EG&G MOUND-29-04-03-05--9602130050

Operable Unit 9
Determination of Potential Pathways from Source Areas Adjacent and Within the Buried Valley Aquifer via Ground Water Flow Modeling and Particle Tracking

MOUND PLANT
MIAMISBURG, OHIO

TECHNICAL MEMORANDUM

December 1995

FINAL

(Revision 0)

Department Of Energy

EG&G Mound Applied Technologies

Terran Corporation

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Mr. Tim Fischer
U.S. Environmental Protection Agency (USEPA)
HSRM-6J
77 West Jackson Street
Chicago, IL 60604

Mr. Brian Nickel
Ohio Environmental Protection Agency (OEPA)
401 East Fifth Street
Dayton, OH 45402-2911

Dear Mr. Fischer and Mr. Nickel:

Enclosed please find cover page changes that were inadvertently left out of the December 11, 1995 DOE transmittal concerning the *Operable Unit 9 (OU9) Determination of Potential Pathways from Source Areas Adjacent and Within the Buried Valley Aquifer via Ground-Water Flow Modeling and Particle Tracking, Technical Memorandum*. There were no changes made to the Draft Final, only comment responses that accompanied the December 11, 1995 transmittal. This document is now a Final, Revision 0.

If there are any questions, please contact me at (513) 320-3601.

Cordially,

Roger W. McCready
Project Manager

Enclosure

cc w/enclosure:
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Ray Beaumier, OEPA
Ruth Vandegrift, ODH
Regina Bayer, CH2M Hill
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Alec Bray
- Make sure it's in the public reading room.
Thanks-Debbie

George V. Voinovich
Governor

December 26, 1995

RE: US DOE MOUND
MONTGOMERY COUNTY
OU9 OPERATIONAL AREA
POTENTIAL PATHWAY REPORT

Mr. Arthur Kleinrath
US DOE Miamisburg Area Office
1 Mound Road
P.O. Box 66
Miamisburg, Ohio 45343-0066

Dear Mr. Kleinrath:

The Ohio Environmental Protection Agency has reviewed the comment responses provided by DOE Mound on the *Operable Unit 9 Determination of Potential Pathways from Source Areas Adjacent and Within the Buried Valley Aquifer via Ground Water Flow Modeling and Particle Tracking*. We have determined that all comments were adequately addressed by the responses. Therefore, we will not be submitting any further comments on the document.

Should there be any questions concerning the above, please contact Lisa Anderson at (513)285-6599 or me at (513)285-6468.

Sincerely,

Lisa Anderson for

Brian Nickel
Mound Project Manager
Office of Federal Facilities Oversight

cc: T. Fischer, USEPA Region V
D. White, DOE/MB
M. Williams, EG&G
J. Zahora, EG&G
J. Rigano, EG&G
R. Bendula, SWDO/DDAGW

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MIAMISBURG
AREA OFFICE

Department of Energy

Ohio Field Office
Miamisburg Area Office
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Miamisburg, Ohio 45343-0066

DEC 11 1995

Mr. Tim Fischer
U.S. Environmental Protection Agency (USEPA)
HSRM-6J
77 West Jackson Street
Chicago, Illinois 60604

Mr. Brian Nickel
Ohio Environmental Protection Agency (OEPA)
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Fischer and Mr. Nickel:

Enclosed please find comment responses and page changes to the *Operable Unit 9 (OU9) Determination of Potential Pathways from Source Areas Adjacent and Within the Buried Valley Aquifer via Ground-Water Flow Modeling and Particle Tracking, Technical Memorandum*. The enclosed are provided in response to comments received from the Ohio Environmental Protection Agency (OEPA) dated November 24, 1995. It should be noted that USEPA had no comments to be addressed regarding this report.

Please notify the Miamisburg Area Office within fourteen (14) days if the responses are found to be unsatisfactory. The document and comment responses will be made available to the public.

If there are any questions, please contact Debbie White, Environmental Protection Specialist, of my staff, at (513) 865-5197.

Sincerely,

Arthur W. Kleinrath
Project Engineer Team Leader

Enclosure

cc: on page 2

cc w/enclosure:
Lisa Anderson, OEPA SWDO
Ray Beaumier, OEPA
Ruth Vandegrift, ODH
Regina Bayer, CH2M Hill
John Sands, EM-453, HQ
Doug Draper, HAZWRAP
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Alec Bray, EG&G
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US DOE MOUND RESPONSE TO OHIO EPA COMMENTS
OPERABLE UNIT 9
DETERMINATION OF POTENTIAL PATHWAYS FROM SOURCE AREAS ADJACENT AND WITHIN THE BURIED VALLEY AQUIFER VIA GROUND WATER FLOW MODELING AND PARTICLE TRACKING

Comment 1. Section 2.2. sixth paragraph:
The sixth paragraph states that information concerning the typical cycle of the four Miamisburg wells was not available. Please explain in comment response whether the cycling of Mound's production well 0076, modeled in this study as a discharge zone, was considered in the modeling.

Response: *Information on the cycling of the Mound Plant production wells is not available as the pump runs almost continuously. The total water volume treated at the water softening plant is recorded, but the actual flow rates are not recorded. Additionally, this steady-state model does not require well cycling information for calibration.*

Comment 2. Section 2.2
Please explain in comment response why a vertical hydraulic conductivity of 40 ft/day was chosen.

Response: *A vertical hydraulic conductivity of 1/10 the horizontal conductivity is generally accepted as a reasonable point of departure for modeling. The normal range of K_v is 1 to 0.001 K_h for sands, shales and gravels (Domenico & Schwartz, 1990).*

Comment 3. Section 6.0
Hydraulic conductivity for the buried valley was estimated from MODFLOWP to be 259 to 452 ft/day. Despite this high conductivity, a relatively slow travel time was estimated for particles migrating from the Spoils area to production well 0076. Please provide an explanation in comment responses.

Response: *Particle velocity is related to conductivity by the following equation:*

$$v=ki/n$$

where v = particle velocity, k = conductivity, i=hydraulic gradient, n = effective porosity.
Particle travel times are slow due to the low gradients in the vicinity of OU-1. Additionally, particles near the onlap edge of the BVA travel more slowly due to the thinning of the aquifer and the no-flow boundary conditions.

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State of Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911
(513) 285-6357
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George V. Voinovich
Governor

November 24, 1995

RE: US DOE MOUND
MONTGOMERY COUNTY
OPERABLE UNIT 9
POTENTIAL PATHWAY
GROUND WATER TECH MEMO

Mr. Arthur Kleinrath
US DOE Miamisburg Area Office
1 Mound Road
P.O. Box 66
Miamisburg, Ohio 45343-0066

Dear Mr. Kleinrath:

The Ohio Environmental Protection Agency has reviewed the *Operable Unit 9 Determination of Potential Pathways from Source Areas Adjacent and Within the Buried Valley Aquifer via Ground Water Flow Modeling and Particle Tracking, September 1995.* Our comments on the document are attached. Please provide comment responses and make the document and comment responses available to the public.

Should there be any questions concerning the above, please contact Lisa Anderson at (513)285-6051 or me at (513)285-6468.

Sincerely,

Lisa Anderson for

Brian Nickel
Mound Project Manager
Office of Federal Facilities Oversight

Attachment (1)

cc: T. Fischer, USEPA Region V
D. White, DOE/MB
M. Williams, EG&G
J. Zahora, EG&G
J. Rigano, EG&G
A. Bray, EG&G
R. Bendula, SWDO/DDAGW

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US DOE MOUND
OPERABLE UNIT 9
DETERMINATION OF POTENTIAL PATHWAYS FROM SOURCE AREAS
ADJACENT AND WITHIN THE BURIED VALLEY AQUIFER
VIA GROUND WATER FLOW MODELING AND PARTICLE TRACKING

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Plese explain in comment responses why a vertical hydraulic conductivity of 40 ft/day was chosen.

3. Section 6.0:
Hydraulic conductivity for the buried valley was estimated from MODFLOWP to be 259 to 452 ft/day. Despite this high conductivity, a relatively slow travel time was estimated for particles migrating from the Spoils area to production well 0076. Please provide an explanation in comment responses.

MIAMISBURG
AREA OFFICE

Department of Energy

Ohio Field Office
Miamisburg Area Office
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Miamisburg, Ohio 45343-0066

SEP 22 1995

Mr. Tim Fischer
U.S. Environmental Protection Agency (USEPA)
HSRM-6J
77 West Jackson Street
Chicago, Illinois 60604

Mr. Brian Nickel
Ohio Environmental Protection Agency (OEPA)
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Fischer and Mr. Nickel:

Enclosed please find the Operable Unit 9 (OU9) Determination of Potential Pathways from Source Areas Adjacent and Within the Buried Valley Aquifer via Ground-Water Flow Modeling and Particle Tracking Technical Memorandum which summarizes the groundwater modeling efforts for OU9.

It should be noted that under the terms of the Federal Facility Agreement, this report is considered a Technical Memorandum and a secondary document, however, a thirty (30) day review period is considered appropriate. Comments and responses to comments will be addressed in letter form and attached to the document. Changes will not be made to the document.

If there are any questions, please contact Debbie White of my staff at (513) 865-5197.

Sincerely,

Art Kleinrath

Arthur W. Kleinrath
Project Engineer Team Leader

Enclosure

cc: on page 2

cc w/enclosure:
Lisa Anderson, OEPA SWDO
Ray Beaumier, OEPA
Ruth Vandegrift, ODH
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ACRONYMS

BGS	below ground surface
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFS	cubic feet per second
DOE	U.S. Department of Energy
DPL	Dayton Power and Light
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facility Agreement
GMR	Great Miami River
GPD	gallons per day
GPM	gallons per minute
HEC-2	Hydrologic Engineering Center U.S. Corps. of Engineers Water Surface Profile Computer Program.
K	hydraulic conductivity (see Glossary for definition)
MAE	mean absolute error (see Glossary for definition)
MCD	The Miami Conservancy District
ME	mean error (see Glossary for definition)
MGD	million gallons per day
MODFLOW	A modular three-dimensional finite difference groundwater flow model. (see Glossary for definition)
MODFLOWP	A computer program for estimating parameters of a transient, three-dimensional, ground water flow model using non-linear regression. (see Glossary for definition)
MODPATH	Computer Program to compute and display pathlines using results from MODFLOW. (see Glossary for definition)
MSL	mean sea level
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List (EPA)
OEPA	Ohio Environmental Protection Agency
OU	operable unit
RI/FS	remedial investigation/feasibility study
RMSE	root mean square error (see Glossary for definition)
SDWA	Safe Drinking Water Act
SSR	sum of squared residuals (see Glossary for definition)
USGS	U.S. Geological Survey

ACKNOWLEDGMENTS

This report was prepared by Terran Corporation (Report # TK-9508), Kettering, Ohio under basic ordering agreement 52263, task order 47738 with EG&G Mound Applied Technologies, Miamisburg, Ohio. Contributing authors were Roger McCready and Amy Lamborg. Graphics were provided by Renee Bicknell and word processing provided by Sandra Allen. Technical reviews were provided by Brent E. Huntsman, Terran Corporation and Alec Bray, Senior Hydrogeologist, EG&G Mound Applied Technologies. Working Draft and Draft was revised in response to comments from the U.S. Department of Energy.

EXECUTIVE SUMMARY

The Mound Plant Environmental Restoration Program Operable Unit 9 (OU-9) is responsible for assessment of the environmental conditions on and off the Mound site. An integral component of the assessment is the local ground water system. The Buried Valley Aquifer (BVA) is a sole source aquifer regulated under the Safe Drinking Water Act (SDWA), and is located beneath the Mound facility and surrounding areas. As part of current OU-9 investigations this study was conducted to develop a ground water flow model for the BVA near the Mound. The flow model was used to identify pathways and travel times from potential sources on the Mound to the BVA.

Methodology

A six step process was conducted to complete this study. The six steps were: developing the purpose of the study, designing a conceptual model, selecting a suitable numerical code and translating the conceptual model information to a numerical model, calibrating and verifying the model, performing sensitivity analysis and using the model for predictive purposes. The first step was outlined above, the five remaining steps are outlined below.

Conceptual Model Hydrogeology

The conceptual model is a summarization of the complex hydrogeologic conditions within the study area. The hydrogeologic setting at and near the Mound consists of bedrock, which is a layered sequence of shale and limestone cut by valleys. The valleys are partially filled with unconsolidated glacial and alluvial deposits. Because preglacial and interglacial valleys in the bedrock of this region are filled with outwash and till, these valleys are categorized as "buried valleys". There are two potential sources of ground water in this area: the shale bedrock with interbedded limestones, and the buried valleys. Buried valleys of outwash and till (the buried valley aquifers) contain significantly more ground water than the bedrock.

Based on this hydrogeologic setting, the conceptual model for this study is a two layer system that receives areally distributed recharge from infiltrating precipitation, natural and induced recharge from the Great Miami River (GMR) and smaller drainage ditches, and has three areas of ground water withdrawal. Bedrock leakage into the BVA is considered minimal and not included. The system is assumed to be heterogeneous, isotropic and steady-state with respect to long term stresses.

Model Design, Calibration and Verification

The study area is bordered on the north by State Route 725 in Miamisburg and on the south by the DPL Hutchings Station on Chautauqua Road. Mound Road is the eastern boundary and Union Road is the western boundary.

The U.S. Geological Survey ground water flow model MODFLOW was used for simulating the BVA. The hydrogeologic conditions summarized in the conceptual model were transferred to a numerical finite-difference model that divided the study area into 3,692 cells and two layers. The extent of the BVA for Layers 1 and 2 were determined when the bedrock elevation was greater than 690 feet above mean sea level (MSL) for Layer 1 and 620 feet above MSL for Layer 2.

Calibration of a ground water flow model is the process by which the model parameters are continually modified until a match with field measured values is obtained. The indirect and geostatistical approaches for model calibration were used in this study. MODFLOWP is a version of the USGS MODFLOW ground water flow model that performs nonlinear regression to make estimates of parameters chosen by the simulator (Hill, 1993). MODFLOWP was used to estimate hydraulic conductivity and riverbed conductance on an initial one-layer model. The model was also developed by starting with a simple configuration and building to the more complex actual conceptual model

representation. This progressive method identified influential parameters and allowed adjustments and realization checks.

To calibrate the model, water levels from September 2, 1993 were applied to 58 target locations chosen to be representative of the BVA. Qualitative and quantitative methods were then used to evaluate the calibration. The qualitative method was a comparison of simulated water level contours to observed water levels for September 2, 1993. Final quantitative calibration results were calculated for the 58 locations using the average difference between observed and simulated water levels. The average differences between the modeled and the observed water levels were examined as the Mean Error (ME), Mean Absolute Error (MAE) and Root Mean Square Error (RMSE). The general calibration target was defined by a calibration error of less than 10 percent of the water level relief across the site. Therefore, for this model a calibration error less than 0.8 feet was acceptable. The calibrated model had an acceptable RMSE between observed and simulated ground water levels of 0.24 feet, and the model water level distribution mirrored the observed distribution measured on September 2, 1993.

Results of a model calibration are not unique -- there may be many combinations of parameters that will produce a match to a set of water levels. Model verification is a method of testing whether the combination of parameters chosen for the system can be used under a different set of system stresses and match an observed measurement. A second steady-state time period, June 23, 1993, was chosen for model verification. System components which varied from the calibrated model during verification were the river stage and BVA water level distribution. The resulting verification RMSE was 0.72 feet.

Sensitivity Analysis

Sensitivity analysis was used to determine which parameters significantly affect model output. The parameters used for sensitivity analysis were: recharge from precipitation, riverbed leakance, river stage, hydraulic conductivity and specified boundary conditions. The model array for each parameter was changed by either a percentage or a multiplication factor of the calibrated value. Individual values at each model node were not changed independently. The model's response to these changes was assessed by plotting the mean error (ME), mean absolute error (MAE), and root mean square error (RMSE) versus percent difference or multiplication factor for each parameter modified.

The model was least sensitive to the vertical leakage between layers (simulated with the MODFLOW parameter vertical leakage), recharge due to precipitation, and specified-head boundaries. A ten fold increase and decrease in vertical leakage only changed the RMSE by -0.019 and 0.034 feet, respectively. Recharge due to precipitation was changed as much as ±50 percent and produced a 0.4 foot change in the RMSE. A similar effect was achieved by varying the specified head at the northern boundary of the model by ±3 feet. The result was a 0.4 foot change in the RMSE.

The model is significantly affected by changes in hydraulic conductivity and river stage. A ten fold decrease and increase in hydraulic conductivity causes a 1.84 and 1.29 feet RMSE, respectively. Sensitivity to river stage was determined using actual river stages. The river stage for each model node was selected from the HEC-2 Water Surface Profile Model. All river stages selected for the analysis were greater than the calibrated model stage because approximately 90 percent of the GMR flow at Miamisburg exceeds the September 2, 1993 flow. There was a direct correlation between increased river stage and the BVA water levels. A river stage increase of 8.95 produced a RMSE for the model of 5.8 feet.

Particle-Tracking Simulations and Results

Several specific questions or scenarios were developed during the scoping of this project to be simulated by particle tracking. The scenarios were:

1. Determine pathways from potential contaminant sources in OU-1.

2. Determine pathways from potential contaminant sources in OU-1 if the proposed production well (#4) on the south property was the water supply for Mound.

3. Determine pathways from OU-1 sources with pump-and-treat wells installed and utilization of production well 0076.

4. Determine pathways from OU-1 sources with pump-and-treat wells installed and proposed production well (#4) on south property as the water supply for Mound.

5. Determine pathways from other Mound potential sources.

For scenario 1, particle pathways from OU-1 potential sources generally take a southerly heading from the sources. The lateral position within the BVA is important to the end result of the particle. Particle tracking, which assumes a steady-state flow field, does not account for dispersion or possible lateral movement due to floodwave processes. Therefore, the particle follows the flow field which is southerly. Mound production well 0076 captures all particles that originated at potential OU-1 sources within 227 to 412 days, depending on the source locations.

Scenarios 2 - 4 showed that during simulated pump-and-treat operations, a pumping rate greater than 10 gpm is required to capture the particles. Any particle not captured by the pump-and-treat system reaches the Mound production well 0076 within 1.5 to 2 years or may reach the proposed south property well within 3 to 5 years and the south property boundary in 10 years. The travel time for these particles to reach 0076 was longer than the first scenario due to the original location of the particles.

An important observation from these simulations can be summarized by the results of scenario 5. This is that if water-soluble contamination anywhere on the Mound plant reaches the BVA, it tends to follow the edge of the BVA, not disperse throughout assuming no dispersion. In fact, wherever a simulated particle starts relative to the east and west boundaries of the BVA, it will remain. This indicates that the location of sources is extremely important to contaminant travel path and destination. Based on the limited simulations conducted, particles originating on the Mound are captured by Mound production well 0076 within 4 to 23 years.

Results from the ground water flow model and particle tracking simulations may be enhanced with additional information. First, more information is needed on the Miamisburg well field pumping schedule and rates. Monitoring of water levels and rates for a period of time would be required to determine the cycle pattern. At a minimum, just prior to and during the next site-wide water level measurement event, the investigation should determine which Miamisburg wells are pumping and obtain an estimate of the pumping rate. The additional data would only slightly affect the steady-state model. However, if a need for transient model is warranted, then detailed cyclic pumping data will be required.

Because the ground water gradient is very flat in the study area, even a 0.2 foot change in water levels affects the water level distribution and therefore might affect production well and pump-and-treat capture zones. The RMSE of the calibrated model was 0.24, which is generally acceptable. For this model, however, it may be beneficial to attempt to reduce this error even further. Additionally, the effect that floodwave fluctuations have on the migration of contaminants should be assessed. If the effect has significant affect on the migration pattern then the transient aquifer system should be simulated. Finally, although the use of this model to test a remedial technology (pump-and-treat) provided information on particle movement and capture, a more detailed model of the OU-1 area is required to 1) identify why only one of the two pump-and-treat wells captured particles, and 2) test other pumping scenarios that might provide more efficient capture zones. The model developed in this study is the foundation for a more detailed model. The method of grid telescoping will be used to extract information from the OU-9 model that could provide boundary conditions for the more detailed model. Changes made in the OU-9 model over time could easily be incorporated into the OU-1 model.

1.0 INTRODUCTION

The Mound Plant in Miamisburg, Ohio, is operated for the U.S. Department of Energy (DOE) by EG&G Mound Applied Technologies. (Figure 1.1) The plant started operation in 1949 and is an integrated research, development, and production facility that operates in support of the DOE weapons and energy programs (DOE 1993a).

The Mound Plant was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund) National Priorities List (NPL) on November 21, 1989 (54 Federal Register 48184). The facility was added to the NPL as a consequence of historic disposal practices and releases of contaminants to the environment. Pursuant to its NPL status, the DOE signed a CERCLA Section 120 Federal Facility Agreement (FFA) with the U.S. Environmental Protection Agency (EPA) that became effective October 11, 1990, (Administrative Docket #VW-'90-C-075). The Ohio EPA (OEPA) became a signatory to the agreement in July 1993. The terms of the FFA required that the DOE develop and implement remedial investigations (RIs) and feasibility studies (FSs) and conduct interim remedial actions to ensure that environmental impacts associated with past and present activities at the site are thoroughly investigated and appropriate action is taken to protect the public health, welfare, and the environment.

Due to the number of potential release sites (more than 300) and the overall complexity of the RI/FS, the site is divided into nine operable units (OUs) to facilitate program management (DOE 1992a). Currently, six OUs remain; the others have been closed. Operable Unit 9 is designated for site-wide studies that provide the framework for the RI/FS. Investigations that are best conducted for the entire Mound Plant and its regional setting are included in OU-9.

1.1. PURPOSE AND SCOPE OF REPORT

The purpose of this work is to develop a ground water flow model for the identification of pathways and travel times from potential sources to the Buried Valley Aquifer System (BVA). This system was designated as a sole source aquifer under the Safe Drinking Water Act (SDWA) in 1988. Therefore, special precautions are required to protect this resource, and information developed from this model significantly contributes to the protection efforts.

This technical memorandum was prepared to summarize important portions of the ground water flow modeling and particle tracking study. The technical memorandum describes the geology and hydrogeology used to develop a conceptual model, the representation of the conceptual model as a numerical model, the model design and calibration, model verification and model sensitivity analysis. This technical memorandum also provides results of specific scenario simulations and particle tracking.

1.2. METHODOLOGY

To be a successful tool for the synthesis of site conditions, the modeling process requires numerous steps. The accepted protocol for these steps is to define the purpose, prepare a conceptual model, choose a numerical model, design the model, conduct model calibration and verification, and finally use the model for prediction (Anderson and Woessner, 1992).

The purpose of the specific model is vital to designing an appropriate model. The conceptual model step is the assemblage of data and summarization of conditions to be simulated. A numerical code suitable for simulating the conceptual model is chosen. The conceptual model information and field data then are put in the form required by the numerical model design. Calibration of the model determines if the numerical model is simulating actual field-measured parameters. Associated with calibration is sensitivity analysis which determines the model assumptions that cause the most deviation from measured values. During model verification, a second set of system stresses is used to test the model's capability to reproduce reality. The final step is the use of the model to predict future conditions.

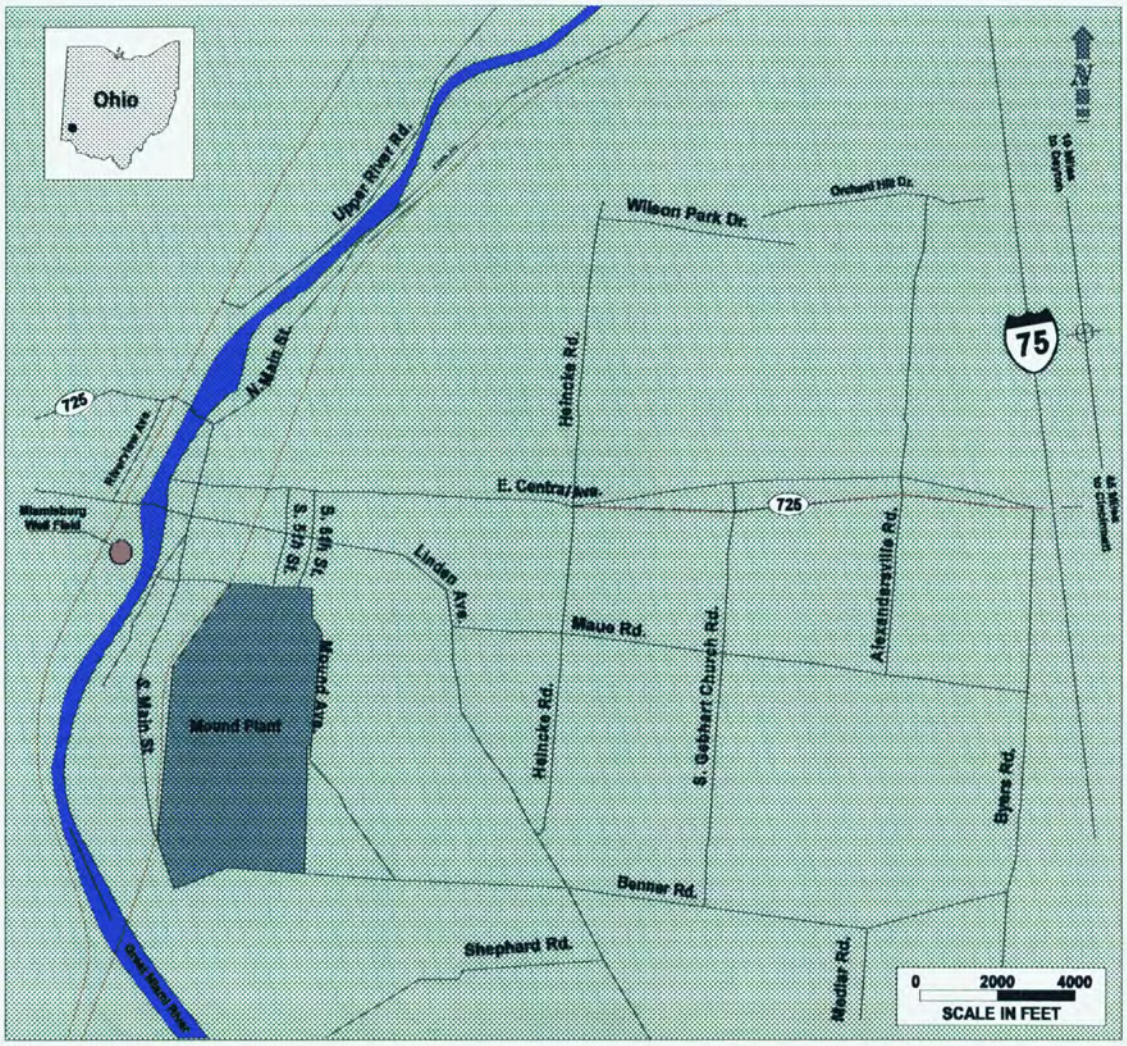


Figure 1.1. Location of the Mound Plant, Miamisburg, Ohio.

1.3. BACKGROUND

The Department of Energy's Mound Plant entered into an agreement with the U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency that requires DOE to thoroughly investigate past and present activities and determine environmental impacts. Because of the BVA's proximity to the Mound, and the sensitivity of the resource, the BVA has the potential to be impacted adversely by Mound activities. This ground water flow model simulating the buried valley aquifer on and off the Mound Plant was completed to assess the Mound's potential impact on the ground water of the buried valley.

Assessment of Mound Plant's activities on the ground water system at and near the facility is an on-going process. Two operable units, OU-1 and OU-9, have completed specific ground water investigations of the BVA. Operable Unit 1 addresses possible chemical and radioactive contamination of the BVA, which underlies the original southwest corner of the Mound Plant. The primary sources of contamination are an historic landfill, a sanitary landfill, and an overflow pond. Investigations conducted in Operable Unit 1 include extensive geological, soil gas, ground water quality studies, aquifer characterization, and historical documentation review of landfill contents. Although Operable Unit 9 integrates all ground water pathways and interaction for the Mound Plant, similar site-specific ground water investigations have been conducted for OU-9 as OU-1. Additionally, the bedrock geology and flow system were investigated in detail during OU-9 investigations. All investigations have provided data to assess and determine remedial options or assess risk of Mound's impact on ground water.

The hydrogeologic data collected during investigation of Operable Units 1 and 9 were used to develop and test the ground water flow model of the buried valley aquifer described in this report. Other operable units, such as OU-5 and OU-2, are currently collecting hydrogeologic information as part of the ER investigation strategy. As these data become available, the interaction of potential subsurface pathways could be assessed through model modification and simulations.

The area considered for this study is shown in Figure 1.2. The study area starts not quite a mile north of the Mound Plant boundary and extends south of the plant 1.1 miles. The study area encompasses the entire Mound property, and includes the Great Miami River. The western boundary is on the west side of the Great Miami River along Union Road. The eastern boundary is located where the buried valley aquifer terminates along the bedrock highs on the Mound site.

The ground water model will be instrumental in assessing the effects of large-scale pumpage at nearby well fields (City of Miamisburg and DPL Hutchings Station, see Figure 1.2) and the currently proposed well field expansion at the Mound Plant. This model will also allow information obtained on ground water flow to be integrated into the regional Great Miami River Basin Aquifer ground water model under development by USGS and local, state, and federal government entities. Additionally, the model will be used to assist in the assessment of remediation options and risk.

1.4. PREVIOUS INVESTIGATIONS

The hydrogeology of the study area and the region have been investigated numerous times. Norris, Cross, and Goldthwait (1948) conducted an investigation of the local consolidated rocks and the glacial deposits. This investigation provided estimates of BVA hydraulic properties, yields of wells, water quality data, and stream-flow characteristics. A similar study of the Mad River BVA near Fairborn was completed by Walton and Scudder (1960). Norris (1959) provided detailed information on the hydraulics and hydrology of the buried valley at Rohrers Island and in the Mad River valley. In 1966, Norris again studied the ground water resources of the Dayton Area which provided more information on hydraulic parameters, well yields, and interpretation of the till layer affect on movement of ground water. A portion of a study conducted by Spieker (1968) provided detailed information just off the Mound plant.

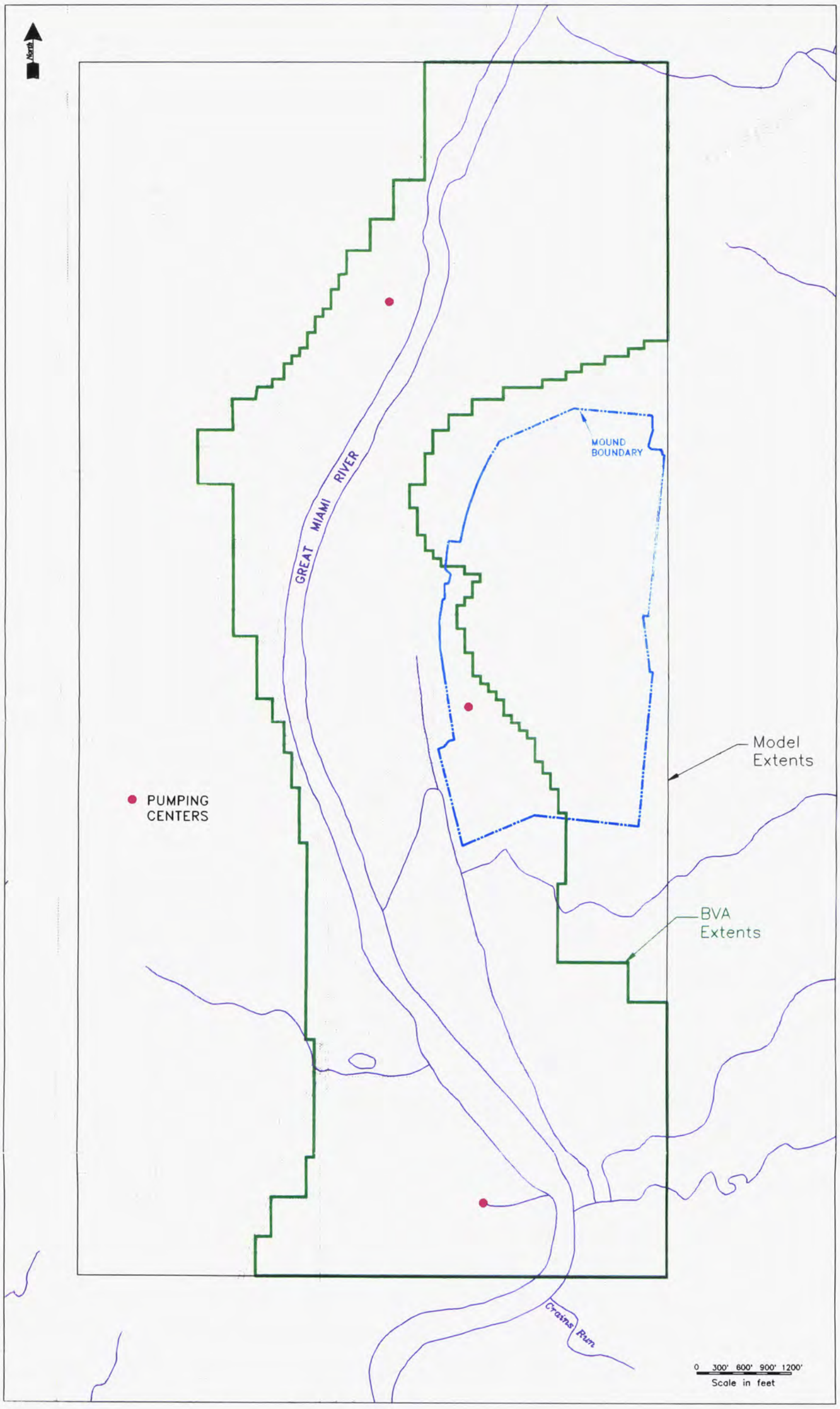


Figure 1.2. Location of study area and extents of buried valley aquifer chosen for this study.

Due to the usage and abundance of ground water in the BVA, the preservation, development and conservation of the aquifer sparked many ground water modeling studies. One of the first studies was by Fidler (1975) who developed a digital model simulation of the glacial outwash. A ground water flow model was developed for a portion of the buried valley aquifer between the Powel Road Landfill and the Miami River well field near Dayton. The flow model was used to assess the potential migration of contaminants (OEPA, 1985). A three dimensional ground water flow model was developed and particle tracking was used to provide information for well-field management of the Montgomery County well fields (Field, 1991). Ritzi et. al. (1994) studied the heterogeneity of the buried valley aquifer in an area 13 km by 5 km centered on the Montgomery County well fields just south of Dayton. Three geostatistical methodologies were used to quantify the areas where low permeability facies exist in areas without data. Information obtained from the three methods evaluated the uncertainty in the continuous nature of the low permeability facies, which allowed proper representation in ground water flow or transport models. A ground water flow model and particle tracking were used to develop a well head protection area between Franklin and Middletown (Shump and Wells, 1991). Terran Corporation used published and unpublished data to develop a model to determine the feasibility of 180 mgd well field for cooling purposes at the Dayton Power & Light Company Hutchings Station (McCready and Huntsman, 1990).

Numerous investigations or studies have been conducted at the Mound plant for water supply and for CERCLA and RCRA compliance program. Several key investigations that support this investigation are:

DOE. 1991a. "Area B, Operable Unit 1 DOE Mound Plant, History of Area B." February 1991, Draft.

DOE. 1991b. "Operable Unit 1, Area B Technical Memorandum (3) Hydrogeology and Groundwater Contamination." U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. April, Draft.

DOE. 1992. "Operable Unit 1; Area B; Technical Memorandum; Extent of Contamination - Soils. March.

DOE. 1993. "Operable Unit 1 Remedial Investigation Report." Environmental Restoration Program, U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. November.

DOE. 1994b. "Operable Unit 9 Hydrogeologic Investigation: Bedrock Report." Environmental Restoration Program, U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. January.

DOE. 1994c. "Operable Unit 9 Hydrogeologic Investigation: Buried Valley Aquifer Report." Environmental Restoration Program, U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

DOE. 1994d. "Operable Unit 1 Feasibility Study Report." Environmental Restoration Program, U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. Draft Final, August.

2.0 HYDROGEOLOGY AND CONCEPTUAL MODEL

The hydrogeology and geology of the study area were determined from published literature, Mound ER Program investigative reports, and The Miami Conservancy District, U. S. Geological Survey, and OEPA files. Existing data reviewed which are pertinent to the BVA included lithology, water levels, aquifer characteristics, river configuration and stage, and precipitation.

2.1. GEOLOGY AND HYDROGEOLOGY

The hydrogeologic setting at and near the Mound consists of bedrock valleys partially filled with unconsolidated glacial and alluvial deposits. Bedrock in the area is a layered sequence of shale and limestone, of the Ordovician Richmond Group. Bedrock valleys created prior to glaciation may have been further incised during glacier movements. Many of these valleys are filled with glacial outwash and other types of deposits during periods of glaciation. Present surface topography is shown in Figure 2.1.

2.1.1. Geology

Norris (1948) conducted a study of Montgomery County that described the geology and water-bearing properties of these Ordovician rocks. The Richmond Group are the oldest exposed rocks in Montgomery County. Generally, rocks of this group are blue-gray or greenish clay shales interbedded with blue-gray crystalline limestone. Montgomery County lies along the crest of the Cincinnati Arch and rocks dip at approximately 5 feet per mile to the northeast along the crest (Norris and others, 1948). Since the deposition of the shales and limestones, uplift and erosion have occurred to produce the flat broadly undulating plain that exists throughout the region. This plain has been dissected during the uplifts by preglacial drainage. In this region the principal stream was the Teays River, which was about the size of the present day Ohio River. Bedrock valleys in the Dayton area were, in part, formed by the Teays River but were disrupted during early glacial episodes. During interglacial periods drainage cut the bedrock valleys which has been called the Deep Stage. It was the numerous glacier advances and retreats of the Wisconsin stage that filled the Teays River and Deep Stage valleys, and Holocene erosion has established the present elevations. The present surface of the bedrock is shown by a bedrock topography map created using several sources of data, including seismic data from Spieker (1968), and a bedrock topography map prepared for the Mound ER Program (Figure 2.2).

The origin of sediments deposited in the valleys can be categorized as till and outwash. Till is a non-sorted non-stratified sediment consisting of clay and larger grain sizes. The glaciers directly deposited till as they crossed the area. Till of the Wisconsin age can be, in order of decreasing weathering, yellowish-brown to dark, light brown and soft, and blue gray and hard. Till in the valleys occurs in both continuous layers and in blocks and lenses. A second component of the valley sediments is outwash, which was deposited by meltwaters beyond the active glacier ice. Outwash is primarily sand and gravel, entrained by the energy of the meltwaters. In some locations till was removed by meltwater or buried by outwash (Norris, 1966). Because preglacial and interglacial valleys in the bedrock of this region have been filled with outwash and till, these valleys have been called "buried" valleys. There are three main valleys in this area that were pre- and interglacially-formed and have present day drainage. These are the Great Miami River, the Mad River and the Stillwater River valleys.

At the northern end of the study area, a col (drainage divide), was created during the Teays and Deep Stage erosion events. This was created by two tributaries of the historical Hamilton River that reached Miamisburg from opposite directions. It is believed that the Illinoisan glacier forced the Hamilton River drainage through this col causing a deep narrow bedrock gorge below the present Great Miami River (Norris and others, 1948). Norris and others (1948) used well logs to show that numerous layers of till are present north of the col and till is absent south of the col. Investigations conducted since Norris

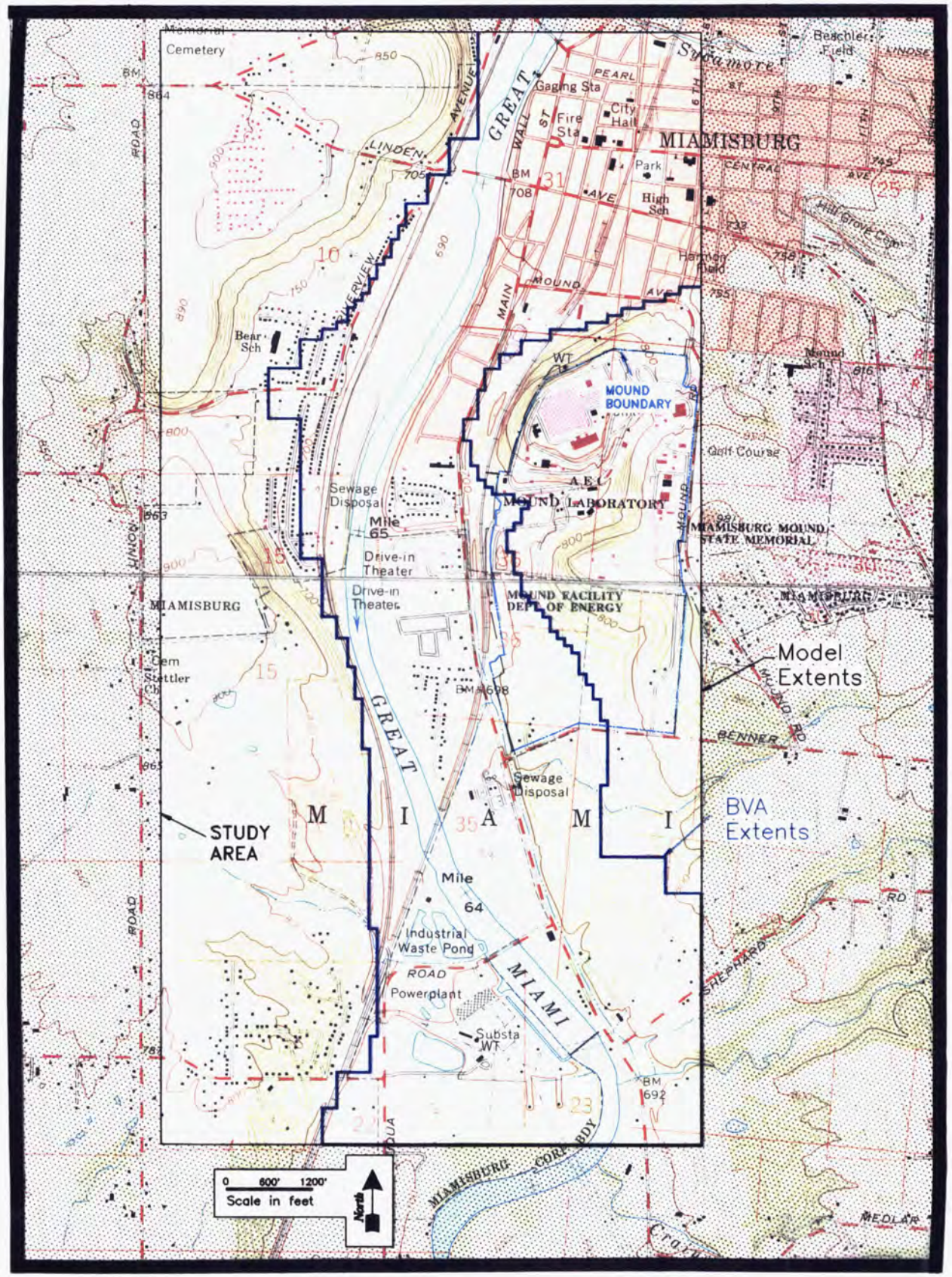


Figure 2.1. Study area location and surface topography.

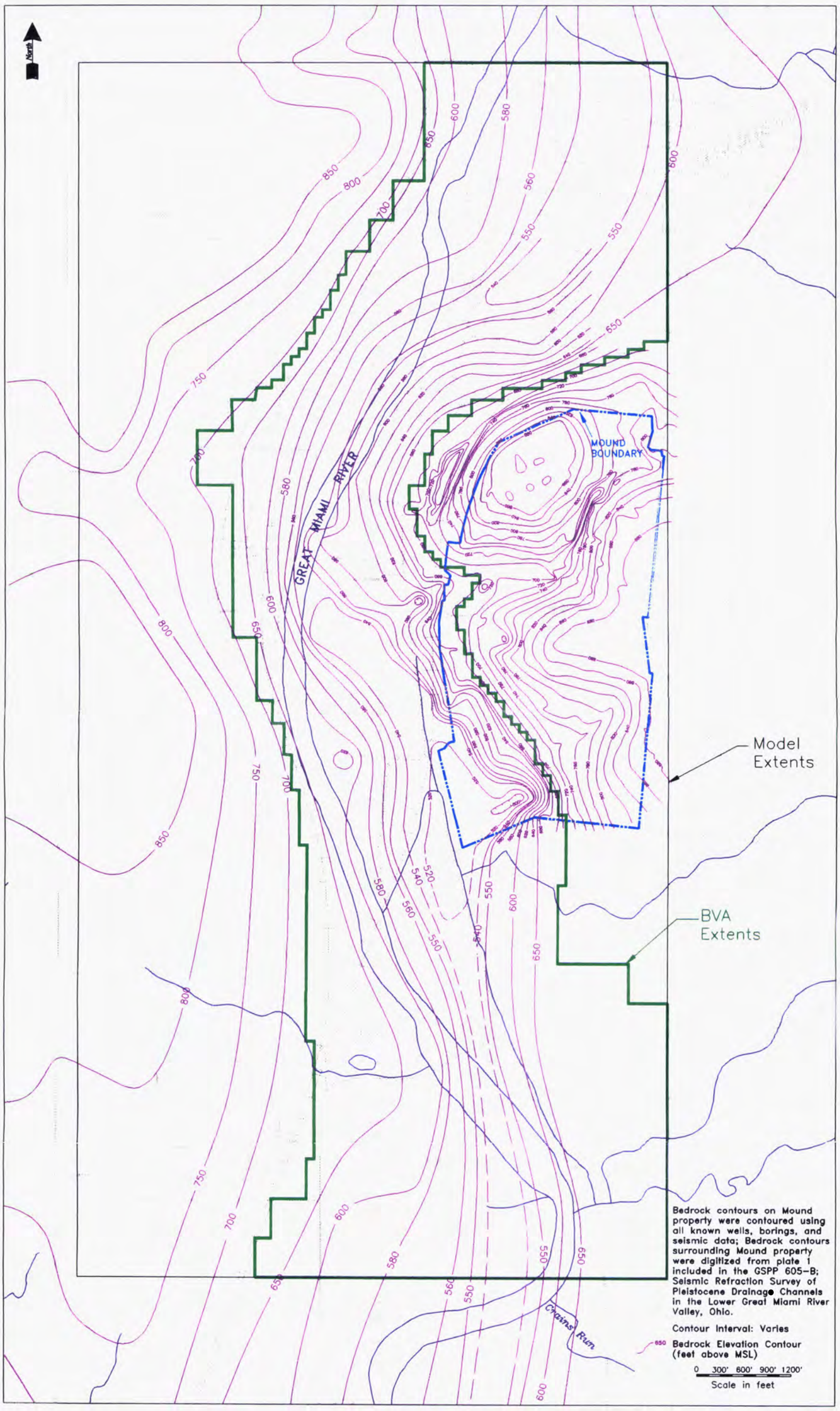


Figure 2.2. Surface topography of Ordovician shale and limestone.

and others (1948) continue to show the lack of continuous tills south of the col. This information was used to hypothesize that the col prevented later glacial ice from moving south of the col.

2.1.2. Hydrogeology

There are two potential sources of ground water in this area: the shale bedrock with interbedded limestones, and the buried valleys filled with till and outwash. Buried valleys of outwash and till (the buried valley aquifers) are more productive aquifers than the bedrock. In areas distant from the buried valley aquifers, however, the bedrock can support some development if low pumping rates are maintained.

2.1.2.1 Bedrock

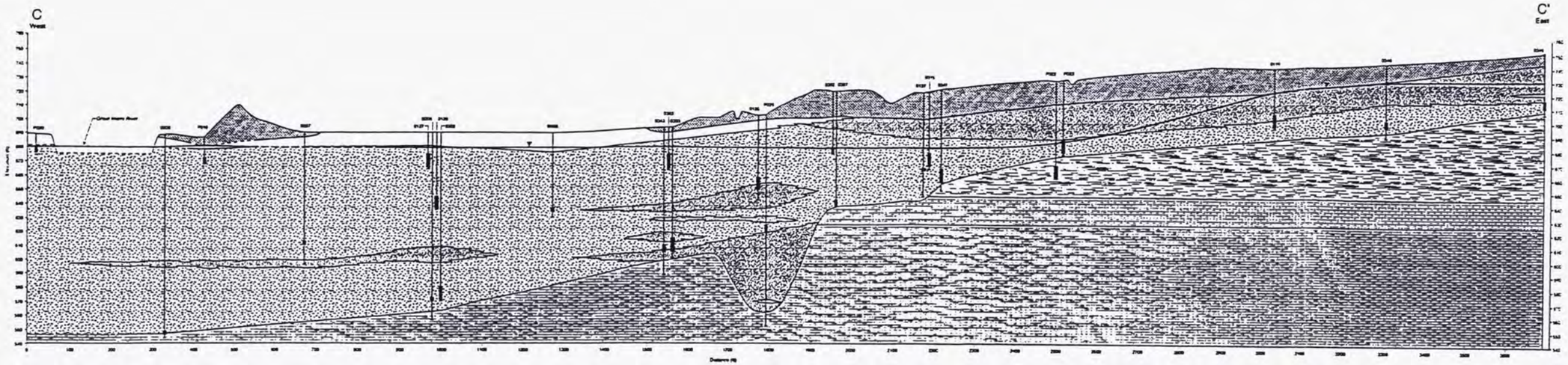
Bedrock ground water occurs in fractures and bedding planes. The thin limestone layers are 1 to 5 inches in thickness and make up 25 to 50 percent of the formation. Both the shale and limestone are dense, with little primary porosity, there by minimizing infiltration from recharge. Most of the water obtained from bedrock is from within a weathered zone near the bedrock surface. Weathering has caused interconnected fractures to be enlarged, allowing ground water storage. Only about 1 in 10 wells drilled into Ordovician bedrock provides sufficient yield for residential supply, and the water quality is highly charged with iron and sulfur (Norris and others, 1948). The average yields from the bedrock are less than 2 gpm (Schmidt, 1986). Bedrock wells in the area have very poor water yields relative to the buried valley aquifers.

A detailed study of the bedrock in and near the Mound was conducted under Operable Unit 9 investigations. The bedrock system at and near the Mound has been investigated as part of the Environmental Restoration Program (DOE, 1994b). As presented in the Operable Unit 9 Bedrock Investigation, the main hill and SM/PP hill are a thick sequence of interbedded shales and limestones that are relatively undeformed and have little primary porosity and permeability. Enhanced fractures along bedding planes and vertical fractures create interconnection and secondary permeability. Downhole heat pulse flowmeter tests, downhole pressure tests, falling head tests, water level monitoring, and quantification of seepage into a collector trench were used to quantify the bedrock flow characteristics. The permeability of bedrock fractures decreases from 1 ft/day in the upper zone (less 50 feet BGS on the main hill) to 0.01 ft/day at a depth of 100 feet. This lower zone permeability approaches the primary permeability value of these rocks. Below this fracture zone there is essentially no flow due to the low primary permeability and low frequency of fractures. The fracture zone is at a higher elevation than the top of the BVA and is therefore not in direct hydraulic connection.

Recharge and discharge from the bedrock have not been quantified. The recharge areas for the bedrock at and near the Mound are the topographical high areas where the glacial till is thin and the bedrock is fractured and weathered. It is suspected, based on local water levels, that some bedrock discharge occurs at the bedrock and buried valley interface. Evidence of bedrock discharge was observed at large seeps located at 0820 feet MSL elevation and as discharge occurring along outcrop faces. Some evidence suggests upward flow from the bedrock into the BVA occurs within the tributary valley on the Mound and along the buried valley extreme limits.

2.1.2.2 Buried Valley Aquifer

The BVA is heterogeneous throughout the valley. There is a large variation in till occurrence. In some locations the till forms layers several feet thick and is continuous across the valley, creating upper and lower permeable units. In other areas, the till occurs as lenses. These lenses have been identified within the study area, and continuous layers across the valley have not been identified. Figure 2.3 is a typical cross-section of the study area displaying some discontinuous tills. Cross-sections and well-logs from Norris and others (1948), Norris and Spieker (1966) and Spieker (1966) indicate that the buried valley aquifer thickness ranges from 120 to 270 feet. The maximum thickness in the study area is in the southwestern corner of the Mound property and is 180 to 200 feet. This is based on a



Location of cross section

LEGEND

Unconsolidated Deposits

Recent

- Artificial fill: consists of variable proportions of gravel, sand and clay
- Alluvium
- Regolith: undifferentiated surface deposits of weathered bedrock, and colluvial and alluvial materials

Quaternary

- Lake deposit: silt- and clay-sized particles
- Glacial till, yellow brown: oxidized zone, perhaps buried soil
- Glacial till: clay containing variable proportions of gravel, sand and silt
- Glacial outwash: sand and gravel containing some silt and trace amounts of clay

Bedrock Stratigraphy

System	Series	Stage	
UPPER ORDOVICIAN	Cincinnatian	Richmondian	Whitewater Formation
			Liberty Formation
			Waynesville Formation
		Maysvillian	Oregonia Formation
			Mount Auburn Formation
			Corryville Formation

0153 Well borehole number

P004 Piezometer borehole number

Inferred contact

Well borehole showing screened interval

Exploratory borehole

Static water

Inferred water level

ER PROGRAM

MOUND PLANT

Miamisburg, Ohio

Geologic Cross Section
C-C'

Prepared for

Operable Unit 9
Hydrogeologic Investigations
Buried Valley Aquifer Report

Figure 2.3. Geologic cross section traversing the BVA west to east on to the Mound Plant.

bedrock topography map which was created from several hundred boring logs, monitoring well logs and seismic data. Residential well logs were used to assist in the interpretation of the bedrock in the southern portion of the model. These additional cross sections used in construction of the numerical flow model are presented in Appendix A.

