	1	1
420					
421					
422	072.5	75.	75.	78.881.383.887.591.3	90. 90. 95. 95.125.135.140.150.160.165.170.
423	175.175.175.175.175.				
424	70.71.372.573.8	75.	75.	78.881.3	80. 85. 90.105.125.135.150.165.175.175.175.
425	175.175.175.175.175.				
426	68. 69. 69. 69. 69.	70. 73. 75. 75. 80. 80. 85. 90.110.120.150.155.160.165.			
427	165.175.175.175.175.				
428	65. 65. 65. 65. 65.	65.67.568.471.3	75.81.387.592.	90.110.115.120.125.130.	
429	140.150.162.162.162.				
430	62.5 60. 60. 60. 60.	57.557.5	70.140.150.160.165.180.185.175.188.100.112.112.		
431	119.125.138.138.138.				
432	60.57.556.353.8	50. 50. 50. 50.113.130.135.158.158.165.170.163.87.593.8100.			
433	100.112.112.112.112.				
434	57.553.851.3	50. 45.43.843.843.8	95.120.133.145.150.158.138.145. 75.77.581.3		
435	87.587.587.587.587.5				
436	55.51.3	50.43.841.337.537.537.5	75.150.150.150.115.125.125.135.68.8	70.71.3	
437	72.572.568.868.862.5				
438	52.5	50.43.8	40.37.5	35.32.531.3	65.150.150.150.105.113.115.120.62.562.562.5
439	57.556.3	50. 50. 50.			
440	0	50. 45.42.537.532.5	30.27.526.3	25.	40.43.8
441	50.47.5	45. 45. 45.			50.52.5
442	0	45.43.8	31.327.5	25.	37.543.8
443	40. 40. 40. 40.43.8				50. 50. 50. 45.42.5
444					25.31.332.537.537.537.537.5
445	35.32.5	35.37.5	0		35.
446					18.8
447	25. 25. 30. 0 0				25. 25. 25.27.5
448					30. 30. 30.
449					18.8
450					
451					
452					
453					
454					
455					

GROUP III: ARRAY DATA
TRANSMISSIVITY
LAYER 5
(FT /SEC)

CARD
NUMBER

456	1.39E-7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
457																			
458																			
459	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
460	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
461	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75
462	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
463	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58
464	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
465	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58
466	.92	.92	.92	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
467	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42
468	.75	.75	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
469	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
470	.58	.58	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75
471	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083
472	.42	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58
473	.083	.083	.042	.083	.083	.083	.042	.042	.042	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083
474	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42	.42
475	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
476	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
477	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
478	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083
479	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
480	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
481																			
482	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
483																			
484	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
485																			
486																			
487																			
488																			
489																			
490																			
491																			
492																			

TK
LAYER 1
(1/SEC)

[illegible]

GROUP III: ARRAY DATA

CARD NUMBER	TX LAYER 2 (1/SEC)																		
530	2.78E-12				1														1
531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
532	0	0	0	0	0	0													
533		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
534	1	1	1	1	1	1													
535		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
536	1	1	1	1	1	1													
537		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
538	1	1	1	1	1	1													
539		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
540	1	1	1	1	1	1													
541		1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
542	1	1	1	1	1	1	0												
543		1	1	1	1	1	1	1	1	1	10	10	100	100	100	1	1	1	1
544	1	1	1	1	1	1	0												
545		1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
546	1	1	1	1	1	1													
547		1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
548	1	1	1	1	1	1													
549		1	1	1	1	1	1	1	1	1	10	10	10	10	10	1	1	1	1
550	1	1	1	1	1	1													
551		1	1	1	1	1	1	1	1	1	100	100	100	100	100	1	1	1	1
552	1	1	1	1	1	1													
553		1	1	1	1	1	1	1											
554	1	1	1	1	1	1													
555																			
556	1	1	1	1															
557																			
558	1	1	1																
559																			
560	1	1																	
561	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
562	0	0	0	0	0	0	0												
563	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
564	0	0	0	0	0	0													
565																			
566																			