The BVA has supplied Dayton and surrounding areas with ground water since the late 1800s. The abundance of water in the BVA is due to several conditions identified by Norris and Spieker (1966) and classified by Spieker (1968). These are recharge due to infiltration and the transmissivity and storage capacity. Spieker (1968) classified the lower Great Miami River valley into 11 hydrogeologic environments listed in Table II.1.

Table II.1. Classification of Hydrogeologic Environments in the Lower Great Miami River Valley Listed in Decreasing Order of Large Production Well Development (Spieker, 1968)

	Transmissivity (gpd/ft)	Storage Coefficient (dimensionless)	Yield (gpm)
Valley-Train Deposits			
I. Sand and gravel aquifer; recharge by induced stream infiltration potentially available.			
A. No interstratified clay layers present.			
1. Aquifer 150-200 feet or more thick.	300,000 - 500,000	0.2	3,000
2. Aquifer less than 150 feet thick.	100,000 - 300,000	0.2	2,000
B. Interstratified clay layers possibly present.			
1. Aquifer 150-200 feet or more thick.	250,00 - 450,000	0.2, 0.02 - 0.0002	3,000LU, 500UP
2. Aquifer less than 150 feet thick.	100,000 - 200,000	0.2 - 0.0002	2,000
II. Sand and gravel aquifer; no recharge by induced stream infiltration available.			
A. No interstratified clay layers present.			
1. Aquifer 150-200 feet or more thick.	300,000 - 500,000	0.2	500 - 1,000
2. Aquifer less than 150 feet thick.	---	---	---
B. Interstratified clay layers possibly present.			
1. Aquifer 150-200 feet or more thick.	---	---	---
2. Aquifer less than 150 feet thick.	---	---	---
III. Sand and gravel aquifer overlain by clay; stream recharge generally not available.			
IV. Valleys filled largely or entirely with clay; large water supplies generally not available.			
Upland Areas			
V. Shale bedrock overlain by glacial till; large water supplies generally not available.			

LU - Lower Unit
UP - Upper Unit

As suggested by Table II.1, the heterogeneity and anisotropy of the outwash and till deposits causes the buried valley aquifer characteristics to vary. Numerous methods have been used to quantify the aquifer parameters up and down the valley. The most common method has been aquifer tests involving one or more pumping and observation wells. The horizontal hydraulic conductivity of sand and gravel deposits, as determined from aquifer tests in the Dayton area, typically ranges between about 1,000 gpd/ft^2 (134 ft/day) and 3,000 gpd/ft^2 (400 ft/day) . A vertical hydraulic conductivity of the till-rich zone at Rohrers Island is between 0.03 gpd/ft^2 (0.004 ft/day) and 0.13 gpd/ft^2 (0.017 ft/day) (Norris, 1948). Upon calibration of a digital model, Fidler (1975) inversely determined hydraulic conductivity values for the upper and lower units to be 750 gpd/ft^2 (100 ft^2/day) and 1,240 gpd/ft^2 (166 ft^2/day) respectively.

For the upper range of parameters, including a maximum aquifer thickness of 200 feet, no interstratified tills and a hydraulic conductivity of 3,000 gpd/ft^2 (400 ft/day), Norris and others (1948) indicates that the potential for a transmissivity of 600,000 gpd/ft (80,200 ft^2/day) is possible but unlikely. The transmissivity of the BVA, as determined from pumping tests, ranges from 125,000 gpd/ft (16,700 ft^2/day) to 250,000 gpd/ft (33,400 ft^2/day) (Norris and others, 1948). CH2M Hill (1983) report a transmissivity of 80,000 gpd/ft (10,700 ft^2/day) at the Rip-Rap well field along the Great Miami River north of Dayton.

Spieker estimated storage coefficients range from 0.2 (specific yield for the unconfined upper units) to 0.0002 (specific yield for the partial confined lower unit). Norris and others (1948) give a specific yield range from 0.10 to 0.25 for sand and gravel.

Within the study area several aquifer tests, single well tests and other methods have been used to determine the aquifer parameters. A transmissivity of 171,000 gpd/ft (22,900 ft^2/day) and a storage coefficient of 0.09 were determined during a pump test for Miamisburg Well Number 11. (Moody & Associates, 1976). Based on a thickness at Well 11 of 98 feet, the hydraulic conductivity was calculated to be 1,750 gpd/ft^2 (233 ft/day).

Buried valley aquifer parameters determined using production wells, monitoring wells, and piezometers on and off the Mound plant are summarized in Table A.III.1. The average transmissivity was 294,000 gpd/ft (39,300 ft^2/day) and ranged from 39,600 gpd/ft (5,300 ft^2/day) to 718,100 gpd/ft (96,000 ft^2/day). The transmissivity values were calculated directly using the aquifer thickness at each test location. Hydraulic conductivity determined directly or indirectly had an average value of 6,560 gpd/ft (876 ft/day) with a range of 970 gpd/ft (130 ft/day) to 26,800 gpd/ft (970 ft/day). An average storage coefficient reported from these tests was 0.103 and reported values ranged from 0.006 to 0.8.

Spatial variation of aquifer parameters within the BVA have also been studied. The primary variation is the presence or absence of till and a secondary variation is that of lithology within the sand and gravel units. Numerous studies (Norris and others, 1948), (Norris and Spieker, 1966), Spieker (1968), DOE (1994c) have identified variation in the amounts and configurations of tills from drilling logs, but quantification of the tills throughout the valley has not been studied. The importance of representing high-permeability facies and their interconnectedness for flow and transport during modeling has been shown by Anderson (1989, 1990). A study centered at the Montgomery County well fields just south of Dayton in the BVA used geostatistical modeling to identify the preferential flow paths that are associated with high-permeability facies (i.e. where low-permeable facies do not exist) (Ritzi et. al., 1994). The study used 287 well logs to identify the geometry and spatial extent of low-permeability facies. The results varied, depending on whether local or global distribution of facies took precedence, and the study indicated that caution should be used when applying these results to transport simulation.

2.1.3. Ground Water Surface Configuration

The piezometric surface within the study area is relatively flat except at pumping centers and river stage fluctuations (Figure 2.4). During OU-9 hydrogeologic investigation field work (DOE, 1994c and DOE, 1995) water level measurements taken created thirteen "snap shots in time" over a one year period from May, 1993 to May 1994. These snap shots revealed the general water- level surface for several different seasons and river stages. An average horizontal gradient from the entire study area during one year was 2.9×10^{-4} ft/ft. Vertical gradients measured at nested monitoring wells seated in the shallow BVA, deep BVA and aquifers bedrock were calculated and are reported to be 0.004 to 0.011 ft/ft (DOE, 1994c). These reported values indicate there is little vertical ground water movement.

Flow generally parallels the Great Miami River except at two pumping centers, the Miamisburg well field and the Mound well field (shown in Figure 2.4). Other deviations from parallel flow occur periodically in response to varying river stages. During high water levels in the northern end of the study area, flow direction can become almost perpendicular and toward to the river. This is caused by a narrowing of the BVA just before the bedrock high of the Mound. A large amount of flow then funnels through this area causing a deviation of the flow direction. During times of high river stage, a perturbation in flow direction occurs caused by the floodwave as it moves away from the river. Additionally, during certain low water level conditions a trough forms along the remnants of the Miami-Erie canal north of the NPDES outfall. The water level elevation contours also indicate that portions of the Great Miami River are a losing stream.

2.1.4. Surface Water and Ground Water Interaction

A year-long study was conducted from May 1993 to May 1994 to continuously monitor the fluctuation of BVA water levels, GMR stage, barometric pressure, and precipitation (DOE, 1994c, 1995). This study utilized a total of 18 continuous monitoring locations: 13 piezometers and 3 monitoring wells within the BVA, one piezometer in a perched zone of the tributary valley on the Mound plant, and a monitoring well on the Mound's main hill. The Great Miami River stage was continuously recorded at a temporary gage at the old U.S. Geological Survey gage house at the Conrail trestle at river mile point 64.2. Figure 2.5 shows hydrographs of the river stage and piezometer P008. The stage and water level peak lag time between the river stage and piezometer P008 is about 36 hours. This lag time depends on the lateral and vertical distance from the GMR. P008 is 1900 feet from the GMR.

The BVA is recharged primarily by infiltration through riverbeds, with a secondary component of recharge from precipitation (Norris, 1966). Several estimates have been made concerning the amount of precipitation that eventually infiltrates to the BVA. A generally acceptable number presented by Norris (1966) is one third of the yearly precipitation. For several reasons most infiltration occurs during high river flows. First, the higher velocities keep fine-grained sediment in suspension, leaving a sand and gravel bed, which allows more infiltration. Also, during high flow a larger head difference exists between the river stage and the head in the aquifer. Finally, higher river flow usually increases the wetted area of the riverbed thus allowing more infiltration. This is not to say that infiltration does not occur during low river flow. Most infiltration studies are conducted during low flow due to the ease at which measurements can be taken. Infiltration studies of low flow are much safer and require less logistics than high flow studies.

Infiltration induced by pumping at Wright-Patterson Air Force Base from Hebble Creek ranged from 0.17 to 0.33 mgd per acre and from Mud Run at 0.34 mgd per acre during low flow (Walton and Schudder, 1960). Dove (1961) estimated the average induced infiltration of the Great Miami River near Ross, Ohio, to be 240,000 gpd per acre of streambed. During a pump test in Butler County, an average infiltration was determined to be 492,000 gpd per acre for a reach about 1800 feet long and a nearby pumping well discharge of 3,000 gpm (Spieker, 1968). During low flow for a river, the infiltration is dependent on the riverbed hydraulic conductivity. Plomb and Arnett (1989) estimated the Great Miami

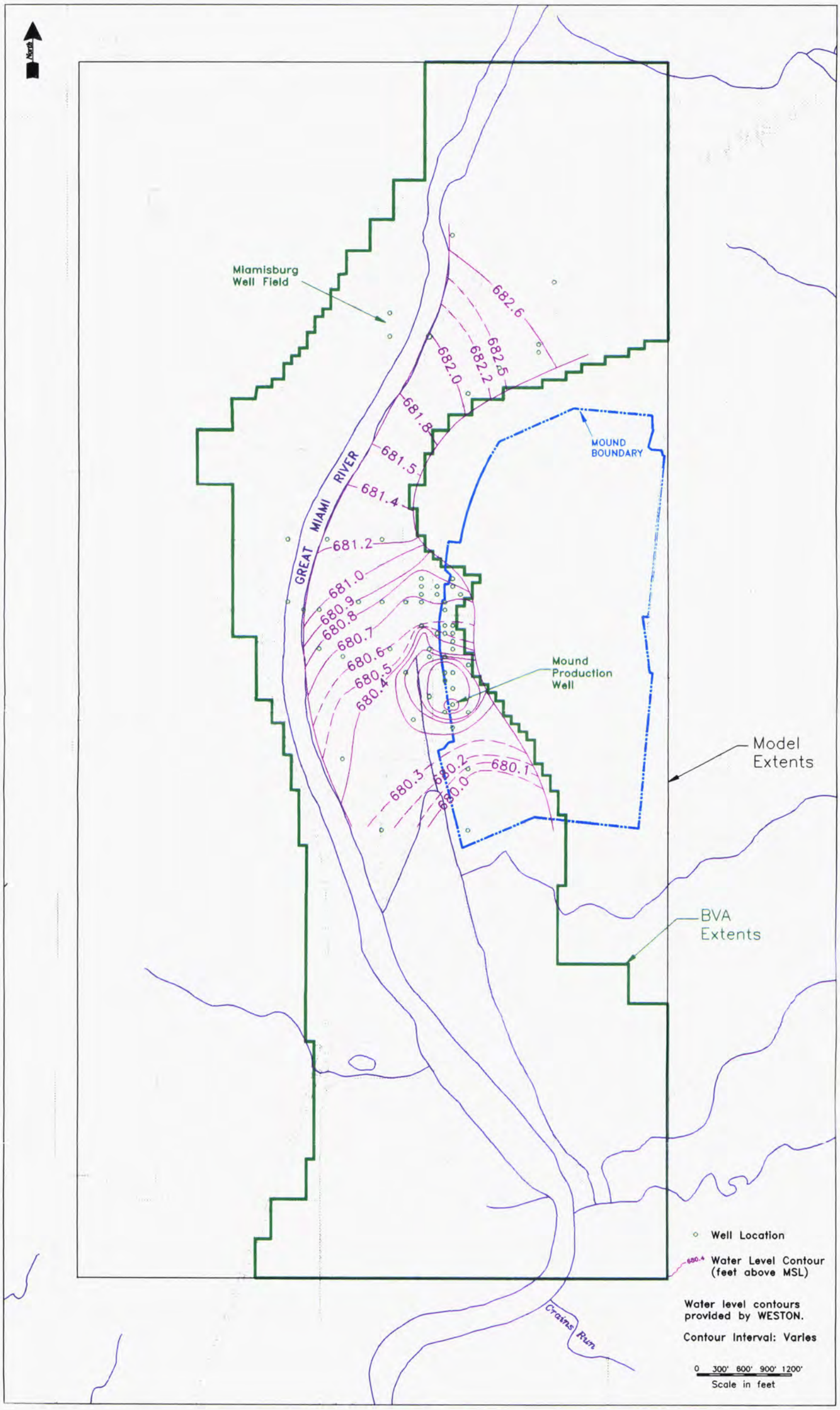


Figure 2.4. Water level surface of the BVA on September 2, 1993.

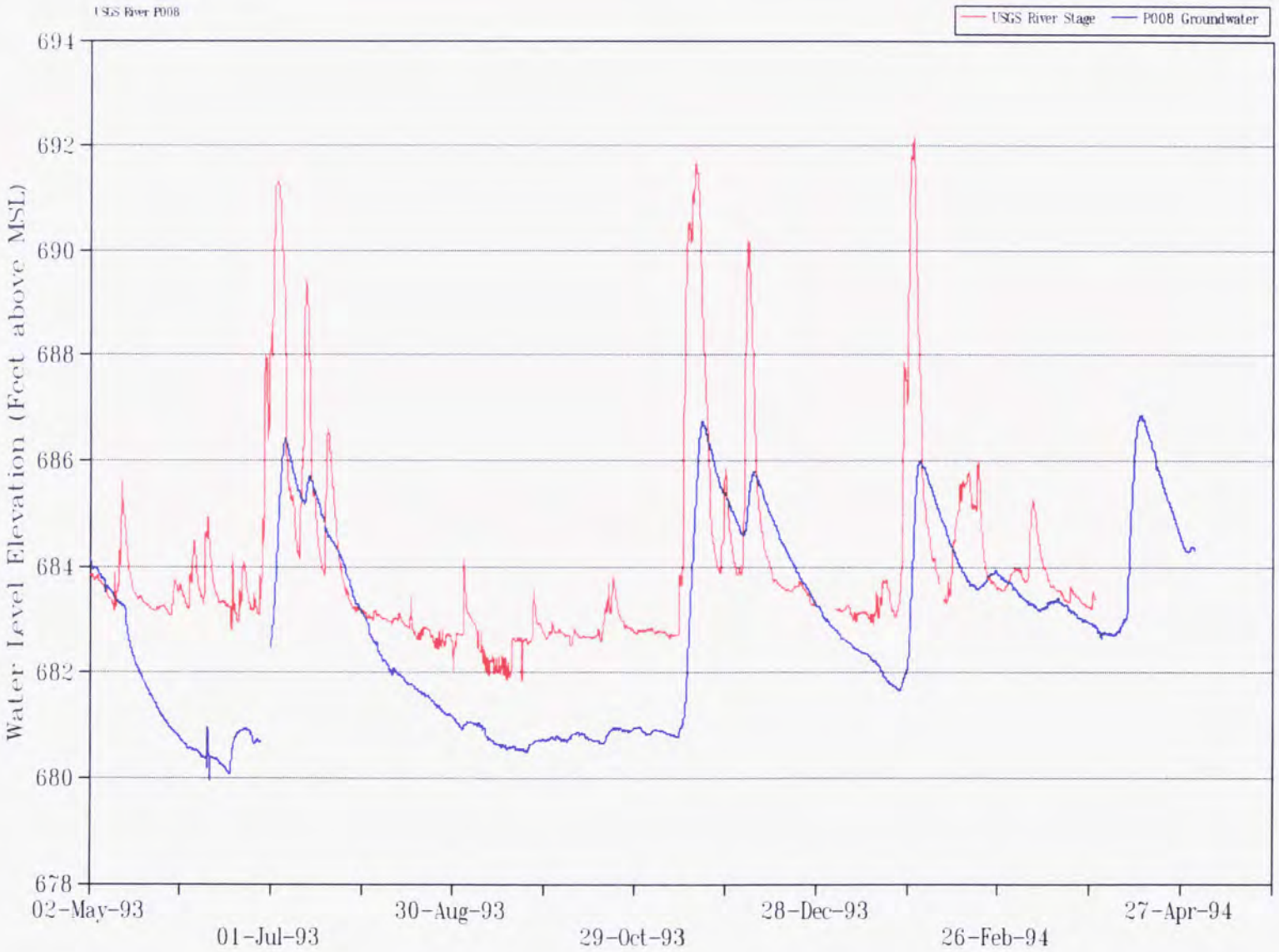


Figure 2.5. Hydrograph of Great Miami River stage and piezometer P008 water level. P008 is 1900 feet from the Great Miami River.

River bed vertical hydraulic conductivity to be 0.1 ft/day. Regionally, the BVA discharges into the Great Miami River in areas where the river is gaining. Discharge to the Great Miami River occurs where the water level elevation in the BVA is greater than the river stage.

2.2. CONCEPTUAL MODEL

Simulation of a ground water flow system requires conceptualization. A conceptual model converts the complexities of hydrogeologic conditions into realistic computational working variables. A conceptual model must have a level of complexity that represents the system adequately but must have enough simplicity so that the mathematics is tractable. Discretization is the spatial division of the conceptual model into blocks called cells. These cells are described in terms of rows, columns and layers. The mathematical equations used to calculate ground water flow are calculated for each cell of the model. The level of complexity required is relative to the study's objectives. The goal of this study is to interpret and predict the behavior of the buried valley aquifer system near the Mound.

Prediction requires the conceptual model to be as detailed as data permit and that the model be shown during calibration to adequately represent actual field conditions. This conceptual model was designed to represent the flow of the buried valley aquifer, its interaction with the Great Miami River, aquifer recharge due the remnant Miami-Erie canal, and pumping centers within the study area.

Overall, the conceptual model consists of an unconfined aquifer (BVA) that is heterogenous and isotropic with horizontal flow and no contribution from the Ordovician shale and limestone. Regional flow enters the model in the north and exits at the southern boundary. Pumping centers provide discharge from the model. The Great Miami River was simulated as recharge or discharge depending on the stage/aquifer head relationship. Recharge occurs areally due to precipitation and locally at recognized infiltration areas such as the remnant Miami-Erie canal. The model is assumed to be in steady-state at the time used for calibration. This assumption was based on analysis of a year's worth of data from May 1993 to May 1994. During September 1993 the river level and groundwater levels were the lowest for the year and for the longest period. It was assumed that these conditions provided the most steady-state time period from May 1993 to May 1994.

Interpolated bedrock topography provides the lower and east-west lateral boundaries of the BVA, based on a detailed bedrock topography map presented in OU-9 Bedrock Investigation (DOE, 1994b). This map, and data from ER program borings and off-site wells, residential well logs and data from well logs and seismic data in Norris and Spieker, (1966) were combined to develop the bedrock topography of the model area (Figure 2.2). Based on a bedrock conceptual model for the Mound (DOE, 1994b) and the lack of quantifiable data for the western and eastern bedrock boundary, the bedrock is considered a no-flow boundary.

The BVA fills the bedrock valley from a depth of 540 MSL to 690 MSL. The lower elevation is the greatest depth at which bedrock occurs. The upper limit of the BVA was determined from saturated upper limits from contiguous water level measurements. There was insufficient evidence during Operable Unit 9 hydrogeologic investigations to determine whether a distinct upper and lower aquifer exists at and near the Mound study area. The BVA was conceptualized as two layers for future use and particle-tracking purposes only (Figure 2.6). The aquifer characteristics of the BVA were considered heterogeneous and isotropic. The northern and southern boundaries of the study area are hydraulic boundaries. Ground water flow into the study area is from the northern BVA boundary and exits at the southern boundary.

Average well field productions rates, as presented in Operable Unit 9 Hydrogeologic Investigation: Buried Valley Aquifer Report Technical Memorandum (DOE, 1994c), were used. Information concerning the typical cycle of the four Miamisburg wells was not available. It was assumed that at least two wells pump almost simultaneously. Therefore, the Miamisburg well field was represented by two wells, Numbers 10 and 11 (ER Well Numbers 0920 and 0921, respectively). The discharge for each well was entered into the model as 1.46 cubic feet per second (cfs), which is 657 gpm or 346

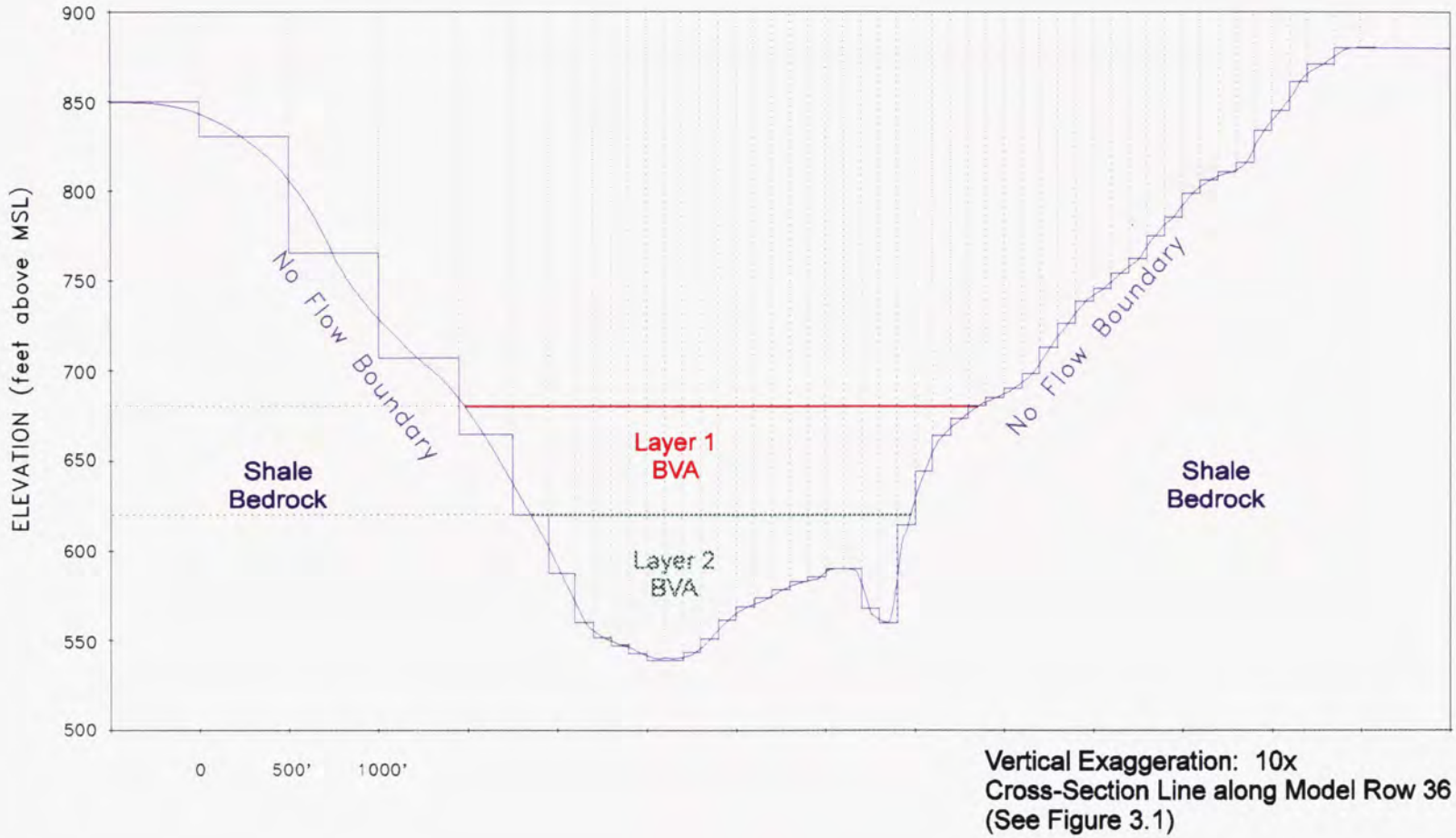


Figure 2.6. Conceptual model cross-section illustrating the bedrock no flow and BVA layer elevations.

million gallons per year per well. This resulted in a total discharge for the Miamisburg well field of 691 million gallons for 1992. Only one well (0076) was used to simulate production at the Mound. Well 0076 is the primary well used to support the Mound. The amount of discharge was determined from the amount of water treated, which totalled 196 million gallons in 1992. This yearly total equals 537,000 gpd or 373 gpm, and was input to the model as 0.83 cfs. Dayton Power & Light, Hutchings Station used 284 and 208 million gallons of ground water pumped from the BVA in 1991 and 1992, respectively. These two years were averaged and a daily discharge calculated to be 674,000 gallons or 1.04 cfs, which was divided equally among DPL's four production wells.

Recharge to the BVA included areal recharge, recharge due to the Great Miami River, and recharge from the drainage ditch that follows the remnants of the Miami-Erie Canal. The rainfall for the Dayton area is approximately 38 inches per year. The amount of this precipitation that eventually recharges the BVA and is not lost to surface runoff, surface detainment and evapotranspiration has not been determined for this area. A value of one third of the yearly precipitation, used by Norris and Spieker (1966) for their investigations was utilized in the conceptual model. Head-dependent flux nodes were used to simulate recharge from the Great Miami River reaches that traverse the model from north to south. The drainage ditch is currently used to transmit water regulated by a permit under the National Pollution Discharge Elimination System. Dames and Moore (1977) under contract to DOE installed instrumentation to measure the discharge in this portion of the drainage ditch. Infiltration rates for the drainage ditch were evaluated by Styron and Meyer (1981) who reported that some 275,000 gallons of water infiltrate daily. Recharge was also applied along the drainage ditch west of Dayton-Cincinnati Pike to simulate infiltration.

Previous investigation reports (DOE, 1994a, 1994c, 1995) have shown that the Great Miami River has a significant affect on groundwater levels in the entire BVA. It was important to model accuracy that the Great Miami River stage elevations used in the model be as accurate as possible. The Miami Conservancy District had measured Great Miami River channel cross-sections in 1989 every 200 feet for the entire model area. These cross-sections, and associated hydrologic parameters, and USGS gaging station data were entered into the US Army Corp of Engineers, HEC-2 Water Surface Profiling program, and stage elevations for the calibration period were determined. Stage elevations were determined for the calibration from the low dam at DPL Hutchings Station north to the Linden Street USGS stage gage (Appendix A).

A steady-state condition was assumed for the conceptual model. There is ample evidence that indicates the BVA is rarely at steady-state due to effects of the Great Miami River and pumping centers. However, during a continuous water level monitoring program from May 1993 to May 1994, a period was identified that water levels remained relatively constant. The time period was September to October 1993. September 2 ,1993 water levels were collected throughout the study area. These water levels provided the water level surface for the conceptual model. Production rates from the three main pumping centers were not know exactly. Average rates based on yearly totals were used. A schematic of the completed conceptual model is shown in Figure 2.7.

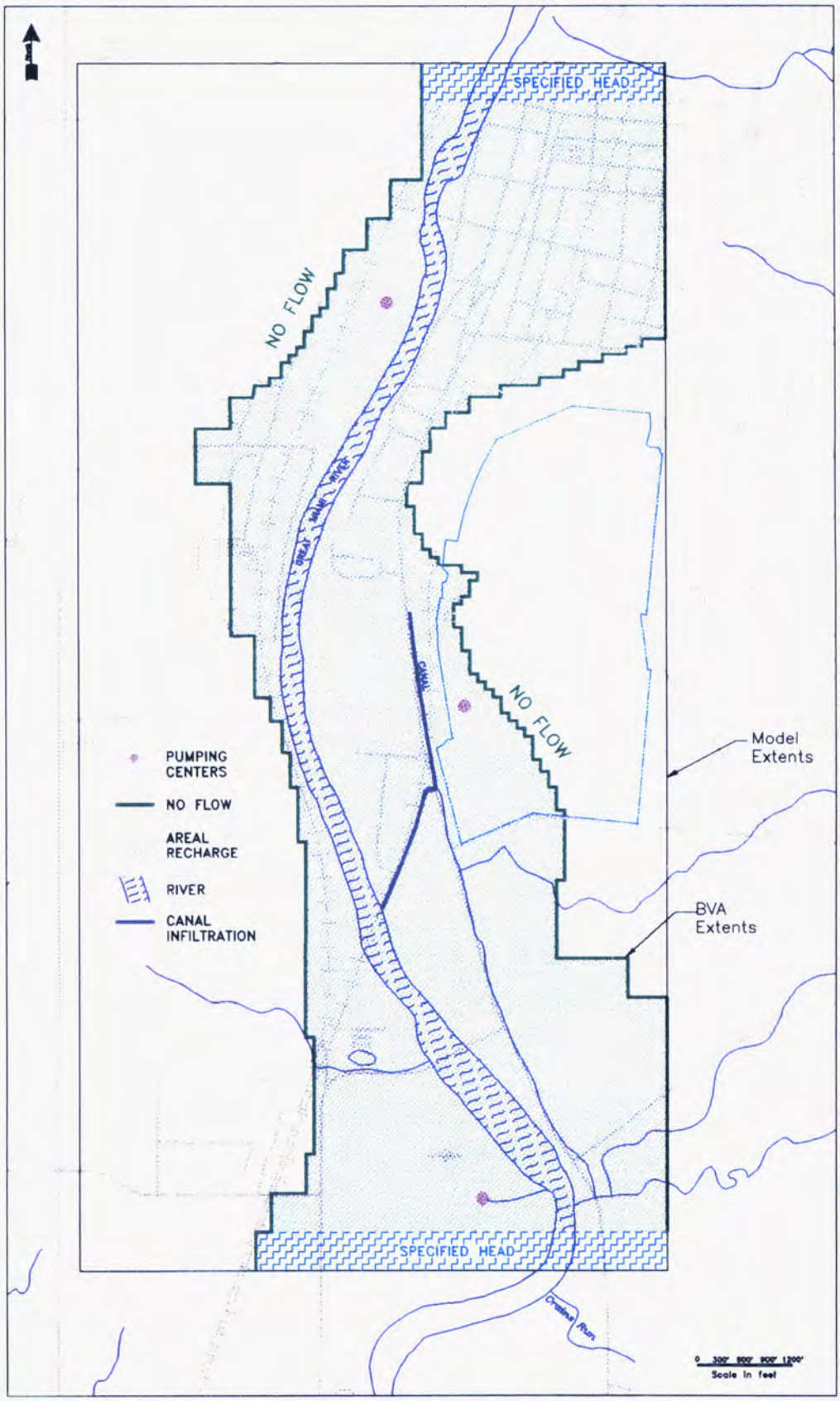


Figure 2.7. Areal conceptual model.

3.0 GROUND WATER FLOW MODEL DESIGN

The U.S.G.S. Modular Three-Dimensional Finite-Difference Ground Water Flow Model, MODFLOW, (McDonald and Harbaugh, 1988) has been extensively documented and verified using analytical and well defined problem data. Many different hydrogeological systems have been simulated using MODFLOW. The conceptual model developed here has a level of complexity which MODFLOW is capable of simulating.

3.1. MODEL DISCRETIZATION

The study area was discretized into a three-dimensional finite-difference grid (Figure 3.1). The area was 15,500 feet along the north-south traverse and 7,500 feet along the east-west traverse. This area was divided into 3,692 non-uniform finite-difference cells. Areas of interest and areas with abundant data had a finer finite-difference mesh. The cell sizes ranged from 100 to 500 feet in both directions. Two areas that have a finer cell mesh were at Operable Unit 1 and the Miamisburg Well Field. These two areas had either sufficient data or required refinement to assess changes in head that occurred. The model was composed of 7,394 finite-difference cells which only 3,738 cells were active. The third dimension is represented by two layers.

In the vertical dimension of the model, Layer 2 (the bottom layer) was determined from the bedrock topography and the depth of production wells. The bottom of the BVA is represented at every cell by the bedrock elevation interpolated from the bedrock topography map (Figure 2.2). The bedrock topography array that represents the bottom of Layer 2 is presented in Appendix A. The top of Layer 2 had an elevation of 620 MSL, which was chosen as halfway between the average water level and the lowest aquifer elevation. Layer 1, the top layer, had a uniform bottom elevation of 620 MSL, and the top was between 675 and 682 MSL, which was determined by the water level of the aquifer for the calibration. The areal extents of Layers 1 and 2 are shown in Figure 3.2.

Within the modeled area there were inactive cells designated where the bedrock elevation is greater than the top of Layer 2 or 1, representing the BVA. These cells are removed from the calculations of the model. A cell was determined to be inactive if the bedrock elevation was greater than 690 feet for Layer 1 and 620 feet for Layer 2.

3.2. BOUNDARY CONDITIONS

Simulation of the BVA in this area required the use of four boundary conditions: specified head, specified recharge, no flow, and specified discharge. The locations of these boundary conditions prescribed for the model are shown in Figure 3.1.

Ground water flow in the BVA is generally north to south, parallel with the Great Miami River. The ground water flow entering the model at the northern boundary was simulated by specified heads based on interpolated water levels for the calibration time period (See Figure 2.4). A specified head continually computes flow to the model based on the saturated thickness and hydraulic conductivity. Specified head boundaries are best suited for steady-state conditions where the water level is not required to change during the simulation. The southern boundary was also designated a specified head boundary as determined from interpolated water levels from September 1993. The sensitivity of the model to these boundaries was determined during the sensitivity analysis.

Recharge due to precipitation and surface water infiltration was applied to appropriate locations. One third of the yearly precipitation was used here as recharge to the top layer (Layer 1). Recharge was applied to all active portions of the model to represent infiltration due to precipitation. Another source of recharge to the BVA is the drainage ditch that follows the remnant of the Miami-Erie Canal west of the Mound Plant. Previous investigations have identified this as a possible area of infiltration. A value of 275,000 gallons per day for the entire 2500 foot length is the reported estimated infiltration (Styron and Meyer, 1981). Recharge of 0.018 to 0.15 feet per day per cell was applied to each of the cells

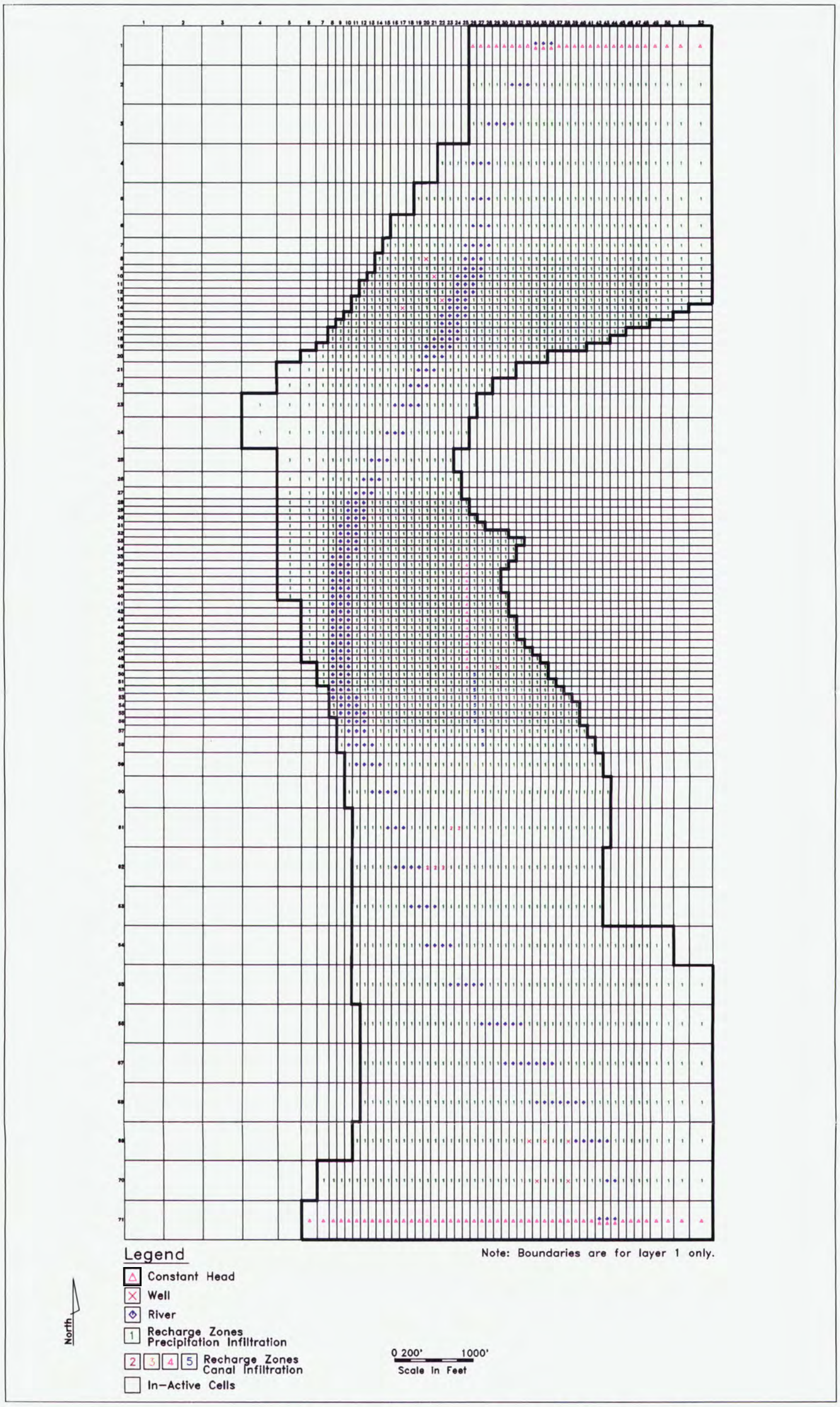


Figure 3.1. Configuration of the BVA model finite-difference grid and boundaries.

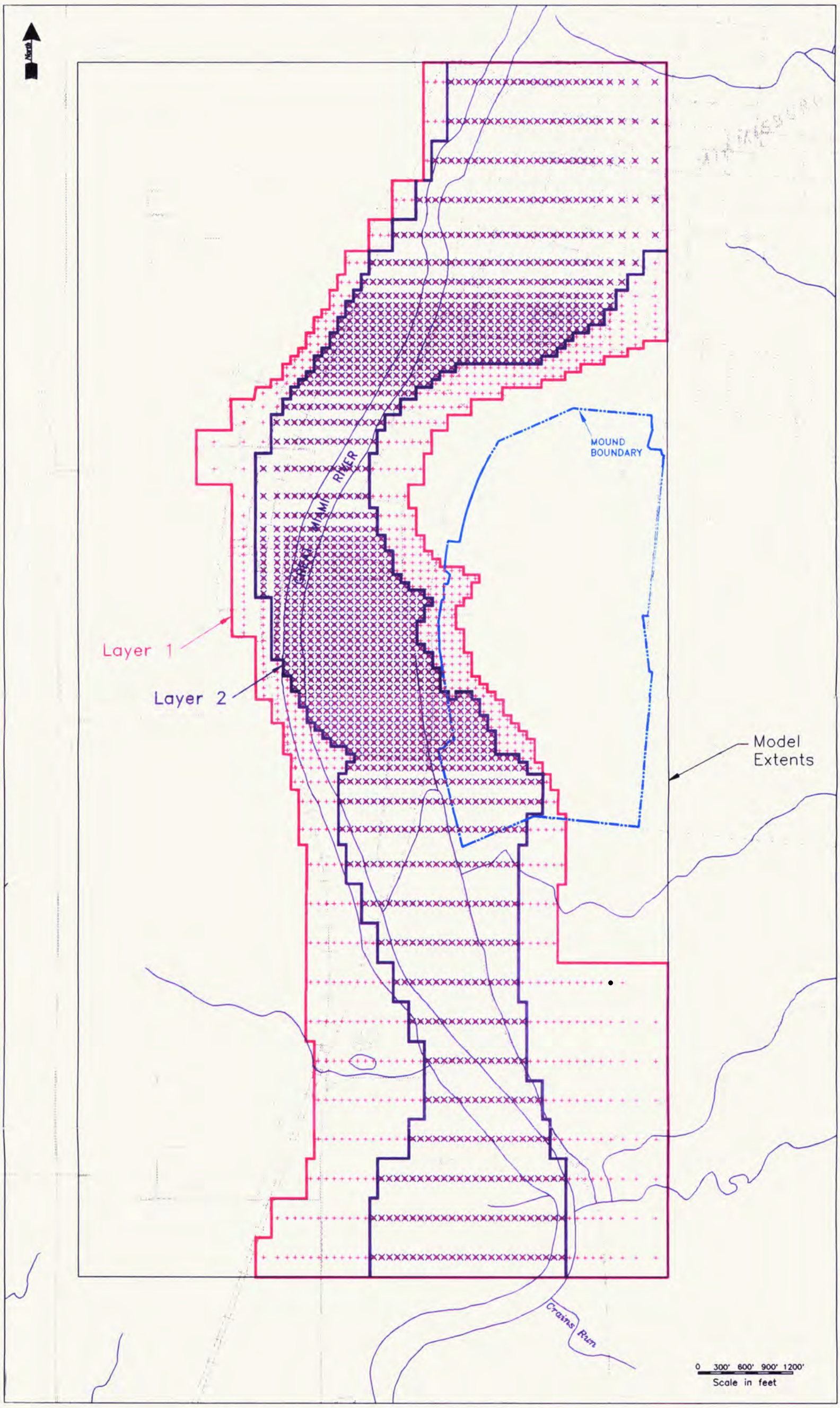


Figure 3.2. Areal extents of Layers 1 and 2 determined from bedrock elevations.

specified as recharge zones (Figure 3.1). MODFLOW multiplies the recharge rate by the area of the cell to calculate the total recharge. Recharge was also applied to the portion of the drainage ditch west of Dayton-Cincinnati Pike. These values were then adjusted within realistic limits during calibration of the model to match September 1993 measured water levels.

Limestone and shale surrounds and rises above the BVA. The amount of groundwater flow in the bedrock at the elevations of the BVA is assumed to be minor with respect to the flow in the BVA. Thus, the bedrock valley walls are considered as no flow boundaries, as shown in Figure 2.6.

There were several locations within the model where it was necessary to specify discharge of water from the aquifer. Discharge boundaries included industrial and municipal production wells, which were assigned a constant discharge based on yearly productions rates. Three sites required specified discharge: the Miamisburg Well Field, Mound Plant Production Wells, and Dayton Power and Light Hutchings Station production wells. Elevation of the screen for each well determined the layer of the model in which the discharge was specified. Mound production well 0076 was located in Layer 1 and the two Miamisburg wells and four DPL wells have well screens below an elevation of 620 MSL and were placed in Layer 2. Constant discharge rates were specified for the Mound well at 71,700 cubic feet per day (536,000 gpd), Miamisburg Wells at 126,100 cubic feet per day per well (1.9 mgd for both) and DPL wells at 18,100 cubic feet per day per well (540,000 gpd combined).

3.3. GREAT MIAMI RIVER INTERACTION

The Great Miami River has a significant affect on the water levels in the BVA. Simulation of the Great Miami River was completed using the head-dependent discharges of the MODFLOW river option. There were 242 cells specified as head-dependent discharges as shown in Figure 3.1. Simulation using head-dependent discharges allows interaction between the river and the underlying aquifer. Flow from the river to the aquifer or discharge from the aquifer to the river is controlled by the relationship of river stage, river bottom, and aquifer head at each location. The rate at which the river loses or gains is dependent upon the riverbed conductance. Riverbed conductance accounts for river channel parameters of length, width, riverbed thickness and vertical hydraulic conductivity. River bottom elevations were calculated by averaging the depth of each MCD channel cross-section for each river cell specified. The river stage was calculated from HEC-2 water surface profiles simulated for the calibration time period. Riverbed conductance was determined inversely during calibration and bound by measured values found in the literature for rivers crossing outwash of buried valley aquifers.

3.4. HYDRAULIC PARAMETERS

Model calibration was conducted assuming steady-state conditions that require either transmissivity ($T = Kb$) or hydraulic conductivity (K) values as input for the model. Aquifer thickness (b) is known based on known bedrock topography, therefore, hydraulic conductivity values were used. The number of locations for which transmissivity or hydraulic conductivity values were measured was insufficient to determine a spatial distribution for estimating values in areas without data. The optimization method of MODFLOWP was used to determine optimal hydraulic conductivity values of many zones. Initially the hydraulic conductivity values for each zone were the same. The inversely computed values of hydraulic conductivity from MODFLOWP were constrained during the optimization process by estimating only two parameters at a time to match observed heads. The model was divided into ten zones, starting in the northern end of the model. The chosen zones do not have any particular hydrogeologic significance except to allow for area-specific zones that may have different values.

When more than one layer is used in MODFLOW a vertical conductance parameter is used to simulate vertical flow across model layers. This parameter, vertical leakage, combines the vertical hydraulic conductivity and thickness of adjacent layers. A vertical hydraulic conductivity of 40 feet per day was assumed for the entire area. This is one tenth of the average horizontal hydraulic conductivity. Vertical leakage was calculated based on the actual thickness of the two layers at each cell and the average vertical hydraulic conductivity of 40 feet/day. Vertical leakage values were between 0.13 to 1.31.

4.0 CALIBRATION AND VERIFICATION

4.1. CALIBRATION

Calibration of a ground water flow model is the process in which model parameters are modified within the range of measured values or within realistic bounds until a match between field measured values and simulated values of heads and/or fluxes is obtained. Calibration of a ground water flow model is generally referred to as the inverse problem. The inverse problem of parameter identification concerns the optimal determination of the parameters. This is done by observing the dependent variable collected in the spatial and time domains, and adjusting the parameters until the model produces values for the dependent variable that are in some sense closest to the observed parameter (Yeh, 1986). Calibration can be conducted by three generally accepted methods: direct, indirect, and geostatistical. The direct approach solves the ground water flow equation with the unknown parameters-- hydraulic conductivity, transmissivity and storage coefficient--as dependent variables and the known parameters--head and flux--as the independent variables. The indirect approach requires that the initial estimates of unknown parameters and the ground water flow equation are solved iteratively and the unknown values are continually updated until a match is obtained. In the geostatistical approach, attempts are made to determine the correlation structure of the unknown parameter. The indirect and geostatistical approaches were used in this study.

Calibration of a ground water flow model is a laborious task. Several procedures were used to reduce the amount of time and number of simulations. The flow system was discretized as a two layer model primarily to simulate the effects of the production wells in the deeper zone and for particle tracking. Hydrogeologically, there were not sufficient data supporting the division of the BVA in this study area into two layers. For initial calibration purposes, the model was converted to simulate one layer so that the parameter estimation (calibration) process could be simplified by using MODFLOWP. MODFLOWP is a version of MODFLOW that performs nonlinear regression to make estimates of parameters chosen by the simulator (Hill, 1993). The parameters estimated with this method were hydraulic conductivity and riverbed conductance. The model was also developed by starting with a simple configuration and building to the more complex actual conceptual model representation. This progressive method identified sensitive areas prior to sensitivity analysis and allowed adjustments and realization checks.

The model was calibrated to assumed steady-state conditions, based on the months of September and October 1993. As stated previously, these conditions provided the most steady-state time period from May 1993 to May 1994. Water levels from September 2, 1993 were applied to 58 target locations chosen to be representative of the BVA and located within Layer 1 (Figure 4.1). The water levels used for the targets were hand measured with an electric tape with increments of 0.01 feet. The only source of error to be considered when determining a calibration target is in the hand measuring processes. A general error associated with hand measurements has been suggested to be 0.02 to 0.1 feet (Nielsen, 1991). The change in water level elevation from the northern model boundary to the southern boundary was 8 feet for the calibration period. A general rule of thumb is that the error be less than 10 percent of the water level relief. Therefore, any calibration error less than 0.8 feet was considered acceptable.

Qualitative and quantitative methods were used to evaluate the calibration results. The qualitative method was a comparison of simulated water-level contours to observed water levels for September 2, 1993 (Figure 2.4). A quick method used to quantify model calibration during the actual simulations involved the sum of squared residuals (SSR), maximum and minimum residual and the average residual of the target locations calculated by MODFLOWP. The individual target locations were routinely checked to identify specific areas that were not within the average error determined by the SSR. Final quantitative calibration results were calculated for the 58 locations using average differences. The average differences between the modeled and the observed water levels computed as the Mean Error

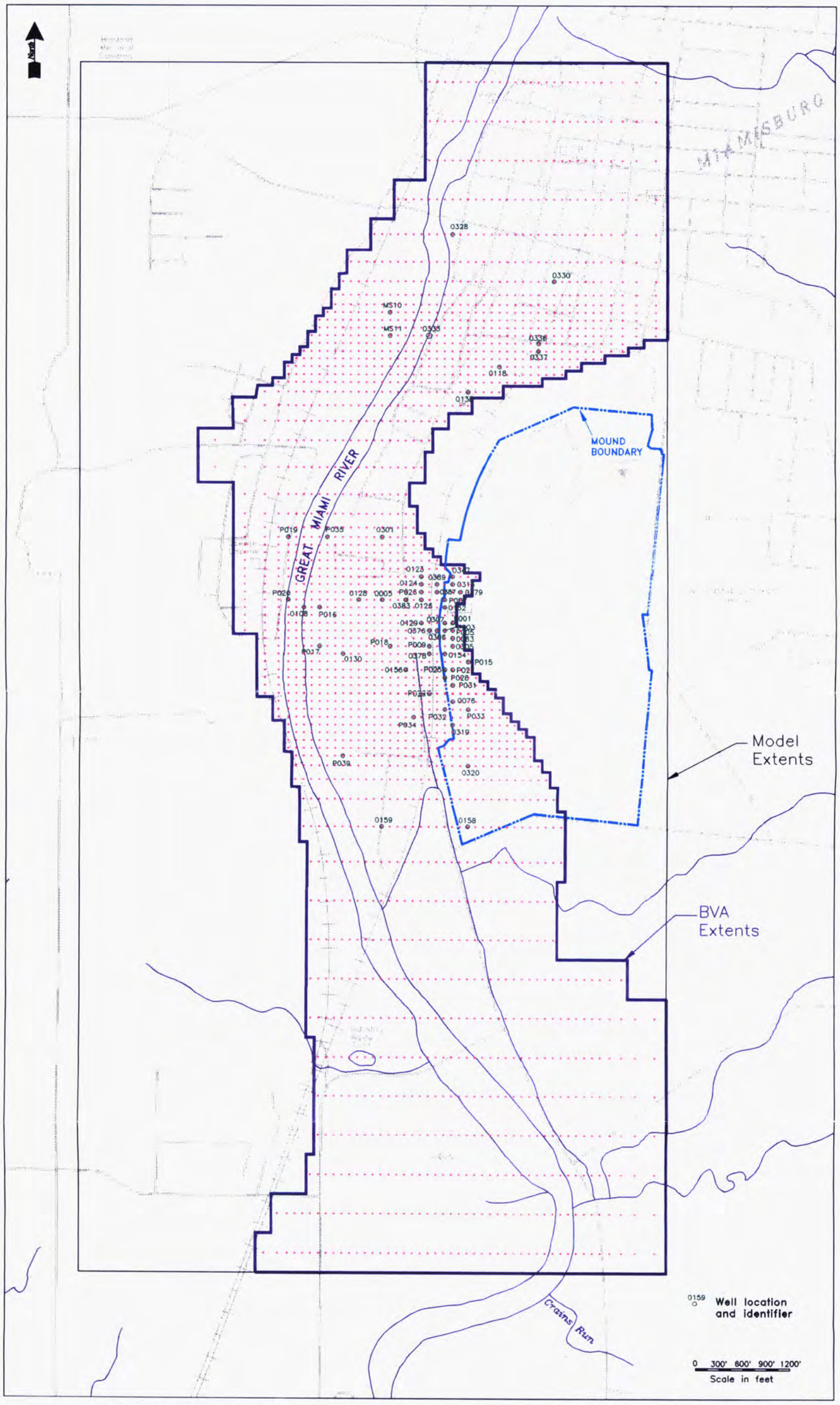


Figure 4.1. Locations of 58 water level measurements used as target locations for model calibration.

(ME), Mean Absolute Error (MAE) and Root Mean Square Error (RMSE). The RMSE is generally more stable when the error is believed to be normally distributed and was given the most weight for determining calibration of the model. A second quantitative method was used for this study that considers the comparison between the observed and computed water levels graphically. The 58 water level locations were used for this analysis. Each target location observed and computed was plotted as an x-y graph pair. Error bars associated with the error plus or minus the observed water levels were also plotted. For the calibrated model, all target locations were within the 0.5 foot error bar and the verification was within the 1.0 foot error bar.

A third calibration method was a check of the volumetric mass balance. Steady-state simulations assume that all water entering the model must also leave the model, therefore, the difference between inflow and outflow should be small. The percent difference is calculated by MODFLOW at the end of each simulation. The percent difference for the calibrated model was -0.02 percent. Generally, the water balance error should be less than 0.1 percent (Konikow and Bredehoeft, 1978).

Many simulations were conducted using MODFLOWP and the single layer model to reach a RMSE of 0.24 feet. The model parameters determined during the MODFLOWP calibration were transferred to the two layer model. The vertical leakage array was added to the model, calibration was continued, and the same RMSE of 0.24 feet from the single layer calibration was achieved with the two layer model. The calibrated water level distribution is shown in Figure 4.2. The pumping centers at the Miamisburg well field and at the Mound production well are evident. The general water level trend is similar to the September 2, 1993, measured water levels except for the cone of depression and trough near the Mound.

Table B.I.1. in Appendix B lists the 58 control point locations, observed water levels, and computed water levels for the calibrated model. An areal distribution of the error between modeled and observed water levels is presented in Figure 4.3.

Two observation wells at the Miamisburg well field (MS10 and MS11) were not used as control points. The observed water levels in September 1993 for MS10 and MS11 were 679.45 feet and 679.70 feet respectively. The calibrated model water level for MS10 was 677.65 feet and for MS11 was 679.83 feet. The observed water level in monitoring well MS10 was 1.8 feet too low and in MS11 it was 0.13 feet too high. The pumping cycle was not known when these water levels were taken, therefore, calibration based on these two wells would require additional information. The Mound production well 0076 is also not listed in Table B.I.1. The modeled water level in 0076 was 678.40 feet and the observed water level was 673.69 feet. The model predicted a much higher water level, because it is averaging discharge over the entire cell (an area of 10,000 square feet) and not at a point. Therefore, when the entire cell is considered, the higher level is actually more correct than a lower level would be.

The comparison of observed heads versus computed heads is shown in Figure 4.4. Excluding the wells mentioned above, 100 percent of the target locations are within 0.5 feet of the observed head. The largest errors were at well 159, where the water level was 0.47 feet too low, and at well P020, where the water level was 0.42 feet too high. As shown in Figure 4.3, the majority of the discrepancy occurs just north of the Mound production wells. The modeled water levels in this area are too high by 0.1 to 0.3 feet.

Calibration results provided values for hydraulic conductivity, canal infiltration, river bottom conductance (inversely calculated K value), and subsequent leakage (or gain) from the river. Hydraulic conductivity values were determined during calibration of the single layer model using MODFLOWP. Subsequently, minor adjustment of hydraulic conductivities was made during the calibration of the two layer model. The inversely determined hydraulic conductivity values are between 259 and 432 ft/day with an average of 347 ft/day. The hydraulic conductivity value of 259 ft/day represents the zone at the Miamisburg well field. This value was not inversely determined because an accurate value for hydraulic conductivity was available from an in-situ test on well number 11 (Section 2). This hydraulic

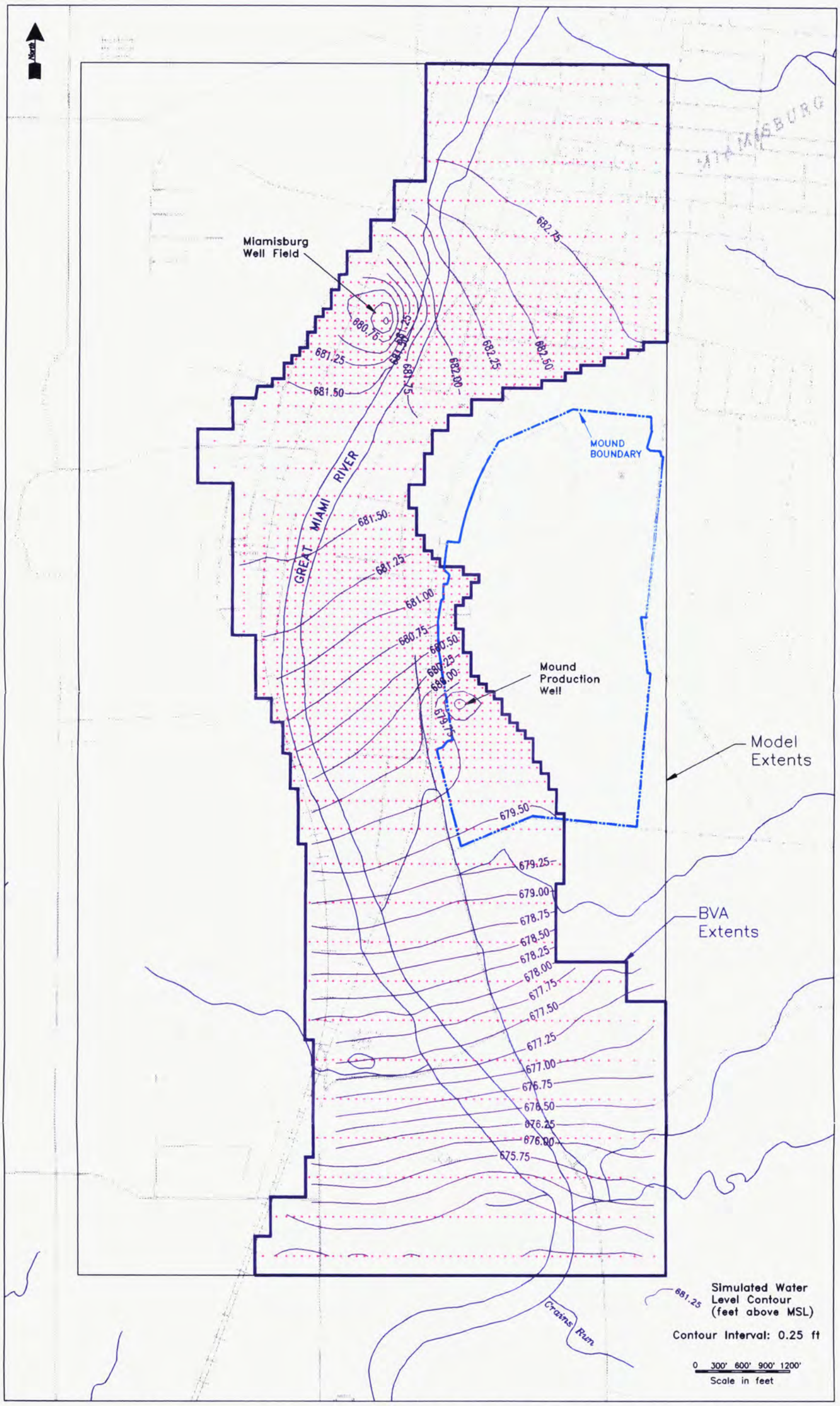


Figure 4.2. Simulated water level distribution in the BVA, as determined by the calibrated model.

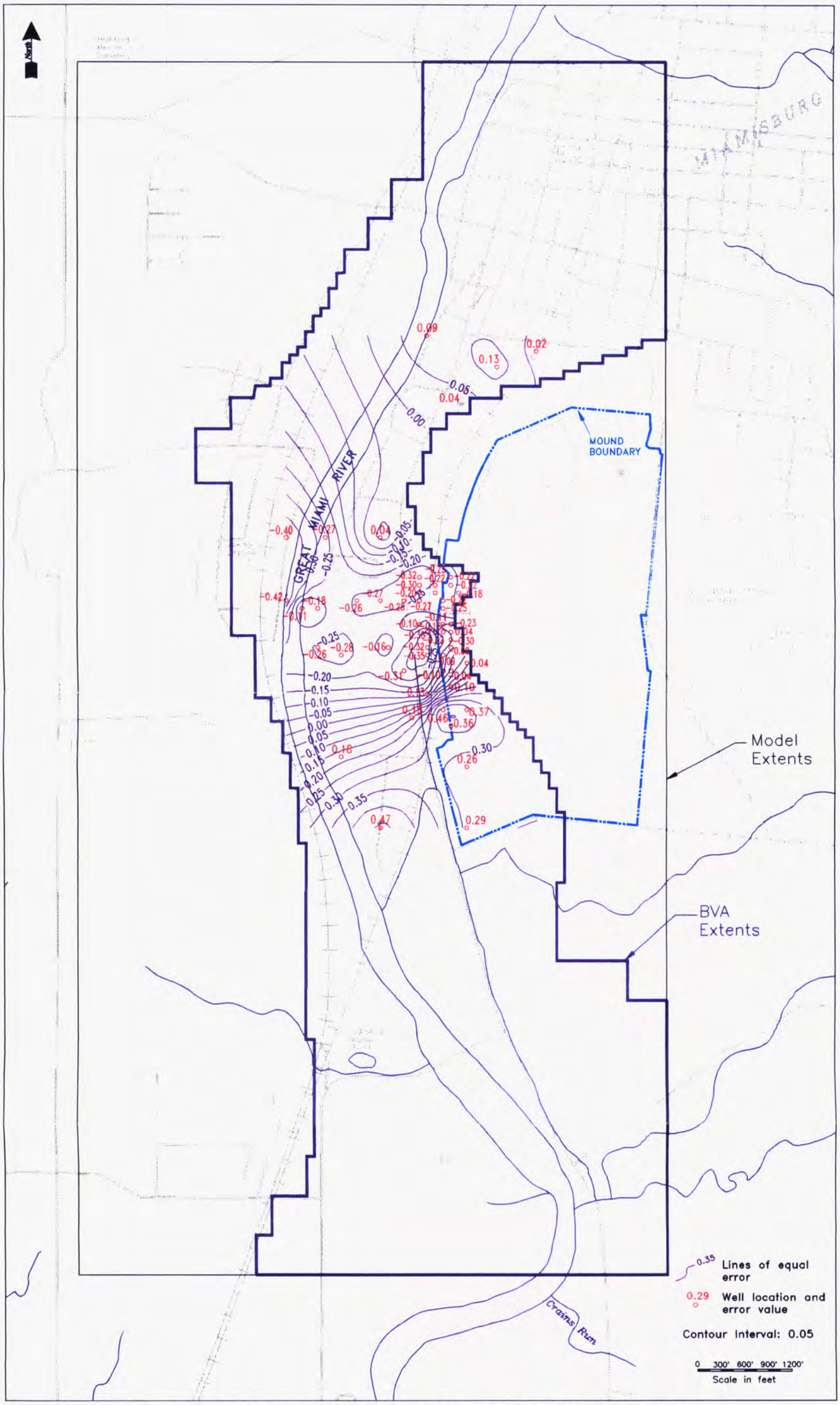


Figure 4.3. Areal distribution of model error between simulated and measured water levels.

conductivity was then used to estimate induced recharge. Calibrated model hydraulic conductivity zones are presented in Figure 4.5. The hydraulic conductivity values determined by the model are well within the range found by others at this site and at other locations.

Recharge to the BVA by infiltration of the NPDES drainage ditch was adjusted during calibration of the two layer model. The northern 1400 feet drainage ditch (Zone 4, Figure 3.1) was estimated to have a recharge rate of 0.075 ft/day. The center portion (Zone 5, Figure 3.1), which is 1100 feet long, has a recharge rate of 0.25 ft/day. The drainage ditch has two recharge rates (Zones 3 and 2 on Figure 3.1), 0.058 and 0.039 ft/day. MODFLOW calculates the total recharge by multiplying these rates by the area of the cells over which they are applied. The total recharge for the canal and drainage ditch west of Dayton-Cincinnati Pike was 378,000 gallons per day. Recharge for the portion east of Dayton-Cincinnati Pike was 275,000 gpd. The drainage ditch west of Dayton-Cincinnati Pike had a recharge of 103,000 gpd.

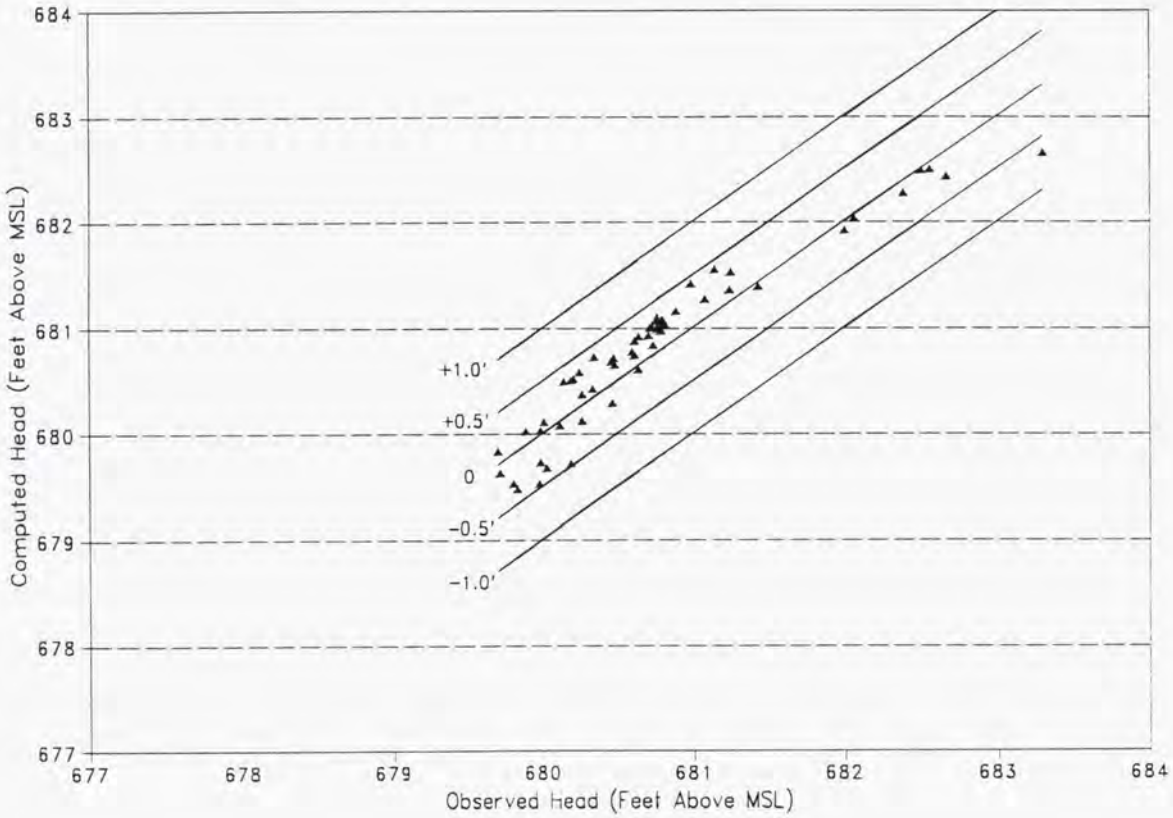


Figure 4.4. Observed water levels at target locations versus computed (modeled) water levels during calibration at model nodes associated with target locations. Error bars associated with +/- 0.5 feet and +/- 1.0 feet of observed water levels are shown.

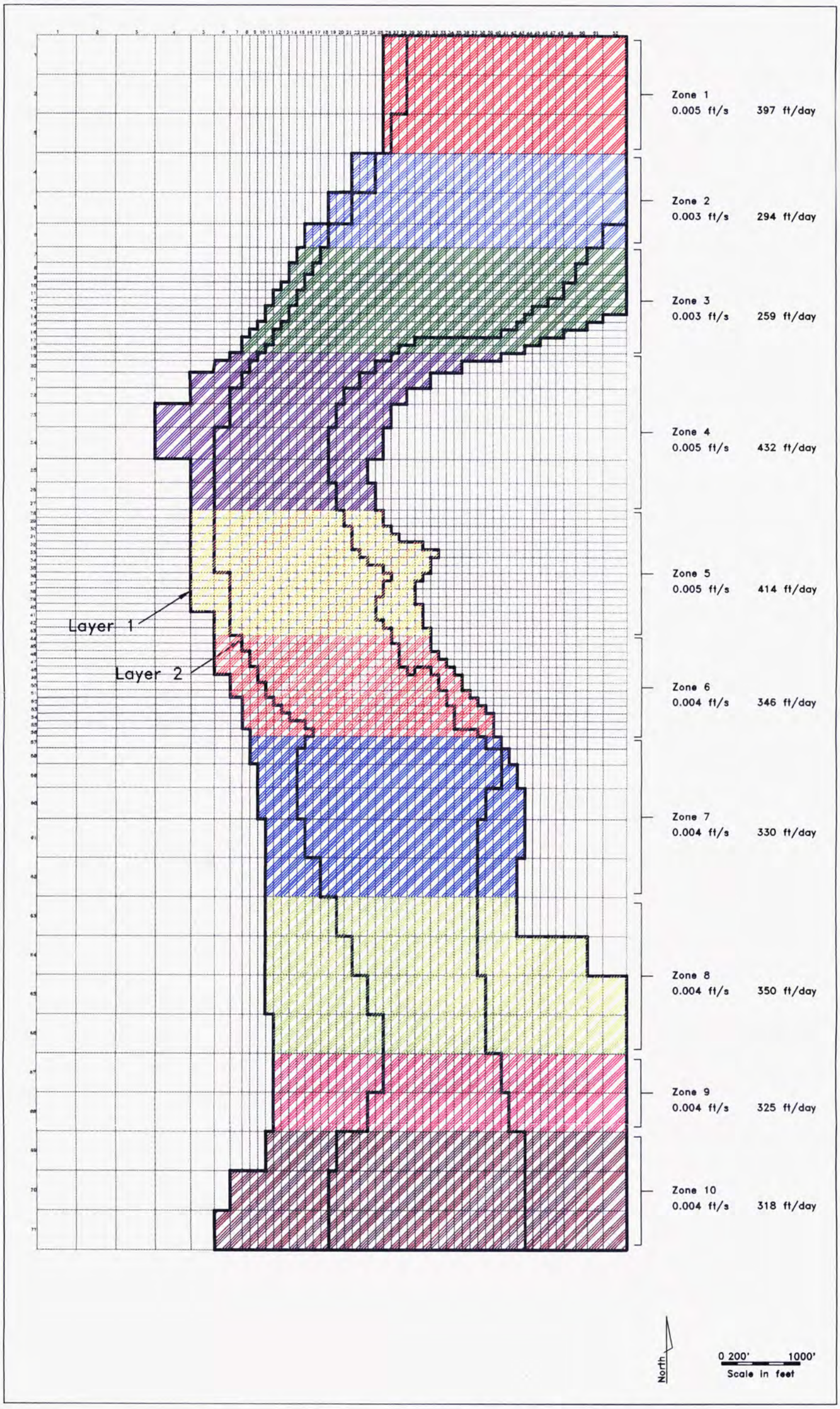


Figure 4.5. Hydraulic conductivity zones and values for Layers 1 and 2.

The Great Miami River is represented by 242 river nodes. River nodes data include river stage elevation, river bottom elevation, river bed conductance (vertical hydraulic conductivity of the riverbed material), length of reach, width of reach and riverbed thickness. The riverbed conductance was inversely determined during model calibration. River bed conductance was greatest near Miamisburg well field due to induced infiltration from production wells, and was 4,320 ft^2/day for reaches (rows, shown on Figure 3.1) 5 through 17 at the well field. Reaches 17 through 39 had values between 0.003 to 0.02 ft^2/day. Northern river reaches 1 through 5 were at 0.0005 ft^2/day; reaches 40 through 57 were 0.0005 ft^2/day; reaches 58-59 were 0.001 ft^2/day; and reaches 60-71 were 0.0015 ft^2/day.

The average vertical hydraulic conductivity from all the river reaches determined by the model was 0.13 ft/day (4.59×10^{-7} cm/s). The maximum calculated river bottom vertical hydraulic conductivity was 2.25 ft/day (7.94×10^{-6} cm/s) and the minimum was 7.2×10^{-4} ft/day (3.0×10^{-9} cm/s). CH2M Hill estimated riverbed leakance for a portion of the BVA to be 0.1 ft/day (Plomb and Arnett, 1989). Norris (1983) estimated the hydraulic conductivity of the Scioto River bottom at a similar buried valley aquifer in Ohio to range from 0.6 to 20.67 ft/day (2.12×10^{-4} to 7.28×10^{-3} cm/s).

Recharge from the river was calculated from the resulting river leakage and the area of the cell. The river as a whole had a simulated average recharge to the aquifer of 0.03 mgd per acre. Induced recharge occurs near the Miamisburg well field at 0.3 mgd per acre. Riverbed infiltration (induced and natural) has been reported for the buried valley aquifer to be from 0.02 to 1.7 mgd per acre (Norris and Spieker, 1966). The high value of 1.7 mgd per acre was at the Rohrers Island artificial recharge areas in Dayton. Estimated recharge values for the model are well within measured and estimated values for the BVA.

The total simulated recharge to the BVA from the Great Miami River was 3 cfs. This is only 0.5 percent of the lowest daily mean flow for October 1992, to September 1993, of 570 cfs measured at the USGS gage north of Linden Street.

The model indicates only the northern end of the river to be gaining. The northern 2800 feet of the Great Miami River are calculated to be gaining at a rate of 5.5×10^{-4} cfs, which equals an average rate per acre of 45 gallons per day. An explanation for this may be that the col (described in Section 2.1.1) causes the ground water level to be backed up as flow is constricted. This would locally elevate ground water level above river stage and cause the river to gain. If the Miamisburg well field was not present the river might be gaining further downstream. A summary of the calibrated model parameters is presented in table IV.1.

4.2. VERIFICATION

Parameter values used to establish model calibration are not unique -- there may be many combinations of parameters that will produce a reasonable match to a set of measured water levels. Model verification is a method to test whether the combination of parameters chosen for the system during calibration can be used under a different set of system stresses and match another set of observed measurements. A second steady-state time period was chosen for model verification analysis. During the latter part of June 1993, a 30-day aquifer test was completed and water levels had recovered. There was approximately one week during which water levels were relatively stable just prior to the largest river-stage rise of the year, on July 4th weekend. On June 23, 1993, water levels were taken for the entire site so this date was used for model verification.

The components of the June 1993, flow system which differ from the flow system used for calibration (September 1993) are river stage, water levels throughout the area, and therefore, the northern and southern boundary conditions. In comparison to model calibration, which used 58 target points, model verification used only 56 target points. This is because two wells were not measured in June 1993. River stage throughout the model was determined for June 23 by running the HEC-2 surface water profile using the reported discharge and stage for that day. This stage was input for the verification;

as where the new specific head values for the north and south boundaries which were interpolated from water levels. All other parameters remained the same as for the calibrated model.

The observed water levels measured on June 23, 1993, and the computed model water levels are shown in Appendix B, Table B.I.2. Quantification of the quality of verification was completed using the error differences described in the calibration section. The model water level distribution and error distributions are presented in Figure 4.6 and 4.7. The comparison of observed heads versus computed heads for verification is shown in Figure 4.8. The ME, MAE and RMSE for the verification are -0.59, 0.68 and 0.72 feet, respectively, which is less than 10 percent of the water level change across the model area. They are also in good agreement with calibration ME, MAE and RMSE of -0.08, 0.21 and 0.24 respectively.

Table IV.1. Calibrated Model Parameter Summary

1.	Two Layer Model
2.	Bottom Layer 1 - Elevation 620 Top Layer 2 - Elevation 620 Bottom Layer 2 - Elevation (varies) 540 to 620
3.	Specified Head Layer 1 - North Model Boundary Elevation 683.00 Specified Head Layer 1 - South Model Boundary Elevation 675.00 East and West boundaries are no flow due to bedrock.
4.	Areal Recharge due to Precipitation 0.0029 ft/day
5.	Hydraulic Conductivity 259 to 432 ft/day
6.	Discharge from Production Wells Miamisburg Well 10 — 126,144 ft^3/day Miamisburg Well 11 — 126,144 ft^3/day Mound 0076 — 71,712 ft^3/day DP&L (4 Production Wells) — 89,856 ft^3/day
7.	Recharge due to Miami-Erie Canal Drainage Ditch 0.039, 0.058, 0.075 and 0.25 ft/day
8.	Great Miami River - River bed conductance 0.005 ft^2/day to 4,320 ft^2/day. Average recharge to aquifer 0.03 mgd/acre, 0.3 mgd/acre near Miamisburg Well Field.

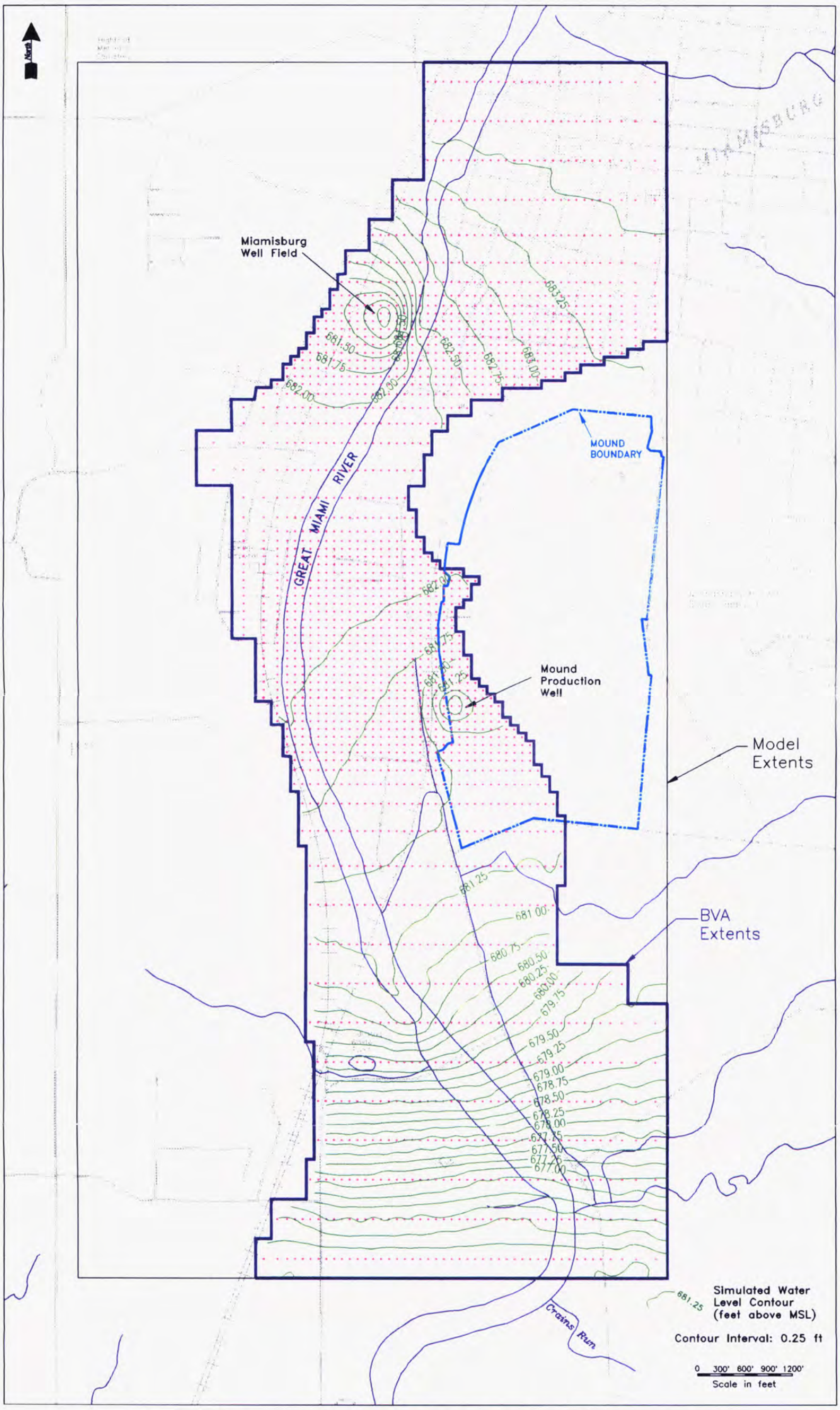


Figure 4.6. Distribution of simulated water levels for June 23, 1993, verification simulation.

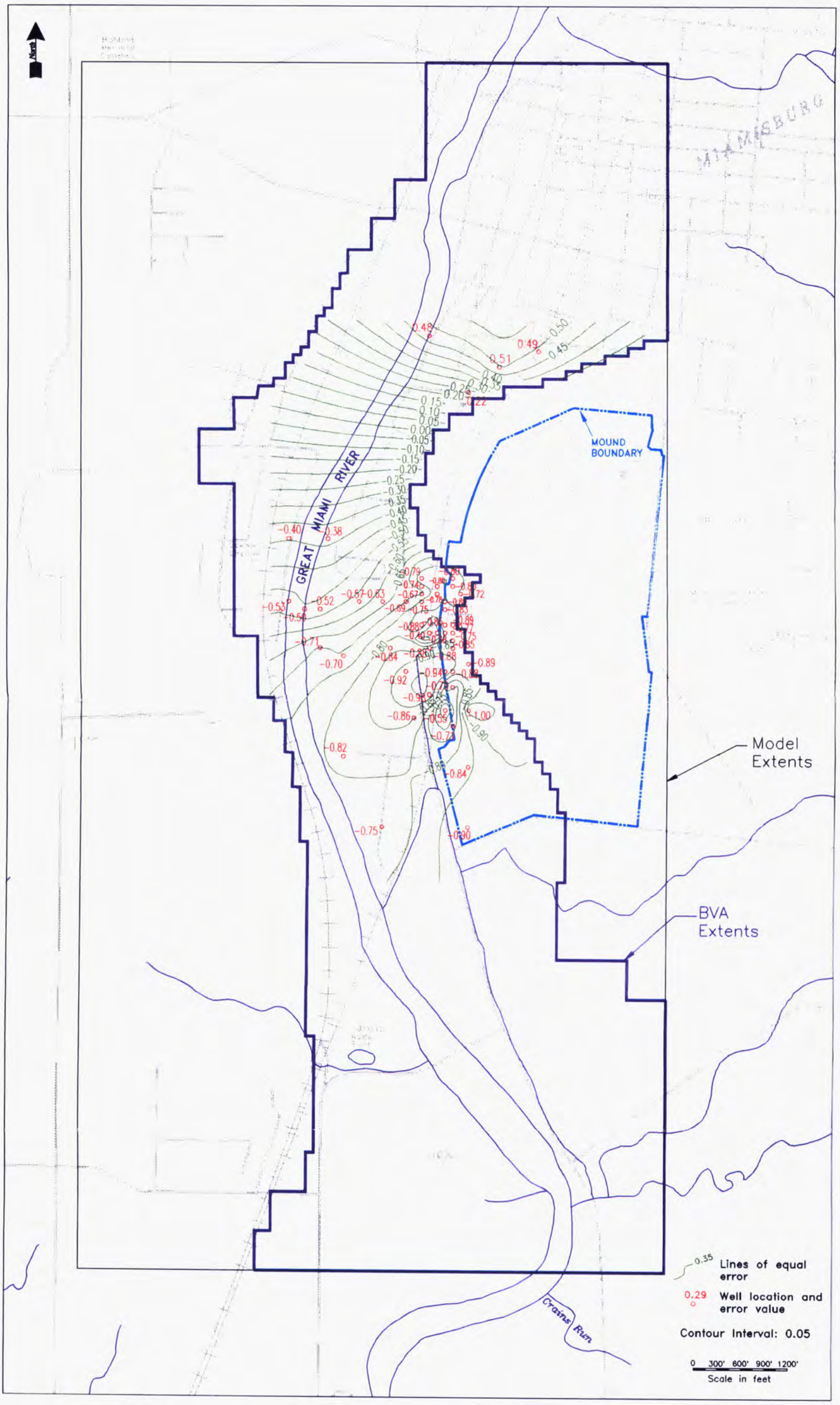


Figure 4.7. Areal distribution of model error between simulated and measured water levels for verification simulation.

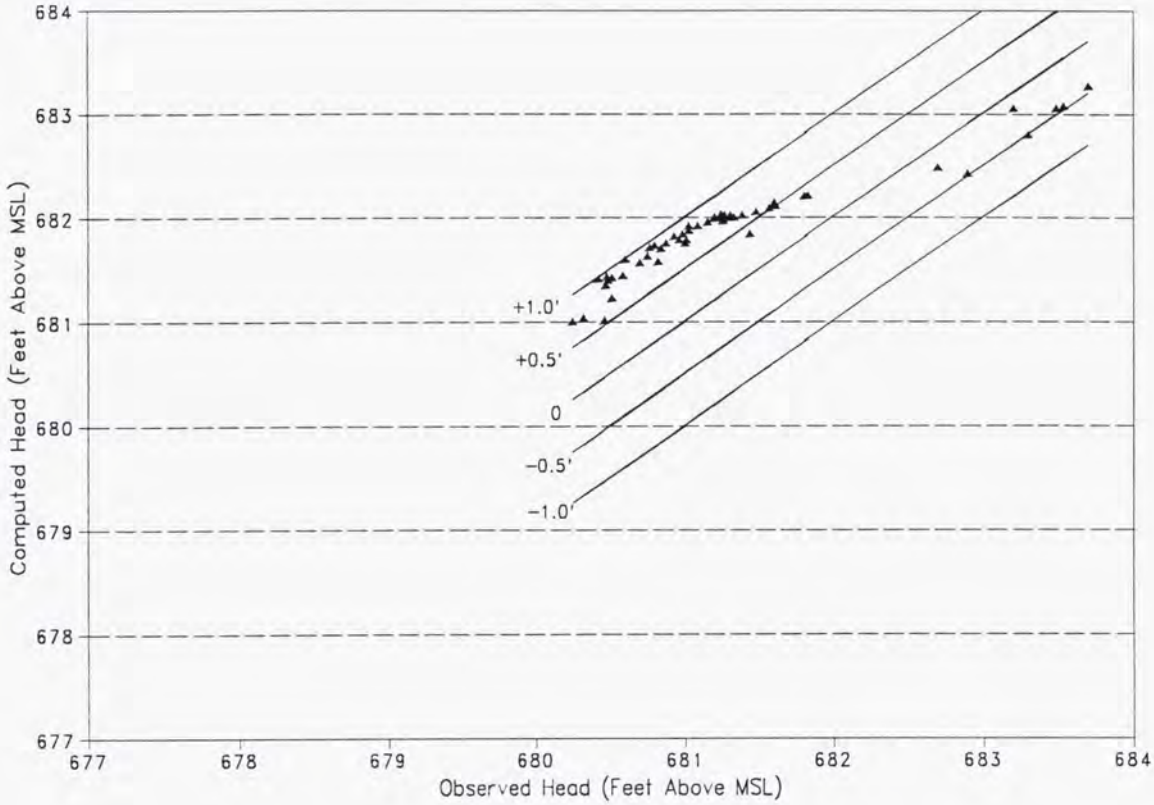


Figure 4.8. Observed water levels at target locations versus computed (modeled) water levels during verification at model nodes associated with target locations. Error bars associated with +/- 0.5 feet and +/- 1.0 feet of observed water levels are shown.

5.0 SENSITIVITY ANALYSIS

Sensitivity analysis was used to determine which parameters significantly affect the model output. The parameters used for sensitivity analysis were vertical leakage, recharge from precipitation, riverbed conductance, river stage, hydraulic conductivity and specified boundary conditions. Each parameter's model array was changed by either a percentage or a multiplication factor of the calibrated value. Individual values at each model node were not changed independently but as a whole. The model's response to these changes was assessed by plotting the mean error (ME), mean absolute error (MAE), and root mean square error (RMSE) versus percent difference or multiplication factor for each parameter modified.

Sensitivity of the model to vertical leakage between layers is shown in Figure 5.1. Vertical leakage was changed by factors of 0.1, 0.25, 0.5, 0.75, 2.5, 5.0, 7.5 and 10. The RMSE and MAE varied only -0.019 and 0.034 feet, respectively, indicating the general model is not sensitive to several orders of magnitude change in vertical leakage. The pumping centers would be more affected by the vertical leakage than areas with less stress due to pumpage vertical gradients. This sensitivity analysis would not detect localized effects of pumping.

Recharge due to precipitation was changed by $\pm 10, \pm 30$, and ± 50 percent of the calibrated value for sensitivity analysis, which gives a range of 6.3 to 19 inches per year. The RMSE, MAE and ME are shown in Figure 5.2. Variation in recharge produced approximately 0.4 feet of head difference in the model.

Prescribed heads were used at the northern and southern boundaries of the model. Sensitivity of the northern boundary was tested by decreasing and increasing the head by 3 feet. The response of the model was almost equivalent at either end of the range. Figure 5.3 shows that the lower prescribed head produces an error larger by 0.04 feet than the higher prescribed head. Essentially, changing the prescribed head several feet has minimal effect on the model.

The model sensitivity to riverbed conductance was determined by changing all riverbed conductances by a constant percent. The riverbed conductance was changed by ± 10, ± 30, and ± 50 percent. The model response was better than the calibrated model by 0.02 feet for a -10 percent change. A decrease in riverbed conductance causes 0.1 foot greater error than the equivalent increase. Overall, riverbed conductance within this percent change only has a slight affect on the model.

The model is the most sensitive to changes in hydraulic conductivity and river stage. Figures 5.5 and 5.6 show the large errors caused by these two parameters. The calibrated model's hydraulic conductivity was changed several orders of magnitude, from 0.1 to 10 times the calibrated values. The range from 0.1 to 1.0 is large for hydraulic conductivity, but estimates between these values were used in the sensitivity analysis as shown in Figure 5.5. Model response to this change as shown by the RMSE and MAE varied from approximately 1.0 to 1.5 foot changes. The model is more sensitive to a ten fold decrease in hydraulic conductivity than to a ten fold increase. The error associated with a ten fold decrease has a RMSE of 1.84 feet, whereas an increase has an error of 1.29 feet.

Sensitivity of the model to river stage changes was determined using actual river stage fluctuations that occurred during November 1993. The dates include November 13, 16, 18, 23, and 26. The stage and river discharge values were entered into the HEC-2 water surface profile model and stage elevations for the model area were determined. The stage used in the calibrated model was one of the lowest for the year. Therefore, each stage event used for this sensitivity analysis was greater than the calibrated model stage. Results for this analysis are shown in Figure 5.6. There is a direct correlation between increased river stage and BVA water levels. For a stage increase of 8.95 feet there was an average water level increase based on the RMSE of 5.8 feet.

A sensitivity analysis of the calibrated model to recharge from the bedrock was performed. Recharge contribution from bedrock to buried valley aquifers has not been assessed in detail. In a study conducted by the USGS (Dumouchelle, 1993), it was estimated that 3 percent of the flow in the buried valley aquifer of the Mad River valley is from bedrock (Brassfield Limestone) (personal communication, 1995). Bedrock recharge to the BVA in this study area was simulated using injection wells. Injection wells were placed in cells along the edge of Layer 1. Three percent of the flow for the calibrated model was calculated and divided by the total area of each cell face that borders the bedrock boundary. This allowed equivalent distribution of flow. A depth of 60 feet was assumed and the row length was used to calculate each area. The appropriate flow for each cell was calculated and applied via injection wells; and the resulting flow rate was 8.8×10^{-3} ft/sec.

A value of bedrock recharge that did not have adverse affects on the model (ie. water levels ten to hundreds of feet too high) was 0.003 percent of the total system flow or 18 cfs. For the model to match the September 1993 water levels with three percent flow from the bedrock, the hydraulic conductivity values would need to be 10 to 100 times greater than the calibrated values. The current conceptual model of the bedrock and BVA is that the bedrock contributes relatively very little to the BVA. This analysis supports this conceptual model.

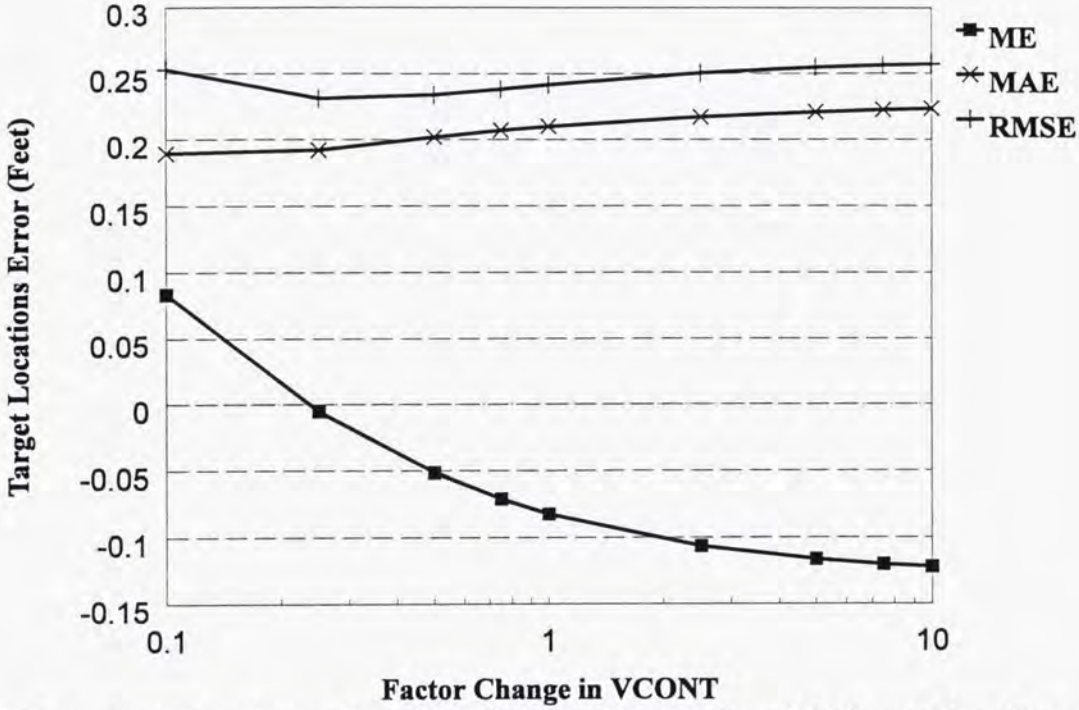


Figure 5.1. Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Error (ME) of model water levels during sensitivity analysis of vertical leakage.

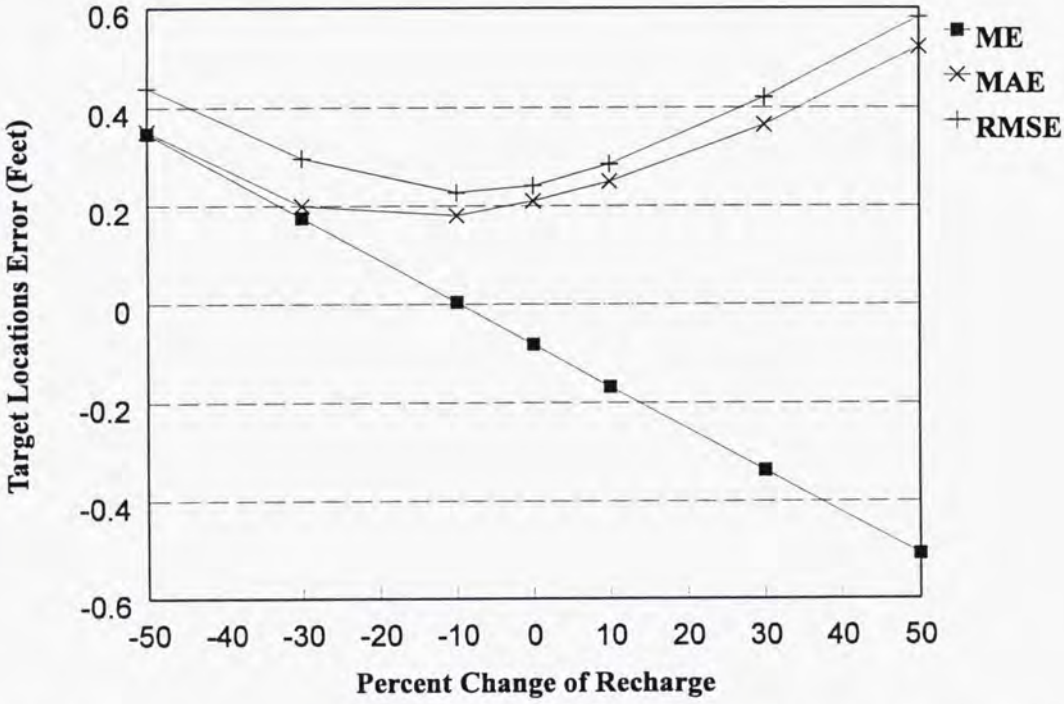


Figure 5.2. Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Error (ME) of model water levels during sensitivity analysis of recharge. The x-axis "0" represents the calibrated model values.

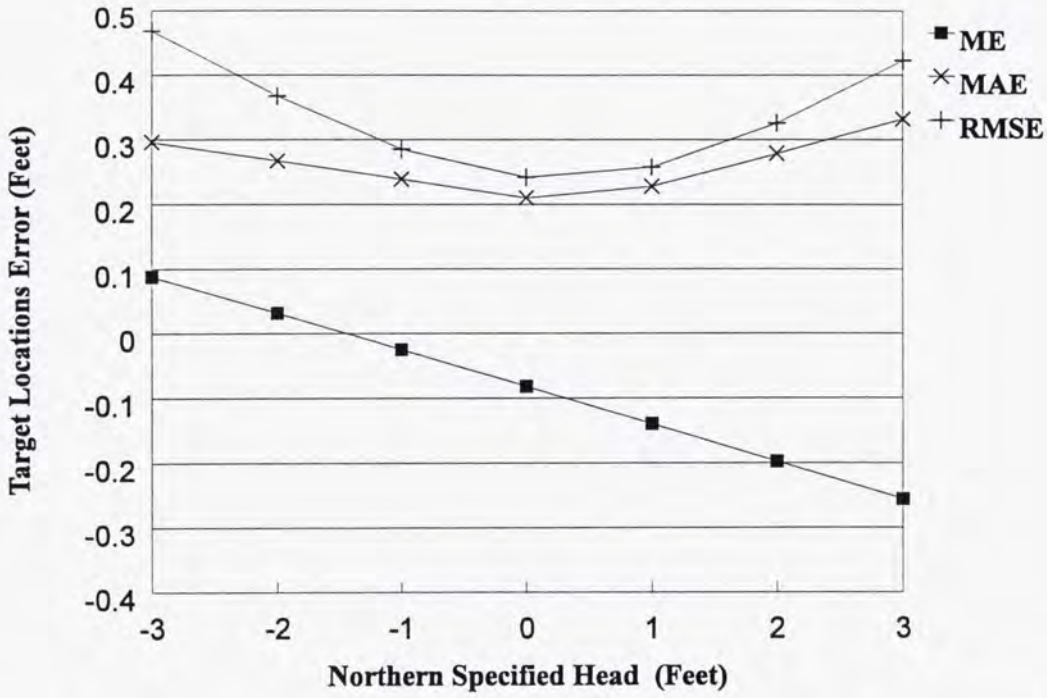


Figure 5.3. Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Error (ME) of model water levels during sensitivity analysis of prescribed head values. The x-axis "0" represents the calibrated model values.

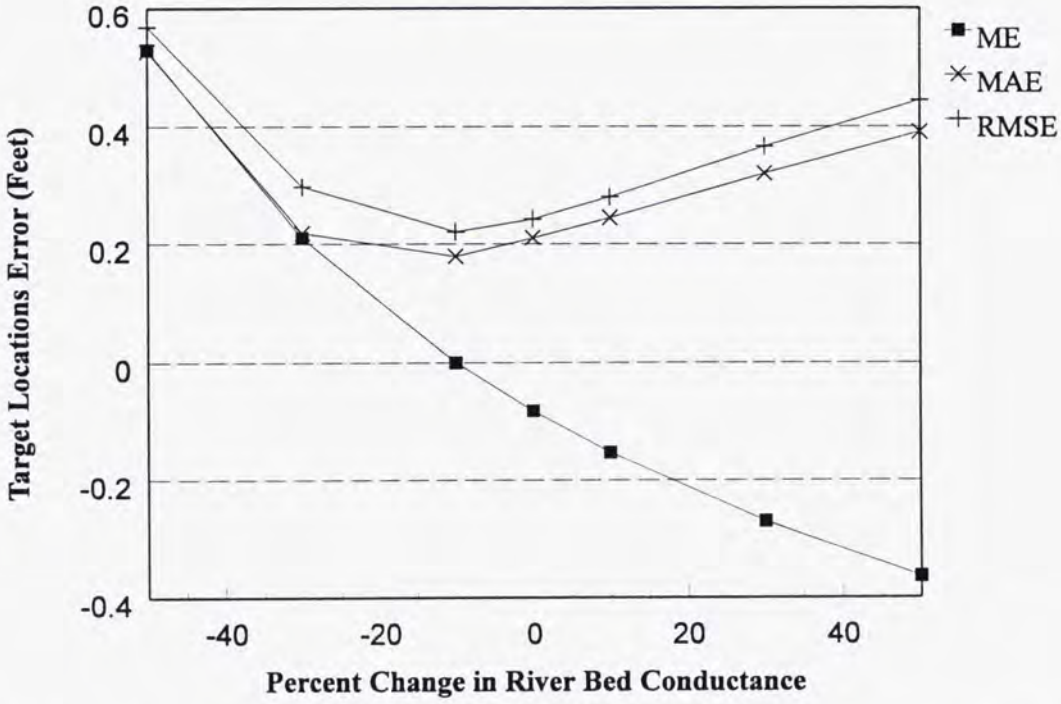


Figure 5.4. Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Error (ME) of model water levels during sensitivity analysis of River Bed Conductance. The x-axis "0" represents the calibrated model values.

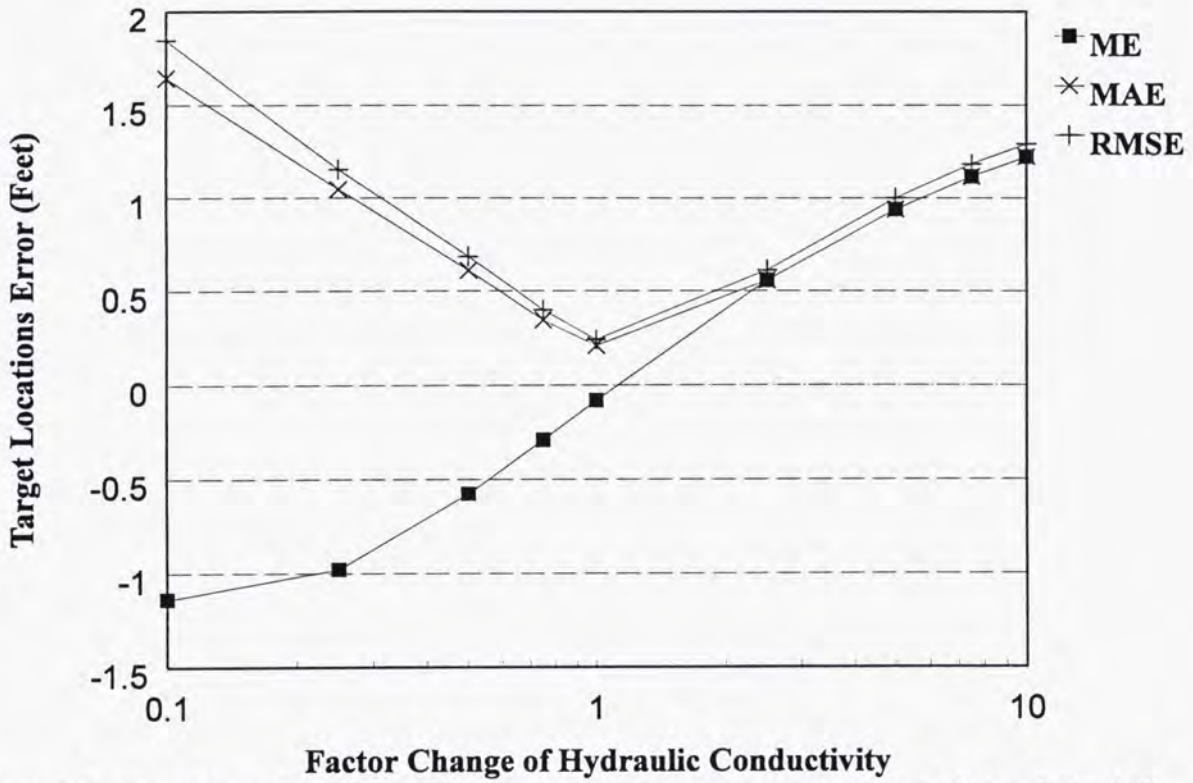


Figure 5.5. Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Error (ME) of model water levels during sensitivity analysis of hydraulic conductivity.