TK
LAYER 3
(1/SEC)

[illegible]

TK

LAYER 4
(1/SEC)

[illegible]

CARD
NUMBER

GROUP III: ARRAY DATA
GRID SPACING IN THE X DIRECTION
(FT)

641		5280		1													11
642		.75	.75	.75	.5	.5	.5	.5	.5	.5	.5	.375	.375	.25	.25	.25	.25
643		.375	.375	.5	.5	.5	.5	.5	.5	.75	.75						

CARD
NUMBER

GROUP III: ARRAY DATA
GRID SPACING IN THE Y DIRECTION
(FT)

644		5280		1													11
645		.75	.75	.5	.5	.5	.5	.5	.375	.375	.25	.25	.25	.25	.25	.25	.25
646		.25	.25														

CARD
NUMBER

GROUP III: ARRAY DATA
GRID SPACING IN THE Z DIRECTION
(FT)

647		5280		1													11
648		.19	.019	.019	.019	.0019											

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER NAMES

649		IVIE CREEK															
650		QUITCHIPAH CREEK															
651		CHRISTIENSEN WASH															
652		MILLER CANYON															
653		MUDDY CREEK															

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER NODE LOCATIONS
LAYER 1

054 |

11

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER NODE LOCATIONS
LAYER 2

055 |
056 |
057 |
058 |
059 |
060 |
061 |
062 |
063 |
064 |
065 |
066 |
067 |
068 |
069 |
070 |
071 |
072 |
073 |

1

1

2

2

1

1

1

4 55

4

11
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GROUP III: ARRAY DATA
RIVER NODE LOCATIONS
LAYER 3

CARD
NUMBER

674		1	1			11
675						
676						
677						
678						
679						
680						
681						
682						
683						
684						
685		23				
686	1	3				
687						
688						
689			4	55		
690						
691						
692						

GROUP III: ARRAY DATA
RIVER NODE LOCATIONS
LAYER 4

CARD
NUMBER

693		1	1			11
694						
695						
696						
697						
698						
699						
700						
701						
702						
703	1					
704	1					
705		333				
706				5		
707			4	5		
708						
709						
710						
711						

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER NODE LOCATIONS
LAYER 5

712 1

11

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER HEAD
(FT)

713 1 1 1 11
714 1587058905850587058505970591059305960588059305920597059905960598059705945600560201
715 16040603060606010 1

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER BOTTOM
(FT)

716 1 1 1 11
717 1586558855845586558455965590559255955587559255915596559855955597559655940600060151
718 16035602560556005 1