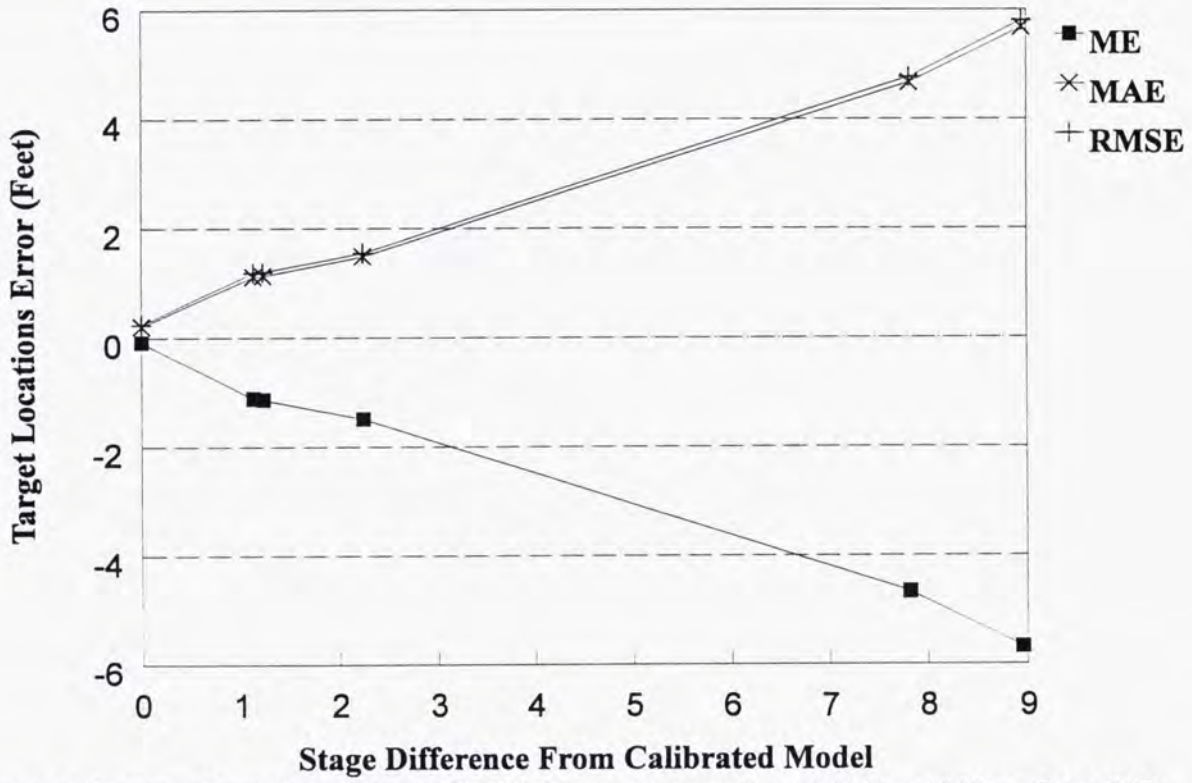


Figure 5.6. Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Error (ME) of model water levels during sensitivity analysis of Great Miami River stage. (feet)

6.0 PATHWAY DETERMINATION SCENARIOS AND RESULTS

An important purpose of this model development was the determination of potential pathways from sources on the Mound Plant. Pathways were identified using the calibrated model results and the USGS particle tracking program MODPATH. MODPATH is a particle tracking post-processing package which was developed to compute three-dimensional pathlines from steady-state simulations produced from MODFLOW. MODPATH can only simulate advective transport of contaminants. Travel times calculated are the times required for a particle to travel from the assumed source to a pump-and-treat or production well. Travel time is not the time required for remediation.

Several specific questions or scenarios were developed during the scope development of this project to be simulated by particle tracking. The scenarios are:

1. Determine pathways from potential contaminant sources in OU-1.

2. Determine pathways from potential contaminant sources in OU-1 if the proposed production well (#4) on the south property was the water supply for Mound.

3. Determine pathways from OU-1 sources with pump-and-treat wells installed and production well 0076 operating.

4. Determine pathways from OU-1 sources with pump-and-treat wells installed and proposed production well (#4) on south property as the water supply for Mound.

5. Determine pathways from other potential Mound sources.

6. Show the recharge areas for the Miamisburg and Mound Plant production wells.

The first four scenarios use a combination of production wells, pump-and-treat wells and particle origin locations within and near OU-1. The locations of the particle origins (potential sources), pump-and-treat wells, Mound production well 0076 and the proposed production well are shown in Figure 6.1 . The same particle locations and well locations are used for all simulations. The production rates of the pump-and-treat wells and the location of the Mound pumping well are the only variables.

First, the results of the calibrated model were used to determine where particles would go if placed at a potential source area (the landfill) in the OU-1 area (Figure 6.1). Six particles were used for this simulation. Three particles were located on the west side and three on the south site of the landfill. These particles were allowed to move forward in time until they reached a well or reached the northern or southern boundary of the model. The results of the modeling are shown in Figure 6.2 The calculated travel time for the particles to reach production well 0076 was between 226 days and 412 days.

The second scenario was an OU-1 source and the use of the proposed south property production well as Mound's water supply. This simulation required the MODFLOW model to be rerun with the Mound production well on the south property. The production rate was the same as that used in the calibrated model for well 0076. Particles were located at the following model nodes: row 39, column 29; row 40 column 29; and row 40, column 30 (Figure 6.1). Figure 6.3 shows the pathlines for each particle and the termination of two particles at well number 4 after 3 and 5 years. The eastern most particle was not captured by the capture zone of production well 4 and reached the Mound property line in 10 years.

Scenario number three included Mound production well 0076 and two pump-and-treat wells. The pump-and-treat wells are located at the southwest corner and directly south of the historic landfill (Figure 6.1). The pump-and-treat wells were added to the calibrated model in Layer 1. Three

simulations were conducted for different pumping rates of the pump-and-treat wells. MODFLOW was rerun with each of three pumping rates, including 10, 25, and 50 gpm for each pump-and-treat well. At a rate of 10 gpm the particles were not captured by the pump-and-treat wells but were captured by well 0076 within 1.5 to 2 years (Figure 6.4). At a rate of 25 gpm, pump-and-treat well 2 captured all three particles within 54 days (Figure 6.5). And at a rate of 50 gpm, pump-and-treat well 2 captured the first particle within 18 days and captured all three within 42 days (Figure 6.6).

A fourth scenario included two pump-and-treat wells and the proposed Mound south property production well. Again, MODFLOW was rerun with the changed well parameters and the results were transferred to MODPATH, where the particle pathlines were determined. The same pump-and-treat wells were used and particles started in the same place as scenario 3. Pumping rates for the pump-and-treat wells were again 10, 25, 50 gpm each. At a pumping rate of 10 gpm the particles were not captured by the pump-and-treat wells. Additionally, the particles were not captured by production well 4 and left the Mound property in 10 years (Figure 6.7). Figure 6.8 shows the results of the pump-and-treat system at a rate of 25 gpm. The particles were captured between 32 and 68 days by pump-and-treat well 2. At a rate of 50 gpm the particles were captured by pump-and-treat well 2 between 20 and 49 days (Figure 6.9).

The fifth scenario located particles at other potential sources on Mound plant and determined pathways from these sources. Particles were located at the BVA edge near seep 607; two sources were located near well 312 west of Building 19 and southwest of well 312; and a source was located at the edge of the tributary valley (Figure 6.1). The calibrated model flow field was used for this particle tracking. The pathlines all followed the eastern edge of the simulated BVA and were captured by well 0076 (Figure 6.10). The travel time for the seep 607 particle to be captured by well 0076 was 23 years. Travel times for the two sources downgradient of well 312 were 4 and 6 years. The tributary valley source required 21 years to be captured by well 0076.

A sixth scenario was simulated to show the recharge areas for the Miamisburg and Mound production wells. Lines of particles were placed at the northern model boundary between the Miamisburg and Mound well fields. The calibrated model flow field was used and the particles were allowed to move forward in time until reaching a well or leaving the model. Figure 6.11 shows the particle pathlines and the essential recharge areas for the two well fields.

Several assumptions were made for the particle tracking simulations which remained constant throughout the simulations. One of the most important was that a particle is terminated at a well if 75 percent of the flow for that cell containing the sink is removed by the well. A porosity value of 0.2 was used throughout the particle tracking simulations. The final assumption is that if dispersion and infiltration of the shallow zones are ignored, contamination does not move into the greater portion of the BVA but stays close to the eastern boundary of the BVA.

It is clear that particles which are not captured by the pump-and-treat wells may eventually reach a Mound production well or may not be captured at all. The travel times determined for the 25 and 50 gpm pump-and-treat scenarios are realistic in that when the Mound production well is located on the south property, it takes longer for the pump-and-treat wells to capture the particle than it does when well 0076 is used. The superposition of capture zones from pump-and-treat wells and 0076 causes an increased gradient and thus a decreased travel time. It should be noted that the model grid size was designed for the regional model calibration and does not have the cell density to determine the effectiveness of the pump-and-treat system in OU-1.

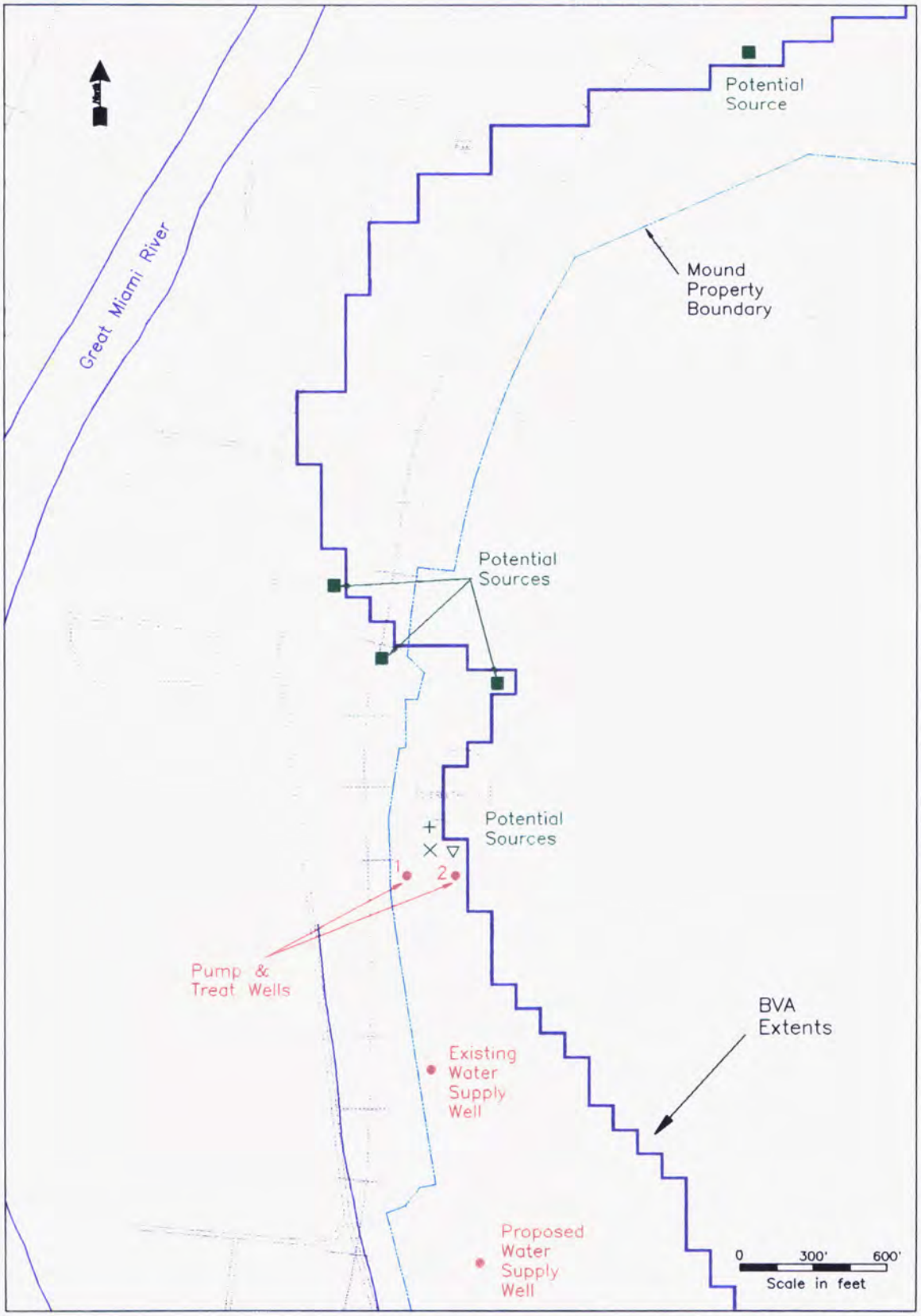


Figure 6.1. Locations of potential sources, pump-and-treat wells and Mound production wells used for particle tracking simulations.

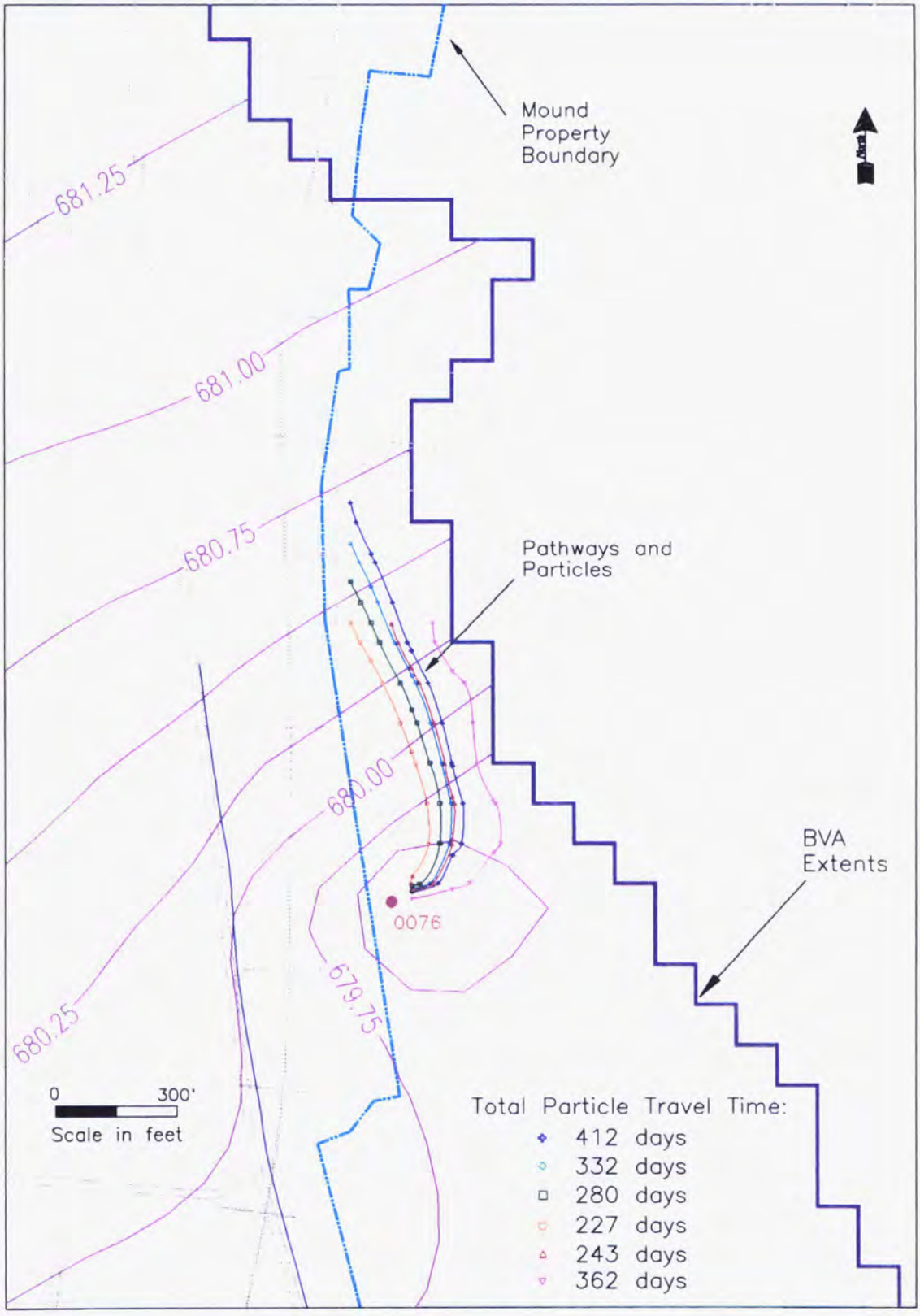


Figure 6.2. Potential pathways from six locations in OU-1 using the calibrated model flow field.

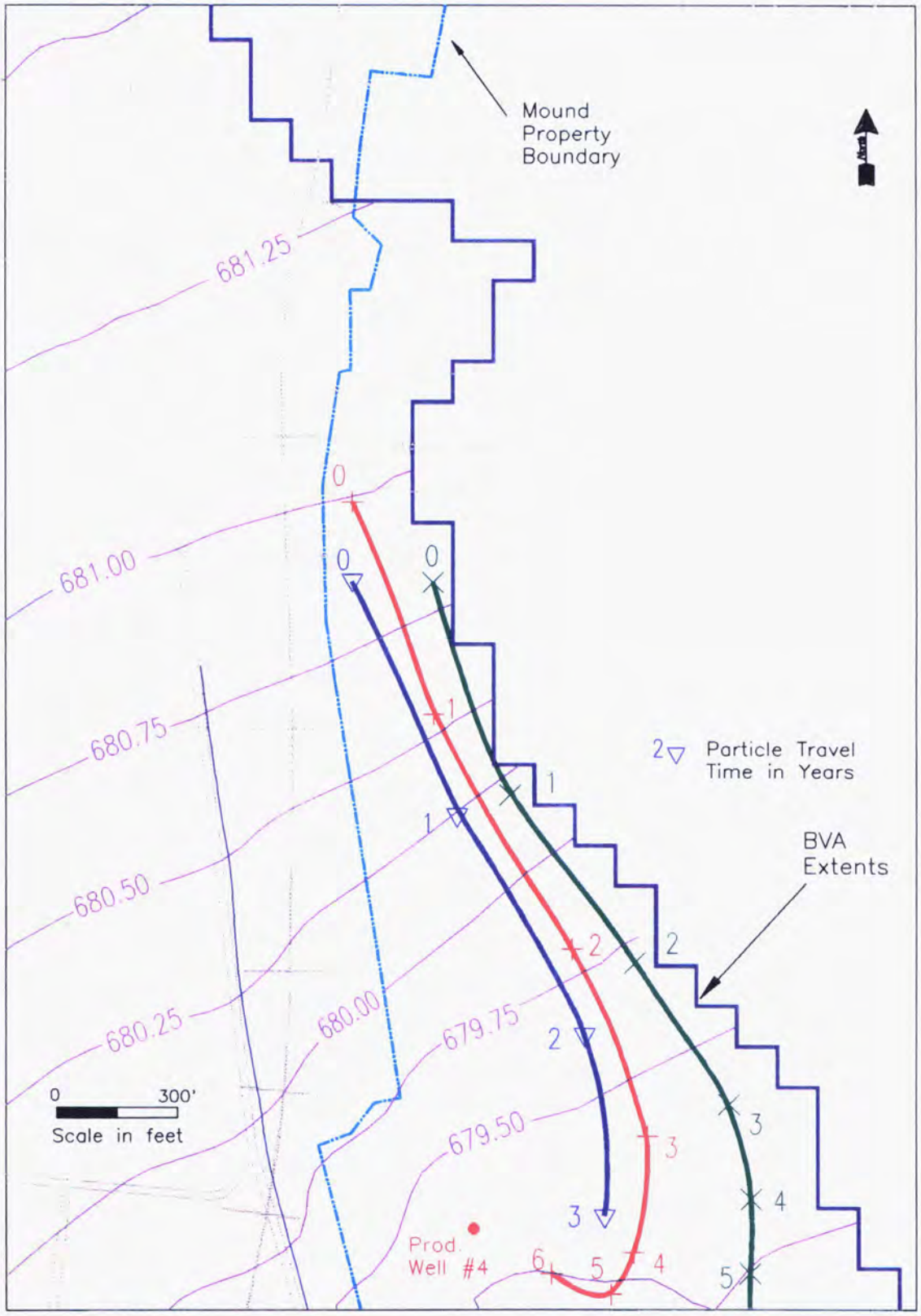


Figure 6.3. Potential pathways from three locations in OU-1 using proposed production well number 4 on south property.

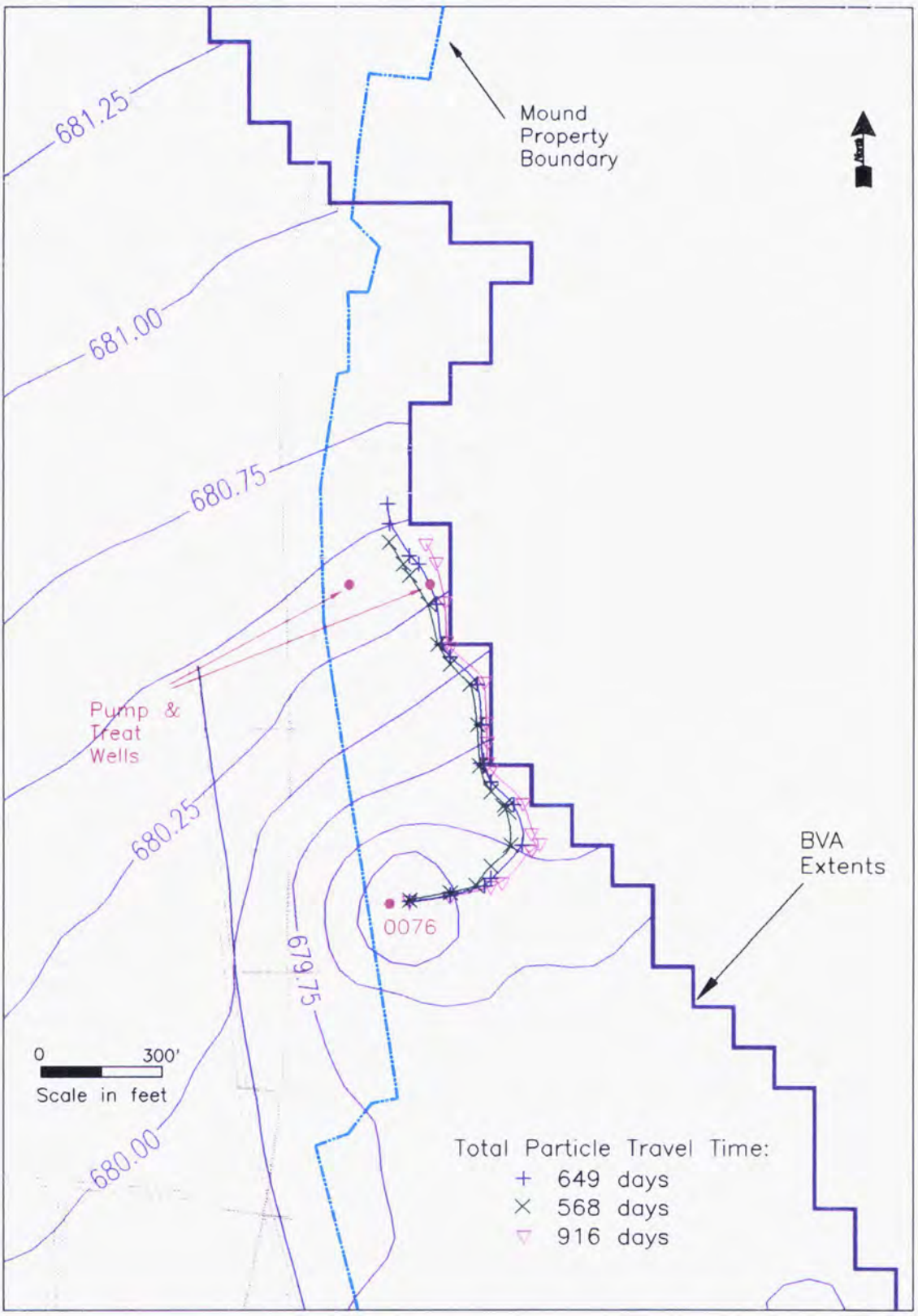


Figure 6.4. Potential pathways from OU-1 sources during pump-and-treat operations at 10 gpm per well with production well 0076 in operation.

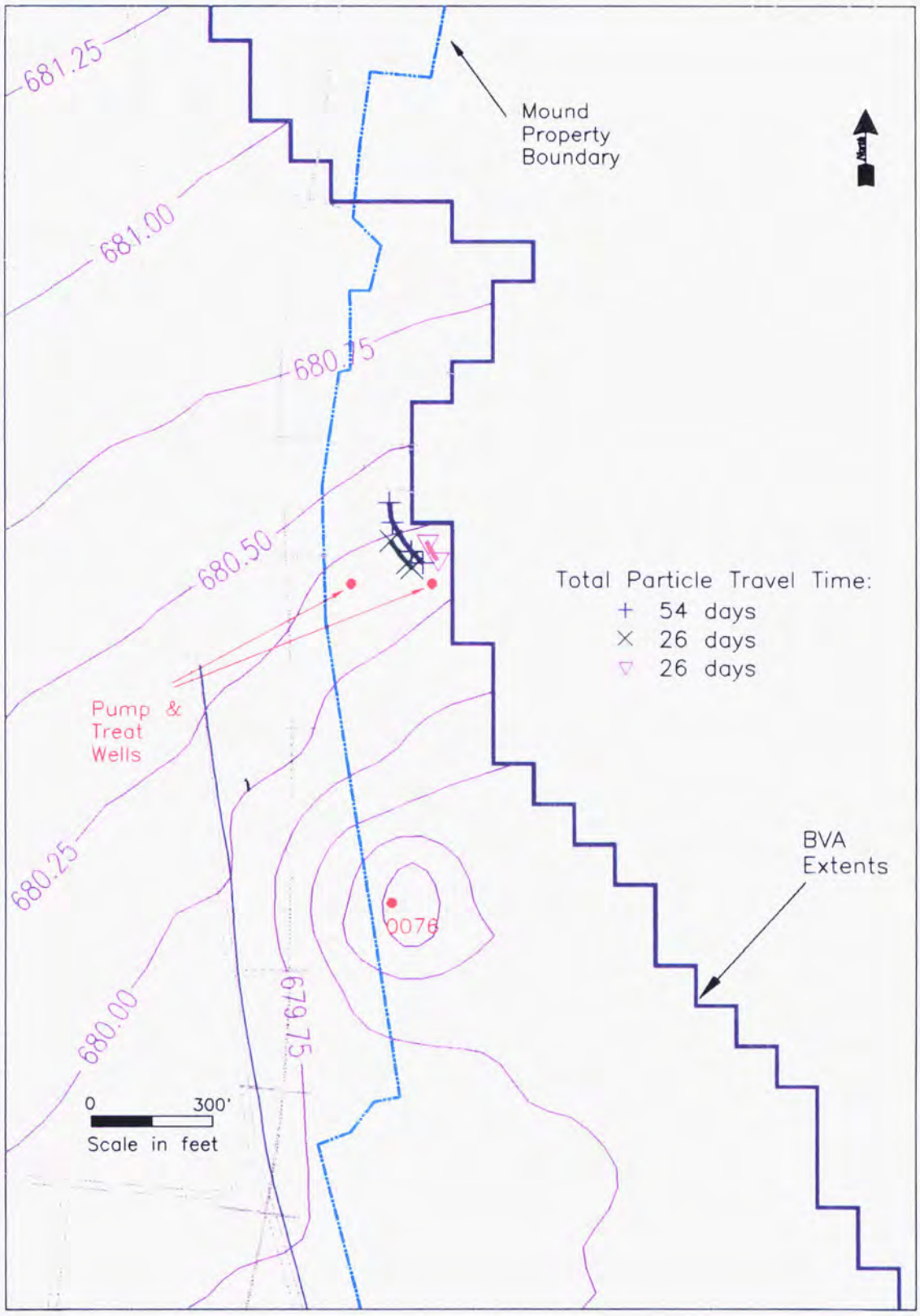


Figure 6.5. Potential pathways from OU-1 sources during pump-and-treat operations at 25 gpm per well with production well 0076 in operation.

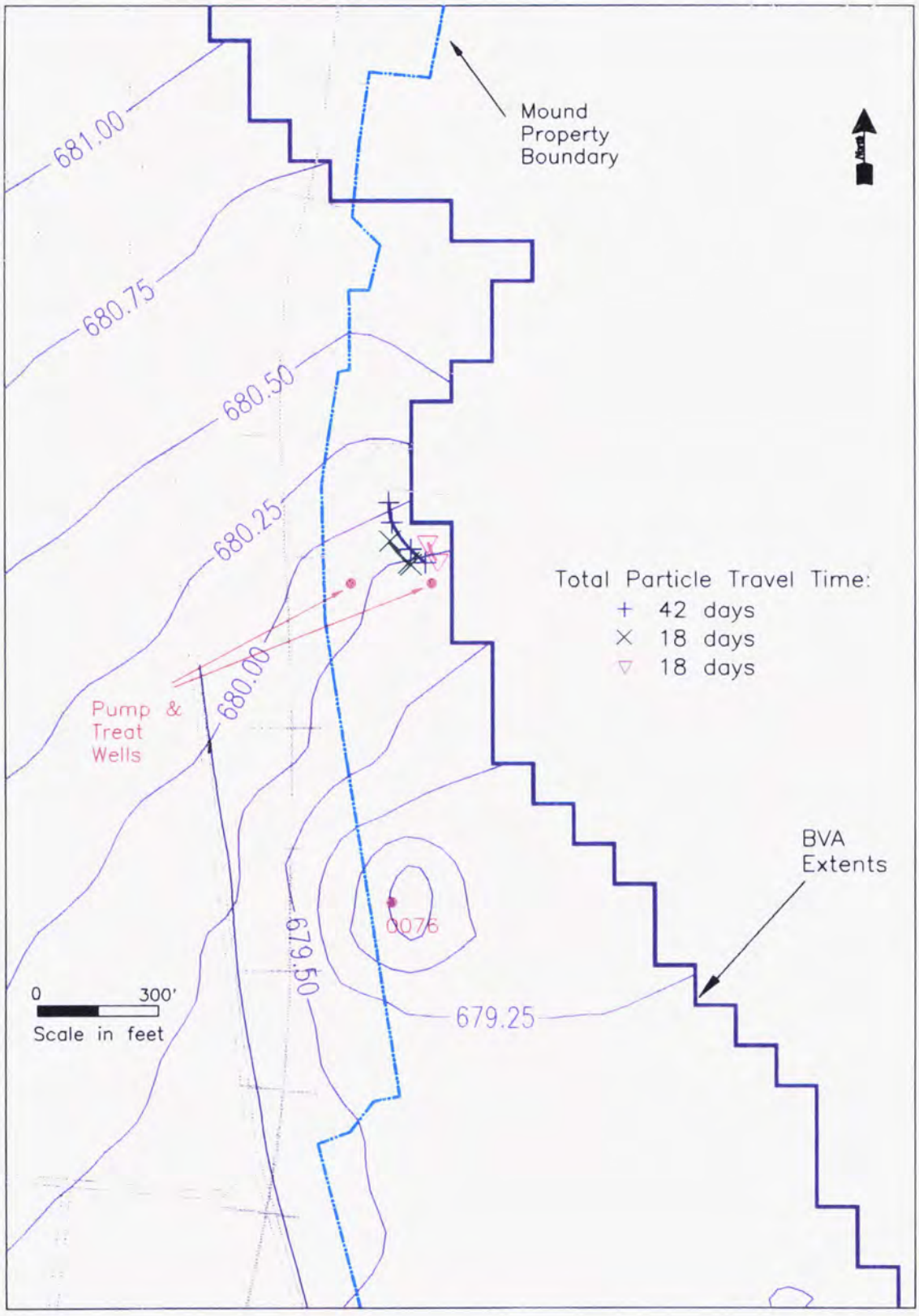


Figure 6.6. Potential pathways from OU-1 sources during pump-and-treat operations at 50 gpm per well with production well 0076 in operation.

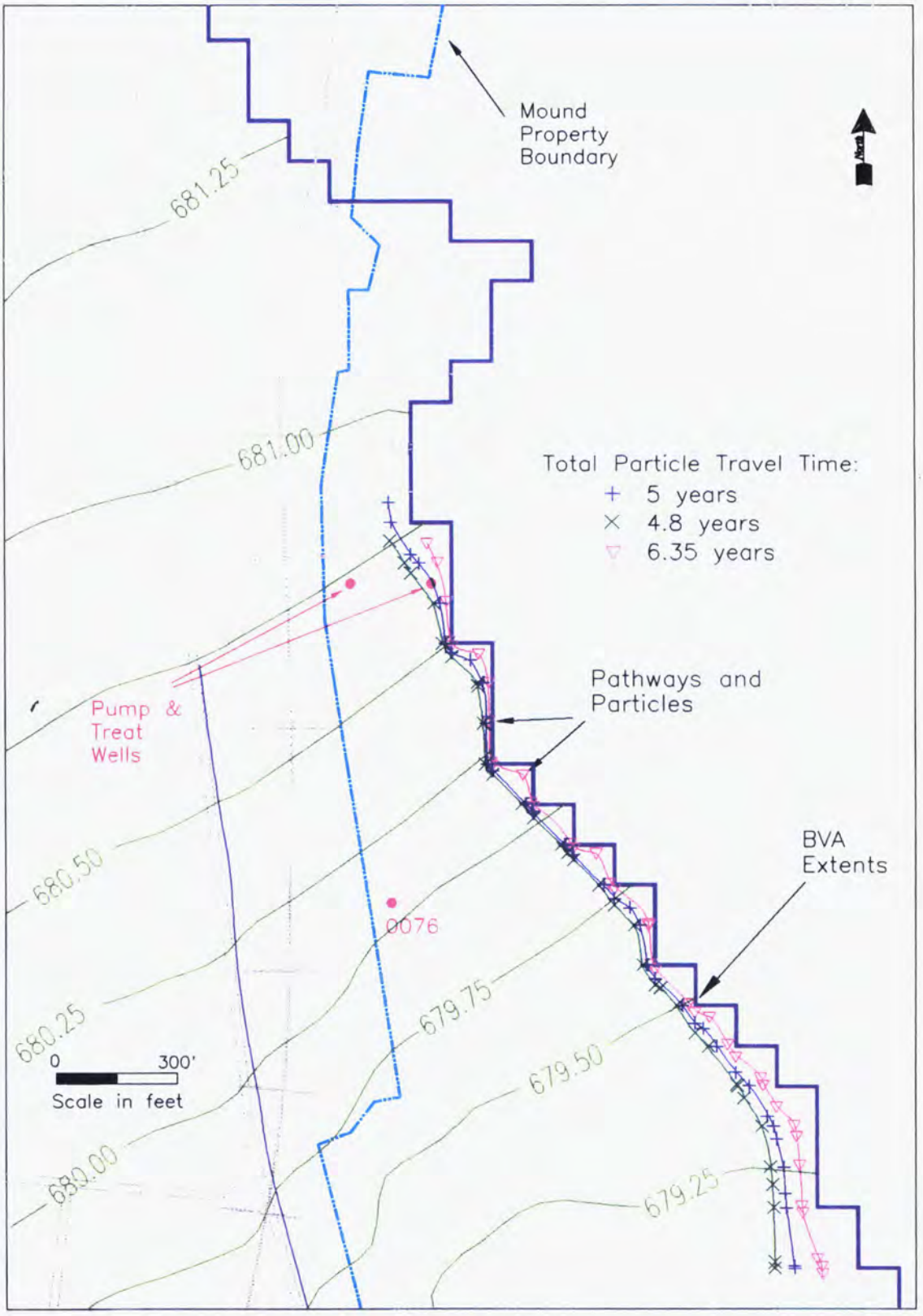


Figure 6.7. Potential pathways from OU-1 sources during pump-and-treat operations at 10 gpm per well with proposed production well #4 in operation.

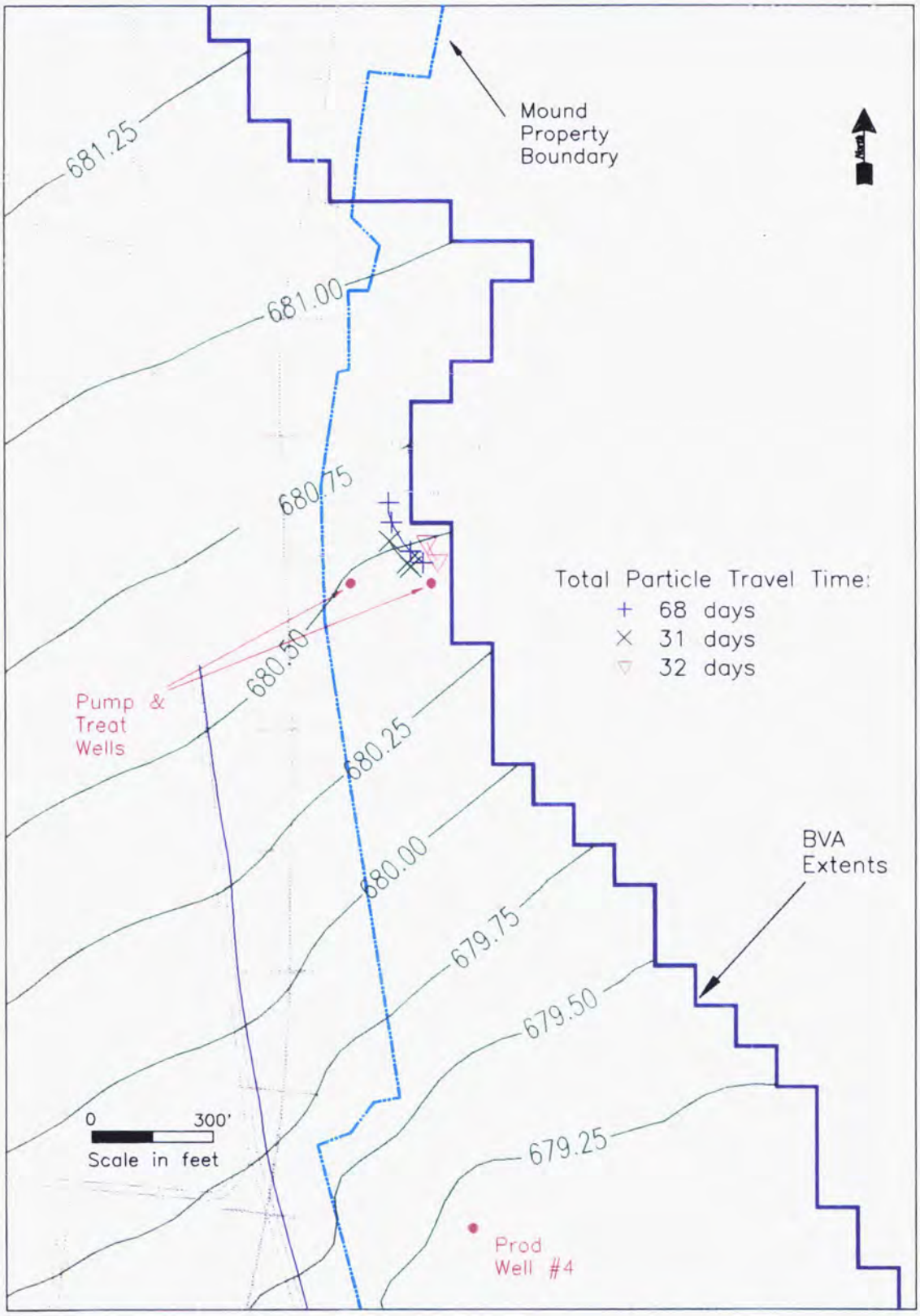


Figure 6.8. Potential pathways from OU-1 sources during pump-and-treat operations at 25 gpm per well with proposed production well #4 in operation.

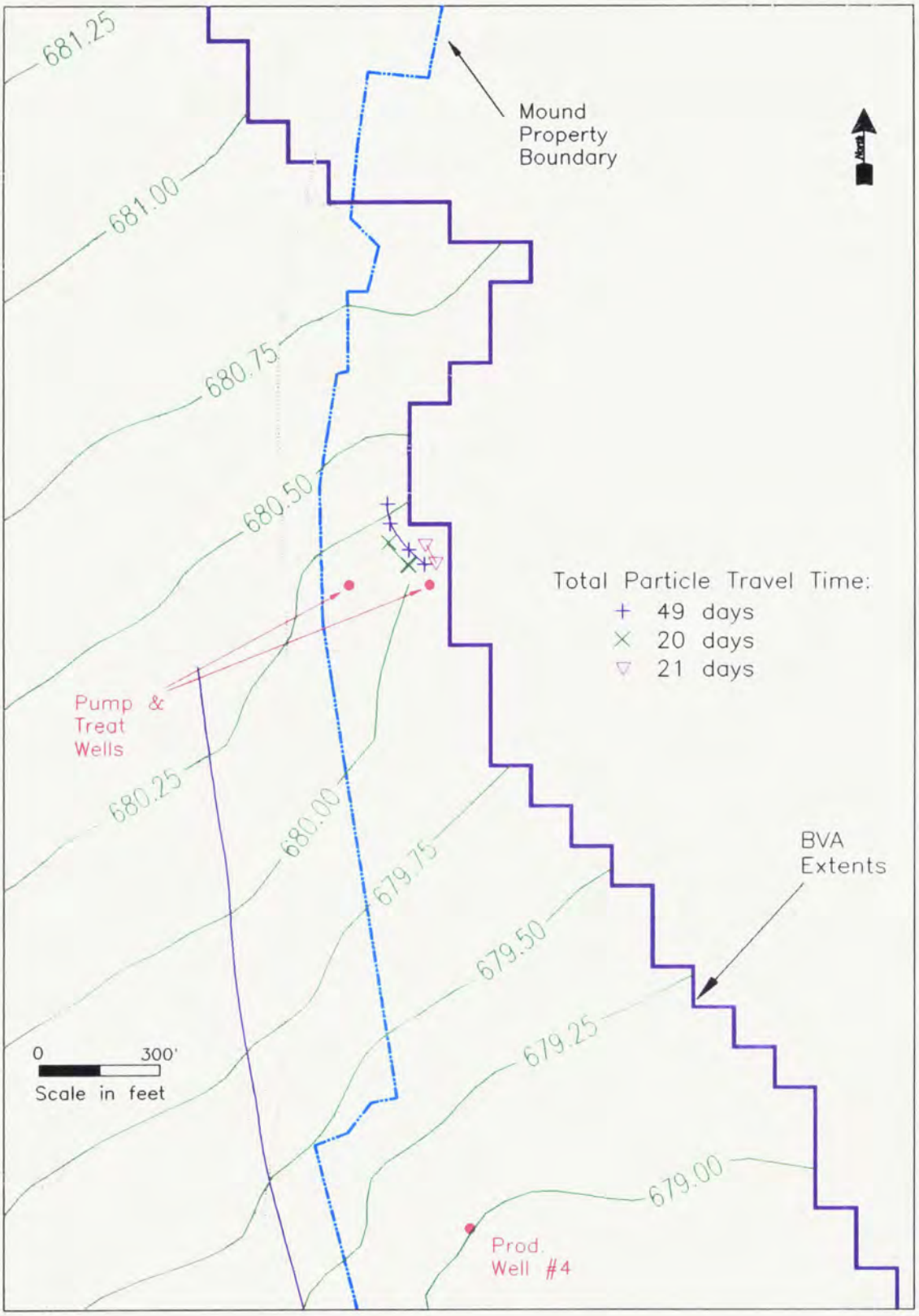


Figure 6.9. Potential pathways from OU-1 sources during pump-and-treat operations at 50 gpm per well with proposed production well #4 in operation.

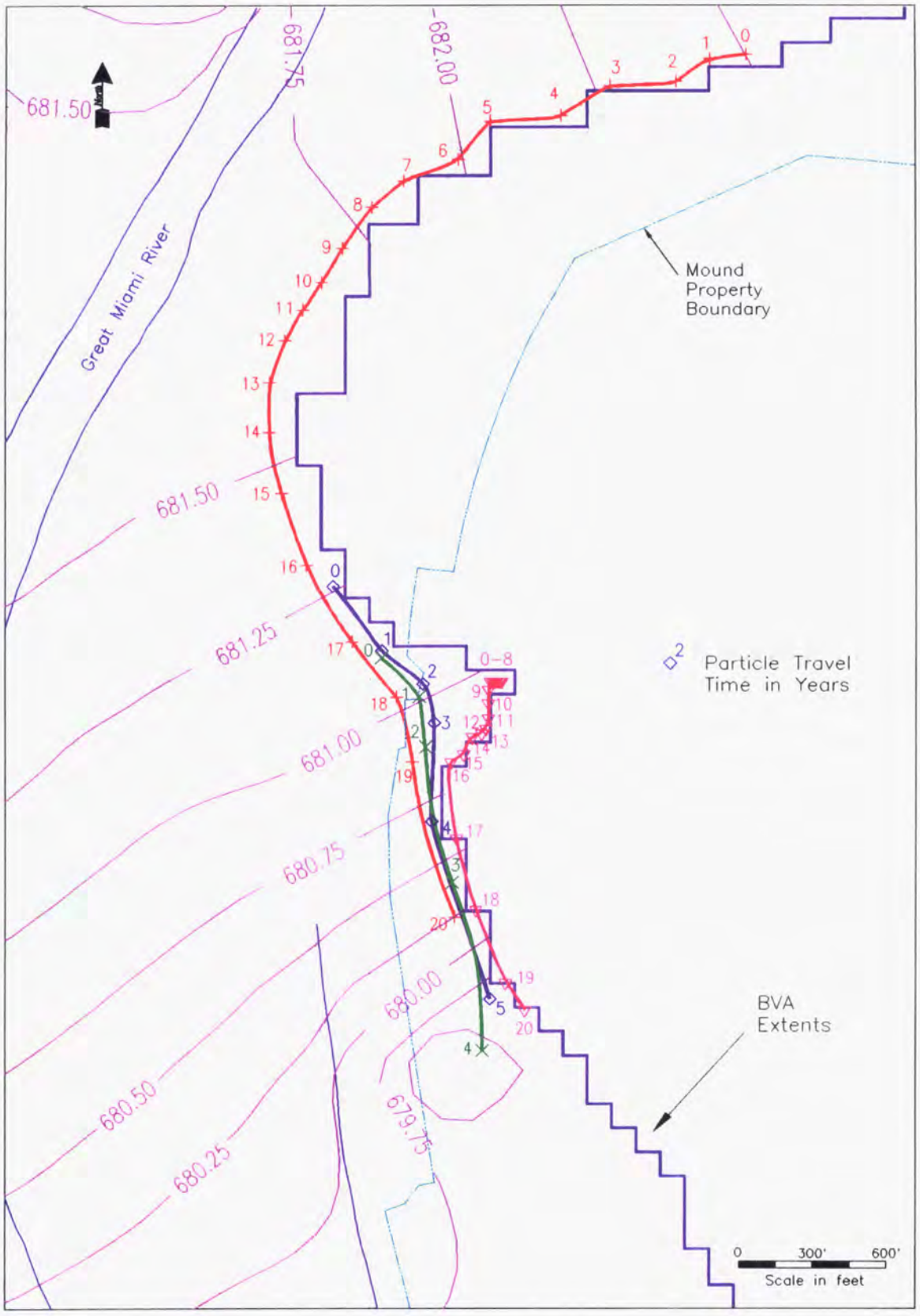


Figure 6.10. Potential pathways from several sources at Mound Plant using calibrated model flow field.

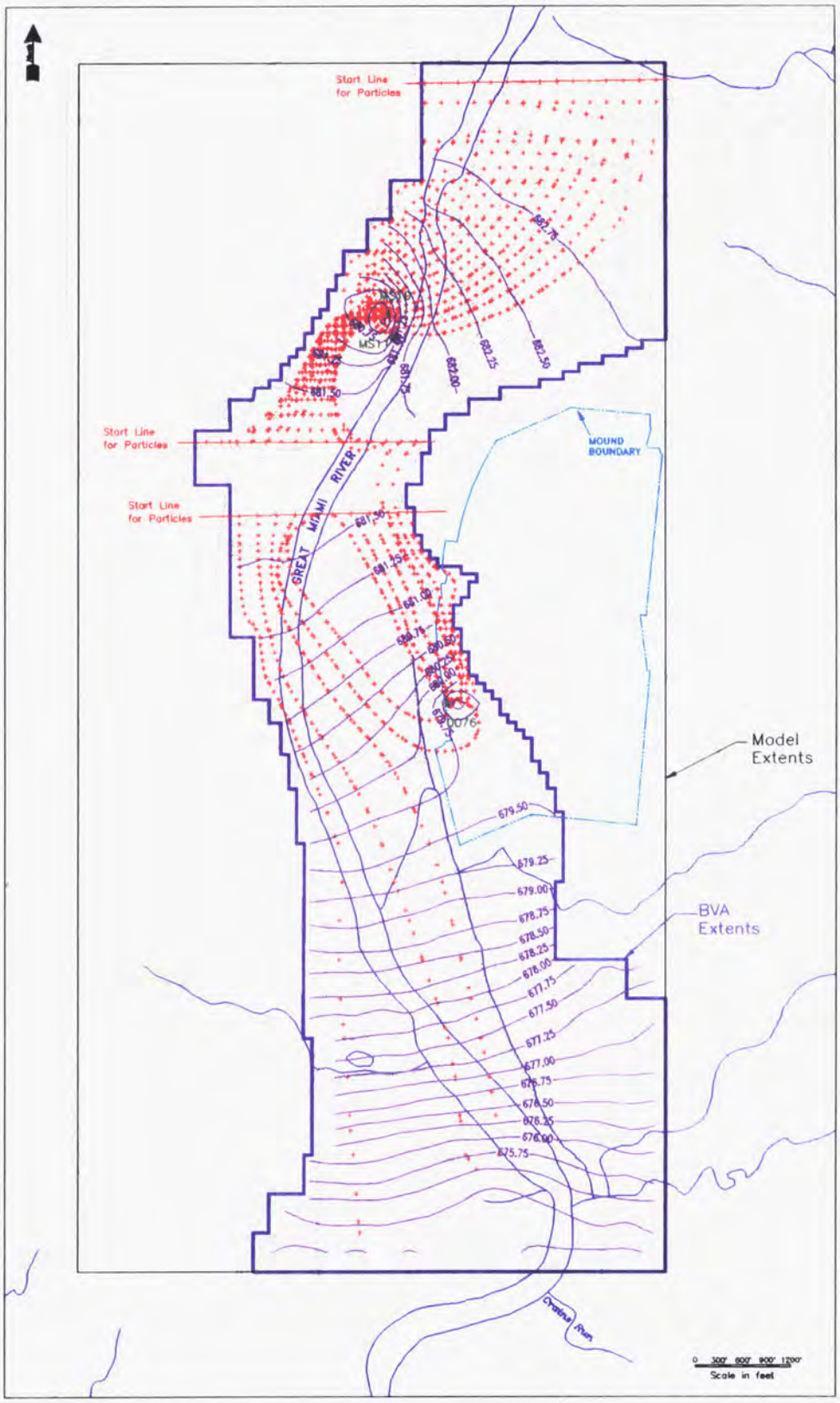


Figure 6.11. General pathways from several starting locations in the study area using calibrated model flow field.

7.0 MODEL LIMITATIONS

Numerical modeling of natural systems is a tool for assessment of various conditions of the system, and contributes to a better understanding of the system as a whole. There are a few limitations of this model that need to be recognized to keep this tool in perspective.

This model assumed steady-state conditions of the flow system. It has been shown in this report and several others that the BVA is continually adjusting to system stresses such as river stage, precipitation events, and pumping centers and is therefore never truly at steady-state. In this study a time period was chosen that would have been the most likely period for the system to have reached steady-state. The results of this report are therefore only reflective or predictive of a similar time period in the cycle of the BVA.

Another important consideration of this model is that there are no control points south of South River Road, essentially the lower third of the model area. This does not have significant effect on the area near the Mound or between the Mound and the Miamisburg Well Field. The results for the southern end of the model area are based on hydrogeological experience.

8.0 SUMMARY AND CONCLUSIONS

A ground water flow model was developed for a portion of the BVA from State Route 725 in Miamisburg, south to the low dam at DPL Hutchings station in Chautauqua. Steady-state conditions were assumed for the model and the site conditions for September 2, 1993 were chosen as steady-state conditions. Several parameters were determined inversely during the calibration process, including hydraulic conductivity, riverbed conductance, and drainage ditch infiltration. The model extent of the BVA was determined from bedrock topography and water level elevations. Two layers were used to simulate the BVA in this area for simplicity, and to test the vertical movement of particles during particle tracking simulations. Three pumping centers were simulated for the area: the Miamisburg well field, the Mound Production well and the DPL Hutchings Station production wells. Areal recharge was applied to simulate infiltration from precipitation. River stage on September 2, 1993, for each river node was calculated using the HEC-2 surface water profile model for model verification.

Inversely determined parameter results included:

- Hydraulic conductivities, which ranged from 259 to 432 ft/day and compare well with other studies of the BVA in the area.
- Riverbed conductance, inversely determined to be between 5.0×10^{-4} ft^2/day and an induced value of 4,320 ft^2/day at the Miamisburg well field.
- Infiltration from the drainage ditch that carries Mound NPDES water to the river, determined to be 378,000 gallons per day.

The calibrated model had a root mean square error (RMSE) between observed and simulated water levels of 0.24, the mass balance percent discrepancy was -0.02; and the model water level distribution mirrored the distribution measured on September 2, 1993.

Water level distribution in this portion of the BVA is controlled by underflow, river stage and riverbed conductance, and infiltration from surface water bodies. The model demonstrated that there may be several different combinations of these sources that would allow a match to the target water levels. For instance, when infiltration from the drainage ditch was added during progressive calibration, the water levels were too high. The riverbed conductance had to be lowered to allow less recharge from the river. This demonstrates the non-uniqueness of ground water flow modeling. A combination of several influential parameters were chosen based on sensitivity analysis, actual measurements and hydrogeologic experience.

The Miamisburg well field may not have a significant affect on the water levels in the BVA from the northern model boundary to the Mound. The Great Miami River is known to provide recharge to well fields up and down the valley. The induced recharge determined for this study amounts to only 1.5 cfs, which is 0.3 percent of low flow and 51 percent of well field pumpage. The riverbed conductance and the river stage determine how much, if any, of the well field capture zone goes beyond the river. Since the calibrated model water levels are lower than observed, then the calibrated model configuration is showing a slight capture zone beyond the river. This does not agree with field observations. Two monitoring wells are located directly across the river from the Miamisburg well field. Well 0333 is in Layer 1 of the model and well 0334 is in Layer 2. The difference between observed and calibrated water levels for wells 0333 and 0334 were 0.09 and 0.24 feet too low, respectively. Monitoring wells 0333 and 0334 were continuously monitored during the OU-1 30-day aquifer test. During this monitoring there seemed to be only fluctuations due to river stage and diurnal barometric effects and not pumping cycles from the Miamisburg well field. From this it is assumed that during low river flows, a capture zone does not exist beyond the river. During times of high river flow there is more natural recharge, therefore the capture zone should certainly not extend beyond the river.

The model did not consider the bedrock as a source of recharge. Other studies in the region have included limestone bedrock as a source of recharge to the BVA, accounting for three percent of the BVA flow. After the model was calibrated, a sensitivity analysis was conducted to determine the effect of bedrock recharge. This analysis determined that 10 to 100 times the hydraulic conductivity of the BVA would be required to remove the water supplied by a bedrock recharge equivalent to 3 percent of the BVA flow. The calibrated model could only tolerate 0.003 percent of the total system flow of 18 cfs; above this volume, unrealistic results were obtained. An OU-9 report (DOE, 1994) did indicate that very little, if any, fracturing occurs below the elevation which would be in contact with the BVA. Additionally, the bedrock in this area is primarily shale, and is thought to recharge the BVA very little.

The Great Miami River has a significant affect on the BVA, and the use of HEC-2 water surface profiling to produce accurate river stages for the model area was important. But, to fully assess the effects of the river on the BVA and contaminant migration, a transient simulation may be necessary. Transient modeling projects are very difficult and would require additional data. A fluctuation in the BVA may not have a significant affect on contamination migration. If not, transient affects of the system due to the river may be ignored.

The ground water flow model was developed to determine the potential pathways from contaminant sources on the Mound plant. MODPATH was used to determine these pathways. Simulations were conducted to provide preliminary assessment of a pump-and-treat system to capture OU-1 contamination. Two pump-and-treat wells were added to the calibrated model at various rates and particle tracking conducted. Three sources at the approximate location of the historic landfill were used. The results indicate that at a pumping rate of 10 gpm no particles were captured, but, at 25 and 50 gpm all particles were captured by one well south east of the landfill. The simulated pump-and-treat well at the southwest corner of the landfill did not capture any particles. MODPATH also demonstrated that Mound's current production well (0076) and proposed production well will capture OU-1 contamination. Therefore, contaminants that the pump-and-treat wells do not capture will (in 2 years) reach the Mound water supply (well 0076). Additionally, if there were contaminants which were not captured by well 0076, they would eventually reach the proposed production well on the south property. However, not all contamination leaving OU-1 would reach or be captured by the proposed production well. This is because in the south property, the BVA is much deeper and the same production rate produces a much smaller capture zone width. In addition, the BVA widens in this area which allows more travel space for particle (contamination) movement.

Travel time of OU-1 contamination was dependent on the location of the Mound production well. When pump-and-treat wells were simulated with the Mound production well 0076, capture times were decreased compared to pump-and-treat wells in conjunction with the proposed south property well. This can be explained by the theory of superposition. This theory states that multiple cones of depression caused by several wells are additive and the total cone is increased in size and gradient. This decreases particle capture time once the particle is within the influence of the wells.

An important observation from these simulations was that water soluble contamination located at the edge of the BVA (hence on Mound plant) tends to follow the edge of the BVA, assuming no dispersion. The ground water flow model assumes horizontal isotropic conditions, therefore, the east-west movement can be as strong as the north-south if there is a gradient component for the east-west movement (which there is not). This suggests that as the system is simulated, wherever the particle starts relative to the east and west boundaries it will remain. The possible deviations are pumping centers, the unknown lateral component of a flood wave, and BVA boundaries. The location of the sources are then extremely important to their travel path and destination.

9.0 SUGGESTED FURTHER ACTIVITIES

The ground water flow model and particle tracking simulations may be enhanced with additional information. First, more information is needed on the Miamisburg well field pumping schedule and rates. For this study it was assumed that only two wells pumped continuously. The well field should be monitored for a period of time to provide detailed information concerning the pumping cycle of each well and the volume pumped. At the same time, the two observation wells MS10 and MS11 as well as ER wells 0333 and 0334 could be continuously monitored to help determine the capture zone. This information could be used for a transient simulation. At a minimum, during the next site-wide water level measurement event for the Mound, all production rates and times of pumping for that day should be determined. The affect that more information will provide will only slightly affect the steady-state model. However, if a need for transient model is warranted, then detailed cyclic pumping data will be required.

Second, information which would reduce error associated with water levels determined by the model would be beneficial. The calibrated model produced a root mean square error of 0.24 feet, which was less than 10 percent of the water level difference across the study area. This error is smaller than the general rule-of-thumb for acceptable model results. However, model calibration and verification have shown that a 0.2 foot change in water level (approximately equal to the RMS error of 0.24 feet) does affect the water level distribution in this area, and could possibly effect production well and pump-and-treat capture zones. This large effect occurs because the ground water gradient within the model is very flat, and small changes in water levels have a relatively large influence. Therefore, reduction of the error even further would be useful. Reducing this error would be pushing the modeling techniques to the accuracy limits.

Third, the effect that floodwave fluctuations have on the migration of contaminants should be assessed. If the floodwave has significant affect on migration patterns, then the transient aquifer system should be simulated. Finally, although the use of this model to test remedial technology (pump-and-treat) provided information of particle movement and capture, a more detailed model of the OU-1 area is required to identify why only one of the two pump-and-treat wells captured particles and to test other pumping scenarios that might provide more efficient capture zones.

Fourth, an infiltration study of the Great Miami River near the Mound would provide another estimate of the river bed ability to transmit water from the river to the aquifer or aquifer to the river. The Great Miami River has a significant affect on the ground water in the study area. Studies have been conducted at other locations of the Great Miami River and this data was used in this study. The results of a new study may either produce results of the same order of magnitude and verify values used in this study or provide data that may change the model response to the river.

The model developed in this study is a foundation for a more detailed OU-1 model. The method of grid telescoping is used to extract information from the OU-9 model that provides the boundary conditions for the OU-1 model. Changes made in the OU-9 model over time could be easily incorporated into the OU-1 model.

Currently, being developed is a detailed model of the Operable Unit 1 area. This detailed model also uses the MODFLOW ground water flow model. The model has been designed with much greater resolution areally and vertically. Once the model is calibrated, it will be used with a code called MODMAN to determine the optimal pump-and-treat locations, number of wells and pumping rates based on remediation objectives.

All scientific projects can obtain more data. The affect that the new data will have on the study may only have small incremental gains depending on the study objectives and methodology.

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11.0 GLOSSARY

Advective transport - Transport of contaminants in ground water at the speed of the average linear velocity of ground water.

Aquifer - A body of rock or unconsolidated sediments that is sufficiently permeable to yield economically significant quantities of water to wells and springs.

Calibrate - To fix, check, or correct the graduations of.

Capture zone - The area of influence created by the pumping of a well. Its perimeter is defined as the point which groundwater is drawn towards the well and is exactly countered by natural flow away from the well.

Conceptual Model - A concept or idea which can be translated into a physical or mathematical framework model that produces governing equations which describe the physical or chemical processes.

Conceptualization (Conceptual Model) - A pictorial representation of the ground water flow system, frequently in the form of a block diagram or a cross-section.

Cone of depression - A depression in the potentiometric surface of a body of ground water, which has the shape of an inverted cone and develops around a well from which water is being withdrawn.

Contiguous - Nearby; neighboring; adjacent.

Correlation - A close or mutual relation: the degree of relative correspondence as between two sets of data.

Discharge - The rate of flow at a given instant in terms of volume per unit of time.

Dispersion - The break up and scattering of particles in various directions (here in the medium of water).

Facies - The aspect, appearance, and characteristics of a rock unit, usually reflecting the conditions of its origin; esp. as differentiating it from adjacent or associated units.

Feasibility - The quality of being practicable, reasonable, likely, probable.

Flood-Wave Fluctuations - A flood-wave response in which a flood on a stream generates head (ground water level) responses in an the adjacent aquifer.

Flow model - A means of representing a simplified form of reality to help groundwater managers understand and manage the resource.

Flux - A flood or outflow of water.

Geostatistical - Statistical analysis methods applied to spatially related data by, for example, plant, soil and environmental scientists. The general geostatistical procedure attempts to take advantage of inherent spatial correlation that is usually found in spatial estimation problems.

Gradient - Degree of inclination of a part of the piezometric surface; steepness of slope.

Head - The elevation to which water rises at a given point as a result of aquifer pressure.

Heterogeneous - Non-uniform in structure or composition. Ant: *homogeneous*

Historic landfill (specific to Mound) - A landfill area that contains buried wastes, including empty crushed drums that had contained thorium, and solid and liquid wastes disposed of by open burning until 1969.

Hydraulic conductivity/conductance (K) - The capacity of a rock or unconsolidated sediment to transmit water. Sands and gravels generally have high values and clay and rocks generally have low values. Hydraulic conductivity has dimensions of a velocity.

Hydraulics - The aspect of engineering that deals with the flow of water in rivers, canals, and aquifers.

Hydrogeology - The science that deals with subsurface waters and with related geologic aspects of surface water.

Induced Recharge - Augmenting the natural infiltration of precipitation or surface water into underground formations.

Infiltration - The flow of a fluid into a solid substance through pores or small openings; specif. the movement of water into soil or porous rock.

Injection Wells - An injection well may be used to artificially recharge groundwater systems which may slow or stop overdrafts of groundwater.

Interstratification - The arrangement of beds lying between or alternating with others of different character; esp. said of rock material laid down in sequence between other beds, such as a contemporaneous lava flow "interbedded" with sediments.

Inverse Problem - Problem used to determine value of the parameters and hydrologic stresses from using information about heads.

Isotropic - Said of a medium whose properties are the same in all directions. Ant: *anisotropic*

Lens - A body of ore of rock that is thick in the middle and thin at the edges, like a doubly convex lens.

Losing Stream - The interaction between a stream and its associated aquifer in which the stream water 'feeds' or recharges the aquifer resulting in a loss of water from the stream to the saturated zone of the aquifer.

Mean sea level - The average height of the surface of the sea for all stages of the tide over a 19-year period; sea level midway between mean high water and mean low water.

Mean Error - A measure of the extent to which sample means, or averages, can be expected to fluctuate, or vary positively or negatively, due to change. The mean error increases as the variability of the population increases. As used in this report, "the average differences between the modeled and the observed water levels."

Mean Absolute Error - A measure of the magnitude to which sample absolute means, or averages, can be expected to change. We are interested in the magnitude of the deviations, and not whether they are positive or negative.

MODFLOW - A modular three-dimensional, finite-difference ground water flow model developed by the U.S. Geological Survey. Modflow is the most widely used ground water flow model in the world.

MODFLOWP - Is a version of U.S. Geological Survey modular three-dimensional, finite-difference ground

water flow model (MODFLOW), which, with the new Parameter-Estimation package, can be used to estimate parameters by nonlinear regression.

MODPATH - Is a particle trucking post-processing package which was developed to compute three-dimensional path lines based on output from steady-state simulations with the U.S. Geological Survey modular three-dimensional finite-difference ground water flow model (MODFLOW).

Model Node - A block, cell, finite-difference or finite element making up the framework of the numerical model. Nodes may be inactive (outside the boundaries) or active (inside the boundaries).

Monitoring well - A well of known depth, installed for the purpose of sampling local ground water.

Numerical Model - A simulation of how groundwater moves in the subsurface environment that uses the computer for solving equations by numerical methods. Numerical models make it possible to simulate the response of extremely complicated systems to changing conditions.

Outwash - Sand and gravel deposited by meltwater streams in front of the end moraine or the margin of an active glacier.

Parameter - Any of a set of physical properties whose values determine the characteristics or behavior of a system.

Permeability - The capacity of a porous rock, sediment, or soil for transmitting a fluid; it is a measure of the relative ease of fluid flow under unequal pressure.

Piezometer - A well of small diameter used for measuring pressure, in this case, the head of the aquifer.

Piezometric surface - An imaginary surface representing the total head of ground water and defined by the level to which water will rise in a well.

Porosity - The ratio of the total volume of voids (spaces) in a rock or soil to its total volume.

Production well - A well designed for the purpose of supplying large quantities of ground water for drinking water and industrial use.

Qualitative - Of, pertaining to, or concerning the character of something, exclusive of numbers.

Quantitative - Of, pertaining to, or susceptible of measurement.

Recharge - The processes involved in the addition of water to the zone of saturation; also, the amount of water added.

Remedial - Providing or attempting to provide a remedy.

Root Mean Square Error - A measure of the absolute value or magnitude of variation from the mean or average. Also known as the population variance.

Sanitary landfill (specific to Mound) - A landfill area that contains sanitary waste from the historic landfill and materials from the excavation of the plant overflow pond (a storm water retention pond).

Sink - A low area in the piezometric surface or ground water surface.

Specific yield - The ratio of the volume of water that will drain under the influence of gravity to the volume of saturated rock.

Stage - The height of a water surface above an established datum plane. Specifically the height of the Great Miami River water surface.

Steady-State Flow Field - A flow field in which the magnitude and direction of the flow velocity are constant with time. In a steady-state flow system, the velocity may vary from point to point, but it will not vary with time at any given point.

Storage coefficient - The volume of water which an aquifer releases from or takes up into storage per unit of surface area of aquifer per unit change in the component of head perpendicular to that surface.

Stratification - The arrangement of sedimentary rocks in strata; bedding. It may be indicated by differences in texture, cementation, color, or composition.

Sum of Squared Residuals - Chance variation which is measured by the sum of the squares of the vertical deviations from data points to a linear plot of data using the method of least squares.

Target/Calibration Target - Is a calibration value determined prior to modeling and used to evaluate the models. Calibration targets for this project were the water levels of 58 monitoring wells on September 1993.

Till - Unstratified drift, deposited directly by a glacier without reworking by meltwater, and consisting of a mixture of clay, silt, sand, gravel, and boulders ranging widely in size and shape.

Transient Aquifer System - An aquifer system in which the magnitude and direction of the flow velocity change with time.

Transmissivity - The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

Trough - Any long, narrow depression in the earth's surface, esp. a glacial trough or a trench.

Unconsolidated - Material that is loosely arranged or unstratified, or whose particles are not cemented together. Ant: *consolidated*

VCONT - A function of the vertical hydraulic conductivity between layers and the thickness of the layers. Specific to MODFLOW.

Well yield - Yield is the volume of water per unit of time discharged from a well, either by pumping or free flow. It is measured commonly as a pumping rate in gallons per minute or cubic meters per day.

WellHead Protection - Public water systems that rely on ground water as a source of supply are often required by the state to implement a WellHead protection program. The purpose of this program is to ensure the public is provided with safe drinking water. Thus, states are required to develop plans and programs designed to protect WellHead areas providing ground water to public supply systems. These WellHead protection plans must protect areas around public supply wells or springs from contaminants that may have any adverse effect on water quality or the health of the population. (Baker, 1992, 1)

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APPENDIX A

MISCELLANEOUS GEOLOGICAL, HYDROGEOLOGICAL AND SURFACE WATER MODEL INPUT DATA

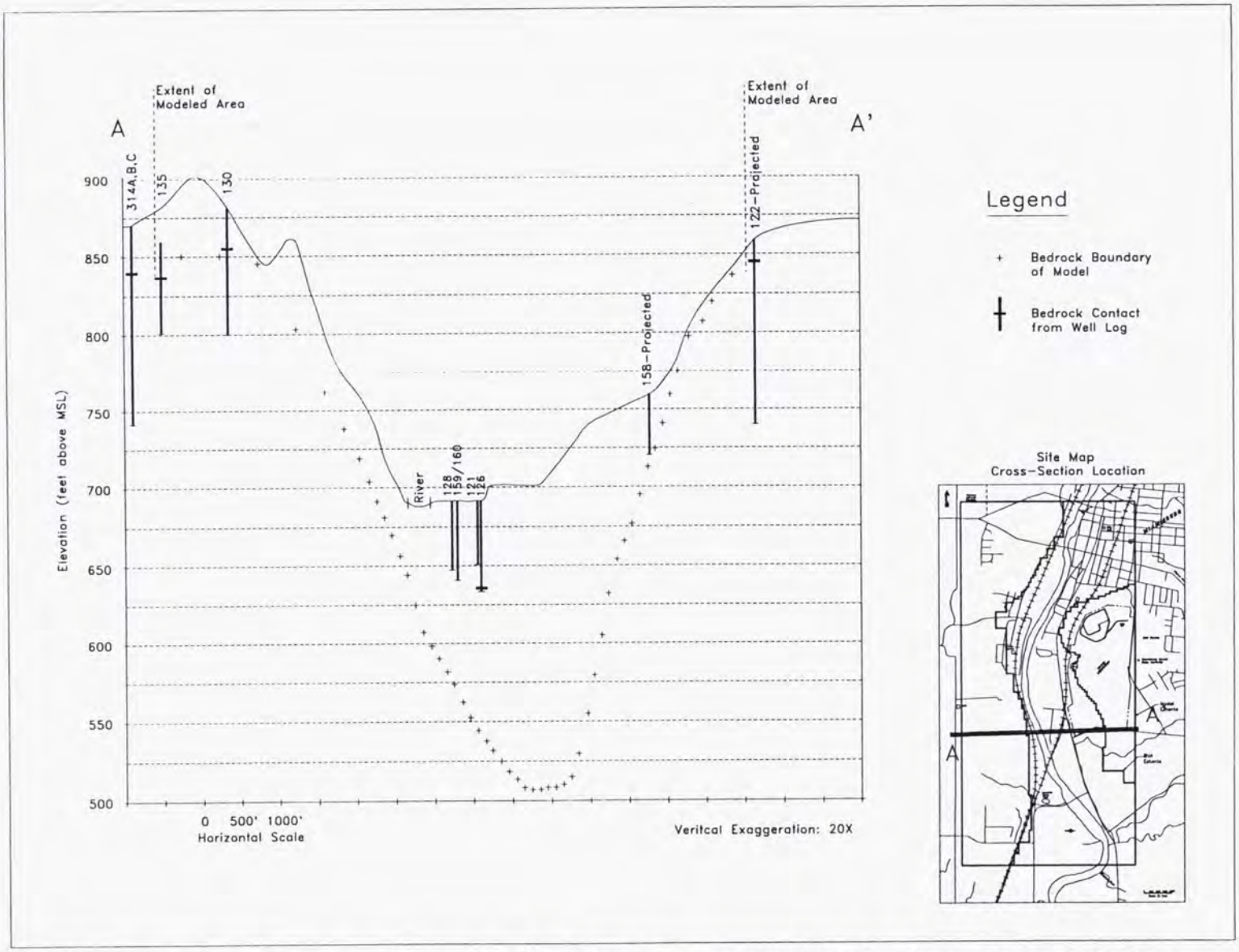

Figure A.1. Geologic cross section south of Mound property comparing bedrock surface and bedrock boundary for the flow model.

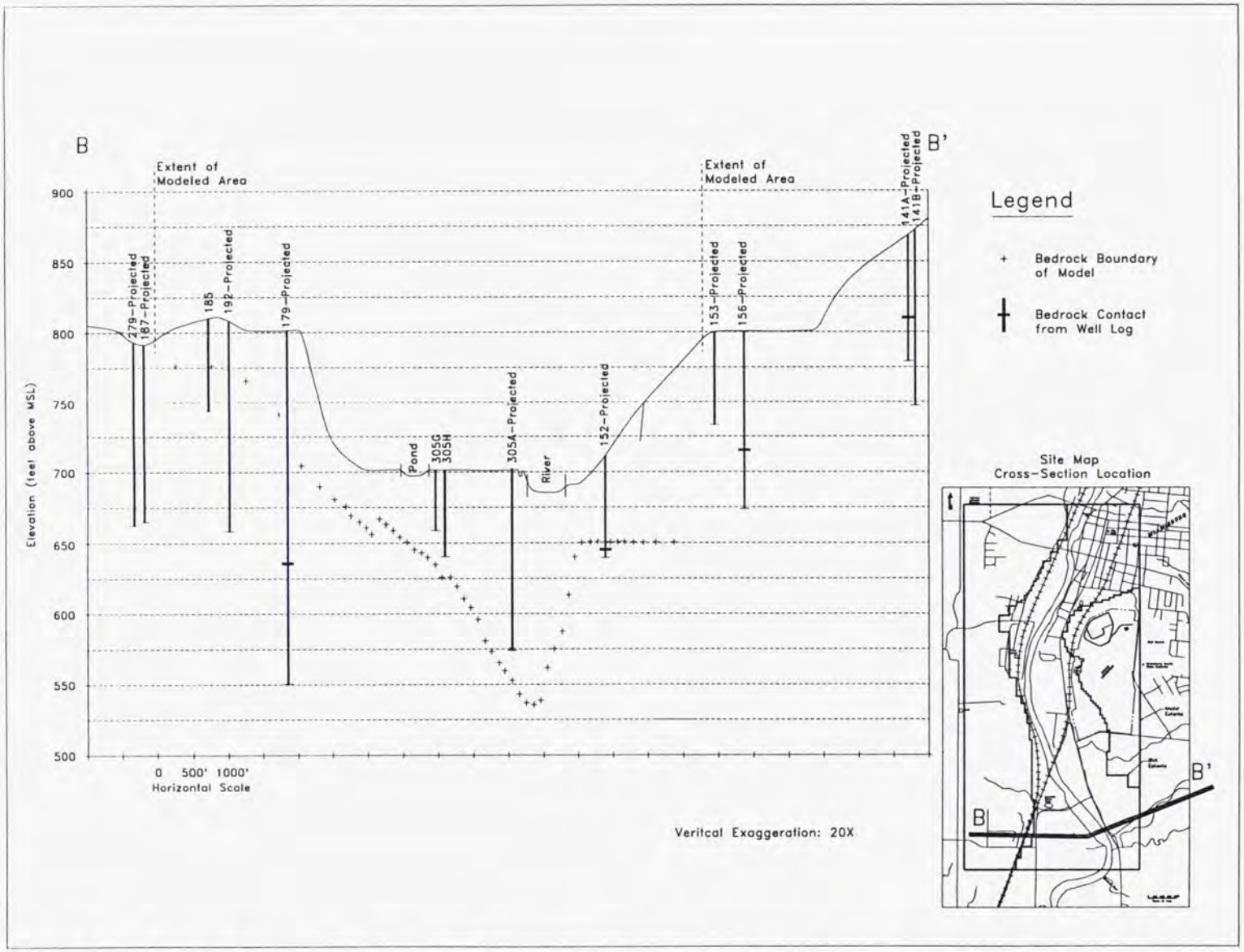

Figure A.2. Geologic cross section at Dayton Power & Light Hutchings Station comparing bedrock surface and bedrock boundary for the flow model.

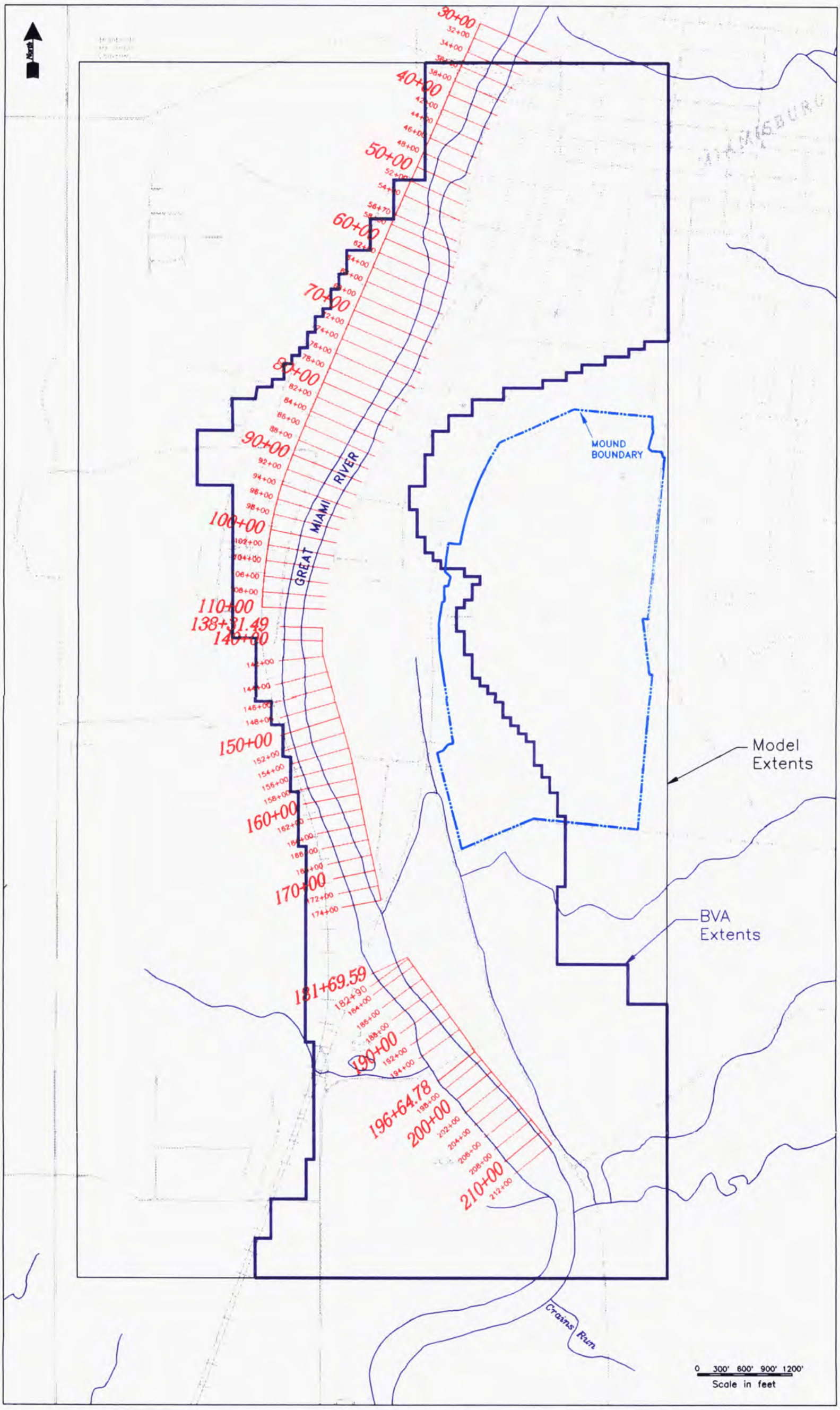

Figure A.3. Locations of the Miami Conservancy District channel cross sections used for HEC-2 water surface profiling modeling.

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HEC2 S/N: 1363000674        HMVersion: 6.52    Data File: rlbx1.hc2

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*  HEC-2 WATER SURFACE PROFILES          *                                  *  U.S. ARMY CORPS OF ENGINEERS
*                                        *                                  *  HYDROLOGIC ENGINEERING CENTER
*                                        *                                  *  609 SECOND STREET, SUITE D
*  Version   4.6.2;  May 1991            *                                  *  DAVIS, CALIFORNIA 95616-4687
*                                        *                                  *          (916) 756-1104
*                                        *
*  RUN DATE    15FEB95    TIME   13:19:16 *
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX

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                  ============================
                  H A E S T A D   M E T H O D S
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37 Brookside Road  •  Waterbury, Connecticut  06708  •  (203) 755-1666

                                                    THIS RUN EXECUTED 15FEB95    13:19:16
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************

T1   Entering cross-sectional data for GMR
T2          Starting at Station 212+50 - Ending at Station 30+00
T2          Manning Coefficients LB & RB 0.08 & 0.01 Channel 0.03
T2  Estimated  Discharge Q = 840 cfs
T2  Estimated  Surface Water Elevation for Station 213+00 = 682.55 ft above MSL
T3      GMR SAMPLE RUN

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0                           0                           0.0015     840     682.55

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

                                                                 -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38         1

NC     0.01      0.07     0.0315
X1    21300       30        235       539
X3       10
GR    704.6        0      704.6         1     698.0        23     690.8        44     690.2        60
GR    689.8       84      688.7       109     686.9       139     685.4       173     685.1       208
GR    684.8      229      680.5       235     678.3       239     675.1       272     675.0       291
GR    674.8      315      674.2       340     673.7       365     673.4       392     673.2       415
GR    673.1      431      672.7       453     672.8       480     672.6       505     674.8       528
GR    678.0      533      680.6       539     689.5       550     689.8       563     690.7       567

SB     1.25      1.5        2.5       465       465         0      4320                672.35    672.35
X1    21250                                      1         1         1
X2                            1       682       682
X3       10

X1    21200       36         43       568        50        50        50
GR    700.0        0      699.7         5     691.2        22     682.1        42     680.8        43
GR    679.1       46      676.4        60     674.9        76     675.6        90     676.6       105
GR    677.4      121      678.2       148     678.4       168     678.6       187     678.7       211
GR    678.6      239      678.1       261     677.6       285     677.0       304     676.4       326
GR    676.0      345      675.8       370     675.1       391     674.5       413     673.9       440
GR    673.4      463      673.3       476     673.3       485     672.0       513     674.2       537
GR    676.7      557      678.8       563     680.8       568     685.1       575     691.9       591
GR    700.1      608

X1    21000       32         42       572       200       200       201
GR    699.6        0      699.5         6     691.4        24     686.5        34     680.8        42
GR    678.2       49      675.0        70     675.9        92     677.2       116     678.4       147
GR    679.0      169      679.4       191     679.6       214     679.5       242     679.2       260
GR    678.6      280      678.2       308     676.8       335     676.2       356     675.5       371
GR    674.8      399      673.8       429     673.0       447     672.9       460     672.4       488
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GR	673.8	508	672.9	538	678.8	565	680.8	572	685.6	578
GR	692.6	593	700.1	608						
X1	20800	34	44	572	200	200	199			
GR	700.0	0	699.9	6	693.1	21	686.4	35	680.8	44
GR	678.8	49	676.8	76	675.6	90	677.5	117	679.2	150
GR	679.5	172	679.5	194	679.4	222	679.2	250	678.8	278
GR	678.3	290	678.1	312	676.6	341	676.5	352	675.4	373
GR	674.3	401	673.9	414	673.2	436	673.0	456	672.4	475
GR	672.2	491	671.2	516	673.6	540	675.9	560	679.0	566
GR	680.8	572	686.0	579	692.6	592	700.3	608		
X1	20600	37	47	569	200	200	203			
GR	700.4	0	700.2	6	691.2	25	685.6	40	680.8	47
GR	678.9	55	675.3	68	675.6	96	676.0	101	678.2	128
GR	679.0	154	679.1	164	679.1	183	679.1	202	678.9	221
GR	678.8	246	678.5	263	678.3	276	678.1	290	677.3	325
GR	676.3	354	676.0	362	675.0	382	674.3	402	673.9	417
GR	673.6	425	673.3	438	672.8	468	672.5	480	672.0	505
GR	671.7	513	672.0	539	678.8	560	680.8	569	685.7	577
GR	692.4	591	700.8	608						
X1	20400	32	49	567	200	200	200			
GR	701.0	0	700.7	5	693.1	22	684.7	42	680.7	49
GR	678.8	55	677.8	74	677.0	99	677.1	121	677.8	140
GR	678.0	165	677.9	201	677.9	226	677.8	253	678.1	276
GR	678.0	302	677.9	323	677.2	346	676.4	362	676.2	371
GR	675.2	396	674.3	426	673.7	442	673.0	462	672.3	492
GR	671.2	524	675.2	549	678.3	560	680.8	567	685.5	573
GR	693.2	592	700.4	607						
X1	20200	34	60	560	200	200	200			
GR	700.4	0	700.1	6	691.0	25	684.7	43	685.9	55
GR	680.8	60	678.5	65	676.6	77	677.7	101	677.0	128
GR	677.0	147	676.7	163	676.5	173	676.3	201	676.5	230
GR	676.7	245	676.6	264	676.9	282	676.7	306	676.1	329
GR	675.6	351	675.6	368	675.7	393	674.7	418	674.0	442
GR	673.1	468	672.4	493	672.1	517	672.3	538	679.0	560
GR	680.8	565	685.4	572	692.3	590	700.5	607		
X1	20000	29	71	563	204	200	182			
GR	700.3	0	700.3	6	696.4	25	684.4	44	683.9	65
GR	680.8	71	678.8	77	674.8	100	676.0	130	675.3	160
GR	675.2	193	675.2	201	675.1	215	675.1	242	675.3	271
GR	675.2	291	675.3	320	675.2	330	675.4	353	674.6	380
GR	674.3	407	673.8	430	674.2	442	674.0	459	672.7	478
GR	672.7	491	673.2	519	674.0	550	675.1	563		
X1	19800	36	63	527	205	200	205			
GR	700.6	0	700.6	7	692.8	24	684.7	43	683.8	60
GR	680.8	63	679.7	69	678.3	83	676.2	104	675.6	131
GR	675.1	153	675.0	169	674.3	179	673.9	200	673.9	216
GR	674.6	246	674.7	260	674.2	284	674.3	300	675.2	324
GR	675.6	342	674.9	369	674.4	398	674.1	408	672.0	431
GR	672.0	454	672.5	475	674.8	497	678.0	509	680.4	518
GR	680.8	527	682.3	529	683.3	553	683.5	570	691.2	590
GR	699.9	607								
X1	19664	36	56	511	135	135	137			
GR	699.6	0	699.0	6	690.6	26	684.5	42	683.2	52
GR	680.8	56	679.7	64	678.2	77	675.2	101	676.5	116
GR	676.4	143	675.7	146	674.6	157	673.5	177	674.1	203
GR	676.5	231	675.2	255	675.1	273	675.1	296	674.4	323
GR	674.3	347	673.5	373	672.0	398	671.1	418	672.6	436
GR	672.2	451	672.8	461	676.2	481	680.0	504	680.8	511
GR	682.0	514	682.1	520	682.8	547	684.3	571	693.3	589
GR	700.4	607								
X1	19400	35	151	551	375	343	365			
GR	689.1	0	689.1	125	681.7	145	680.8	151	680.2	158
GR	679.4	166	676.5	176	675.3	196	674.9	219	675.2	240
GR	675.1	262	675.0	275	674.9	296	674.4	320	674.0	335
GR	673.9	347	673.5	357	672.9	369	671.6	392	671.3	405
GR	671.5	434	671.8	447	671.7	464	671.4	475	673.0	501
GR	675.3	522	678.2	537	679.3	544	680.8	551	683.9	555
GR	684.7	573	692.1	594	693.3	602	700.3	620	707.9	634
X1	19200	40	128	546	200	200	203			
GR	689.1	0	689.1	60	684.2	81	683.6	92	685.1	106
GR	682.5	114	680.8	128	679.9	140	680.0	142	676.6	160
GR	675.5	172	674.4	200	674.3	224	674.0	248	673.7	262
GR	673.2	278	673.1	281	672.8	296	672.5	306	671.5	329
GR	671.3	347	671.0	369	672.2	385	672.5	396	673.9	418
GR	673.8	432	680.1	453	680.8	458	688.9	475	680.8	485
GR	678.3	501	679.1	519	679.7	541	680.8	546	682.4	550
GR	683.8	573	690.7	591	693.3	602	699.1	616	708.0	634
X1	19000	29	164	551	200	200	240			
GR	688.8	0	688.8	78	688.0	108	683.5	124	682.3	147
GR	680.8	164	680.2	172	678.5	192	676.4	222	676.3	249
GR	676.0	279	675.5	312	674.8	339	674.8	349	674.3	378
GR	673.4	406	672.3	435	672.7	465	671.6	491	671.2	508
GR	672.9	526	679.0	546	680.8	551	683.1	554	684.3	573
GR	691.6	593	693.0	602	699.6	618	708.0	638		
X1	18800	30	178	552	200	200	202			
GR	684.4	0	684.4	97	684.2	116	682.5	140	683.3	164
GR	680.8	178	680.0	183	679.1	194	676.4	218	675.8	239
GR	675.7	264	675.9	286	676.0	306	675.6	322	675.5	332
GR	674.7	362	673.8	392	674.1	425	672.5	455	671.3	482
GR	672.9	506	673.0	519	679.0	546	680.8	552	683.4	555
GR	684.1	573	691.9	594	693.0	602	701.2	621	708.1	640
X1	18600	31	189	552	200	200	204			
GR	684.4	0	684.4	62	684.0	109	684.2	142	683.3	169
GR	680.8	189	679.4	195	676.8	202	674.8	224	674.5	243
GR	674.9	267	675.2	290	675.2	308	675.2	331	675.6	355
GR	674.5	381	674.1	405	673.1	430	672.0	447	671.9	469
GR	672.4	482	671.4	501	669.9	521	678.8	545	680.8	552
GR	683.2	555	685.0	575	691.4	592	692.9	602	698.4	616

GR	708.2	639								
X1	18400	32	173	539	200	200	246			
GR	687.1	0	687.1	99	685.3	159	680.8	173	678.2	182
GR	675.7	198	675.0	219	674.3	237	674.4	256	673.4	277
GR	674.4	281	673.7	301	673.9	306	673.7	317	673.4	331
GR	673.3	347	673.2	370	673.2	386	673.8	405	674.3	428
GR	674.5	435	674.7	457	673.3	482	673.6	492	673.5	504
GR	677.8	532	680.8	539	684.8	573	691.7	593	697.1	602
GR	699.3	609	706.9	633						
X1	18169	26	135	466	276	133	211			
GR	687.8	0	686.1	59	684.8	122	680.8	135	677.9	144
GR	675.6	157	674.6	178	673.0	202	672.2	220	671.9	230
GR	672.1	238	671.1	256	671.5	260	670.6	288	672.7	314
GR	674.5	335	674.5	346	674.4	367	674.6	369	671.7	404
GR	670.7	431	674.0	448	676.3	461	680.7	466	684.0	467
GR	688.7	482								
X1	17400	26	73	427	932	802	850			
GR	699.6	0	695.4	14	687.1	40	686.4	60	680.5	73
GR	679.9	78	673.8	97	672.3	116	672.7	133	673.1	160
GR	672.8	188	672.9	211	673.1	236	673.1	262	673.5	285
GR	673.8	320	673.9	333	675.5	354	676.5	387	676.8	406
GR	679.6	422	680.5	427	686.5	433	688.0	461	688.6	487
GR	687.7	503								
X1	17200	25	109	443	179	195	208			
GR	703.6	0	703.6	2	695.4	29	686.1	60	685.5	77
GR	684.0	95	680.4	109	679.8	114	675.9	132	672.8	166
GR	672.2	193	672.2	216	672.4	228	672.5	236	672.9	264
GR	673.0	295	673.6	320	674.0	351	674.7	381	675.9	411
GR	679.3	433	680.4	443	687.0	458	686.8	481	690.2	517
X1	17000	27	136	463	199	200	200			
GR	703.8	0	703.8	2	696.1	28	685.5	60	684.6	85
GR	684.7	110	684.7	128	680.4	136	678.9	140	673.0	160
GR	672.7	172	672.6	192	672.3	215	672.7	251	673.0	280
GR	673.1	315	673.3	341	673.8	364	674.0	397	674.0	417
GR	675.4	433	677.8	453	680.3	463	687.1	479	686.8	502
GR	687.0	527	691.3	541						
X1	16800	29	170	494	198	200	198			
GR	704.3	0	704.3	4	695.7	29	685.6	60	685.0	86
GR	685.1	111	685.5	136	685.3	159	680.4	170	678.8	176
GR	673.6	200	672.6	212	672.5	222	672.1	244	672.6	268
GR	672.7	288	672.8	315	672.9	339	673.4	364	673.6	391
GR	673.5	413	674.5	442	675.1	465	678.6	490	680.5	494
GR	686.9	504	687.1	535	687.2	549	690.0	572		
X1	16600	30	201	524	209	200	205			
GR	704.7	0	704.7	3	686.2	29	686.2	60	685.6	87
GR	685.0	113	684.4	139	684.4	166	684.4	194	680.4	201
GR	678.8	204	672.0	230	672.2	253	672.9	274	673.0	295
GR	672.9	309	672.9	317	673.0	327	672.8	358	672.8	385
GR	673.1	415	674.0	441	674.9	465	676.1	499	678.3	519
GR	680.4	524	686.3	529	687.8	549	687.4	571	688.5	598
X1	16400	31	243	554	201	200	292			
GR	704.7	0	704.7	3	695.2	34	686.4	60	685.2	91
GR	684.9	120	685.0	152	685.3	185	685.0	218	685.2	237
GR	680.6	243	678.4	248	673.1	267	673.3	280	675.3	290
GR	674.2	303	674.2	328	673.6	352	673.0	383	672.2	413
GR	672.2	443	672.2	462	673.5	491	673.6	512	674.0	540
GR	676.7	549	680.5	554	687.4	563	687.7	578	686.7	597
GR	691.0	620								
X1	16200	37	285	597	223	200	207			
GR	704.2	0	704.2	2	695.7	31	686.6	60	685.7	88
GR	685.4	118	685.4	141	685.2	164	685.4	188	685.1	217
GR	684.9	249	684.6	273	680.5	285	678.0	292	674.3	300
GR	675.7	309	672.2	328	675.5	355	674.7	371	674.3	386
GR	673.7	399	672.9	413	671.8	426	672.3	443	671.9	460
GR	671.5	490	672.0	525	672.7	534	680.5	555	676.1	577
GR	678.5	589	680.5	597	685.7	615	687.4	640	692.4	661
GR	702.3	685	703.2	704						
X1	16000	37	331	643	206	200	244			
GR	704.4	0	704.4	1	695.3	30	687.0	53	686.8	60
GR	686.1	85	686.0	113	685.9	142	685.6	165	685.5	188
GR	685.3	212	685.1	239	684.9	264	684.9	288	685.0	324
GR	680.5	331	678.7	348	677.3	353	674.4	381	674.5	401
GR	673.8	429	673.3	446	672.8	464	672.3	483	672.3	507
GR	672.3	537	672.1	553	672.2	569	671.2	595	670.8	619
GR	679.7	628	678.5	639	680.5	643	688.5	660	690.9	675
GR	702.2	694	703.6	721						
X1	15800	35	356	670	202	200	189			
GR	704.6	0	704.6	2	694.3	32	688.2	49	687.6	60
GR	686.6	88	686.5	112	686.4	135	686.2	160	686.0	183
GR	685.4	210	685.3	236	685.3	265	685.2	293	685.3	322
GR	684.9	349	680.5	356	679.8	362	678.9	381	676.5	389
GR	674.9	409	673.9	449	673.9	497	673.3	533	672.5	560
GR	672.2	585	672.1	612	673.1	635	674.5	655	678.0	664
GR	680.5	670	686.9	684	692.3	697	702.1	711	703.5	800
X1	15600	40	377	688	177	200	179			
GR	704.5	0	704.5	4	697.5	23	690.9	44	690.4	60
GR	689.3	84	688.7	111	688.6	136	688.5	163	688.5	189
GR	686.8	216	686.1	241	685.9	267	685.7	295	685.3	323
GR	685.0	350	685.4	364	680.5	377	680.2	381	679.4	400
GR	677.1	420	676.8	436	676.5	444	674.8	471	673.8	500
GR	672.1	530	671.9	550	670.9	565	670.5	571	669.4	600
GR	669.0	630	670.5	659	673.4	672	677.6	683	680.5	688
GR	685.1	694	692.7	712	697.9	727	701.7	734	703.0	764
X1	15400	36	386	696	173	200	178			
GR	704.8	0	704.8	1	697.8	21	693.1	37	693.2	60
GR	692.1	88	691.7	113	691.7	138	691.0	164	690.2	195
GR	687.7	222	686.4	252	686.1	283	685.7	314	685.1	345

GR	684.2	370	680.5	386	679.6	415	679.8	435	677.0	454
GR	676.3	473	674.9	497	674.0	522	672.5	550	671.1	580
GR	668.9	611	668.8	629	667.8	641	669.1	667	671.0	685
GR	680.5	696	686.6	702	688.5	716	694.5	730	702.2	746
GR	702.7	775								
X1	15200	39	397	706	187	200	189			
GR	704.4	0	704.4	2	698.3	21	694.0	38	693.8	60
GR	692.8	88	692.2	112	691.7	136	691.4	159	691.0	184
GR	689.2	209	687.6	234	686.9	259	686.4	281	685.7	306
GR	685.3	329	685.0	352	684.9	367	681.5	389	680.5	397
GR	679.9	421	678.0	443	676.6	451	676.4	467	675.8	488
GR	675.2	517	674.6	547	673.2	575	671.9	600	669.0	627
GR	667.5	656	668.7	678	670.1	692	671.6	701	680.6	706
GR	686.0	714	687.8	727	702.5	754	702.8	784		
X1	15000	42	407	716	200	200	202			
GR	704.7	0	704.7	3	698.1	22	693.5	41	693.1	60
GR	692.3	88	691.5	116	691.0	144	690.2	168	689.0	193
GR	687.7	219	686.6	246	686.2	274	685.6	301	685.2	328
GR	684.5	356	682.0	365	680.9	386	681.3	405	680.5	407
GR	679.5	413	676.5	428	676.5	444	676.2	460	676.0	476
GR	675.9	490	675.9	492	675.3	512	674.9	534	674.4	560
GR	674.1	584	673.6	608	672.2	632	670.8	648	670.4	668
GR	669.9	687	674.3	704	678.0	712	680.5	716	686.4	722
GR	702.1	763	703.4	793						
X1	14800	38	371	694	222	200	219			
GR	704.5	0	704.5	2	698.5	21	692.8	38	691.9	60
GR	691.2	87	690.4	117	689.6	148	688.9	176	687.6	204
GR	686.7	233	685.9	266	685.5	289	685.7	314	685.4	330
GR	682.5	342	682.1	360	680.6	371	679.5	379	675.4	394
GR	675.9	418	675.8	437	675.6	453	675.2	477	675.0	501
GR	674.7	533	674.6	565	674.5	567	673.8	602	673.4	629
GR	673.5	639	673.9	658	673.6	672	675.8	686	680.5	694
GR	685.8	706	686.9	723	687.6	730				
X1	14600	32	315	657	200	200	207			
GR	704.5	0	704.5	5	697.9	25	692.3	44	692.0	60
GR	691.7	89	690.6	121	689.1	155	687.2	188	686.0	224
GR	684.9	258	684.3	294	683.8	311	680.6	315	679.5	325
GR	678.5	342	675.2	365	675.2	396	675.0	420	674.8	453
GR	674.7	485	674.5	515	673.7	545	673.5	575	673.7	610
GR	674.0	634	679.1	652	680.6	657	687.8	674	688.0	696
GR	687.3	720	689.0	737						
X1	14400	34	282	605	219	200	215			
GR	704.7	0	704.7	5	697.0	28	692.4	44	691.7	60
GR	690.5	88	691.3	107	690.6	127	687.7	150	686.2	183
GR	684.9	214	684.8	244	683.9	277	680.6	282	678.8	288
GR	675.3	315	675.2	332	674.8	355	674.5	378	674.6	395
GR	674.5	420	674.2	447	673.6	475	673.6	508	673.5	526
GR	674.2	558	674.1	586	677.5	601	680.6	605	682.1	616
GR	687.8	627	688.1	641	690.1	660	690.0	681		
X1	14200	30	235	539	313	200	280			
GR	704.6	0	704.6	1	698.0	23	690.8	44	690.2	60
GR	689.8	84	688.7	109	686.9	139	685.4	173	685.1	208
GR	684.8	229	680.5	235	678.3	239	675.1	272	675.0	291
GR	674.8	315	674.2	340	673.7	365	673.4	392	673.2	415
GR	673.1	431	672.7	453	672.8	480	672.6	505	674.8	528
GR	678.0	533	680.6	539	689.5	550	689.8	563	690.7	567
X1	14000	30	213	505	269	199	270			
GR	704.9	0	704.9	5	696.2	29	689.1	50	689.1	60
GR	688.5	90	687.5	118	686.4	142	685.8	171	686.0	195
GR	685.3	204	680.5	213	678.6	218	676.3	249	675.5	278
GR	674.8	301	674.0	320	673.3	341	672.5	360	672.0	378
GR	671.5	400	670.8	414	671.0	429	671.0	449	673.3	466
GR	675.0	491	676.7	500	680.5	505	688.6	510	691.2	525
X1	13831	30	214	494	170	168	177			
GR	704.6	0	696.7	26	689.8	48	689.3	60	688.3	86
GR	687.7	117	686.7	147	686.1	181	686.1	206	680.6	214
GR	678.9	219	676.7	237	675.5	253	674.6	284	673.5	310
GR	673.1	335	672.9	347	672.6	360	671.6	388	670.9	410
GR	670.4	431	670.3	454	672.5	472	676.1	487	678.2	489
GR	680.6	494	688.7	498	690.9	512	690.4	531	689.8	545
X1	11000	31	226	495	335	249	251			
GR	705.1	0	700.3	19	699.7	34	693.2	51	688.2	67
GR	687.7	80	687.2	105	687.4	128	687.0	156	686.7	183
GR	686.1	208	685.8	218	680.6	226	678.6	231	676.3	250
GR	676.0	264	675.4	286	674.5	306	674.1	323	673.3	350
GR	672.3	374	671.2	398	669.7	427	671.2	456	674.4	480
GR	678.0	491	680.6	495	687.2	500	691.2	515	690.5	526
GR	690.5	815								
X1	10800	32	199	476	200	158	180			
GR	704.8	0	697.3	19	688.2	45	686.8	71	686.3	94
GR	686.7	120	686.7	145	686.5	170	686.1	190	680.6	199
GR	679.0	204	676.9	229	676.3	249	675.2	272	674.4	300
GR	674.0	316	673.8	332	673.0	346	672.9	353	672.4	365
GR	672.0	375	670.4	397	670.1	400	669.6	422	670.1	435
GR	672.4	448	675.1	461	677.9	472	680.6	476	690.4	482
GR	691.8	503	691.8	806						
X1	10600	27	184	467	200	172	187			
GR	704.7	0	691.4	35	689.9	56	686.5	76	685.3	101
GR	686.0	125	686.5	154	684.6	177	680.5	184	678.9	188
GR	676.9	215	675.7	242	674.8	267	674.1	292	673.6	320
GR	672.9	342	671.9	368	670.4	393	670.3	416	670.2	425
GR	672.8	442	677.2	461	680.6	467	689.1	469	692.6	477
GR	693.2	491	693.2	811						
X1	10400	29	166	447	200	186	197			
GR	705.5	0	696.5	20	688.0	44	687.3	66	686.5	83
GR	685.7	107	686.6	142	686.4	155	680.6	166	679.1	171
GR	677.0	183	676.1	208	675.5	226	675.1	233	674.5	253
GR	673.8	280	673.7	292	673.1	315	672.6	333	671.2	351