CARD
NUMBER

GROUP III: ARRAY DATA
RIVER COEFFICIENTS

719 1 1.0E-8 1 11
720 1 1.005 1.001.001 1.001.001 1 1 1 .01 1 1 1 1 10 10 1 11
721 1 1 1 10 1 11

CARD
NUMBER

WMAX
MAXIMUM ITERATION PARAMETER

722 1 0.99863 1

CARD
NUMBER

GROUP IV: PARAMETERS THAT CHANGE WITH THE PUMPING PERIOD

723	1		134	5475	15	1	8750
724	2	4	22	-.170			
725	2	2	2	.07940			
726	2	2	3	.01423			
727	2	2	4	.03939			
728	2	2	5	.03869			
729	2	2	6	.02993			
730	2	2	7	.02792			
731	2	2	8	.009605			
732	2	2	9	.01703			
733	2	2	10	.01848			
734	2	2	11	.008153			
735	2	2	12	-.02757			
736	2	2	13	.02045			
737	2	2	14	-.007356			
738	2	2	15	.03894			
739	2	2	16	.02912			
740	2	2	17	.03993			
741	2	2	18	.04362			
742	2	2	19	.04346			
743	2	2	20	.04337			
744	2	2	21	.1110			
745	2	2	22	.04802			
746	2	2	23	.04613			
747	2	2	24	.09939			
748	2	2	25	.2616			
749	3	2	2	.03490			
750	3	2	3	.01554			
751	3	2	4	.01791			
752	3	2	5	.01701			
753	3	2	6	.01249			
754	3	2	7	.01252			
755	3	2	8	.005894			
756	3	2	9	.01081			
757	3	2	10	.001256			
758	3	2	11	.004611			
759	3	2	12	-.007951			
760	3	2	13	.006046			
761	3	2	14	-.001914			
762	3	2	15	.03105			
763	3	2	16	.006782			
764	3	2	17	.02811			
765	3	2	18	.02399			
766	3	2	19	.01846			
767	3	2	20	.01576			
768	3	2	21	.03957			
769	3	2	22	.02789			
770	3	2	23	.01999			
771	3	2	24	.06648			
772	3	2	25	.1554			
773	4	2	2	.05582			

CARD
NUMBER

GROUP IV: PARAMETERS THAT CHANGE WITH THE PUMPING PERIOD (CONT)

774	4	2	3	.04381
775	4	2	4	.03410
776	4	2	5	.02705
777	4	2	6	.01820
778	4	2	7	.04177
779	4	2	8	-.0005653
780	4	2	9	.01644
781	4	2	10	-.002766
782	4	2	11	.01607
783	4	2	12	-.02560
784	4	2	13	.04816
785	4	2	14	.001285
786	4	2	15	.1109
787	4	2	16	.01052
788	4	2	17	.09713
789	4	2	18	.08675
790	4	2	19	.06301
791	4	2	20	.05244
792	4	2	21	.08675
793	4	2	22	.07091
794	4	2	23	.03919
795	4	2	24	.09563
796	4	2	25	.1819
797	4	3	2	-.003502
798	4	3	25	.07032
799	4	4	2	.02889
800	2	3	2	.01754
801	2	3	25	.02919
802	2	4	2	.01908
803	2	4	25	.04503
804	2	5	2	.02456
805	2	5	25	-.06956
806	2	6	2	.01745
807	2	6	25	.02448
808	2	7	2	.01699
809	2	7	25	-.05254
810	2	8	2	.01872
811	2	8	25	-.005445
812	2	9	2	.01270
813	2	9	25	-.01573
814	2	10	2	-.001617
815	2	10	25	-.004283
816	2	11	2	.007601
817	2	11	25	-.002107
818	2	12	2	.007668
819	2	12	25	-.01525
820	2	13	2	-.01570
821	3	3	2	.003731
822	3	3	25	.02919
823	3	4	2	.01202
824	3	4	25	.01991

CARD
NUMBER

GROUP IV: PARAMETERS THAT CHANGE WITH THE PUMPING PERIOD (CONT)

825	3	5	2	.01194	
826	3	5	25	-.02367	
827	3	6	2	.01240	
828	3	6	25	.002867	
829	3	7	2	.005439	
830	3	7	25	-.05260	
831	3	8	2	.009857	
832	3	8	25	-.009058	
833	3	9	2	.001480	
834	3	9	25	-.008252	
835	3	10	2	.002458	
836	3	10	25	-.007987	
837	3	11	2	.001561	
838	3	11	25	.0003354	
839	3	12	2	-.01442	
840	3	12	25	-.02215	
841	4	4	25	.01988	
842	4	5	2	.02395	
843	4	5	25	-.004634	
844	4	6	2	.03626	
845	4	6	25	-.01960	
846	4	7	2	.008671	
847	4	7	25	-.04043	
848	4	8	2	.03224	
849	4	8	25	.02204	
850	4	9	2	.007451	
851	4	9	25	.05118	
852	4	10	2	.02692	
853	4	10	25	.06967	
854	4	11	2	.01404	
855	4	11	25	.01440	
856	4	12	2	-.02763	
857	4	12	25	-.003689	

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