GR	670.9	369	670.5	394	673.3	419	676.3	436	678.2	440
GR	680.6	447	692.7	459	693.1	478	693.1	818		
X1	10200	26	158	441	200	172	186			
GR	705.4	0	691.8	36	690.2	59	686.5	79	686.5	102
GR	686.5	122	687.1	148	680.6	158	678.8	165	676.4	192
GR	676.2	205	675.7	218	675.1	236	674.0	262	673.6	292
GR	672.7	320	672.0	342	671.2	355	670.6	365	670.1	388
GR	672.6	413	677.0	430	680.5	441	688.4	447	692.4	475
GR	692.4	837								
NC	0.01	0.01	0.0315							
X1	10000	24	152	427	200	164	187			
GR	705.4	0	693.6	31	691.1	54	687.2	72	686.0	96
GR	686.2	122	686.0	140	680.6	152	678.0	158	675.0	187
GR	675.0	215	674.1	246	674.0	279	673.8	294	673.2	319
GR	672.9	349	672.1	369	672.3	400	677.7	417	679.6	423
GR	680.6	427	684.4	436	689.5	460	689.5	857		
X1	9800	25	138	393	200	174	217			
GR	705.0	0	694.1	19	692.1	48	686.6	67	686.2	73
GR	686.8	95	687.46	121	686.6	128	680.6	138	679.2	143
GR	675.6	174	673.2	196	672.2	232	671.4	267	672.6	296
GR	673.3	316	673.9	329	674.0	343	677.0	370	679.5	387
GR	680.5	393	682.4	410	685.3	434	687.3	455	687.3	878
X1	9600	32	119	400	200	160	181			
GR	705.0	0	695.0	20	693.9	57	688.2	73	688.1	99
GR	688.3	107	680.6	119	677.0	125	673.7	155	673.1	181
GR	672.8	195	672.4	210	672.5	240	672.7	257	672.8	260
GR	672.7	276	672.4	303	674.5	325	677.3	345	679.0	367
GR	679.2	387	679.4	396	680.6	400	684.5	410	685.0	436
GR	685.9	460	686.9	476	692.8	499	694.3	512	694.3	531
GR	692.7	538	692.7	904						
X1	9400	29	108	374	200	145	169			
GR	705.4	0	696.1	27	695.3	44	694.8	50	688.7	71
GR	687.5	96	680.7	108	677.0	113	673.4	126	672.6	155
GR	672.3	181	672.3	212	672.5	237	672.9	262	673.4	286
GR	674.5	309	675.5	328	676.9	351	679.4	369	680.7	374
GR	684.1	381	684.6	404	684.8	418	684.6	442	685.0	469
GR	687.8	496	692.5	523	693.8	548	693.8	924		
X1	9200	31	95	328	200	184	184			
GR	705.3	0	696.8	25	696.0	48	688.8	68	688.5	81
GR	680.7	95	677.2	100	674.3	123	673.6	142	673.3	151
GR	672.8	174	673.2	199	673.8	219	675.3	237	677.8	255
GR	679.6	273	680.0	288	679.5	307	680.2	322	680.7	328
GR	681.1	331	682.0	359	684.1	390	686.0	417	685.9	429
GR	685.6	452	685.8	477	687.9	505	690.3	531	690.4	561
GR	690.4	937								
X1	9000	30	85	334	200	179	187			
GR	705.9	0	697.1	30	686.5	41	688.8	61	688.0	72
GR	680.8	85	677.4	89	675.0	98	674.2	126	673.9	146
GR	673.8	164	673.9	194	673.8	223	673.9	243	674.1	255
GR	674.6	281	674.2	305	675.1	320	678.9	329	680.8	334
GR	681.6	346	683.2	365	684.5	394	685.1	424	686.0	456
GR	687.4	485	689.5	516	690.4	545	689.0	562	689.0	944
X1	8800	42	73	345	200	186	191			
GR	705.3	0	696.0	19	695.3	30	688.6	46	688.1	59
GR	680.7	73	679.0	79	675.8	92	675.4	101	675.3	123
GR	675.0	138	675.1	159	675.0	188	675.0	209	673.9	241
GR	674.7	266	674.9	284	675.5	307	676.8	322	678.9	338
GR	680.8	345	683.1	370	684.3	403	686.1	434	687.7	458
GR	687.4	488	687.6	524	688.0	560	688.4	594	689.3	628
GR	690.1	664	690.0	696	689.6	729	687.9	765	688.0	799
GR	692.3	831	693.3	865	695.3	900	697.3	930	701.8	941
GR	704.7	950	704.7	954						
X1	8600	47	68	355	200	190	194			
GR	704.9	0	697.3	18	696.9	28	689.2	44	688.1	57
GR	680.8	68	678.8	72	675.2	78	675.8	98	676.2	115
GR	676.1	136	675.4	165	675.4	188	674.9	210	675.2	228
GR	675.4	246	675.8	270	676.1	293	676.6	316	676.8	322
GR	677.4	333	679.2	349	680.8	355	681.8	373	684.3	398
GR	685.7	430	687.1	457	687.4	478	687.5	500	688.1	528
GR	688.0	558	687.5	590	687.8	622	688.6	656	689.4	691
GR	688.2	722	686.5	750	686.8	772	688.2	802	689.9	833
GR	692.7	861	694.2	889	695.3	921	696.2	949	702.8	963
GR	704.7	973	704.7	977						
X1	8400	49	86	372	200	202	247			
GR	706.1	0	697.0	23	697.0	35	688.0	58	688.1	74
GR	680.8	86	677.4	92	674.7	99	675.2	120	674.9	141
GR	675.1	157	675.3	170	675.4	182	675.6	186	675.5	207
GR	675.6	227	675.6	240	675.6	265	675.7	281	675.8	295
GR	675.9	304	676.2	324	676.4	334	676.7	346	678.5	367
GR	680.8	372	684.5	400	686.5	434	688.0	464	689.1	492
GR	688.7	519	688.4	545	688.8	571	688.2	598	685.5	628
GR	687.9	663	687.2	696	688.2	729	688.9	764	688.4	801
GR	688.3	835	688.9	868	690.7	901	694.0	929	695.9	959
GR	696.0	987	702.7	998	704.4	1008	704.4	1012		
X1	8200	48	102	375	194	195	194			
GR	705.9	0	698.5	21	698.6	39	686.9	74	686.7	92
GR	680.7	102	678.0	107	675.7	115	674.6	135	675.0	149
GR	675.0	167	675.4	197	675.3	211	675.2	219	675.2	245
GR	675.2	266	675.3	286	675.6	314	676.1	340	676.6	354
GR	679.0	369	680.7	375	686.4	401	689.9	414	690.35	422
GR	689.5	439	688.4	465	689.1	494	689.9	521	689.6	547
GR	689.9	585	689.3	615	687.8	648	688.3	681	687.8	713
GR	687.9	745	689.0	778	691.1	813	691.9	847	691.9	877
GR	691.0	906	691.9	936	693.5	964	694.5	993	694.6	1013
GR	702.8	1028	704.5	1037	704.5	1041				
X1	8000	52	96	378	206	210	207			
GR	705.4	0	698.7	14	697.9	39	688.6	67	686.7	87
GR	680.9	96	676.9	103	675.5	111	674.9	127	674.2	139

GR	674.4	161	674.7	176	674.8	192	675.3	217	675.8	239
GR	676.0	247	676.2	259	676.2	279	676.5	306	676.8	324
GR	676.8	347	677.3	365	680.0	372	680.8	378	687.1	397
GR	688.5	409	690.07	430.4	689.8	452	690.0	485	689.7	516
GR	690.5	547	690.1	568	690.6	590	690.8	620	689.0	648
GR	688.0	677	687.8	716	688.0	734	688.8	762	689.3	787
GR	689.3	818	689.9	848	692.3	875	694.0	902	694.0	931
GR	693.0	959	693.6	985	693.4	1011	694.9	1038	703.7	1059
GR	704.3	1066	704.3	1067						
X1	7800	52	86	380	196	194	196			
GR	706.2	0	698.5	14	697.6	40	689.4	61	687.9	76
GR	681.0	86	677.8	92	675.5	111	674.9	132	674.6	148
GR	674.9	162	675.0	180	675.5	200	675.8	219	676.1	226
GR	676.5	242	676.4	258	676.6	277	676.8	300	677.3	323
GR	677.6	343	677.8	366	679.7	374	680.8	380	685.3	386
GR	689.67	400	690.9	424	690.6	454	690.3	483	689.9	509
GR	689.9	534	690.8	563	690.7	596	691.0	632	690.1	660
GR	688.1	688	687.3	717	688.0	744	688.4	772	688.5	797
GR	689.5	831	690.6	862	691.3	891	692.4	920	693.0	947
GR	692.7	974	693.6	1002	696.0	1018	695.8	1054	702.8	1073
GR	704.3	1081	704.3	1083						
X1	7600	52	88	383	203	205	209			
GR	706.2	0	699.7	14	698.9	42	690.2	62	689.7	73
GR	680.9	88	678.1	91	675.4	101	674.7	116	674.8	131
GR	674.6	142	674.7	160	675.1	185	674.9	210	674.4	220
GR	676.1	246	676.9	270	677.5	291	677.5	314	677.3	336
GR	678.2	360	680.6	375	680.8	383	683.2	392	690.12	411.8
GR	690.7	426	690.9	454	690.6	481	689.0	506	689.4	534
GR	690.5	561	690.9	587	691.5	609	691.6	640	690.3	673
GR	688.8	704	688.0	733	688.5	762	687.9	789	688.1	818
GR	689.0	847	690.3	876	691.8	904	692.5	931	693.7	963
GR	694.1	997	694.7	1026	695.3	1052	695.5	1079	702.3	1095
GR	704.2	1104	704.2	1107						
X1	7400	56	93	392	200	200	217			
GR	705.9	0	699.8	14	699.0	40	690.4	61	688.8	82
GR	680.8	93	677.8	98	674.5	116	674.2	127	674.0	140
GR	674.0	159	674.2	172	674.5	190	677.5	206	675.3	226
GR	676.1	249	676.2	260	676.8	282	677.0	293	677.6	313
GR	677.1	326	677.2	338	678.1	355	679.1	364	680.7	386
GR	680.8	392	688.4	399	690.2	418	691.03	428	691.4	438
GR	691.3	464	690.4	492	690.7	524	692.3	546	692.6	574
GR	692.9	601	691.8	635	691.6	663	691.2	691	690.0	719
GR	688.2	748	686.8	774	686.6	802	687.3	830	688.7	858
GR	690.5	888	691.4	916	694.9	950	695.1	979	694.5	1009
GR	694.9	1037	695.0	1063	695.5	1089	702.8	1109	704.4	1118
GR	704.4	1121								
X1	7200	53	76	374	201	201	201			
GR	706.3	0	700.5	12	699.7	22	691.9	44	690.6	62
GR	681.0	76	675.9	83	674.4	89	673.0	117	673.6	139
GR	673.9	157	674.4	184	675.2	216	675.8	236	675.9	245
GR	676.0	259	676.6	280	677.7	311	678.3	323	678.3	330
GR	678.7	342	679.5	351	680.2	369	680.9	374	686.9	390
GR	692.74	407.1	692.4	427	692.3	451	692.9	481	692.4	504
GR	693.2	533	693.0	564	692.4	586	691.4	610	691.2	638
GR	691.4	671	691.3	699	688.4	728	686.1	754	685.7	785
GR	687.5	816	689.2	845	690.8	874	692.2	904	693.8	934
GR	695.7	961	695.9	991	695.7	1020	696.0	1050	696.3	1079
GR	703.1	1094	704.6	1103	704.6	1106				
X1	7000	51	62	351	199	202	207			
GR	706.8	0	695.9	21	683.1	46	682.8	55	681.0	62
GR	679.0	64	676.9	71	674.4	96	673.7	127	673.7	162
GR	674.4	188	675.1	219	675.5	246	677.0	266	678.6	287
GR	678.6	302	679.1	314	679.6	326	680.7	343	681.0	351
GR	683.8	364	690.0	383	692.06	398.9	692.0	424	694.2	452
GR	693.2	479	692.2	505	692.0	529	692.2	557	692.3	575
GR	692.5	599	693.2	629	693.0	655	691.0	682	687.9	706
GR	685.1	730	685.3	754	687.0	779	689.1	808	690.8	836
GR	691.8	864	692.7	891	693.9	918	696.1	945	696.0	972
GR	695.9	997	696.5	1024	697.9	1050	703.0	1065	704.6	1074
GR	704.6	1077								
X1	6800	52	59	366	196	197	197			
GR	707.3	0	694.0	25	683.9	45	681.0	59	679.0	63
GR	675.1	74	672.8	92	671.6	107	672.2	123	672.9	141
GR	673.7	169	674.0	188	675.2	211	678.3	238	679.1	245
GR	679.5	263	679.2	279	679.3	297	679.4	314	679.4	329
GR	679.6	342	680.7	358	681.0	366	682.8	384	687.4	407
GR	693.0	431	692.86	441	692.4	462	692.4	487	693.0	514
GR	693.6	540	693.2	569	693.5	599	693.1	626	692.1	651
GR	690.4	678	686.0	700	685.0	726	686.8	754	688.6	780
GR	690.8	807	692.3	836	693.2	865	695.0	894	695.5	924
GR	695.7	951	696.5	979	696.5	1007	696.6	1033	702.8	1047
GR	704.6	1058	704.6	1060						
X1	6600	48	63	375	203	204	205			
GR	707.1	0	701.1	17	690.8	35	683.1	50	682.7	57
GR	681.0	63	678.4	69	674.7	88	672.6	102	671.9	126
GR	672.1	148	673.6	177	675.9	208	677.0	227	677.8	242
GR	678.3	263	678.8	281	679.7	300	680.0	323	679.9	349
GR	680.4	367	680.9	375	681.7	398	683.5	426	686.8	455
GR	693.3	482	692.8	507	693.6	534	693.6	571	694.0	601
GR	693.2	629	691.6	656	690.9	685	686.3	716	685.7	745
GR	684.9	773	689.5	802	690.5	830	691.7	859	692.3	887
GR	692.3	915	692.3	943	692.4	968	695.0	993	695.2	1019
GR	702.8	1042	704.7	1053	704.7	1054				
X1	6400	46	60	399	200	202	201			
GR	706.8	0	696.2	21	683.3	46	680.9	60	678.8	72
GR	673.7	88	674.5	102	675.0	122	675.7	147	676.0	176
GR	676.2	198	678.4	228	678.6	251	678.6	266	678.8	280
GR	679.3	298	679.9	322	680.1	339	680.1	371	680.8	394
GR	681.0	399	684.7	425	686.9	451	689.7	480	693.4	508
GR	693.1	540	693.6	567	692.9	590	693.1	616	693.8	639
GR	693.7	664	692.2	688	690.9	702	689.6	721	687.8	745
GR	688.5	789	690.6	813	690.4	839	690.6	865	690.4	892

GR	690.8	918	691.2	943	691.7	969	692.3	993	702.8	1016
GR	704.6	1028								
X1	6200	48	64	421	201	203	201			
GR	707.1	0	694.0	26	683.3	47	683.0	57	681.0	64
GR	676.8	75	677.2	88	677.5	104	677.7	124	677.8	144
GR	677.8	168	677.8	189	677.9	210	679.3	234	678.3	257
GR	677.5	278	677.0	296	677.5	313	678.2	331	679.5	353
GR	678.3	373	680.6	395	680.4	415	681.0	421	689.6	454
GR	692.85	473	692.3	493	693.2	520	693.5	551	693.2	577
GR	693.8	604	693.8	628	693.3	658	692.4	677	691.6	703
GR	691.2	731	690.3	759	687.4	786	688.0	813	691.0	848
GR	690.3	876	690.2	904	690.1	930	690.5	958	693.8	970
GR	702.8	983	704.8	997	704.8	998				
X1	6000	41	65	428	199	206	361			
GR	707.3	0	690.7	20	683.1	48	682.8	58	681.0	65
GR	678.7	70	678.1	80	678.9	100	679.1	129	679.1	155
GR	678.8	181	678.7	206	678.9	231	677.6	255	677.8	275
GR	677.8	303	677.4	325	678.9	351	679.6	375	679.5	398
GR	680.5	418	680.9	428	684.3	461	688.3	485	690.7	513
GR	693.8	546	694.1	576	693.9	606	693.7	627	693.5	666
GR	692.9	697	690.9	727	688.7	756	688.0	786	687.1	813
GR	690.2	843	690.9	871	690.6	898	702.6	921	704.8	946
GR	704.8	947								
X1	5800	40	71	466	196	203	243			
GR	706.8	0	700.2	17	682.8	53	682.7	63	681.2	71
GR	680.1	78	679.7	103	680.0	130	679.6	155	679.5	181
GR	679.1	207	678.8	234	679.1	261	679.4	287	679.7	312
GR	680.1	338	680.2	365	679.3	391	678.7	416	679.1	438
GR	679.9	459	681.3	466	688.1	474	689.01	481.3	691.0	499
GR	694.3	527	695.1	554	694.5	579	693.1	610	690.9	642
GR	689.5	673	688.6	701	689.1	742	689.7	773	691.7	803
GR	697.8	828	703.2	842	702.9	867	704.8	893	704.8	894
X1	5670	37	90	436	132	137	133			
GR	706.7	0	696.4	23	682.8	53	682.7	66	681.2	90
GR	680.9	95	680.4	109	680.6	135	680.6	157	680.0	180
GR	679.3	204	678.5	229	677.8	251	678.1	277	678.6	298
GR	679.1	320	679.2	335	675.3	355	674.1	374	675.1	393
GR	678.2	415	679.4	429	681.3	436	685.8	444	686.7	476
GR	689.0	504	690.7	526	689.8	558	690.0	584	689.7	614
GR	689.4	642	689.8	671	692.5	700	686.8	733	702.5	755
GR	704.1	766	704.1	844						
X1	5400	33	99	456	271	275	285			
GR	707.7	0	693.0	34	683.4	55	683.0	75	681.3	99
GR	680.7	108	680.2	133	679.9	157	680.0	182	680.2	205
GR	680.1	230	680.3	234	679.9	263	679.4	294	678.5	325
GR	677.8	346	677.1	361	676.4	380	675.9	406	678.1	430
GR	680.1	446	681.4	456	691.82	481.2	690.0	507	690.1	538
GR	690.8	560	690.7	590	691.0	624	690.4	656	690.8	689
GR	692.1	719	702.2	743	705.0	768				
X1	5200	34	160	459	201	203	213			
GR	707.5	0	696.6	27	684.2	57	683.8	75	682.5	105
GR	681.8	135	681.4	160	681.3	172	680.8	195	680.6	220
GR	680.3	245	680.1	270	680.1	295	680.4	319	679.6	344
GR	678.4	365	677.6	380	676.8	398	676.4	418	677.4	437
GR	680.1	454	681.4	459	693.45	474.7	694.3	479	691.8	499
GR	691.0	514	691.2	536	690.4	563	690.7	593	689.8	622
GR	690.5	653	691.7	681	701.9	699	705.0	729		
X1	5000	33	121	438	199	202	200			
GR	707.3	0	693.3	34	684.8	55	684.0	68	683.3	93
GR	681.4	121	681.2	128	680.6	152	680.4	178	680.4	205
GR	680.2	233	680.0	254	679.6	280	679.5	306	679.4	329
GR	679.0	353	677.9	373	676.9	386	675.5	401	677.0	421
GR	679.7	430	681.4	438	691.0	453	691.2	462	691.6	493
GR	691.7	520	690.7	547	690.7	573	689.1	605	690.0	634
GR	702.6	676	705.0	691	705.0	692				
X1	4800	33	83	440	196	200	199			
GR	707.2	0	690.9	39	685.0	52	684.3	64	682.5	70
GR	681.6	83	681.5	88	680.2	108	679.7	139	679.3	164
GR	679.1	189	679.1	215	679.2	240	679.5	264	679.6	288
GR	679.6	312	679.4	337	679.0	361	677.6	383	676.5	404
GR	678.1	422	680.3	434	681.5	440	691.18	455	692.9	480
GR	691.4	495	692.5	519	692.6	548	689.3	577	689.4	603
GR	702.3	644	704.8	659	704.8	660				
X1	4600	36	70	431	203	214	313			
GR	705.8	0	705.5	10	690.6	42	684.5	52	681.6	70
GR	680.0	75	679.0	89	678.1	106	677.8	123	677.5	137
GR	677.5	152	677.5	170	677.7	189	677.9	202	678.4	221
GR	678.5	242	678.7	266	678.6	290	678.7	309	679.8	330
GR	679.3	350	678.9	368	679.0	390	678.7	410	680.5	425
GR	681.5	431	688.0	447	687.9	457	688.8	479	691.6	509
GR	691.7	534	690.0	560	690.5	587	702.7	629	704.8	643
GR	704.8	644								
X1	4400	39	50	341	200	200	207			
GR	706.3	0	702.4	2	700.9	12	690.9	27	685.2	38
GR	684.8	42	681.8	50	679.6	59	676.8	74	676.4	97
GR	676.7	117	676.9	142	677.6	166	677.8	189	678.4	207
GR	678.4	221	678.8	237	678.8	250	678.6	261	678.2	277
GR	677.8	302	678.2	315	681.4	335	681.8	341	685.2	356
GR	688.3	374.5	687.8	402	686.9	425	687.1	449	685.9	474
GR	687.3	497	689.6	519	692.1	531	693.0	548	693.1	568
GR	692.6	588	701.4	608	705.7	635	705.7	639		
X1	4200	38	45	322	201	201	201			
GR	702.9	0	691.2	20	684.7	30	684.0	40	681.8	45
GR	679.7	53	677.0	59	676.9	73	677.0	87	676.9	107
GR	677.0	130	677.0	143	677.0	156	677.3	172	677.5	186
GR	678.5	206	678.7	230	678.8	252	678.0	271	677.5	287
GR	678.0	305	680.3	317	681.8	322	683.4	324	686.6	349
GR	688.3	376	687.6	409	687.5	440	687.7	463	687.3	484
GR	687.2	512	687.6	532	690.3	559	693.5	581	694.1	603

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GR    701.3        620      705.8        645      705.8        649

X1     4000         38         54        319        199        200        200
GR    705.4          0      693.2         23      684.4         39      683.3         50      681.7         54
GR    677.8         60      675.9         63      675.4         84      676.1        105      676.6        123
GR    676.8        142      677.4        165      677.7        182      678.4        197      678.5        218
GR    678.1        238      678.0        255      677.7        272      678.1        289      679.4        298
GR    681.4        314      681.8        319      684.4        327      684.5        353      686.8        380
GR    687.5        403      688.0        432      687.9        466      688.4        489      688.8        513
GR    688.5        536      688.1        560      689.6        583      691.2        604      692.9        624
GR    702.4        647      705.7        668      705.7        672

X1     3800         48         53        318        196        199        203
GR    701.5          0      692.8         12      687.9         22      683.9         31      683.2         49
GR    681.8         53      677.5         58      675.5         59      674.8         66      675.0         78
GR    675.1         87      675.3        100      675.3        106      675.2        111      675.4        124
GR    676.1        141      675.8        156      676.1        163      676.5        174      678.1        188
GR    679.6        202      679.2        218      677.9        238      677.2        250      676.4        264
GR    676.1        268      675.9        273      675.9        289      677.4        304      680.5        314
GR    681.8        318      684.1        322      686.1        341      687.9        365      688.6        389
GR    688.6        413      688.2        438      688.6        466      689.2        492      688.9        516
GR    688.2        538      688.2        561      689.8        583      691.8        606      692.6        630
GR    702.2        649      705.9        674      705.9        678

X1     3600         35         98        379        203        208        204
GR    705.3          0      698.2         22      697.3         43      692.1         59      685.0         76
GR    682.1         98      678.8        103      675.0        127      675.6        159      676.6        178
GR    677.1        216      676.5        247      677.0        273      677.6        295      677.6        318
GR    677.7        341      678.3        360      680.5        372      682.0        379      684.0        387
GR    686.2        411      687.7        434      688.2        462      689.4        488      689.7        514
GR    689.8        536      689.8        563      688.9        590      688.6        619      688.8        647
GR    691.0        673      692.3        699      702.7        730      705.1        753      705.1        754

X1     3400         39         94        383        200        201        298
GR    708.8          0      702.0          2      697.0         13      691.2         46      685.2         68
GR    682.2         94      678.4        106      677.7        123      679.2        140      679.4        144
GR    678.2        154      678.3        186      677.6        197      678.0        207      678.5        233
GR    678.9        248      678.5        261      677.9        277      678.5        311      678.0        336
GR    677.3        356      678.5        362      681.0        378      682.2        383      687.8        396
GR    690.7      419.5      690.7        445      689.2        470      689.6        497      690.0        525
GR    690.1        561      689.8        589      689.3        618      690.2        646      692.1        674
GR    693.1        702      702.5        740      704.9        763      704.9        765

X1     3200         37        160        452        201        216        194
GR    709.0          0      704.5          1      699.4         15      691.0         33      690.5         52
GR    685.8         73      684.6        105      684.5        135      682.3        160      681.6        164
GR    681.0        181      680.8        203      680.4        230      680.2        255      679.9        281
GR    679.6        306      679.3        331      679.5        356      679.8        381      679.0        403
GR    679.3        424      680.7        444      682.4        452      684.5        462      688.1        485
GR    689.6        509      689.7        529      690.2        555      690.3        580      690.5        605
GR    690.8        621      690.6        645      690.3        673      691.5        700      696.6        722
GR    703.7        746      703.7        845

X1     3000         42        245        525        199        215        207
GR    709.2          0      704.5          2      699.7         16      690.8         36      690.6         52
GR    686.5         67      686.3         79      685.6        105      685.4        132      684.9        159
GR    685.3        188      685.4        220      682.5        245      680.6        258      679.9        276
GR    679.8        297      679.7        319      679.8        343      679.8        365      680.1        393
GR    680.1        417      680.0        440      679.8        465      679.6        484      679.5        500
GR    681.0        520      682.5        525      691.6      556.6      691.7        578      691.2        601
GR    691.6        628      691.9        650      691.4        681      691.8        707      691.9        734
GR    692.2        759      692.0        788      691.6        816      690.0        843      690.9        869
GR    702.7        892      702.7        921

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS


*SECNO 21300.000
 21300.000      9.95    682.55    674.06    682.55    682.55      0.00      0.00      0.00    680.50
     840.0       0.7     839.3       0.1       2.9    2531.1       2.3       0.0       0.0    680.60
      0.00      0.23      0.33      0.03     0.010     0.032     0.070     0.000    672.60    232.14
  0.000003        0.        0.        0.         0        19         0      0.00    309.27    541.41


SPECIAL BRIDGE

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.25      1.50      2.50    465.00    465.00      0.00   4320.00      0.00    672.35    672.35

*SECNO 21250.000

6070,LOW FLOW BY NORMAL BRIDGE

EGPRS=    682.551  EGLWC=    682.552  ELLC=    682.000  PCWSE=    682.550  ELTRD=    682.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  0.48


3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=   682.00 MAX ELLC=   682.00

 21250.000      9.95    682.55    674.06      0.00    682.55      0.00      0.00      0.00    680.50
     840.0       0.8     839.1       0.1       2.9    2531.1       2.3       0.1       0.0    680.60
      0.00      0.28      0.33      0.04     0.010     0.032     0.070     0.000    672.60    232.14
  0.000013        1.        1.        1.         2        26         0      0.00    309.27    541.41

*SECNO 21200.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.28
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 21200.000      10.55    682.55    674.50      0.00    682.55      0.00      0.00      0.00    680.80
     840.0        0.2     839.7       0.1       1.3    3328.3       2.5       3.4       0.5    680.80
      0.06       0.16      0.25      0.03     0.010     0.032     0.070     0.000    672.00     41.01
  0.000002        50.       50.       50.         2        11         0      0.00    529.84    570.85

*SECNO 21000.000
 21000.000      10.15    682.55    674.30      0.00    682.55      0.00      0.00      0.00    680.80
     840.0        0.4     839.5       0.1       2.2    3204.3       1.9      18.5       2.9    680.80
      0.27       0.20      0.26      0.03     0.010     0.032     0.070     0.000    672.40     39.54
  0.000003       200.      201.      200.         2        25         0      0.00    534.65    574.19

*SECNO 20800.000
 20800.000      11.35    682.55    673.69      0.00    682.55      0.00      0.00      0.00    680.80
     840.0        0.5     839.4       0.1       2.5    3227.4       2.1      33.2       5.4    680.80
      0.48       0.20      0.26      0.03     0.010     0.032     0.070     0.000    671.20     41.18
  0.000003       200.      199.      200.         2        14         0      0.00    533.17    574.36

*SECNO 20600.000
 20600.000      10.85    682.55    673.69      0.00    682.55      0.00      0.00      0.00    680.80
     840.0        0.4     839.5       0.1       2.2    3285.5       2.5      48.4       7.9    680.80
      0.70       0.19      0.26      0.03     0.010     0.032     0.070     0.000    671.70     44.44
  0.000003       200.      203.      200.         2        25         0      0.00    527.42    571.86

*SECNO 20400.000
 20400.000      11.35    682.55    673.78      0.00    682.55      0.00      0.00      0.00    680.70
     840.0        0.6     839.3       0.1       3.0    3240.6       2.0      63.4      10.3    680.80
      0.92       0.21      0.26      0.03     0.010     0.032     0.070     0.000    671.20     45.76
  0.000003       200.      200.      200.         2        17         0      0.00    523.48    569.24

*SECNO 20200.000
 20200.000      10.45    682.55    674.03      0.00    682.55      0.00      0.00      0.00    680.80
     840.0        0.2     839.0       0.8       1.5    3452.2      15.6      78.8      12.6    679.00
      1.15       0.15      0.24      0.05     0.010     0.032     0.070     0.000    672.10     58.28
  0.000002       200.      200.      200.         2        25         0      0.00    509.39    567.67

*SECNO 20000.000
3280 CROSS SECTION  20000.00 EXTENDED      7.45 FEET

 20000.000       9.85    682.55    674.56      0.00    682.55      0.00      0.00      0.00    680.80
     840.0        0.4     839.6       0.0       3.0    3804.8       0.0      94.1      14.7    675.10
      1.37       0.15      0.22      0.00     0.010     0.032     0.000     0.000    672.70     67.60
  0.000001       204.      182.      200.         2        19         0      0.00    495.40    563.00

*SECNO 19800.000
 19800.000      10.55    682.55    674.27      0.00    682.56      0.00      0.00      0.00    680.80
     840.0        0.2     839.7       0.1       1.5    3536.3       2.8     111.3      17.0    680.80
      1.61       0.14      0.24      0.02     0.010     0.032     0.070     0.000    672.00     61.25
  0.000002       205.      205.      200.         2        17         0      0.00    473.86    535.10

*SECNO 19664.000
 19664.000      11.45    682.55    673.68      0.00    682.56      0.00      0.00      0.00    680.80
     840.0        0.4     839.4       0.2       2.6    3460.6      10.5     122.4      18.5    680.80
      1.77       0.16      0.24      0.02     0.010     0.032     0.070     0.000    671.10     53.08
  0.000002       135.      137.      135.         2        14         0      0.00    484.45    537.53

*SECNO 19400.000
 19400.000      11.26    682.56    672.86      0.00    682.56      0.00      0.00      0.00    680.80
     840.0        1.9     838.0       0.0       8.8    3312.3       2.0     150.8      22.3    680.80
      2.17       0.22      0.25      0.02     0.010     0.032     0.070     0.000    671.30    142.69
  0.000002       375.      365.      343.         2        17         0      0.00    410.58    553.26

*SECNO 19200.000

3265 DIVIDED FLOW

 19200.000      11.56    682.56    673.08      0.00    682.56      0.00      0.00      0.00    680.80
     840.0        2.7     837.1       0.1      12.7    2978.3       4.0     165.6      24.2    680.80
      2.37       0.22      0.28      0.03     0.010     0.032     0.070     0.000    671.00    113.83
  0.000002       200.      203.      200.         2        25         0      0.00    417.57    552.55

*SECNO 19000.000
 19000.000      11.36    682.56    673.43      0.00    682.56      0.00      0.00      0.00    680.80
     840.0        4.0     836.0       0.1      17.7    2949.3       2.0     182.0      26.5    680.80
      2.61       0.23      0.28      0.03     0.010     0.032     0.070     0.000    671.20    142.10
  0.000002       200.      240.      200.         2        25         0      0.00    411.19    553.29

*SECNO 18800.000

3265 DIVIDED FLOW

 18800.000      11.26    682.56    673.97      0.00    682.56      0.00      0.00      0.00    680.80
     840.0        1.9     838.0       0.0       8.7    2814.9       1.8     195.4      28.3    680.80
      2.80       0.22      0.30      0.03     0.010     0.032     0.070     0.000    671.30    139.21
  0.000003       200.      202.      200.         2        14         0      0.00    388.34    554.03

*SECNO 18600.000
 18600.000      12.66    682.56    673.06      0.00    682.56      0.00      0.00      0.00    680.80
     840.0        2.4     837.5       0.0      12.3    2992.3       1.9     209.1      30.1    680.80
      3.00       0.20      0.28      0.02     0.010     0.032     0.070     0.000    669.90    174.95
  0.000002       200.      204.      200.         2        14         0      0.00    379.25    554.20

*SECNO 18400.000
 18400.000       9.36    682.56    674.44      0.00    682.56      0.00      0.00      0.00    680.80
     840.0        0.9     838.7       0.4       4.8    2960.0      13.1     226.0      32.3    680.80
      3.24       0.20      0.28      0.03     0.010     0.032     0.070     0.000    673.20    167.53
  0.000002       200.      246.      200.         2        24         0      0.00    386.41    553.94
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*SECNO 18169.000
 18169.000     11.96    682.56    672.53      0.00    682.56      0.00      0.00      0.00    680.80
     840.0       0.9     839.1       0.0       5.0    3077.3       0.5     240.6      34.0    680.70
      3.46      0.17      0.27      0.01     0.010     0.032     0.070     0.000    670.60    129.29
  0.000002      276.      211.      133.         2        21         0      0.00    337.28    466.56

*SECNO 17400.000
 17400.000     10.26    682.56    673.84      0.00    682.56      0.00      0.00      0.00    680.50
     840.0       1.0     839.0       0.1       4.7    2924.2       2.1     299.3      40.8    680.50
      4.28      0.21      0.29      0.03     0.010     0.032     0.070     0.000    672.30     68.46
  0.000002      932.      850.      802.         2        17         0      0.00    360.60    429.06

*SECNO 17200.000
 17200.000     10.36    682.56    673.67      0.00    682.56      0.00      0.00      0.00    680.40
     840.0       2.2     837.6       0.2       9.1    2767.4       5.3     312.9      42.5    680.40
      4.47      0.24      0.30      0.03     0.010     0.032     0.070     0.000    672.20    100.60
  0.000002      179.      208.      195.         2        17         0      0.00    347.31    447.91

*SECNO 17000.000
 17000.000     10.26    682.56    673.67      0.00    682.56      0.00      0.00      0.00    680.40
     840.0       0.9     838.9       0.2       4.3    2855.4       6.0     325.9      44.1    680.30
      4.66      0.21      0.29      0.03     0.010     0.032     0.070     0.000    672.30    131.98
  0.000002      199.      200.      200.         2        17         0      0.00    336.34    468.32

*SECNO 16800.000
 16800.000     10.46    682.56    673.67      0.00    682.56      0.00      0.00      0.00    680.40
     840.0       1.2     838.7       0.1       5.2    2810.7       3.3     338.8      45.6    680.50
      4.84      0.22      0.30      0.03     0.010     0.032     0.070     0.000    672.10    165.15
  0.000002      198.      198.      200.         2        20         0      0.00    332.07    497.22

*SECNO 16600.000
 16600.000     10.56    682.56    673.60      0.00    682.56      0.00      0.00      0.00    680.40
     840.0       0.9     839.1       0.0       4.1    2799.4       2.0     352.1      47.1    680.40
      5.03      0.22      0.30      0.03     0.010     0.032     0.070     0.000    672.00    197.22
  0.000002      209.      205.      200.         2        20         0      0.00    328.61    525.83

*SECNO 16400.000
 16400.000     10.36    682.56    673.73      0.00    682.56      0.00      0.00      0.00    680.60
     840.0       0.5     839.4       0.1       2.5    2762.2       2.8     370.7      49.3    680.50
      5.30      0.19      0.30      0.03     0.010     0.032     0.070     0.000    672.20    240.44
  0.000002      201.      292.      200.         2        17         0      0.00    316.25    556.69

*SECNO 16200.000
 16200.000     11.06    682.56    673.07      0.00    682.56      0.00      0.00      0.00    680.50
     840.0       1.5     838.2       0.3       6.2    2614.9       7.4     383.6      50.8    680.50
      5.48      0.24      0.32      0.04     0.010     0.032     0.070     0.000    671.50    278.96
  0.000003      223.      207.      200.         2        20         0      0.00    325.17    604.14

*SECNO 16000.000
 16000.000     11.76    682.56    672.95      0.00    682.56      0.00      0.00      0.00    680.50
     840.0       0.7     839.2       0.1       3.3    2736.4       4.5     398.6      52.6    680.50
      5.70      0.21      0.31      0.03     0.010     0.032     0.070     0.000    670.80    327.79
  0.000002      206.      244.      200.         2        25         0      0.00    319.59    647.38

*SECNO 15800.000
 15800.000     10.46    682.56    673.81      0.00    682.56      0.00      0.00      0.00    680.50
     840.0       0.8     839.1       0.2       3.4    2595.3       4.7     410.2      54.0    680.50
      5.86      0.23      0.32      0.03     0.010     0.032     0.070     0.000    672.10    352.72
  0.000003      202.      189.      200.         2        17         0      0.00    321.80    674.51

*SECNO 15600.000
 15600.000     13.56    682.56    671.05      0.00    682.57      0.00      0.00      0.00    680.50
     840.0       1.2     838.7       0.1       5.7    2821.2       2.8     421.4      55.3    680.50
      6.03      0.21      0.30      0.03     0.010     0.032     0.070     0.000    669.00    371.52
  0.000002      177.      179.      200.         2        21         0      0.00    319.17    690.69

*SECNO 15400.000
 15400.000     14.76    682.56    670.35      0.00    682.57      0.00      0.00      0.00    680.50
     840.0       2.1     837.9       0.1       9.2    2750.1       2.1     432.8      56.6    680.50
      6.19      0.23      0.30      0.03     0.010     0.032     0.070     0.000    667.80    377.07
  0.000002      173.      178.      200.         2        25         0      0.00    320.96    698.03

*SECNO 15200.000
 15200.000     15.06    682.56    670.16      0.00    682.57      0.00      0.00      0.00    680.50
     840.0       4.4     835.5       0.1      16.2    2721.5       2.9     444.7      58.0    680.60
      6.36      0.27      0.31      0.03     0.010     0.032     0.070     0.000    667.50    382.11
  0.000002      187.      189.      200.         2        25         0      0.00    326.80    708.91

*SECNO 15000.000
 15000.000     12.66    682.57    672.54      0.00    682.57      0.00      0.00      0.00    680.50
     840.0      16.6     823.3       0.1      55.2    2534.5       2.2     457.1      59.6    680.50
      6.54      0.30      0.32      0.03     0.010     0.032     0.070     0.000    669.90    362.97
  0.000003      200.      202.      200.         2        25         0      0.00    355.13    718.10

*SECNO 14800.000
 14800.000      9.17    682.57    675.06      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       4.8     835.0       0.2      18.2    2432.8       4.8     469.8      61.4    680.50
      6.72      0.27      0.34      0.04     0.010     0.032     0.070     0.000    673.40    341.73
  0.000004      222.      219.      200.         2        17         0      0.00    356.95    698.68

*SECNO 14600.000
 14600.000      9.07    682.57    674.98      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       0.6     839.3       0.2       2.4    2534.8       4.6     481.6      63.1    680.60
      6.89      0.23      0.33      0.04     0.010     0.032     0.070     0.000    673.50    312.54
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 0.000003      200.      207.      200.         2        20         0      0.00    349.10    661.64

*SECNO 14400.000
 14400.000      9.07    682.57    674.83      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       0.7     838.7       0.6       2.9    2536.2      13.6     494.2      64.8    680.60
      7.07      0.23      0.33      0.04     0.010     0.032     0.070     0.000    673.50    279.02
 0.000003      219.      215.      200.         0        20         0      0.00    337.88    616.90

*SECNO 14200.000
 14200.000      9.97    682.57    674.06      0.00    682.57      0.00      0.00      0.00    680.50
     840.0       0.7     839.3       0.1       3.0    2536.6       2.4     510.6      66.8    680.60
      7.31      0.23      0.33      0.03     0.010     0.032     0.070     0.000    672.60    232.11
 0.000003      313.      280.      200.         2        20         0      0.00    309.32    541.43

*SECNO 14000.000
 14000.000     11.77    682.57    672.79      0.00    682.57      0.00      0.00      0.00    680.50
     840.0       0.9     839.0       0.0       4.0    2522.0       1.3     526.3      68.7    680.50
      7.53      0.24      0.33      0.02     0.010     0.032     0.070     0.000    670.80    209.12
 0.000003      269.      270.      199.         2        21         0      0.00    297.16    506.28

*SECNO 13831.000
 13831.000     12.27    682.57    672.35      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       0.6     839.4       0.0       2.8    2557.5       1.0     536.6      69.9    680.60
      7.68      0.21      0.33      0.02     0.010     0.032     0.070     0.000    670.30    211.14
 0.000003      170.      177.      168.         2        25         0      0.00    283.84    494.97

*SECNO 11000.000
 11000.000     12.87    682.57    672.29      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       0.7     839.3       0.0       3.0    2400.3       1.5     550.9      71.5    680.60
      7.88      0.23      0.35      0.03     0.010     0.032     0.070     0.000    669.70    222.97
 0.000003      335.      251.      249.         2        21         0      0.00    273.52    496.49

*SECNO 10800.000
 10800.000     12.97    682.57    672.12      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       0.7     839.2       0.0       3.2    2388.5       1.2     560.8      72.7    680.60
      8.02      0.24      0.35      0.02     0.010     0.032     0.070     0.000    669.60    195.78
 0.000003      200.      180.      158.         2        21         0      0.00    281.43    477.21

*SECNO 10600.000
 10600.000     12.37    682.57    672.47      0.00    682.57      0.00      0.00      0.00    680.50
     840.0       0.9     839.1       0.0       3.7    2438.2       0.5     571.2      73.9    680.60
      8.17      0.24      0.34      0.01     0.010     0.032     0.070     0.000    670.20    180.46
 0.000003      200.      187.      172.         2        25         0      0.00    287.00    467.46

*SECNO 10400.000
 10400.000     12.07    682.57    672.80      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       0.9     839.1       0.1       3.7    2404.5       1.9     582.2      75.2    680.60
      8.33      0.24      0.35      0.03     0.010     0.032     0.070     0.000    670.50    162.26
 0.000003      200.      197.      186.         2        21         0      0.00    286.69    448.96

*SECNO 10200.000
 10200.000     12.47    682.57    672.68      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       0.7     839.3       0.0       3.0    2406.7       1.6     592.5      76.4    680.50
      8.48      0.23      0.35      0.03     0.010     0.032     0.070     0.000    670.10    154.97
 0.000003      200.      186.      172.         2        21         0      0.00    287.61    442.57

*SECNO 10000.000
 10000.000     10.47    682.57    674.13      0.00    682.57      0.00      0.00      0.00    680.60
     840.0       1.2     837.6       1.2       4.3    2265.5       4.6     602.5      77.6    680.60
      8.62      0.27      0.37      0.27     0.010     0.032     0.010     0.000    672.10    147.62
 0.000004      200.      187.      164.         2        23         0      0.00    284.06    431.67

*SECNO 9800.000
  9800.000     11.17    682.57    673.46      0.00    682.58      0.00      0.00      0.00    680.60
     840.0       0.9     832.8       6.3       3.2    2102.4      19.2     613.5      79.0    680.50
      8.77      0.27      0.40      0.33     0.010     0.032     0.010     0.000    671.40    134.71
 0.000004      200.      217.      174.         2        21         0      0.00    276.72    411.43

*SECNO 9600.000
  9600.000     10.17    682.57    673.72      0.00    682.58      0.00      0.00      0.00    680.60
     840.0       0.8     837.8       1.4       3.0    2233.6       5.0     622.6      80.2    680.60
      8.91      0.26      0.38      0.28     0.010     0.032     0.010     0.000    672.40    115.92
 0.000004      200.      181.      160.         2        20         0      0.00    289.14    405.06

*SECNO 9400.000
  9400.000     10.27    682.57    673.61      0.00    682.58      0.00      0.00      0.00    680.70
     840.0       0.8     838.4       0.9       3.1    2282.5       3.6     631.3      81.3    680.70
      9.03      0.24      0.37      0.25     0.010     0.032     0.010     0.000    672.30    104.69
 0.000003      200.      169.      145.         2        17         0      0.00    273.17    377.86

*SECNO 9200.000

1645 INT SEC ADDED BY RAISING SEC   9200.00,  -0.250 FT AND MULTIPLYING BY   1.192

     1.010     10.02    682.57    674.28      0.00    682.58      0.00      0.00      0.00    680.45
     840.0       1.8     814.1      24.1       4.8    1896.3      55.4     635.8      81.9    680.45
      9.09      0.37      0.43      0.43     0.010     0.032     0.010     0.000    672.55    108.70
 0.000006      100.       92.       92.         2        25         0      0.00    333.76    442.46


1645 INT SEC ADDED BY RAISING SEC      1.01,   0.250 FT AND MULTIPLYING BY   0.839

3301 HV CHANGED MORE THAN HVINS
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 9200.000      9.77    682.57    674.68      0.00    682.58      0.00      0.00      0.00    680.70
    840.0       1.3     820.7      18.0       3.2    1532.3      36.1     639.6      82.6    680.70
     9.14      0.42      0.54      0.50     0.010     0.032     0.010     0.000    672.80     91.64
 0.000011      100.       92.       92.         2        25         0      0.00    275.83    367.47

*SECNO 9000.000

1645 INT SEC ADDED BY RAISING SEC   9000.00,  -0.500 FT AND MULTIPLYING BY   0.840

     1.010      9.28    682.58    674.50      0.00    682.58      0.00      0.00      0.00    680.30
    840.0       1.3     825.5      13.2       3.9    1789.9      29.8     643.2      83.1    680.30
     9.20      0.34      0.46      0.44     0.010     0.032     0.010     0.000    673.30     67.92
 0.000006      100.       94.       90.         2        17         0      0.00    237.31    305.23


1645 INT SEC ADDED BY RAISING SEC      1.01,   0.500 FT AND MULTIPLYING BY   1.191

 9000.000      8.78    682.58    674.89      0.00    682.58      0.00      0.00      0.00    680.80
    840.0       0.8     831.4       7.8       2.8    2007.4      22.2     647.3      83.7    680.80
     9.26      0.28      0.41      0.35     0.010     0.032     0.010     0.000    673.80     81.79
 0.000005      100.       94.       90.         2        20         0      0.00    275.80    357.60

*SECNO 8800.000
 8800.000      8.68    682.58    675.69      0.00    682.58      0.00      0.00      0.00    680.70
    840.0       1.1     833.0       5.9       3.3    1920.2      17.2     656.0      84.9    680.80
     9.38      0.33      0.43      0.34     0.010     0.032     0.010     0.000    673.90     69.45
 0.000006      200.      191.      186.         2        21         0      0.00    294.87    364.32

*SECNO 8600.000
 8600.000      7.68    682.58    676.37      0.00    682.58      0.00      0.00      0.00    680.80
    840.0       0.8     827.7      11.5       2.4    1868.7      26.0     664.6      86.3    680.80
     9.50      0.33      0.44      0.44     0.010     0.032     0.010     0.000    674.90     65.32
 0.000007      200.      194.      190.         2        25         0      0.00    315.47    380.79

*SECNO 8400.000
 8400.000      7.88    682.58    676.20      0.00    682.58      0.00      0.00      0.00    680.80
    840.0       0.8     834.9       4.3       2.6    1922.9      12.0     675.4      88.0    680.80
     9.66      0.32      0.43      0.35     0.010     0.032     0.010     0.000    674.70     83.07
 0.000007      200.      247.      202.         2        25         0      0.00    302.40    385.47

*SECNO 8200.000
 8200.000      7.98    682.58    676.02      0.00    682.58      0.00      0.00      0.00    680.70
    840.0       1.0     836.0       3.0       3.0    1881.0       8.1     684.0      89.3    680.70
     9.78      0.34      0.44      0.37     0.010     0.032     0.010     0.000    674.60     98.86
 0.000007      194.      194.      195.         2        25         0      0.00    284.72    383.58

*SECNO 8000.000
 8000.000      8.38    682.58    676.00      0.00    682.59      0.00      0.00      0.00    680.90
    840.0       0.7     837.6       1.7       2.2    1869.7       4.8     692.9      90.7    680.80
     9.91      0.32      0.45      0.36     0.010     0.032     0.010     0.000    674.20     93.39
 0.000007      206.      207.      210.         2        14         0      0.00    289.99    383.38

*SECNO 7800.000
 7800.000      7.98    682.58    676.36      0.00    682.59      0.00      0.00      0.00    681.00
    840.0       0.6     838.7       0.7       1.8    1820.9       2.1     701.2      92.0    680.80
    10.03      0.32      0.46      0.34     0.010     0.032     0.010     0.000    674.60     83.70
 0.000008      196.      196.      194.         2        17         0      0.00    298.68    382.38

*SECNO 7600.000
 7600.000      8.19    682.59    675.92      0.00    682.59      0.00      0.00      0.00    680.90
    840.0       0.8     836.9       2.3       2.4    1848.9       6.0     710.1      93.4    680.80
    10.16      0.34      0.45      0.38     0.010     0.032     0.010     0.000    674.40     85.13
 0.000008      203.      209.      205.         2        25         0      0.00    304.57    389.70

*SECNO 7400.000
 7400.000      8.59    682.59    675.78      0.00    682.59      0.00      0.00      0.00    680.80
    840.0       0.8     838.8       0.5       2.2    1839.1       1.5     719.3      95.0    680.80
    10.29      0.35      0.46      0.31     0.010     0.032     0.010     0.000    674.00     90.54
 0.000008      200.      217.      200.         2        18         0      0.00    303.11    393.65

*SECNO 7200.000
 7200.000      9.59    682.59    675.10      0.00    682.59      0.00      0.00      0.00    681.00
    840.0       0.5     838.2       1.2       1.8    1984.4       3.8     728.1      96.4    680.90
    10.42      0.28      0.42      0.32     0.010     0.032     0.010     0.000    673.00     73.68
 0.000006      201.      201.      201.         2        14         0      0.00    304.82    378.51

*SECNO 7000.000
 7000.000      8.89    682.59    675.27      0.00    682.59      0.00      0.00      0.00    681.00
    840.0       1.7     836.3       2.0       4.9    1875.6       5.9     737.3      97.8    681.00
    10.55      0.34      0.45      0.34     0.010     0.032     0.010     0.000    673.70     55.81
 0.000007      199.      207.      202.         2        20         0      0.00    302.57    358.39

*SECNO 6800.000
 6800.000     10.99    682.59    674.18      0.00    682.60      0.00      0.00      0.00    681.00
    840.0       2.1     833.4       4.5       6.1    1897.6      12.7     745.9      99.2    681.00
    10.68      0.35      0.44      0.35     0.010     0.032     0.010     0.000    671.60     51.31
 0.000008      196.      197.      197.         2        14         0      0.00    330.63    381.94

*SECNO 6600.000
 6600.000     10.69    682.59    673.97      0.00    682.60      0.00      0.00      0.00    681.00
    840.0       1.6     822.2      16.2       4.5    1882.3      36.0     755.0     100.8    680.90
    10.81      0.35      0.44      0.45     0.010     0.032     0.010     0.000    671.90     57.37
 0.000008      203.      205.      204.         2        21         0      0.00    354.53    411.91

*SECNO 6400.000
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  6400.000      8.90    682.60    676.48      0.00    682.60      0.00      0.00      0.00    680.90
     840.0       4.3     831.3       4.4       8.4    1615.0       8.9     763.2     102.5    681.00
     10.92      0.51      0.51      0.49     0.010     0.032     0.010     0.000    673.70     50.11
  0.000015      200.      201.      202.         2        14         0      0.00    360.10    410.21

*SECNO 6200.000
  6200.000      5.80    682.60    678.40      0.00    682.60      0.00      0.00      0.00    681.00
     840.0       2.4     834.9       2.7       4.5    1543.8       4.9     770.5     104.2    681.00
     11.02      0.54      0.54      0.54     0.010     0.032     0.010     0.000    676.80     58.40
  0.000019      201.      201.      203.         2        25         0      0.00    368.73    427.13

*SECNO 6000.000
  6000.000      5.20    682.60    679.07      0.00    682.61      0.01      0.01      0.00    681.00
     840.0       3.2     827.3       9.5       5.0    1405.1      14.1     782.8     107.2    680.90
     11.19      0.64      0.59      0.67     0.010     0.032     0.010     0.000    677.40     58.76
  0.000026      199.      361.      206.         2        14         0      0.00    385.79    444.55

*SECNO 5800.000

1645 INT SEC ADDED BY RAISING SEC   5800.00,  -0.650 FT AND MULTIPLYING BY   0.907

     1.010      4.56    682.61    679.38      0.00    682.61      0.01      0.00      0.00    680.55
     840.0      11.5     827.1       1.3      14.3    1334.5       2.0     786.7     108.3    680.65
     11.24      0.81      0.62      0.65     0.010     0.032     0.010     0.000    678.05     47.20
  0.000030       98.      122.      102.         2        11         0      0.00    377.43    424.63

1645 INT SEC ADDED BY RAISING SEC      1.01,   0.650 FT AND MULTIPLYING BY   1.103

  5800.000      3.91    682.61    679.98      0.00    682.62      0.01      0.00      0.00    681.20
     840.0       4.3     835.1       0.7       5.3    1216.2       1.0     790.3     109.4    681.30
     11.29      0.80      0.69      0.64     0.010     0.032     0.010     0.000    678.70     63.47
  0.000047       98.      122.      102.         2        14         0      0.00    404.07    467.54

*SECNO 5670.000

1645 INT SEC ADDED BY RAISING SEC   5670.00,   2.300 FT AND MULTIPLYING BY   3.893

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.71

     1.010      6.22    682.62    677.95      0.00    682.62      0.00      0.00      0.00    683.50
     840.0       0.0     840.0       0.0       0.0    2468.4       0.0     793.1     110.5    683.60
     11.35      0.00      0.34      0.00     0.000     0.032     0.000     0.000    676.40    653.25
  0.000016       66.       67.       69.         3        18         0      0.00   1029.95   1683.20

1645 INT SEC ADDED BY RAISING SEC      1.01,  -2.300 FT AND MULTIPLYING BY   0.257

3301 HV CHANGED MORE THAN HVINS

  5670.000      8.52    682.62    676.99      0.00    682.62      0.01      0.00      0.00    681.20
     840.0       9.3     829.9       0.8      16.0    1406.5       1.5     796.1     111.5    681.30
     11.38      0.58      0.59      0.50     0.010     0.032     0.010     0.000    674.10     67.35
  0.000024       66.       67.       69.         3        14         0      0.00    370.99    438.34

*SECNO 5400.000
  5400.000      6.72    682.62    678.26      0.00    682.63      0.01      0.01      0.00    681.30
     840.0       8.3     830.6       1.1      12.4    1267.7       1.8     804.9     114.0    681.40
     11.50      0.67      0.66      0.61     0.010     0.032     0.010     0.000    675.90     80.32
  0.000036      271.      285.      275.         2        14         0      0.00    378.64    458.96

*SECNO 5200.000

1645 INT SEC ADDED BY RAISING SEC   5200.00,  -0.375 FT AND MULTIPLYING BY   1.117

     1.010      6.60    682.62    678.25      0.00    682.63      0.01      0.00      0.00    681.03
     840.0      66.9     771.9       1.2      70.7    1183.7       1.9     806.4     114.5    681.03
     11.52      0.95      0.65      0.67     0.010     0.032     0.010     0.000    676.03    104.40
  0.000035       50.       53.       51.         2        17         0      0.00    410.54    514.94

1645 INT SEC ADDED BY RAISING SEC      1.01,   0.125 FT AND MULTIPLYING BY   0.965

     1.020      6.48    682.63    678.40      0.00    682.63      0.01      0.00      0.00    681.15
     840.0      58.9     780.1       1.1      59.6    1102.5       1.5     807.9     114.9    681.15
     11.54      0.99      0.71      0.70     0.010     0.032     0.010     0.000    676.15    103.85
  0.000044       50.       53.       51.         2        22         0      0.00    392.97    496.81

1645 INT SEC ADDED BY RAISING SEC      1.02,   0.125 FT AND MULTIPLYING BY   0.964

     1.030      6.35    682.63    678.57      0.00    682.64      0.01      0.00      0.00    681.28
     840.0      50.8     788.3       0.9      49.4    1024.3       1.2     809.3     115.4    681.28
     11.56      1.03      0.77      0.73     0.010     0.032     0.010     0.000    676.28    103.06
  0.000054       50.       53.       51.         2        22         0      0.00    375.64    478.70

1645 INT SEC ADDED BY RAISING SEC      1.03,   0.125 FT AND MULTIPLYING BY   0.963

3301 HV CHANGED MORE THAN HVINS

  5200.000      6.23    682.63    678.73      0.00    682.64      0.01      0.00      0.00    681.40
     840.0      42.9     796.4       0.7      40.2     949.0       1.0     810.5     115.9    681.40
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    11.58      1.07      0.84      0.76     0.010     0.032     0.010     0.000    676.40    102.05
 0.000068       50.       53.       51.         2        22         0      0.00    358.55    460.60

*SECNO 5000.000
  5000.000      7.14    682.64    678.69      0.00    682.65      0.01      0.01      0.00    681.40
     840.0       9.6     829.5       0.9      11.4    1028.9       1.2     815.2     117.5    681.40
     11.64      0.84      0.81      0.75     0.010     0.032     0.010     0.000    675.50    102.68
 0.000061      199.      200.      202.         2        11         0      0.00    337.26    439.94

*SECNO 4800.000

1645 INT SEC ADDED BY RAISING SEC   4800.00,  -0.500 FT AND MULTIPLYING BY   0.827

3301 HV CHANGED MORE THAN HVINS

     1.010      6.65    682.65    679.13      0.00    682.66      0.01      0.00      0.00    681.10
     840.0      11.6     827.2       1.2      12.4    1155.9       1.7     817.7     118.2    681.00
     11.68      0.94      0.72      0.68     0.010     0.032     0.010     0.000    676.00     56.09
 0.000037       98.      100.      100.         2        15         0      0.00    309.84    365.93

1645 INT SEC ADDED BY RAISING SEC      1.01,   0.500 FT AND MULTIPLYING BY   1.209

  4800.000      6.15    682.65    679.55      0.00    682.66      0.01      0.00      0.00    681.60
     840.0       5.3     834.1       0.6       7.9    1221.1       1.0     820.5     119.0    681.50
     11.72      0.67      0.68      0.59     0.010     0.032     0.010     0.000    676.50     69.49
 0.000041       98.      100.      100.         2        12         0      0.00    372.30    441.79

*SECNO 4600.000

1645 INT SEC ADDED BY RAISING SEC   4600.00,  -0.500 FT AND MULTIPLYING BY   0.836

     1.010      5.66    682.66    678.55      0.00    682.67      0.01      0.00      0.00    681.10
     840.0       3.7     834.7       1.6       6.3    1369.0       2.8     825.1     120.2    681.00
     11.79      0.59      0.61      0.58     0.010     0.032     0.010     0.000    677.00     50.45
 0.000022      102.      157.      107.         2        11         0      0.00    313.44    363.89

1645 INT SEC ADDED BY RAISING SEC      1.01,   0.500 FT AND MULTIPLYING BY   1.196

  4600.000      5.16    682.66    678.95      0.00    682.67      0.01      0.00      0.00    681.60
     840.0       1.6     837.6       0.8       3.5    1457.9       1.7     830.2     121.4    681.50
     11.87      0.46      0.57      0.47     0.010     0.032     0.010     0.000    677.50     63.40
 0.000023      102.      157.      107.         2        11         0      0.00    370.47    433.86

*SECNO 4400.000
  4400.000      6.27    682.67    678.21      0.00    682.67      0.01      0.00      0.00    681.80
     840.0       0.4     838.9       0.7       1.0    1348.2       1.7     836.9     123.0    681.80
     11.96      0.39      0.62      0.40     0.010     0.032     0.010     0.000    676.40     47.68
 0.000023      200.      207.      200.         2        23         0      0.00    297.15    344.83

*SECNO 4200.000
  4200.000      5.77    682.67    678.13      0.00    682.68      0.01      0.00      0.00    681.80
     840.0       0.3     839.5       0.2       0.9    1333.5       0.5     843.1     124.3    681.80
     12.05      0.38      0.63      0.34     0.010     0.032     0.010     0.000    676.90     43.02
 0.000022      201.      201.      201.         2        21         0      0.00    280.07    323.09

*SECNO 4000.000
  4000.000      7.28    682.68    677.60      0.00    682.68      0.01      0.00      0.00    681.70
     840.0       0.5     839.1       0.4       1.2    1335.9       1.2     849.3     125.6    681.80
     12.14      0.40      0.63      0.38     0.010     0.032     0.010     0.000    675.40     51.56
 0.000021      199.      200.      200.         2        18         0      0.00    270.14    321.70

*SECNO 3800.000

1645 INT SEC ADDED BY RAISING SEC   3800.00,   0.300 FT AND MULTIPLYING BY   0.978

     1.010      7.58    682.68    676.94      0.00    682.68      0.01      0.00      0.00    682.10
     840.0       0.1     839.8       0.1       0.5    1444.5       0.3     852.5     126.2    682.10
     12.19      0.25      0.58      0.23     0.010     0.032     0.010     0.000    675.10     50.24
 0.000016       98.      102.      100.         2        11         0      0.00    261.89    312.13

1645 INT SEC ADDED BY RAISING SEC      1.01,  -0.300 FT AND MULTIPLYING BY   1.022

  3800.000      7.88    682.68    676.62      0.00    682.69      0.00      0.00      0.00    681.80
     840.0       0.3     839.5       0.2       1.1    1556.4       0.7     856.0     126.8    681.80
     12.24      0.29      0.54      0.28     0.010     0.032     0.010     0.000    674.80     50.48
 0.000013       98.      102.      100.         2        17         0      0.00    269.05    319.53

*SECNO 3600.000
  3600.000      7.68    682.68    677.30      0.00    682.69      0.00      0.00      0.00    682.10
     840.0       0.3     839.5       0.2       1.3    1559.3       0.9     863.3     128.1    682.00
     12.35      0.24      0.54      0.26     0.010     0.032     0.010     0.000    675.00     93.57
 0.000013      203.      204.      208.         2        17         0      0.00    288.16    381.74

*SECNO 3400.000
1645 INT SEC ADDED BY RAISING SEC   3400.00,  -1.150 FT AND MULTIPLYING BY   0.914

     1.010      6.54    682.69    677.80      0.00    682.69      0.01      0.00      0.00    681.05
     840.0       5.6     833.0       1.4      10.6    1417.7       2.8     868.4     129.1    681.05
     12.42      0.53      0.59      0.50     0.010     0.032     0.010     0.000    676.15     72.97
 0.000017      100.      149.      101.         2        21         0      0.00    280.60    353.57

1645 INT SEC ADDED BY RAISING SEC      1.01,   1.150 FT AND MULTIPLYING BY   1.094
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3301 HV CHANGED MORE THAN HVINS

3400.000	5.39	682.69	678.92	0.00	682.69	0.01	0.00	0.00	682.20
840.0	0.3	839.6	0.1	1.0	1219.0	0.3	872.9	130.1	682.20
12.48	0.32	0.69	0.31	0.010	0.032	0.010	0.000	677.30	89.78
0.000031	100.	149.	101.	2	12	0	0.00	294.35	384.13

*SECNO 3200.000

1645 INT SEC ADDED BY RAISING SEC 3200.00, -1.275 FT AND MULTIPLYING BY 0.971

1.010	4.96	682.69	679.21	0.00	682.70	0.01	0.00	0.00	681.03
840.0	12.6	823.0	4.4	15.2	1111.1	5.6	874.3	130.4	681.13
12.49	0.83	0.74	0.78	0.010	0.032	0.010	0.000	677.73	136.98
0.000040	50.	49.	54.	2	14	0	0.00	309.00	445.98

1645 INT SEC ADDED BY RAISING SEC 1.01, 0.425 FT AND MULTIPLYING BY 1.010

3301 HV CHANGED MORE THAN HVINS

1.020	4.54	682.69	679.63	0.00	682.70	0.01	0.00	0.00	681.45
840.0	7.0	830.7	2.3	8.5	1000.6	3.0	875.4	130.7	681.55
12.51	0.82	0.83	0.77	0.010	0.032	0.010	0.000	678.15	143.09
0.000058	50.	49.	54.	2	17	0	0.00	305.39	448.49

1645 INT SEC ADDED BY RAISING SEC 1.02, 0.425 FT AND MULTIPLYING BY 1.010

3301 HV CHANGED MORE THAN HVINS

1.030	4.11	682.69	680.05	0.00	682.70	0.01	0.00	0.00	681.88
840.0	2.9	836.3	0.8	3.7	887.9	1.2	876.5	131.1	681.98
12.52	0.77	0.94	0.70	0.010	0.032	0.010	0.000	678.58	149.29
0.000089	50.	49.	54.	2	17	0	0.00	301.66	450.95

1645 INT SEC ADDED BY RAISING SEC 1.03, 0.425 FT AND MULTIPLYING BY 1.010

3301 HV CHANGED MORE THAN HVINS

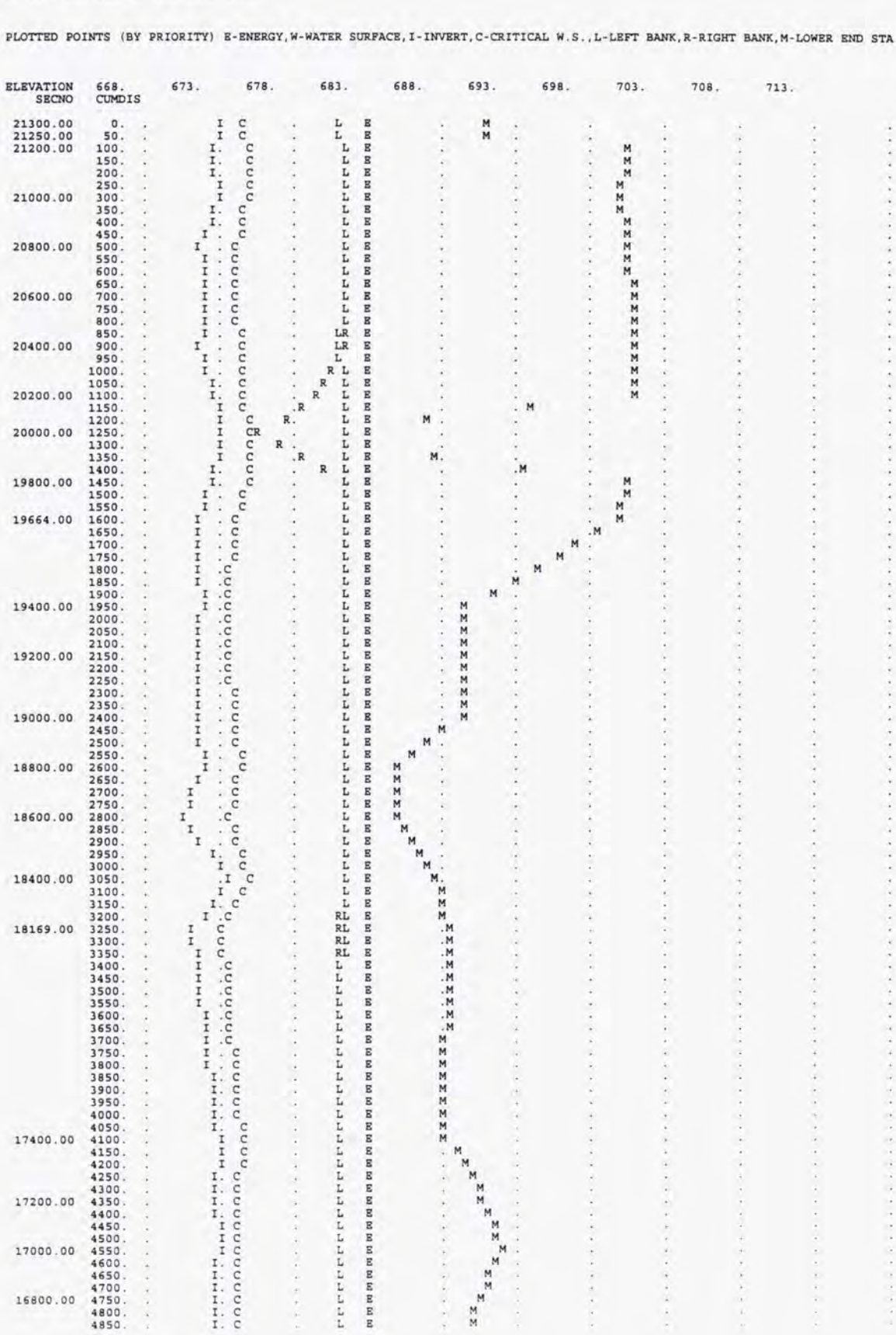
3200.000	3.69	682.69	680.46	0.00	682.71	0.02	0.01	0.00	682.30
840.0	0.5	839.4	0.1	0.9	772.8	0.2	877.4	131.4	682.40
12.54	0.60	1.09	0.49	0.010	0.032	0.010	0.000	679.00	155.58
0.000145	50.	49.	54.	2	22	0	0.00	297.79	453.38

*SECNO 3000.000

3000.000	3.22	682.72	680.58	0.00	682.74	0.02	0.03	0.00	682.50
840.0	0.1	839.9	0.0	0.2	754.9	0.1	881.1	132.8	682.50
12.59	0.41	1.11	0.02	0.010	0.032	0.010	0.000	679.50	243.12
0.000149	199.	207.	215.	2	17	0	0.00	282.63	525.76

PROFILE FOR STREAM GMR SAMPLE RUN

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA



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            4900. .         I. C        .     L    E          .  M       .          .          .          .          .          .
 16600.00   4950. .         I. C        .     L    E          . M        .          .          .          .          .          .
            5000. .         I. C        .     L    E          .  M       .          .          .          .          .          .
            5050. .         I. C        .     L    E          .   M      .          .          .          .          .          .
            5100. .         I. C        .     L    E          .    M     .          .          .          .          .          .
            5150. .         I. C        .     L    E          .    M     .          .          .          .          .          .
            5200. .         I. C        .     L    E          .     M    .          .          .          .          .          .
 16400.00   5250. .         I. C        .     L    E          .      M   .          .          .          .          .          .
            5300. .         I. C        .     L    E          .          .  M       .          .          .          .          .
            5350. .         I. C        .     L    E          .          .         M.          .          .          .          .
            5400. .        I . C        .     L    E          .          .          .    M     .          .          .          .
 16200.00   5450. .        I .C         .     L    E          .          .          .          .M         .          .          .
            5500. .        I .C         .     L    E          .          .          .          . M        .          .          .
            5550. .       I  .C         .     L    E          .          .          .          . M        .          .          .
            5600. .       I  .C         .     L    E          .          .          .          . M        .          .          .
            5650. .       I  .C         .     L    E          .          .          .          . M        .          .          .
 16000.00   5700. .       I  .C         .     L    E          .          .          .          . M        .          .          .
            5750. .       I  .C         .     L    E          .          .          .          . M        .          .          .
            5800. .        I . C        .     L    E          .          .          .          . M        .          .          .
 15800.00   5850. .         I.  C       .     L    E          .          .          .          . M        .          .          .
            5900. .       I  .C         .     L    E          .          .          .          . M        .          .          .
            5950. .      I   C          .     L    E          .          .          .          .M         .          .          .
            6000. .    I   C .          .     L    E          .          .          .          .M         .          .          .
 15600.00   6050. .  I    C  .          .     L    E          .          .          .          .M         .          .          .
            6100. . I     C  .          .     L    E          .          .          .          .M         .          .          .
            6150. . I    C   .          .     L    E          .          .          .          .M         .          .          .
 15400.00   6200. .I     C   .          .     L    E          .          .          .          M          .          .          .
            6250. I      C   .          .     L    E          .          .          .          M          .          .          .
            6300. I     C    .          .     L    E          .          .          .          .M         .          .          .
            6350. I     C    .          .     L    E          .          .          .          .M         .          .          .
 15200.00   6400. I     C    .          .     L    E          .          .          .          .M         .          .          .
            6450. .I     C   .          .     L    E          .          .          .          .M         .          .          .
            6500. . I      C .          .     L    E          .          .          .          .M         .          .          .
            6550. .    I    C.          .     L    E          .          .          .          .M         .          .          .
 15000.00   6600. .     I    C          .     L    E          .          .          .          . M        .          .          .
            6650. .      I   .C         .     L    E          .          .          .    M     .          .          .          .
            6700. .        I . C        .     L    E          .          .      M   .          .          .          .          .
            6750. .          I   C      .     L    E          .          M          .          .          .          .          .
            6800. .          .I   C     .     L    E          .  M       .          .          .          .          .          .
 14800.00   6850. .          . I  C     .     L    E          M          .          .          .          .          .          .
            6900. .          . I  C     .     L    E          .M         .          .          .          .          .          .
            6950. .          . I  C     .     L    E          . M        .          .          .          .          .          .
            7000. .          . I  C     .     L    E          . M        .          .          .          .          .          .
 14600.00   7050. .          . I  C     .     L    E          .  M       .          .          .          .          .          .
            7100. .          . I  C     .     L    E          .  M       .          .          .          .          .          .
            7150. .          . I  C     .     L    E          .   M      .          .          .          .          .          .
            7200. .          . I  C     .     L    E          .   M      .          .          .          .          .          .
 14400.00   7250. .          . I  C     .     L    E          .    M     .          .          .          .          .          .
            7300. .          . I C      .     L    E          .    M     .          .          .          .          .          .
            7350. .          .I  C      .     L    E          .     M    .          .          .          .          .          .
            7400. .          .I  C      .     L    E          .     M    .          .          .          .          .          .
            7450. .          .I  C      .     L    E          .     M    .          .          .          .          .          .
            7500. .          I  C       .     L    E          .     M    .          .          .          .          .          .
 14200.00   7550. .          I  C       .     L    E          .     M    .          .          .          .          .          .
            7600. .          I  C       .     L    E          .      M   .          .          .          .          .          .
            7650. .         I. C        .     L    E          .      M   .          .          .          .          .          .
            7700. .        I . C        .     L    E          .      M   .          .          .          .          .          .
            7750. .        I .C         .     L    E          .      M   .          .          .          .          .          .
 14000.00   7800. .       I  .C         .     L    E          .      M   .          .          .          .          .          .
            7850. .     I    C          .     L    E          .      M   .          .          .          .          .          .
            7900. .     I    C          .     L    E          .     M    .          .          .          .          .          .
            7950. .     I    C          .     L    E          .    M     .          .          .          .          .          .
 13831.00   8000. .     I    C          .     L    E          .    M     .          .          .          .          .          .
            8050. .    I     C          .     L    E          .    M     .          .          .          .          .          .
            8100. .    I     C          .     L    E          .    M     .          .          .          .          .          .
            8150. .    I     C          .     L    E          .    M     .          .          .          .          .          .
            8200. .    I     C          .     L    E          .     M    .          .          .          .          .          .
 11000.00   8250. .   I      C          .     L    E          .     M    .          .          .          .          .          .
            8300. .   I     C.          .     L    E          .      M   .          .          .          .          .          .
            8350. .   I     C.          .     L    E          .      M   .          .          .          .          .          .
 10800.00   8400. .   I     C.          .     L    E          .         M.          .          .          .          .          .
            8450. .    I    C.          .     L    E          .         M.          .          .          .          .          .
            8500. .    I     C          .     L    E          .          M          .          .          .          .          .
            8550. .    I     C          .     L    E          .          .M         .          .          .          .          .
 10600.00   8600. .    I     C          .     L    E          .          .M         .          .          .          .          .
            8650. .     I    C          .     L    E          .          .M         .          .          .          .          .
            8700. .     I    C          .     L    E          .          .M         .          .          .          .          .
            8750. .     I    C          .     L    E          .          .M         .          .          .          .          .
 10400.00   8800. .     I    .C         .     L    E          .          .M         .          .          .          .          .
            8850. .     I    .C         .     L    E          .          .M         .          .          .          .          .
            8900. .     I    C          .     L    E          .          M          .          .          .          .          .
            8950. .    I     C          .     L    E          .          M          .          .          .          .          .
 10200.00   9000. .    I     C          .     L    E          .          M          .          .          .          .          .
            9050. .     I    .C         .     L    E          .       M  .          .          .          .          .          .
            9100. .      I   . C        .     L    E          .      M   .          .          .          .          .          .
 10000.00   9150. .         I.  C       .     L    E          .   M      .          .          .          .          .          .
            9200. .         I.  C       .     L    E          .  M       .          .          .          .          .          .
            9250. .         I.  C       .     L    E          . M        .          .          .          .          .          .
            9300. .        I . C        .     L    E          .M         .          .          .          .          .          .
            9350. .        I . C        .     L    E          M          .          .          .          .          .          .
  9800.00   9400. .        I . C        .     L    E          M          .          .          .          .          .          .
            9450. .        I . C        .     L    E          .  M       .          .          .          .          .          .
            9500. .         I. C        .     L    E          .     M    .          .          .          .          .          .
  9600.00   9550. .          I C        .     L    E          .          M          .          .          .          .          .
            9600. .          I C        .     L    E          .          .M         .          .          .          .          .
            9650. .          I C        .     L    E          .          . M        .          .          .          .          .
            9700. .          I C        .     L    E          .          . M        .          .          .          .          .
  9400.00   9750. .          I C        .     L    E          .          .  M       .          .          .          .          .
            9800. .          I  C       .     L    E          .         M.          .          .          .          .          .
     1.01   9850. .          I   C      .     L    E          .    M     .          .          .          .          .          .
  9200.00   9900. .          .I  C      .     L    E          .     M    .          .          .          .          .          .
            9950. .          .I  C      .     L    E          .   M      .          .          .          .          .          .
     1.01  10000. .          . I C      .     L    E          . M        .          .          .          .          .          .
           10050. .          . I C      .     L    E          .  M       .          .          .          .          .          .
  9000.00  10100. .          .  I C     .      L   E          .  M       .          .          .          .          .          .
           10150. .          .  I C     .      L   E          .          .M         .          .          .          .          .
           10200. .          .  I  C    .     LR   E          .          .         M.          .          .          .          .
           10250. .          .  I  C    .     LR   E          .          .          .       M  .          .          .          .
  8800.00  10300. .          .  I  C    .     LR   E          .          .          .          .   M      .          .          .
           10350. .          .  I   C   .     LR   E          .          .          .          .   M      .          .          .
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        10400.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
        10450.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
8600.00 10500.  .         .    I  C .      L  E         .         .         .         .   M     .         .         .
        10550.  .         .    I  C .      L  E         .         .         .         .   M     .         .         .
        10600.  .         .    I  C .      L  E         .         .         .         .   M     .         .         .
        10650.  .         .    I  C .      L  E         .         .         .         .   M     .         .         .
        10700.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
8400.00 10750.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
        10800.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
        10850.  .         .   I  C  .     L   E         .         .         .         .   M     .         .         .
        10900.  .         .   I  C  .     L   E         .         .         .         .   M     .         .         .
8200.00 10950.  .         .   I  C  .     L   E         .         .         .         .   M     .         .         .
        11000.  .         .   I  C  .     L   E         .         .         .         .   M     .         .         .
        11050.  .         .   I  C  .     RL  E         .         .         .         .   M     .         .         .
        11100.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
8000.00 11150.  .         .  I   C  .      L  E         .         .         .         .   M     .         .         .
        11200.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
        11250.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
        11300.  .         .   I   C .      L  E         .         .         .         .   M     .         .         .
7800.00 11350.  .         .   I   C .      L  E         .         .         .         .   M     .         .         .
        11400.  .         .   I   C .      L  E         .         .         .         .   M     .         .         .
        11450.  .         .   I  C  .      L  E         .         .         .         .   M     .         .         .
        11500.  .         .   I  C  .      L  E         .         .         .         .  M      .         .         .
7600.00 11550.  .         .   I  C  .      L  E         .         .         .         .  M      .         .         .
        11600.  .         .   I  C  .      L  E         .         .         .         .  M      .         .         .
        11650.  .         .  I   C  .      L  E         .         .         .         .   M     .         .         .
        11700.  .         .  I   C  .      L  E         .         .         .         .   M     .         .         .
7400.00 11750.  .         .  I   C  .      L  E         .         .         .         .   M     .         .         .
        11800.  .         .  I  C   .      L  E         .         .         .         .   M     .         .         .
        11850.  .         . I   C   .      L  E         .         .         .         .   M     .         .         .
        11900.  .         . I   C   .      L  E         .         .         .         .   M     .         .         .
7200.00 11950.  .         .I   C    .      L  E         .         .         .         .   M     .         .         .
        12000.  .         .I   C    .      L  E         .         .         .         .   M     .         .         .
        12050.  .         . I  C    .      L  E         .         .         .         .   M     .         .         .
        12100.  .         . I  C    .      L  E         .         .         .         .   M     .         .         .
7000.00 12150.  .         . I   C   .      L  E         .         .         .         .   M     .         .         .
        12200.  .         .I   C    .      L  E         .         .         .         .   M     .         .         .
        12250.  .         I   C     .      L  E         .         .         .         .   M     .         .         .
        12300.  .        I.   C     .      L  E         .         .         .         .   M     .         .         .
6800.00 12350.  .       I .  C      .      L  E         .         .         .         .   M     .         .         .
        12400.  .       I .  C      .      L  E         .         .         .         .   M     .         .         .
        12450.  .       I .  C      .      L  E         .         .         .         .   M     .         .         .
        12500.  .        I.  C      .      L  E         .         .         .         .   M     .         .         .
6600.00 12550.  .        I.  C      .      L  E         .         .         .         .   M     .         .         .
        12600.  .         I   C     .      L  E         .         .         .         .   M     .         .         .
        12650.  .         .I   C    .      L  E         .         .         .         .   M     .         .         .
        12700.  .         .I     C  .      L  E         .         .         .         .   M     .         .         .
6400.00 12750.  .         . I     C .      L  E         .         .         .         .   M     .         .         .
        12800.  .         .   I    C.      L  E         .         .         .         .   M     .         .         .
        12850.  .         .    I    C      L  E         .         .         .         .   M     .         .         .
        12900.  .         .      I  .C     L  E         .         .         .         .   M     .         .         .
        12950.  .         .        I. C    L  E         .         .         .         .    M    .         .         .
6200.00 13000.  .         .        I. C    L  E         .         .         .         .    M    .         .         .
        13050.  .         .        I. C    L  E         .         .         .         .    M    .         .         .
        13100.  .         .        I. C    L  E         .         .         .         .    M    .         .         .
        13150.  .         .        I. C    L  E         .         .         .         .    M    .         .         .
        13200.  .         .        I.  C   L  E         .         .         .         .    M    .         .         .
        13250.  .         .        I.  C   L  E         .         .         .         .    M    .         .         .
        13300.  .         .         I  C   L  E         .         .         .         .    M    .         .         .
6000.00 13350.  .         .         I  C   L  E         .         .         .         .    M    .         .         .
        13400.  .         .         I  C   L  E         .         .         .         .   M     .         .         .
   1.01 13450.  .         .         .I  C L   E         .         .         .         .  M      .         .         .
        13500.  .         .         . I C  L  E         .         .         .         .   M     .         .         .
        13550.  .         .         . I  C L  E         .         .         .         .   M     .         .         .
5800.00 13600.  .         .         . I  C LR E         .         .         .         .    M    .         .         .
   1.01 13650.  .         .       I .C        E L       .         .         .         .       M .         .         .
5670.00 13700.  .         .  I     C.      LR E         .         .         .         .  M      .         .         .
        13750.  .         .   I    C.      LR E         .         .         .         .   M     .         .         .
        13800.  .         .   I     C      LR E         .         .         .         .   M     .         .         .
        13850.  .         .    I    C       L E         .         .         .         .   M     .         .         .
        13900.  .         .     I   .C      L E         .         .         .         .   M     .         .         .
        13950.  .         .     I   .C      L E         .         .         .         .    M    .         .         .
5400.00 14000.  .         .      I  . C     L E         .         .         .         .    M    .         .         .
   1.01 14050.  .         .      I  . C    L  E         .         .         .         .   M     .         .         .
   1.02 14100.  .         .      I  . C    L  E         .         .         .         .    M    .         .         .
   1.03 14150.  .         .       I . C     L E         .         .         .         .    M    .         .         .
5200.00 14200.  .         .       I . C     L E         .         .         .         .    M    .         .         .
        14250.  .         .      I  . C     L E         .         .         .         .    M    .         .         .
        14300.  .         .      I  . C     L E         .         .         .         .    M    .         .         .
        14350.  .         .     I   . C     L E         .         .         .         .    M    .         .         .
5000.00 14400.  .         .     I   . C     L E         .         .         .         .    M    .         .         .
        14450.  .         .      I  .  C   L  E         .         .         .         .   M     .         .         .
   1.01 14500.  .         .      I  .  C   L  E         .         .         .         .   M     .         .         .
        14550.  .         .       I .   C   L E         .         .         .         .   M     .         .         .
4800.00 14600.  .         .       I .   C   L E         .         .         .         .    M    .         .         .
        14650.  .         .       I .  C    L E         .         .         .         .   M     .         .         .
        14700.  .         .        I.  C   RL E         .         .         .         .   M     .         .         .
   1.01 14750.  .         .        I. C    L  E         .         .         .         .   M     .         .         .
        14800.  .         .        I. C    RL E         .         .         .         .   M     .         .         .
        14850.  .         .         I  C    L E         .         .         .         .   M     .         .         .
4600.00 14900.  .         .         I  C    L E         .         .         .         .    M    .         .         .
        14950.  .         .        I.  C    L E         .         .         .         .    M    .         .         .
        15000.  .         .        I. C     L E         .         .         .         .    M    .         .         .
        15050.  .         .       I . C     L E         .         .         .         .     M   .         .         .
        15100.  .         .       I .C       LE         .         .         .         .     M   .         .         .
4400.00 15150.  .         .       I .C       LE         .         .         .         .     M   .         .         .
        15200.  .         .       I .C       LE         .         .         .         .    M    .         .         .
        15250.  .         .       I .C       LE         .         .         .         .   M     .         .         .
        15300.  .         .        I.C       LE         .         .         .         . M       .         .         .
4200.00 15350.  .         .        I.C       LE         .         .         .         .M        .         .         .
        15400.  .         .       I .C       LE         .         .         .         . M       .         .         .
        15450.  .         .      I  .C       LE         .         .         .         .  M      .         .         .
        15500.  .         .      I  C       LRE         .         .         .         .    M    .         .         .
4000.00 15550.  .         .     I   C       LRE         .         .         .         .     M   .         .         .
        15600.  .         .     I   C        LE         .         .         .         . M       .         .         .
   1.01 15650.  .         .    I   C.        LE         .         .         .        M.         .         .         .
        15700.  .         .    I   C.        LE         .         .         .       M .         .         .         .
3800.00 15750.  .         .    I  C .        LE         .         .         .       M .         .         .         .
        15800.  .         .    I   C.        LE         .         .         .         M         .         .         .
        15850.  .         .    I   C.        LE         .         .         .         . M       .         .         .
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        15900.  .         .   I   C.        LE        .         .         .         . M       .         .         .
3600.00 15950.  .         .   I    C        LE        .         .         .         .   M     .         .         .
        16000.  .         .    I   C       L E        .         .         .         .  M      .         .         .
        16050.  .         .     I  C       L E        .         .         .         . M       .         .         .
   1.01 16100.  .         .     I  .C     L  E        .         .         .         . M       .         .         .
        16150.  .         .      I .C      L E        .         .         .         . M       .         .         .
        16200.  .         .       I. C      LE        .         .         .         .  M      .         .         .
3400.00 16250.  .         .        I  C     LE        .         .         .         .   M     .         .         .
   1.01 16300.  .         .        I  C   L  E        .         .         .        M        .         .         .
   1.02 16350.  .         .        .I  C   L E        .         .         .        .M        .         .         .
   1.03 16400.  .         .        . I  C   LE        .         .         .        . M       .         .         .
3200.00 16450.  .         .        .  I  C   E        .         .         .        . M       .         .         .
        16500.  .         .        .  I  C   E        .         .         .        . M       .         .         .
        16550.  .         .        .  I  C   E        .         .         .        .M        .         .         .
        16600.  .         .        .   I C   E        .         .         .        .M        .         .         .
3000.00 16650.  .         .        .   I C   E        .         .         .        M         .         .         .
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SUMMARY OF ERRORS AND SPECIAL NOTES

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WARNING SECNO= 21250.000  PROFILE= 1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 21200.000  PROFILE= 1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=  9200.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  9000.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  5800.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  5670.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  5200.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  4800.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  4600.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  3800.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  3400.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
CAUTION SECNO=  3200.000  PROFILE= 1  INTERPOLATED X-SECTIONS USED
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Table A.I.1 Comparison of Aquifer Parameters of Mound Wells and Piezometers

Test Ref	Test Year	Well No.	Aquifer Thickness (feet)	Test Duration (days)	Analyses Method	Hydraulic Conduct. (ft/day)	Hydraulic Conduct. (gal/day/ft^2)	Transmissivity (Ft^2/day)	Transmissivity (gal/day/ft)	Storage Coefficient S	Specific Yield Sy	Diffusivity (Ft^2/day)	Diffusivity (gal/day/ft)
a	1976	2	45		M-Theis	289	2,161	13,000	97,240	0.09		144,444	1,080,444
	1976	2	45		Theis	244	1,828	11,000	82,280	0.2		55,000	411,400
	1976	3	45		M-Theis	356	2,660	16,000	119,680	0.03		533,333	3,989,333
	1976	3	45		Theis	289	2,161	13,000	97,240	0.04		325,000	2,431,000
	1976	4	82		M-Theis	232	1,733	19,000	142,120	0.02		950,000	7,106,000
	1976	4	82		Theis	207	1,551	17,000	127,160	0.02		850,000	6,358,000
b	1987	4	82		Theis	695	5,200	57,000	426,360	0.1		570,000	4,263,600
	1987	4	82		Theis	927	6,933	76,000	568,480	0.3		253,333	1,894,933
	1987	4	82		Co-Jacob	634	4,743	52,000	388,960	0.5		104,000	777,920
a	1987	5	70		M-Theis	343	2,565	24,000	179,520	0.09		266,667	1,994,667
	1987	5	70		Theis	329	2,458	23,000	172,040	0.1		230,000	1,720,400
d	1986	63	30	0.0188	Co-Jacob	833	6,233	25,000	187,000	0.05		500,000	3,740,000
	1986	63	30	0.0016	D-Draw	1,008	7,543	30,254	226,300	0.031		975,935	7,299,997
e	1989?	63	30			2,233	16,705	67,000	501,160	0.05		1,340,000	10,023,200
d	1986	71	40		Theis	133	991	5,300	39,644				
e	1989?	71	40			1,775	13,277	71,000	531,080	0.2		355,000	2,655,400
	1989?	71	40			1,575	11,781	63,000	471,240	0.19		331,579	2,480,211
c	1961	76	104		D-Draw	260	1,942	27,000	201,960				
e	1989?	76	104			692	5,178	72,000	538,560	0.13		553,846	4,142,769
	1989?	76	104			798	5,970	83,000	620,840	0.1		830,000	6,208,400
a	1976	101	59		Theis	220	1,648	13000	97,240	0.8		16,250	121,550
	1976	101	59		M-Theis	220	1,648	13000	97,240	0.7		18,571	138,914
	1976	106	65		M-Theis	415	3,107	27,000	201,960	0.06		450,000	3,366,000
	1976	106	65		Theis	308	2,302	20,000	149,600	0.08		250,000	1,870,000
e	1987	118	95		Theis	505	3,779	48,000	359,040	0.007		6,857,143	51,291,429
	1987	118	95		Boulton	295	2,205	28,000	209,440	0.004		7,000,000	52,360,000
	1987	118	95		Boulton	305	2,283	29,000	216,920	0.04		725,000	5,423,000
	1987	118	95		Theis-R	547	4,094	52,000	388,960				

Table A.I.1 Comparison of Aquifer Parameters of Mound Wells and Piezometers (cont.)

Test Ref	Test Year	Well No.	Aquifer Thickness (feet)	Test Duration (days)	Analyses Method	Hydraulic Conduct. (ft/day)	Hydraulic Conduct. (gal/day/ft²)	Transmissivity (Ft²/day)	Transmissivity (gal/day/ft)	Storage Coefficient S	Specific Yield Sy	Diffusivity (Ft²/day)	Diffusivity (gal/day/ft)
b	1987	123	44		Theis	250	1,870	11,000	82,280	0.1		110,000	822,800
	1987	123	44		Co-Jacob	364	2,720	16,000	119,680	0.05		320,000	2,393,600
	1987	123	44		D-Draw	614	4,590	27,000	201,960				
	1987	124	44		Theis	295	2,210	13,000	97,240	0.09		144,444	1,080,444
	1987	124	44		Co-Jacob	614	4,590	27,000	201,960	0.02		1,350,000	10,098,000
	1987	124	44		D-Draw	614	4,590	27,000	201,960				
	1987	126	59		Boulton	271	2,028	16,000	119,680	0.02		800,000	5,984,000
	1987	126	59		Boulton	627	4,691	37,000	276,760	0.02		1,850,000	13,838,000
	1987	126	59		Co-Jacob	220	1,648	13,000	97,240	0.4		32,500	243,100
	1987	126	59		D-Draw	458	3,423	27,000	201,960				
a	1976	137	40		Theis	200	1,496	8,000	59,840	0.02		400,000	2,992,000
	1976	137	40		M-Theis	400	2,992	16,000	119,680	0.01		1,600,000	11,968,000
e	1987	138	86		Boulton	221	1,653	19,000	142,120	0.01		1,900,000	14,212,000
	1987	138	86		Boulton	337	2,522	29,000	216,920	0.01		2,900,000	21,692,000
	1989?	152	26			1,423	10,645	37,000	276,760	0.09		411,111	3,075,111
	1989?	153	25			2,120	15,858	53,000	396,440	0.11		481,818	3,604,000
	1989?	153	25			1,880	14,062	47,000	351,560	0.12		391,667	2,929,667
	1989?	154	35			2,114	15,815	74,000	553,520	0.04		1,850,000	13,838,000
	1989?	154	35			1,829	13,678	64,000	478,720	0.06		1,066,667	7,978,667
	1989?	155	35			1,771	13,250	62,000	463,760	0.08		775,000	5,797,000
	1989?	155	35			1,486	11,113	52,000	388,960	0.15		346,667	2,593,067
	1993	156	138	30	Theis	336	2,515	46,400	347,072	0.15		309,333	2,313,813
	1993	156	138	30	Neuman	366	2,737	50,500	377,740		0.13	388,462	2,905,692
	1993	156	138	13.89	Neuman	378	2,829	52,200	390,456	0.001		52,200,000	390,456,000
	1993	156	138	13.89	Neuman	378	2,829	52,200	390,456		0.14	372,857	2,788,971
c/e	1961	271	46		D-Draw	1,696	12,683	78,000	583,440				
	1961	271	46		WHIP	1,000	7,480	46,000	344,080	0.002		23,000,000	172,040,000
d	1986	271	46		D-Draw	658	4,920	30,254	226,300	0.031		975,935	7,299,997

Table A.I.1 Comparison of Aquifer Parameters of Mound Wells and Piezometers (cont.)

Test Ref	Test Year	Well No.	Aquifer Thickness (feet)	Test Duration (days)	Analyses Method	Hydraulic Conduct. (ft/day)	Hydraulic Conduct. (gal/day/ft^2)	Transmissivity (Ft^2/day)	Transmissivity (gal/day/ft)	Storage Coefficient S	Specific Yield Sy	Diffusivity (Ft^2/day)	Diffusivity (gal/day/ft)
e	1993	304	138	30	Hantush	130	970	17,900	133,892		0.06	298,333	2,231,533
	1993	304	138	13.89	Neuman	392	2,932	54,100	404,668	0.14		386,429	2,890,486
	1993	304	138	13.89	Neuman	392	2,932	54,100	404,668		0.27	200,370	1,498,770
	1989?	305	35			1,229	9,190	43,000	321,640	0.07		614,286	4,594,857
	1989?	305	35			1,200	8,976	42,000	314,160	0.09		466,667	3,490,667
	1989?	306	25			2,040	15,259	51,000	381,480	0.11		463,636	3,468,000
	1989?	306	25			1,840	13,763	46,000	344,080	0.12		383,333	2,867,333
	1989?	307	16			2,813	21,038	45,000	336,600	0.06		750,000	5,610,000
	1989?	309	35			1,057	7,907	37,000	276,760	0.24		154,167	1,153,167
	1989?	309	35			1,200	8,976	42,000	314,160	0.19		221,053	1,653,474
	1993	309	35	30	Hantush	871	6,518	30,500	228,140		0.33	92,424	691,333
	1993	309	35	13.89	Neuman	880	6,582	30,800	230,384	0.28		110,000	822,800
	1993	309	35	13.89	Neuman	880	6,582	30,800	230,384		0.34	90,588	677,600
	1989?	310	25			2,200	16,456	55,000	411,400	0.11		500,000	3,740,000
	1989?	310	25			2,000	14,960	50,000	374,000	0.1		500,000	3,740,000
	1989?	313	17			3,588	26,840	61,000	456,280	0.08		762,500	5,703,500
	1989?	317	45			822	6,150	37,000	276,760	0.09		411,111	3,075,111
d	1986	371	45		D-Draw	672	5,029	30,254	226,300	0.031		975,935	7,299,997
c/e	1961	371	45		WHIP	1,422	10,638	64,000	478,720	0.0006		106,666,667	797,866,667
e	1993	393	13	30	Theis	2,292	17,146	29,800	222,904	0.27		110,370	825,570
	1993	393	13	30	Neuman	2,131	15,938	27,700	207,196		0.21	131,905	986,648
	1993	393	13	30	Hantush	1,131	8,458	14,700	109,956		0.17	86,471	646,800
	1993	393	13	13.89	Neuman	2,508	18,758	32,600	243,848	0.1		326,000	2,438,480
	1993	393	13	13.89	Neuman	2,508	18,758	32,600	243,848		0.14	232,857	1,741,771
	1993	394	28	30	Theis	2,086	15,601	58,400	436,832	0.01		5,840,000	43,683,200
	1993	394	28	30	Neuman	1,414	10,579	39,600	296,208		0.04	990,000	7,405,200
	1993	394	28	13.89	Neuman	1,382	10,338	38,700	289,476	0.01		3,870,000	28,947,600
	1993	394	28	13.89	Neuman	1,382	10,338	38,700	289,476		0.04	967,500	7,236,900
c/e	1961	471	45		WHIP	1,578	11,802	71,000	531,080	0.003		23,666,667	177,026,667

Table A.I.1 Comparison of Aquifer Parameters of Mound Wells and Piezometers (cont.)

Test Ref	Test Year	Well No.	Aquifer Thickness (feet)	Test Duration (days)	Analyses Method	Hydraulic Conduct. (ft/day)	Hydraulic Conduct. (gal/day/ft^2)	Transmissivity (Ft^2/day)	Transmissivity (gal/day/ft)	Storage Coefficient S	Specific Yield Sy	Diffusivity (Ft^2/day)	Diffusivity (gal/day/ft)
d	1986	471	45		Theis	556	4,156	25,000	187,000	0.04		625,000	4,675,000
	1986	471	45		Co-Jacob	622	4,654	28,000	209,440	0.03		933,333	6,981,333
	1986	471	45		D-Draw	672	5,029	30,254	226,300	0.031		975,935	7,299,997
c/e	1961	571	35		WHIP	2,743	20,517	96,000	718,080	0.04		2,400,000	17,952,000
b	1993	912	60	30	Theis	597	4,463	35,800	267,784	0.23		155,652	1,164,278
	1993	912	60	30	Neuman	600	4,488	36,000	269,280		0.23	156,522	1,170,783
	1993	912	60	30	Hantush	308	2,306	18,500	138,380		0.15	123,333	922,533
	1993	912	60	13.89	Neuman	458	3,428	27,500	205,700	0.11		250,000	1,870,000
	1993	912	60	13.89	Neuman	458	3,428	27,500	205,700		0.12	229,167	1,714,167
e	1987	913	40		Theis-R	675	5,049	27,000	201,960				
	1993	P005	98	30	Neuman	399	2,984	39,100	292,468		0.05	782,000	5,849,360
	1993	P005	98	13.89	Neuman	371	2,778	36,400	272,272	0.01		3,640,000	27,227,200
	1993	P005	98	13.89	Neuman	371	2,778	36,400	272,272		0.05	728,000	5,445,440
	1993	P006	30	30	Neuman	1,183	8,851	35,500	265,540	0.06		591,667	4,425,667
	1993	P006	30	13.89	Neuman	1,143	8,552	34,300	256,564	0.02		1,715,000	12,828,200
	1993	P006	30	13.89	Neuman	1,143	8,552	34,300	256,564		0.06	571,667	4,276,067
	1993	P009	58	30	Theis	936	7,003	54,300	406,164	0.11		493,636	3,692,400
	1993	P009	58	30	Neuman	847	6,332	49,100	367,268		0.13	377,692	2,825,138
	1993	P009	58	13.89	Neuman	819	6,126	47,500	355,300	0.004		11,875,000	88,825,000
	1993	P009	58	13.89	Neuman	819	6,126	47,500	355,300		0.13	365,385	2,733,077
	1993	P013	82	30	Theis	711	5,318	58,300	436,084	0.13		448,462	3,354,492
	1993	P013	82	30	Neuman	584	4,369	47,900	358,292		0.1	479,000	3,582,920
	1993	P013	82	13.89	Neuman	368	2,755	30,200	225,896	0.03		1,006,667	7,529,867
	1993	P013	82	13.89	Neuman	368	2,755	30,200	225,896		0.1	302,000	2,258,960
	1993	P018	95	30	Theis	481	3,598	45,700	341,836	0.13		351,538	2,629,508
	1993	P018	95	30	Neuman	481	3,598	45,700	341,836		0.14	326,429	2,441,686
	1993	P018	95	13.89	Neuman	517	3,866	49,100	367,268	0.06		818,333	6,121,133
	1993	P018	95	13.89	Neuman	517	3,866	49,100	367,268		0.07	701,429	5,246,686

Table A.I.1 Comparison of Aquifer Parameters of Mound Wells and Piezometers (cont.)

Test Ref	Test Year	Well No.	Aquifer Thickness (feet)	Test Duration (days)	Analyses Method	Hydraulic Conduct. (ft/day)	Hydraulic Conduct. (gal/day/ft²)	Transmissivity (Ft²/day)	Transmissivity (gal/day/ft)	Storage Coefficient S	Specific Yield Sy	Diffusivity (Ft²/day)	Diffusivity (gal/day/ft)
e	1993	P027	45	30	Neuman	753	5,635	33,900	253,572		0.11	308,182	2,305,200
	1993	P027	45	13.89	Neuman	718	5,369	32,300	241,604	0.1		323,000	2,416,040
	1993	P027	45	13.89	Neuman	718	5,369	32,300	241,604		0.17	190,000	1,421,200
	1993	P029	140	30	Theis	399	2,981	55,800	417,384	0.09		620,000	4,637,600
	1993	P029	140	30	Neuman	413	3,088	57,800	432,344		0.08	722,500	5,404,300
	1993	P029	140	13.89	Neuman	364	2,720	50,900	380,732	0.009		5,655,556	42,303,556
	1993	P029	140	13.89	Neuman	364	2,720	50,900	380,732		0.1	509,000	3,807,320
	1993	P032	133	30	Neuman	401	2,998	53,300	398,684		0.09	592,222	4,429,822
	1993	P032	133	30	Hantush	338	2,525	44,900	335,852		0.09	498,889	3,731,689
	1993	P032	133	13.89	Neuman	415	3,104	55,200	412,896	0.001	0.07	55,200,000	412,896,000
	1993	P032	133	13.89	Neuman	415	3,104	55,200	412,896		0.07	788,571	5,898,514
ESTIMATED AQUIFER CHARACTERISTICS USING ASSIGNED VALUES FOR STORITIVITY AND CALCULATED DIFFUSIVITY FROM THIS STUDY.													
										Assigned			
f	1994	P001	11	5.38	Ferris T-L	280	2,095	3,081	23,045	0.005		616,174	4,609,597
	1994	P008	30		Pinder et al	301	2,254	9,039	67,612	0.07		129,128	966,008
	1994	P008	30	5.38	Ferris T-L	306	2,287	9,173	68,613	0.015		611,522	4,574,793
	1994	P014	15		Pinder et al	268	2,002	4,015	30,033	0.015		267,677	2,002,492
	1994	P014	15	5.38	Ferris T-L	332	2,481	4,975	37,214	0.008		621,888	4,652,347
	1994	P017	135	5.38	Ferris T-L	244	1,828	32,988	246,747	0.06		549,793	4,113,003
	1994	P020	135	5.38	Ferris T-L	252	1,881	33,954	253,978	0.06		565,906	4,233,540
	1994	0302	115		Pinder et al	298	2,226	34,220	255,966	0.016		2,138,752	16,000,000
	1994	0302	115	5.38	Ferris T-L	305	2,284	35,108	262,610	0.06		585,138	4,377,418
	1994	0343	75	5.38	Ferris T-L	312	2,334	23,406	175,073	0.04		585,138	4,377,418
	1994	0387	40	5.38	Ferris T-L	264	1,972	10,547	78,888	0.017		620,384	4,641,091

Table A.I.1 Comparison of Aquifer Parameters of Mound Wells and Piezometers (cont.)

Test References:

a Dames and Moore, 1976
b Department of Energy, 1990
c Earth Science Laboratories, Inc., 1961
d Terran Corporation, 1987
e Roy F. Weston, Inc., 1990
f Analysis used in this investigation

Method References:

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Bedrock Topography Array - Bottom Layer 2 Array

Row \ Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		20	21	22	23	24	25	26
1	850	850	850	850	850	845	835	825	825	820	820	820	815	815	815	810	810	805	800	790	775	760	740	725	700	675
2	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	835	825	815	805	780	755	730	710	685
3	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	840	825	820	810	800	770	750	720	700	655	635
4	850	850	850	850	850	850	850	850	850	850	840	825	810	795	785	775	760	755	740	720	700	660	640	625	605	597
5	850	850	850	850	850	850	850	845	825	810	790	780	765	755	740	730	715	700	660	640	620	600	598	596	594	592
6	850	850	850	850	850	835	815	795	785	770	760	745	735	715	705	680	660	630	610	598	594	590	587	583	581	580
7	850	850	850	850	825	800	785	770	760	745	735	725	715	700	675	650	620	598	595	590	584	580	578	575	572	569
8	850	850	850	840	800	785	765	755	745	735	725	712	700	675	650	625	598	592	586	580	577	572	568	565	562	560
9	850	850	850	825	785	770	750	740	735	725	715	705	685	665	635	605	595	585	577	572	569	566	563	558	556	554
10	850	850	850	805	780	755	743	735	725	715	710	690	670	650	625	597	586	580	572	568	565	560	557	554	552	549
11	850	850	840	790	770	748	740	730	718	712	700	680	660	638	610	594	582	574	568	563	558	556	552	549	548	546
12	850	850	825	785	755	740	730	720	712	705	688	670	648	625	600	587	575	567	562	557	553	550	548	546	545	547
13	850	850	810	775	750	735	720	712	705	690	680	660	637	612	595	580	570	560	558	552	548	547	545	546	548	549
14	850	850	800	765	740	730	715	705	695	685	665	645	625	600	585	575	561	557	552	548	547	546	547	549	554	560
15	850	850	795	760	738	720	710	700	688	670	650	630	605	590	578	564	557	553	548	547	547	548	551	559	563	570
16	850	850	790	755	735	715	705	690	670	660	638	610	595	580	571	560	554	549	547	547	548	553	562	568	577	580
17	850	850	785	748	725	710	695	680	665	645	620	598	585	576	563	557	552	547	546	548	552	562	570	578	587	595
18	850	850	785	740	720	705	685	665	650	630	60	590	580	570	560	554	549	545	548	553	560	570	579	585	598	605
19	850	850	775	735	715	690	670	650	635	605	592	582	576	563	557	551	547	547	551	560	570	580	590	600	609	618
20	850	850	760	725	700	675	650	630	610	595	585	577	562	557	552	548	547	550	562	575	583	593	603	612	625	635
21	850	840	745	715	680	655	630	610	595	585	578	562	557	552	548	546	550	562	576	585	598	610	620	632	641	647
22	850	820	740	700	665	630	612	595	585	578	562	557	554	548	546	550	563	578	590	603	615	628	640	647	657	665
23	825	780	720	680	645	620	600	585	578	561	555	549	545	548	555	570	585	600	610	622	637	647	655	665	672	680
24	775	750	718	681	648	613	592	580	564	553	548	545	547	552	568	583	602	615	637	641	650	661	667	675	683	700
25	788	763	728	694	650	610	584	572	560	549	545	546	550	557	569	582	597	610	623	641	653	668	682	691	699	722
26	796	769	738	700	650	606	583	568	556	548	547	552	556	559	572	583	593	603	618	631	644	658	667	676	695	721
27	804	775	740	700	650	604	582	565	554	545	555	565	570	575	582	587	595	600	612	622	638	650	662	679	690	700
28	813	779	743	700	650	604	581	562	552	549	563	577	583	585	588	593	596	598	605	617	630	644	657	670	682	695
29	825	781	745	700	652	606	580	560	550	550	565	575	582	584	586	590	593	597	602	614	623	639	650	662	675	688
30	837	787	747	700	653	608	580	559	550	549	560	570	578	582	585	587	592	595	599	609	619	631	645	657	670	680
31	849	792	750	700	655	610	580	558	549	547	555	562	570	578	582	585	587	592	597	605	615	625	639	650	662	672
32	850	797	750	700	655	610	580	557	548	545	549	555	562	568	576	582	585	590	595	602	610	620	632	643	650	668
33	850	800	750	700	658	610	580	557	548	546	548	550	555	562	570	577	583	587	592	598	605	615	622	635	648	657
34	850	812	750	700	658	612	582	857	549	547	547	547	550	557	564	572	579	583	588	595	601	609	615	620	640	644
35	850	820	758	700	660	615	583	560	550	548	546	545	545	550	560	567	574	580	584	590	595	603	605	598	598	621
36	850	831	763	706	663	620	586	560	552	548	544	540	540	542	550	561	568	572	578	582	584	590	590	565	560	610
37	850	840	765	710	663	625	590	570	555	547	543	540	540	540	542	548	555	559	562	568	570	574	575	579	598	620
38	850	850	775	718	669	625	593	575	555	548	540	540	540	540	540	540	544	547	552	555	561	568	578	600	615	640
39	850	850	780	720	675	637	600	582	562	550	540	540	540	540	540	540	540	540	542	550	557	569	590	611	632	648
40	850	850	789	725	678	637	606	587	570	555	540	540	540	540	540	540	540	540	540	544	552	565	590	612	633	648

Bedrock Topography Array - Bottom Layer 2 Array

Row \ Column	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
1	650	625	605	598	595	592	589	586	583	580	576	572	568	564	560	558	556	554	552	548	544	540	540	540	540	555
2	650	630	610	598	595	592	589	586	583	580	576	572	566	562	558	556	554	552	550	548	544	540	540	540	540	555
3	615	600	587	586	585	584	583	582	581	578	573	568	563	558	556	554	552	547	543	540	540	540	540	540	543	560
4	595	593	591	589	587	585	583	581	576	570	565	562	558	554	551	547	542	540	540	540	540	540	540	543	560	590
5	590	588	586	584	582	580	576	572	568	564	557	550	548	544	540	540	540	540	540	540	540	540	550	570	590	610
6	579	578	577	575	570	565	562	560	555	546	543	540	540	540	540	540	540	540	540	545	555	565	580	600	610	620
7	567	565	564	563	561	556	550	544	540	540	540	540	540	540	540	540	540	550	555	565	570	580	600	610	620	640
8	558	556	554	551	548	546	542	540	540	540	540	540	540	540	543	548	555	562	571	575	585	595	610	620	630	652
9	552	550	548	547	545	545	542	541	542	543	544	545	546	548	553	558	563	571	577	587	594	605	615	630	645	658
10	548	547	546	545	547	548	546	544	546	548	551	552	555	557	560	565	573	577	588	593	603	615	625	640	653	665
11	545	546	547	548	549	550	559	560	561	562	562	563	564	565	566	573	579	588	593	603	615	605	635	651	659	675
12	548	549	553	558	564	568	571	570	570	566	567	567	568	569	574	579	589	594	605	617	625	635	650	658	670	685
13	554	559	564	568	572	576	578	579	579	578	577	576	575	575	580	589	595	606	620	630	638	650	658	667	680	690
14	563	569	576	579	583	588	589	590	590	587	585	583	582	583	590	600	608	622	633	642	653	660	667	678	690	695
15	577	580	585	595	598	599	600	600	600	599	599	598	597	596	601	617	626	636	649	656	665	672	680	693	703	705
16	590	596	600	608	613	615	615	615	615	615	615	615	617	619	625	633	645	655	665	673	680	687	697	707	715	712
17	605	610	617	622	627	627	626	626	625	626	627	630	633	640	650	657	665	675	682	690	700	705	713	722	730	722
18	615	622	630	637	641	643	642	641	641	642	645	650	65	662	670	680	688	695	703	712	718	722	737	735	744	733
19	628	638	642	644	646	647	648	650	654	660	666	673	680	690	698	710	720	725	730	735	736	738	742	752	762	745
20	642	647	648	652	655	657	660	670	680	688	696	715	730	750	758	770	770	770	765	760	759	760	765	768	770	760
21	655	662	666	670	678	685	690	695	730	755	770	785	795	808	820	827	830	820	812	806	798	790	785	778	777	780
22	673	678	685	690	695	705	740	782	795	810	830	850	860	860	860	860	860	858	840	820	810	795	785	783	785	790
23	695	730	760	720	760	798	820	850	860	860	860	860	860	860	860	860	860	860	850	835	820	803	783	770	770	795
24	745	760	715	779	801	825	845	860	860	860	860	860	860	860	860	860	856	841	820	800	760	735	780	801	818	840
25	750	725	752	773	795	822	835	843	850	855	860	860	860	860	848	830	818	802	783	730	780	802	815	842	860	868
26	715	732	742	758	779	799	815	821	821	822	826	830	835	830	820	808	792	776	760	750	797	818	841	865	863	877
27	712	724	735	749	772	788	788	790	794	795	798	801	801	801	795	782	768	768	720	770	801	830	848	866	875	880
28	707	720	729	744	768	780	770	770	780	776	774	778	781	782	778	767	750	762	730	780	798	825	858	869	880	880
29	700	710	722	740	742	740	739	738	739	740	748	755	760	760	759	751	738	715	750	787	810	830	861	872	880	880
30	692	701	709	717	719	717	720	720	718	721	725	730	732	739	738	731	715	730	758	788	812	839	862	876	880	880
31	682	690	696	701	702	703	703	702	702	701	701	701	700	705	715	715	718	738	762	790	818	838	862	879	880	880
32	672	675	682	687	690	685	688	690	690	690	690	690	690	693	698	720	728	745	770	783	819	846	862	880	880	880
33	655	658	665	675	675	670	715	715	700	700	701	702	702	702	702	700	760	767	782	798	821	846	863	879	880	880
34	638	650	660	666	673	679	740	720	705	710	712	715	718	720	732	750	768	780	786	805	832	850	865	880	880	880
35	640	655	664	671	678	690	695	698	710	719	725	730	738	748	760	772	785	792	797	814	838	852	866	880	880	880
36	642	663	672	680	685	690	697	712	725	738	745	754	761	775	785	798	806	810	815	832	845	860	870	880	880	880
37	650	667	679	685	691	697	717	730	742	755	765	778	788	800	810	820	832	842	855	860	863	867	877	880	880	880
38	660	670	678	686	696	710	720	738	752	765	781	792	804	817	829	842	852	861	868	873	875	878	880	880	880	880
39	663	670	676	685	698	712	722	733	725	761	781	800	817	830	842	858	864	875	880	880	880	880	880	880	880	880
40	661	667	675	683	700	718	725	730	735	749	780	805	827	842	856	868	877	880	880	880	880	880	880	880	880	880

Bedrock Topography Array - Bottom Layer 2 Array

Row \ Column	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
40	661	667	675	683	700	718	725	730	735	749	780	805	827	842	856	868	877	880	880	880	880	880	880	880	880	880
41	658	665	672	679	698	715	725	730	735	740	780	815	835	849	862	879	880	880	880	880	880	880	880	880	880	880
42	646	656	658	667	693	713	725	741	752	770	792	818	838	852	865	879	880	880	880	880	880	880	880	880	880	880
43	638	650	662	672	686	708	722	745	772	792	805	818	836	848	861	870	872	877	879	880	880	880	880	880	880	880
44	623	645	659	670	682	698	712	734	760	782	800	812	825	838	850	856	858	861	865	869	871	874	879	880	880	880
45	615	640	655	668	675	685	700	720	740	768	786	798	810	820	840	845	845	846	850	855	857	861	868	871	880	880
46	600	630	648	660	660	670	688	708	728	745	769	782	793	702	813	822	828	830	835	840	842	843	850	860	869	880
47	585	620	643	644	640	648	670	692	712	730	752	768	778	788	797	805	812	817	820	822	828	830	833	844	858	880
48	578	612	623	613	614	628	650	680	700	718	738	752	767	777	785	795	800	805	808	810	814	817	819	833	855	880
49	560	610	610	595	596	615	628	662	682	702	720	740	758	768	780	790	792	795	798	800	804	808	808	822	855	880
50	549	575	582	585	590	604	625	645	670	690	708	725	741	760	780	782	784	786	785	790	795	798	798	820	857	880
51	540	546	555	565	580	595	618	638	655	678	695	712	728	743	758	769	775	775	778	783	784	781	800	820	853	880
52	540	540	540	544	565	585	604	627	644	661	681	700	716	731	745	753	758	762	769	770	770	789	808	830	860	880
53	530	530	535	538	552	573	595	618	634	648	664	681	701	719	735	745	748	752	757	762	780	798	815	838	865	880
54	520	518	525	533	545	565	584	608	625	638	650	665	682	708	721	738	741	750	762	772	785	800	822	843	869	880
55	516	516	518	528	538	550	576	600	621	628	635	650	670	700	693	728	743	754	763	774	788	805	828	848	865	880
56	516	514	515	520	530	545	563	588	605	610	618	630	655	690	708	722	742	753	764	776	791	810	834	852	864	880
57	515	510	511	515	520	532	547	562	572	580	590	602	625	667	688	710	739	750	762	777	792	814	835	850	862	876
58	515	509	508	509	513	518	528	538	540	540	540	554	575	613	652	685	715	741	760	776	791	808	823	840	853	869
59	515	509	508	508	507	508	509	510	505	500	500	520	550	595	635	665	700	734	745	763	780	796	809	832	838	855
60	513	509	507	507	508	508	510	515	530	540	580	605	632	653	666	677	695	712	724	740	760	775	795	807	820	837
61	514	510	509	511	517	525	540	552	572	585	598	620	638	650	667	680	694	705	720	728	736	748	765	783	801	820
62	521	518	517	518	525	535	545	557	571	585	602	620	638	652	670	683	693	702	714	722	727	733	739	758	777	798
63	550	540	538	535	538	540	547	558	575	592	608	620	635	650	675	683	692	700	710	720	722	727	733	738	748	775
64	564	556	550	540	535	538	545	558	575	592	610	625	640	650	650	650	650	650	650	650	650	650	650	650	650	650
65	582	572	560	552	540	535	538	550	565	585	600	615	640	650	650	650	650	650	650	650	650	650	650	650	650	650
66	607	592	572	560	552	542	535	538	550	565	585	600	620	640	650	650	650	650	650	650	650	650	650	650	650	650
67	606	592	578	565	557	550	540	535	538	545	563	575	588	613	638	650	650	650	650	650	650	650	650	650	650	650
68	595	580	572	565	558	552	542	537	535	538	542	550	563	581	600	625	650	650	650	650	650	650	650	650	650	650
69	578	573	568	563	558	552	545	538	535	535	537	542	548	560	575	590	613	640	650	650	650	650	650	650	650	650
70	571	568	565	562	557	550	545	538	535	534	535	538	543	548	560	575	595	618	640	650	650	650	650	650	650	650
71	567	564	561	558	553	548	543	538	535	534	535	538	542	547	550	575	600	620	640	650	650	650	650	650	650	650

Bedrock Topography Array - Bottom Layer 2 Array

Row \ Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		20	21	22	23	24	25	26
40	850	850	789	725	678	637	606	587	570	555	540	540	540	540	540	540	540	540	540	544	552	565	590	612	633	648
41	850	850	800	731	688	640	610	593	580	560	550	540	540	540	540	540	540	540	540	541	549	562	582	602	623	643
42	850	850	810	737	694	648	614	598	584	570	556	546	540	540	540	540	540	540	540	540	545	557	572	590	610	632
43	850	850	818	744	698	650	618	604	590	579	564	555	548	541	540	540	540	540	540	540	541	547	560	574	592	615
44	850	850	830	750	702	654	625	608	597	585	575	563	555	549	542	540	540	540	540	540	540	540	548	561	578	598
45	850	850	840	763	707	660	631	613	602	590	582	571	563	556	550	544	540	540	540	540	540	540	540	549	562	582
46	850	850	850	774	712	668	637	621	606	596	587	580	570	563	556	550	544	540	540	540	540	540	540	540	550	575
47	850	850	850	785	720	675	640	625	612	601	593	585	578	569	562	556	549	543	540	540	540	540	540	540	540	555
48	850	850	850	794	730	680	650	636	622	608	598	590	583	577	569	562	555	548	541	540	540	540	540	540	540	540
49	850	850	850	800	741	695	654	638	626	614	602	596	588	582	575	567	560	553	546	540	540	540	540	540	540	540
50	850	850	850	806	747	702	665	644	633	622	611	600	594	586	581	575	565	560	552	544	540	540	540	540	540	540
51	850	850	850	813	753	710	673	648	638	628	618	608	599	593	585	580	574	564	557	548	540	540	540	540	540	540
52	850	850	850	815	756	715	685	652	644	634	624	614	604	599	592	585	579	570	562	553	544	540	540	540	540	540
53	850	850	850	815	762	725	695	662	647	639	631	623	615	607	600	593	584	576	565	557	548	540	540	538	535	535
54	850	850	850	814	765	730	700	670	650	644	637	630	623	616	610	602	592	582	572	560	551	543	538	533	528	523
55	850	850	850	814	770	737	707	675	655	645	638	631	624	622	620	615	600	588	576	562	553	546	539	534	528	522
56	850	850	850	814	770	738	711	687	663	647	640	633	626	620	620	620	608	590	578	562	555	547	540	534	527	522
57	850	850	850	812	770	739	719	695	680	651	644	638	628	623	620	618	605	590	578	564	555	548	542	535	528	521
58	850	850	850	809	770	738	718	700	682	663	648	639	630	621	612	603	597	587	577	563	556	548	542	535	528	521
59	850	850	850	808	768	738	718	700	687	670	656	645	632	620	608	598	592	583	574	562	554	547	540	535	528	521
60	850	850	847	803	762	739	719	703	690	680	669	656	643	625	606	598	590	582	574	562	552	544	539	532	525	519
61	850	850	830	798	760	738	718	703	690	684	675	666	660	644	625	605	595	587	581	571	562	550	545	540	528	519
62	830	830	820	790	760	735	720	702	695	688	680	670	663	655	648	631	620	600	593	585	577	570	563	552	546	538
63	825	825	815	784	755	731	715	700	694	688	682	676	670	664	658	652	643	631	618	606	595	585	576	570	564	557
64	825	825	810	778	750	730	710	700	695	690	685	680	675	671	666	661	656	652	643	631	625	612	600	590	580	571
65	825	825	800	770	745	720	704	698	695	691	687	683	679	675	671	667	664	661	657	653	650	644	631	618	606	600
66	810	815	790	763	743	718	700	693	690	687	684	681	678	675	673	670	667	664	661	658	655	652	645	632	626	619
67	780	780	780	756	773	706	697	691	687	684	681	678	675	675	673	670	667	664	661	658	655	652	644	631	625	618
68	775	775	770	750	720	698	691	686	682	678	674	670	666	662	658	654	650	646	643	639	634	625	625	618	610	603
69	775	775	763	740	703	688	680	675	668	664	660	656	652	645	639	633	630	625	625	618	615	613	608	604	600	588
70	775	775	756	725	694	680	672	665	660	655	650	640	625	612	600	597	595	593	591	589	587	585	583	580	577	574
71	775	775	745	706	683	670	660	654	645	637	625	612	600	597	595	593	591	589	587	585	583	580	579	576	573	570

APPENDIX B

FLOW MODEL CONTROL POINTS AND CALIBRATED MODEL OUTPUT

Table B.I.1. Flow Model Control Point Locations and Comparison of Observed Water Level and Modeled Water Level and the Resulting Difference

Well ID	Row	Column	SEPT 93 WLS (Feet, MSL)	Modeled Head (Feet, MSL)	Difference (Feet)
327	5	29	682.67	682.42	0.25
329	7	42	683	682.65	0.35
333	13	26	682	681.91	0.09
336	14	40	682.56	682.49	0.07
337	15	40	682.5	682.48	0.02
118	17	35	682.39	682.26	0.13
138	20	31	682.07	682.03	0.05
P019	28	8	681.14	681.54	-0.40
P035	28	13	681.25	681.53	-0.28
301	28	20	681.43	681.39	0.04
123	33	25	680.77	681.09	-0.32
347	33	29	680.79	681.01	-0.22
124	34	25	680.76	681.06	-0.30
389	34	27	680.79	681.02	-0.23
315	34	29	680.77	680.99	-0.22
P026	35	25	680.82	681.02	-0.20
387	35	27	680.76	680.98	-0.22
379	35	30	680.79	680.97	-0.18
P020	36	8	680.99	681.41	-0.42
128	36	17	680.89	681.15	-0.26
5	36	20	680.8	681.07	-0.27
383	36	23	680.73	681.01	-0.28
126	36	25	680.72	680.99	-0.27
P007	36	28	680.71	680.93	-0.22
108	37	10	681.24	681.35	-0.11
P016	37	12	681.08	681.26	-0.18
152	37	28	680.62	680.88	-0.26
129	39	25	680.74	680.84	-0.10
307	39	28	680.62	680.73	-0.11
P001	39	29	680.48	680.71	-0.23
376	40	26	680.35	680.73	-0.38

Table B.I.1. Flow Model Control Point Locations and Comparison of Observed Water Level and Modeled Water Level and the Resulting Difference (cont.)

Well ID	Row	Column	SEPT 93 WLS (Feet, MSL)	Modeled Head (Feet, MSL)	Difference (Feet)
306	40	27	680.46	680.69	-0.23
P003	40	28	680.49	680.65	-0.16
P005	40	29	680.64	680.60	0.04
63	41	29	680.21	680.51	-0.30
P017	42	12	680.8	681.06	-0.26
P018	42	21	680.6	680.76	-0.16
P009	42	26	680.25	680.57	-0.32
305	42	29	680.34	680.42	-0.08
130	43	15	680.64	680.92	-0.28
378	43	26	680.14	680.49	-0.35
154	43	28	680.27	680.36	-0.09
P015	44	31	680.12	680.08	0.04
156	45	23	680.19	680.50	-0.31
P025	45	28	680.01	680.11	-0.10
P027	45	29	679.99	680.03	-0.04
P031	47	29	679.72	679.62	0.10
P029	48	26	679.89	680.02	-0.13
P032	50	28	679.98	679.52	0.46
P033	50	31	679.83	679.46	0.37
P034	51	24	680.27	680.12	0.15
319	52	29	680.03	679.67	0.36
P039	56	15	680.47	680.29	0.18
320	57	31	679.99	679.73	0.26
159	60	20	680.19	679.72	0.47
158	60	31	679.81	679.52	0.29
Maximum Error		0.47	ME	MAE	RMS
Minimum Error		-0.42	-0.08	0.21	0.24

Table B.I.2. Flow Model Control Point Locations and Comparison of Observed Water Level and Modeled Water Level for Model Verification

Well ID	Row	Column	June, 93 WLS (Feet, MSL)	Modeled Head (Feet, MSL)	Difference (Feet)
327	5	29	683.2	683.05	0.16
329	7	42	683.7	683.26	0.44
333	13	26	682.9	682.42	0.48
336	14	40	683.54	683.07	0.47
337	15	40	683.49	683.05	0.44
118	17	35	683.3	682.79	0.51
138	20	31	682.7	682.48	0.22
P019	28	8	681.81	682.21	-0.40
P035	28	13	681.83	682.21	-0.38
301	28	20	681.6	682.14	-0.54
123	33	25	681.24	682.03	-0.79
347	33	29	681.2	682.00	-0.80
124	34	25	681.27	682.02	-0.75
389	34	27	681.2	682.00	-0.80
315	34	29	681.19	681.99	-0.80
P026	35	25	681.33	682.00	-0.67
387	35	27	681.2	681.98	-0.78
379	35	30	681.26	681.98	-0.72
P020	36	8	681.6	682.13	-0.53
128	36	17	681.48	682.05	-0.57
5	36	20	681.39	682.02	-0.63
383	36	23	681.3	681.99	-0.69
126	36	25	681.24	681.99	-0.75
P007	36	28	681.15	681.95	-0.80
108	37	10	681.61	682.11	-0.50
P016	37	12	681.57	682.09	-0.52
152	37	28	681.09	681.92	-0.83
129	39	25	681.03	681.92	-0.89
307	39	28	680.99	681.84	-0.85
P001	39	29	680.93	681.82	-0.89
376	40	26	681.44	681.84	-0.40
306	40	27	680.93	681.81	-0.88

Table B.I.2. Flow Model Control Point Locations and Comparison of Observed Water Level and Modeled Water Level for Model Verification (cont.)

Well ID	Row	Column	June, 93 WLS (Feet, MSL)	Modeled Head (Feet, MSL)	Difference (Feet)
P003	40	28	681.01	681.78	-0.77
P005	40	29	681	681.75	-0.75
63	41	29	680.84	681.69	-0.85
P017	42	12	681.31	682.02	-0.71
P018	42	21	681.03	681.87	-0.84
P009	42	26	680.87	681.75	-0.88
305	42	29	680.75	681.63	-0.88
130	43	15	681.26	681.96	-0.70
378	43	26	680.77	681.70	-0.93
154	43	28	680.6	681.60	-1.00
P015	44	31	680.49	681.39	-0.90
156	45	23	680.8	681.73	-0.93
P025	45	28	680.48	681.42	-0.94
P027	45	29	680.47	681.35	-0.88
P031	47	29	680.32	681.02	-0.70
P029	48	26	680.42	681.40	-0.98
P032	50	28	680.46	681.01	-0.55
P033	50	31	680.25	681.00	-0.75
P034	51	24	680.7	681.56	-0.86
319	52	29	680.51	681.22	-0.71
P039	56	15	680.96	681.78	-0.82
320	57	31	680.59	681.43	-0.84
159	60	20	680.82	681.57	-0.75
158	60	31	680.51	681.41	-0.90
Maximum Error		0.513	ME	MAE	RMS
Minimum Error		-1.0	-0.59	0.68	0.72

MODFLOWP VERSION 1.9 01JAN1994

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1              U.S. GEOLOGICAL SURVEY MODULAR FINITE-DIFFERENCE GROUND-WATER MODEL - MODFLOWP VERSION
0OU-9 BVA Model Calibrated Model
  2 LAYERS       71 ROWS       52 COLUMNS
  1 STRESS PERIOD(S) IN SIMULATION
 MODEL TIME UNIT IS DAYS
0I/O UNITS:
 ELEMENT OF IUNIT:  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
        I/O UNIT: 11 12  0 14  0  0  0 18 19  0  0 22  0  0  0  0  0  0  0  0  0  0  0  0
0BAS1 -- BASIC MODEL PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT  1
 ARRAYS RHS AND BUFF WILL SHARE MEMORY.
 START HEAD WILL NOT BE SAVED -- DRAWDOWN CANNOT BE CALCULATED
   62895 ELEMENTS IN X ARRAY ARE USED BY BAS
   62895 ELEMENTS OF X ARRAY USED OUT OF 6000000
0BCF2 -- BLOCK-CENTERED FLOW PACKAGE, VERSION 2, 7/1/91 INPUT READ FROM UNIT 11
 STEADY-STATE SIMULATION
 CONSTANT HEAD CELL-BY-CELL FLOWS WILL BE PRINTED
 HEAD AT CELLS THAT CONVERT TO DRY =   999.99
 WETTING CAPABILITY IS NOT ACTIVE
    LAYER  AQUIFER TYPE
    ---------------
      1        1
      2        3
   18462 ELEMENTS IN X ARRAY ARE USED BY BCF
   81357 ELEMENTS OF X ARRAY USED OUT OF 6000000
0WEL1 -- WELL PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM 12
 MAXIMUM OF   10 WELLS
 CELL-BY-CELL FLOWS WILL BE PRINTED WHEN ICBCFL NOT 0
      44 ELEMENTS IN X ARRAY ARE USED FOR WELLS
   81401 ELEMENTS OF X ARRAY USED OUT OF 6000000
0RCH1 -- RECHARGE PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT 18
 OPTION 1 -- RECHARGE TO TOP LAYER
    3692 ELEMENTS OF X ARRAY USED FOR RECHARGE
   85093 ELEMENTS OF X ARRAY USED OUT OF 6000000
0RIV1 -- RIVER PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT 14
 MAXIMUM OF  242 RIVER NODES
 CELL-BY-CELL FLOWS WILL BE PRINTED
    1458 ELEMENTS IN X ARRAY ARE USED FOR RIVERS
   86551 ELEMENTS OF X ARRAY USED OUT OF 6000000
0SIP1 -- STRONGLY IMPLICIT PROCEDURE SOLUTION PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT 19
 MAXIMUM OF 300 ITERATIONS ALLOWED FOR CLOSURE
  5 ITERATION PARAMETERS
   30741 ELEMENTS IN X ARRAY ARE USED BY SIP
  117292 ELEMENTS OF X ARRAY USED OUT OF 6000000
1OU-9 BVA Model Calibrated Model
0

                    BOUNDARY ARRAY FOR LAYER  1 WILL BE READ ON UNIT  1 USING FORMAT: (25I3)
                ------------------------------------------------------------------------

      1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
     41 42 43 44 45 46 47 48 49 50 51 52
 ..................................................................................................
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BOUNDARY ARRAY FOR LAYER 2 WILL BE READ ON UNIT 1 USING FORMAT: (25I3)

```
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0AQUIFER HEAD WILL BE SET TO  999.99     AT ALL NO-FLOW NODES (IBOUND=0).
0


                    INITIAL HEAD FOR LAYER  1 WILL BE READ ON UNIT  1 USING FORMAT: (10e12.4)
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0                                INITIAL HEAD =  680.4000    FOR LAYER  2
0HEAD PRINT FORMAT IS FORMAT NUMBER  0   DRAWDOWN PRINT FORMAT IS FORMAT NUMBER  0
0HEADS WILL BE SAVED ON UNIT 30   DRAWDOWNS WILL BE SAVED ON UNIT  0
0OUTPUT CONTROL IS SPECIFIED EVERY TIME STEP
0                              COLUMN TO ROW ANISOTROPY =  1.000000
0
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DELR WILL BE READ ON UNIT 11 USING FORMAT: (10E12.4)

500.00	500.00	500.00	450.00	300.00	200.00	150.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
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  100.00    100.00    100.00    100.00    100.00    100.00    100.00    100.00    150.00    150.00
  200.00    300.00
0
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DELC WILL BE READ ON UNIT 11 USING FORMAT: (10E12.4)

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  500.00    500.00    500.00    500.00    400.00    300.00    200.00    150.00    100.00    100.00
  100.00    100.00    100.00    100.00    100.00    100.00    100.00    100.00    100.00    150.00
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HYD. COND. ALONG ROWS FOR LAYER 1 WILL BE READ ON UNIT 11 USING FORMAT: (10e12.4)

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     1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
    16   17   18   19   20   21   22   23   24   25   26   27   28   29   30
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          VERT HYD COND /THICKNESS FOR LAYER  1 WILL BE READ ON UNIT 11 USING FORMAT: (10e12.4)
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      1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
     16   17   18   19   20   21   22   23   24   25   26   27   28   29   30
     31   32   33   34   35   36   37   38   39   40   41   42   43   44   45
     46   47   48   49   50   51   52
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0 1   0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.07  0.98
     0.94  0.91  0.88  0.85  0.82  0.80  0.77  0.74  0.71  0.69  0.67  0.66  0.65  0.63  0.63
     0.61  0.59  0.57  0.57  0.57  0.57  0.64
0 2   0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.14  0.98
     0.94  0.91  0.88  0.85  0.82  0.80  0.77  0.74  0.70  0.68  0.66  0.65  0.63  0.63  0.62
     0.61  0.59  0.57  0.57  0.57  0.57  0.64
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0 33 0.50 0.50 0.50 0.50 0.50 1.14 0.80 0.65 0.61 0.60 0.61 0.62 0.64 0.68 0.73
0.78 0.82 0.86 0.91 0.98 1.07 1.23 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50
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0 34 0.50 0.50 0.50 0.50 0.50 1.18 0.82 0.50 0.61 0.60 0.60 0.60 0.62 0.65 0.69
0.74 0.79 0.82 0.87 0.94 1.01 1.13 1.23 1.00 0.50 0.50 0.50 0.50 0.50 0.50
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0 35 0.50 0.50 0.50 0.50 0.50 1.23 0.82 0.67 0.62 0.61 0.60 0.59 0.59 0.62 0.67
0.71 0.75 0.80 0.83 0.89 0.94 1.04 1.07 0.98 0.98 0.50 0.50 0.50 0.50 0.50
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0 36 0.50 0.50 0.50 0.50 0.50 1.00 0.85 0.67 0.63 0.61 0.59 0.57 0.57 0.58 0.62
0.67 0.71 0.74 0.78 0.82 0.83 0.89 0.89 0.70 0.67 1.14 0.50 0.50 0.50 0.50
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0 37 0.50 0.50 0.50 0.50 0.50 0.50 0.89 0.73 0.64 0.60 0.58 0.57 0.57 0.57 0.58
0.61 0.64 0.66 0.68 0.71 0.73 0.75 0.76 0.79 0.98 1.00 0.50 0.50 0.50 0.50
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0 38 0.50 0.50 0.50 0.50 0.50 0.50 0.92 0.76 0.64 0.61 0.57 0.57 0.57 0.57 0.57
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0 39 0.50 0.50 0.50 0.50 0.50 0.50 1.00 0.82 0.68 0.62 0.57 0.57 0.57 0.57 0.57
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0 40 0.50 0.50 0.50 0.50 0.50 0.50 1.08 0.86 0.73 0.64 0.57 0.57 0.57 0.57 0.57
0.57 0.57 0.57 0.57 0.59 0.63 0.70 0.89 1.18 0.50 0.50 0.50 0.50 0.50 0.50
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0 41 0.50 0.50 0.50 0.50 0.50 0.50 1.14 0.92 0.80 0.67 0.62 0.57 0.57 0.57 0.57
0.57 0.57 0.57 0.57 0.58 0.61 0.68 0.82 1.03 0.50 0.50 0.50 0.50 0.50 0.50
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0 42 0.50 0.50 0.50 0.50 0.50 0.50 1.21 0.98 0.83 0.73 0.65 0.60 0.57 0.57 0.57
0.57 0.57 0.57 0.57 0.57 0.59 0.65 0.74 0.89 1.14 0.50 0.50 0.50 0.50 0.50
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0.50 0.50 0.50 0.50 0.50 0.50 0.50
0 43 0.50 0.50 0.50 0.50 0.50 0.50 1.29 1.05 0.89 0.79 0.69 0.64 0.61 0.58 0.57
0.57 0.57 0.57 0.57 0.57 0.58 0.60 0.67 0.75 0.91 1.23 0.50 0.50 0.50 0.50
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0.50 0.50 0.50 0.50 0.50 0.50 0.50
0 44 0.50 0.50 0.50 0.50 0.50 0.50 0.50 1.11 0.96 0.84 0.76 0.68 0.64 0.61 0.58
0.57 0.57 0.57 0.57 0.57 0.57 0.57 0.61 0.67 0.78 0.98 0.50 0.50 0.50 0.50
0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50

```
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 45  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.19  1.03  0.89  0.82  0.73  0.68  0.65  0.62
     0.59  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.61  0.68  0.82  1.23  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 46  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.08  0.95  0.86  0.80  0.73  0.68  0.65
     0.62  0.59  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.62  0.76  1.00  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 47  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.18  1.01  0.92  0.84  0.78  0.72  0.68
     0.65  0.61  0.58  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.64  0.84  1.00  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 48  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.11  0.98  0.89  0.82  0.78  0.72
     0.68  0.64  0.61  0.58  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.78  1.18  0.50  1.19
     1.21  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 49  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.21  1.03  0.95  0.87  0.82  0.76
     0.71  0.67  0.63  0.60  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.67  1.14  1.14  0.94
     0.95  1.23  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.16  1.00  0.93  0.85  0.81
     0.76  0.70  0.67  0.63  0.59  0.57  0.57  0.57  0.57  0.57  0.57  0.61  0.76  0.82  0.84
     0.89  1.05  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 51  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.29  1.11  0.99  0.92  0.84
     0.80  0.75  0.69  0.65  0.61  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.60  0.64  0.70
     0.80  0.94  1.29  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 52  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.21  1.05  0.99  0.91
     0.84  0.79  0.73  0.68  0.63  0.59  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.57  0.59
     0.70  0.84  1.05  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 53  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.23  1.10  1.00
     0.92  0.83  0.77  0.70  0.65  0.61  0.57  0.57  0.56  0.55  0.55  0.53  0.53  0.55  0.56
     0.63  0.75  0.94  1.29  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 54  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.25  1.14
     1.03  0.91  0.82  0.74  0.67  0.62  0.58  0.56  0.54  0.53  0.51  0.50  0.49  0.52  0.54
     0.59  0.70  0.83  1.11  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 55  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.00
     1.23  1.00  0.87  0.77  0.68  0.63  0.60  0.57  0.55  0.53  0.51  0.49  0.49  0.49  0.53
     0.56  0.62  0.77  1.00  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 56  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.00  1.00
     1.00  1.11  0.89  0.78  0.68  0.64  0.60  0.57  0.55  0.52  0.51  0.49  0.48  0.48  0.50
     0.53  0.59  0.68  0.87  1.07  1.14  1.29  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 57  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.00
     1.29  1.07  0.89  0.78  0.69  0.64  0.61  0.58  0.55  0.53  0.50  0.48  0.47  0.47  0.48
     0.50  0.54  0.60  0.68  0.74  0.80  0.89  1.03  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 58  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.18
     1.04  0.96  0.86  0.78  0.68  0.65  0.61  0.58  0.55  0.53  0.50  0.48  0.47  0.47  0.47
     0.48  0.49  0.53  0.56  0.57  0.57  0.57  0.63  0.76  1.19  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 59  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.00  1.11
     0.98  0.91  0.82  0.75  0.68  0.63  0.60  0.57  0.55  0.53  0.50  0.48  0.47  0.47  0.47
     0.46  0.47  0.47  0.47  0.46  0.44  0.44  0.50  0.62  0.94  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 60  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.08
     0.98  0.89  0.82  0.75  0.68  0.63  0.59  0.57  0.54  0.52  0.50  0.48  0.47  0.46  0.46
     0.47  0.47  0.47  0.48  0.53  0.57  0.80  1.07  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 61  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     1.07  0.94  0.86  0.81  0.73  0.68  0.62  0.59  0.57  0.53  0.50  0.48  0.47  0.47  0.47
     0.49  0.52  0.57  0.63  0.74  0.84  0.98  1.00  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 62  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  1.00  1.00  0.92  0.84  0.78  0.73  0.68  0.63  0.60  0.56  0.50  0.49  0.49  0.49
     0.52  0.55  0.59  0.65  0.73  0.84  1.03  1.00  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 63  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  1.29  1.08  0.94  0.84  0.77  0.73  0.69  0.65  0.62  0.57  0.56  0.55
     0.56  0.57  0.60  0.66  0.76  0.91  1.11  1.00  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 64  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  1.18  1.00  0.89  0.80  0.73  0.69  0.65  0.62  0.57
     0.55  0.56  0.59  0.66  0.76  0.91  1.14  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 65  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.29  1.08  1.00  0.82  0.74  0.67  0.63
```

```
     0.57  0.55  0.56  0.62  0.70  0.84  1.00  1.23  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 66  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.31  1.10  0.91  0.74  0.67
     0.63  0.58  0.55  0.56  0.62  0.70  0.84  1.00  1.00  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 67  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.29  1.08  0.91  0.78  0.70
     0.65  0.62  0.57  0.55  0.56  0.59  0.68  0.76  0.87  1.19  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 68  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.29  1.14  1.04  0.94  0.80  0.74  0.70
     0.66  0.63  0.58  0.56  0.55  0.56  0.58  0.62  0.68  0.81  1.00  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 69  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50
     0.50  0.50  0.50  0.50  1.29  1.23  1.19  1.11  1.05  1.00  0.87  0.78  0.75  0.71  0.68
     0.66  0.63  0.59  0.56  0.55  0.55  0.56  0.58  0.61  0.67  0.76  0.89  1.19  0.50  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 70  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.18  1.00
     0.96  0.94  0.92  0.90  0.88  0.86  0.84  0.82  0.80  0.78  0.75  0.73  0.71  0.70  0.68
     0.65  0.62  0.59  0.56  0.55  0.55  0.55  0.56  0.58  0.61  0.67  0.76  0.94  1.29  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0 71  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  0.50  1.18  1.00  0.96  0.94
     0.92  0.90  0.88  0.86  0.84  0.82  0.80  0.79  0.77  0.75  0.73  0.71  0.69  0.67  0.66
     0.63  0.61  0.58  0.56  0.55  0.55  0.55  0.56  0.58  0.60  0.62  0.76  1.00  1.00  0.50
     0.50  0.50  0.50  0.50  0.50  0.50  0.50
0
```

HYD. COND. ALONG ROWS FOR LAYER 2 WILL BE READ ON UNIT 11 USING FORMAT: (10e12.4)

```
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    16  17  18  19  20  21  22  23  24  25  26  27  28  29  30
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BOTTOM FOR LAYER 2 WILL BE READ ON UNIT 11 USING FORMAT: (10e12.4)

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     557.00 552.00 547.00 546.00 548.00 552.00 562.00 570.00 578.00 587.00 595.00 605.00 610.00 617.00 622.00
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     551.00 547.00 547.00 551.00 560.00 570.00 580.00 590.00 600.00 609.00 618.00 628.00 638.00 642.00 644.00
     646.00 647.00 648.00 650.00 654.00 660.00 666.00 673.00 680.00 690.00 698.00 710.00 720.00 725.00 730.00
     735.00 736.00 738.00 742.00 752.00 762.00 745.00
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     655.00 657.00 660.00 670.00 680.00 688.00 696.00 715.00 730.00 750.00 758.00 770.00 770.00 770.00 765.00
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0 21 850.00 840.00 745.00 715.00 680.00 655.00 630.00 610.00 595.00 585.00 578.00 562.00 557.00 552.00 548.00
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0 22 850.00 820.00 740.00 700.00 665.00 630.00 612.00 595.00 585.00 578.00 562.00 557.00 554.00 548.00 546.00
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820.00 810.00 795.00 785.00 783.00 785.00 790.00
0 23 825.00 780.00 720.00 680.00 645.00 620.00 600.00 585.00 578.00 561.00 555.00 549.00 545.00 548.00 555.00
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0 25 788.00 763.00 728.00 694.00 650.00 610.00 584.00 572.00 560.00 549.00 545.00 546.00 550.00 557.00 569.00
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0 26 796.00 769.00 738.00 700.00 650.00 606.00 583.00 568.00 556.00 548.00 547.00 552.00 556.00 559.00 572.00
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722.00 727.00 733.00 739.00 758.00 777.00 798.00
0 63 825.00 825.00 815.00 784.00 755.00 731.00 715.00 700.00 694.00 688.00 682.00 676.00 670.00 664.00 658.00

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    652.00 643.00 631.00 618.00 606.00 595.00 585.00 576.00 570.00 564.00 557.00 550.00 540.00 538.00 535.00
    538.00 540.00 547.00 558.00 575.00 592.00 608.00 620.00 635.00 650.00 675.00 683.00 692.00 700.00 710.00
    720.00 722.00 727.00 733.00 738.00 748.00 775.00
0 64  825.00 825.00 810.00 778.00 750.00 730.00 710.00 700.00 695.00 690.00 685.00 680.00 675.00 671.00 666.00
    661.00 656.00 652.00 643.00 631.00 625.00 612.00 600.00 590.00 580.00 571.00 564.00 556.00 550.00 540.00
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    667.00 664.00 661.00 657.00 653.00 650.00 644.00 631.00 618.00 606.00 600.00 582.00 572.00 560.00 552.00
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    670.00 667.00 664.00 661.00 658.00 655.00 652.00 645.00 632.00 626.00 619.00 607.00 592.00 572.00 560.00
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    593.00 591.00 589.00 587.00 585.00 583.00 580.00 579.00 576.00 573.00 570.00 567.00 564.00 561.00 558.00
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0                                   TOP =  620.0000    FOR LAYER  2
0


                    SOLUTION BY THE STRONGLY IMPLICIT PROCEDURE
                    --------------------------------------------
0                 MAXIMUM ITERATIONS ALLOWED FOR CLOSURE =     300
                        ACCELERATION PARAMETER =    1.0000
                  HEAD CHANGE CRITERION FOR CLOSURE =   0.10000E-03
                  SIP HEAD CHANGE PRINTOUT INTERVAL =       5
0                  CALCULATE ITERATION PARAMETERS FROM MODEL CALCULATED WSEED
1                 STRESS PERIOD NO.  1, LENGTH =  1.000000
                  ----------------------------------------

                  NUMBER OF TIME STEPS =   24

                  MULTIPLIER FOR DELT =    1.000

                 INITIAL TIME STEP SIZE = 0.4166667E-01
0        10 WELLS
                 LAYER   ROW   COL   STRESS RATE   WELL NO.
                 ---------------------------------------
                  1    49    29   -71710.        1
                  2    13    22   -0.12610E+06    2
                  2    10    21   -0.12610E+06    3
                  2     8    20   0.00000         4
                  2    14    17   0.00000         5
                  2    69    35   -18060.         6
                  2    69    33   -18060.         7
                  2    69    38   -18060.         8
                  2    70    34   -18060.         9
                  2    70    38   -18060.        10
0


                    RECHARGE WILL BE READ ON UNIT 18 USING FORMAT: (10e12.4)
                    ---------------------------------------------------------

     1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
    16   17   18   19   20   21   22   23   24   25   26   27   28   29   30
    31   32   33   34   35   36   37   38   39   40   41   42   43   44   45
    46   47   48   49   50   51   52
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242 RIVER REACHES

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LAYER	ROW	COL	STAGE	CONDUCTANCE	BOTTOM ELEVATION	RIVER REACH
1	1	34	682.7	43.20	677.0	1
1	1	35	682.7	43.20	677.0	2
1	2	31	682.7	43.20	678.3	3
1	2	32	682.7	43.20	678.3	4
1	2	33	682.7	43.20	678.3	5
1	3	28	682.7	43.20	679.5	6
1	3	29	682.7	43.20	679.5	7
1	3	30	682.7	43.20	679.5	8
1	3	31	682.7	43.20	679.5	9
1	4	26	682.7	43.20	679.4	10
1	4	27	682.7	43.20	679.4	11
1	5	26	682.7	4320.	679.3	12
1	5	27	682.7	4320.	679.3	13
1	6	26	682.6	4320.	679.0	14
1	6	27	682.6	4320.	679.0	15
1	6	28	682.6	4320.	679.0	16
1	7	26	682.6	4320.	678.5	17
1	7	27	682.6	4320.	678.5	18
1	7	28	682.6	4320.	678.5	19
1	8	26	682.6	4320.	678.1	20
1	8	27	682.6	4320.	678.1	21
1	9	25	682.6	4320.	677.2	22
1	9	26	682.6	4320.	677.2	23
1	9	27	682.6	4320.	677.2	24
1	10	25	682.6	4320.	677.2	25
1	10	26	682.6	4320.	677.2	26
1	10	27	682.6	4320.	677.2	27
1	11	25	682.6	7776.	677.2	28
1	11	26	682.6	7776.	677.2	29
1	12	24	682.6	7776.	677.3	30
1	12	25	682.6	7776.	677.3	31
1	12	26	682.6	7776.	677.3	32
1	13	24	682.5	7776.	677.4	33
1	13	25	682.5	7776.	677.3	34
1	14	23	682.5	7776.	677.1	35
1	14	24	682.5	7776.	677.1	36
1	14	25	682.5	7776.	677.1	37
1	15	23	682.5	7776.	676.8	38
1	15	24	682.5	7776.	677.1	39
1	15	25	682.5	7776.	677.1	40
1	16	22	682.5	7776.	677.1	41
1	16	23	682.5	7776.	677.1	42
1	16	24	682.5	7776.	676.8	43
1	17	22	682.5	7776.	677.3	44
1	17	23	682.5	7776.	677.3	45
1	17	24	682.5	1728.	677.1	46
1	18	21	682.5	1728.	677.1	47
1	18	22	682.5	1728.	677.1	48

1	18	23	682.5	1728.	677.1	49
1	19	20	682.5	1728.	676.8	50
1	19	21	682.5	1728.	676.8	51
1	19	22	682.5	1728.	676.8	52
1	20	20	682.5	777.6	676.9	53
1	20	21	682.5	777.6	676.9	54
1	21	19	682.5	777.6	676.5	55
1	21	20	682.5	777.6	676.5	56
1	22	18	682.5	267.8	676.3	57
1	22	19	682.5	267.8	676.3	58
1	23	16	682.5	302.4	676.4	59
1	23	17	682.5	302.4	676.6	60
1	24	15	682.5	777.6	676.8	61
1	25	13	682.5	777.6	675.5	62
1	26	12	682.5	777.6	675.6	63
1	26	13	682.5	777.6	675.5	64
1	27	11	682.5	777.6	675.6	65
1	27	12	682.5	777.6	675.6	66
1	28	10	682.5	777.6	675.6	67
1	28	11	682.5	777.6	675.6	68
1	28	12	682.5	777.6	675.6	69
1	29	10	682.5	777.6	675.2	70
1	29	11	682.5	777.6	675.2	71
1	29	12	682.5	777.6	675.2	72
1	30	10	682.5	587.5	674.8	73
1	30	11	682.5	587.5	674.8	74
1	31	9	682.5	777.6	675.0	75
1	31	10	682.5	777.6	675.0	76
1	31	11	682.5	777.6	675.0	77
1	32	9	682.5	440.6	675.1	78
1	32	10	682.5	440.6	675.1	79
1	32	11	682.5	440.6	675.1	80
1	33	9	682.5	146.9	674.9	81
1	33	10	682.5	146.9	674.9	82
1	34	9	682.5	25.92	674.5	83
1	34	10	682.5	25.92	674.5	84
1	35	8	682.5	777.6	674.3	85
1	35	9	682.5	777.6	674.3	86
1	35	10	682.5	777.6	674.3	87
1	36	8	682.5	777.6	674.7	88
1	36	9	682.5	777.6	674.7	89
1	36	10	682.5	777.6	674.7	90
1	37	8	682.5	777.6	675.1	91
1	37	9	682.5	777.6	675.1	92
1	37	10	682.5	777.6	675.1	93
1	38	8	682.5	777.6	674.9	94
1	38	9	682.5	777.6	674.9	95
1	39	8	682.5	777.6	674.7	96
1	39	9	682.5	777.6	674.7	97
1	40	8	682.5	43.20	674.6	98
1	40	9	682.5	43.20	674.6	99
1	41	8	682.5	43.20	674.5	100
1	41	9	682.5	43.20	674.5	101
1	42	8	682.5	43.20	675.9	102
1	42	9	682.5	43.20	675.9	103
1	43	8	682.5	43.20	675.2	104
1	43	9	682.5	43.20	675.2	105
1	43	10	682.5	43.20	675.2	106
1	44	8	682.5	43.20	675.4	107
1	44	9	682.5	43.20	675.4	108
1	44	10	682.5	43.20	675.6	109
1	45	8	682.5	43.20	675.6	110
1	45	9	682.5	43.20	675.6	111
1	45	10	682.5	43.20	675.6	112
1	46	8	682.5	43.20	675.9	113
1	46	9	682.5	43.20	675.9	114
1	46	10	682.5	43.20	676.2	115
1	47	8	682.5	43.20	676.2	116
1	47	9	682.5	43.20	676.2	117
1	47	10	682.5	43.20	675.9	118
1	48	8	682.5	43.20	675.9	119
1	48	9	682.5	43.20	675.9	120
1	48	10	682.5	43.20	675.6	121
1	49	8	682.5	43.20	675.6	122
1	49	9	682.5	43.20	675.6	123
1	49	10	682.5	43.20	675.6	124
1	50	8	682.5	43.20	675.5	125
1	50	9	682.5	43.20	675.5	126
1	50	10	682.5	43.20	675.5	127
1	51	9	682.5	43.20	675.3	128
1	51	10	682.5	43.20	675.3	129
1	52	9	682.5	43.20	674.8	130
1	52	10	682.5	43.20	674.8	131

1	53	9	682.5	43.20	674.3	132
1	53	10	682.5	43.20	674.3	133
1	53	11	682.5	43.20	674.2	134
1	54	9	682.5	43.20	674.2	135
1	54	10	682.5	43.20	674.2	136
1	54	11	682.5	43.20	674.1	137
1	55	10	682.5	43.20	674.1	138
1	55	11	682.5	43.20	674.1	139
1	56	10	682.5	43.20	674.4	140
1	56	11	682.5	43.20	674.7	141
1	56	12	682.5	43.20	674.7	142
1	57	10	682.5	43.20	674.7	143
1	57	11	682.5	43.20	674.7	144
1	57	12	682.5	43.20	675.2	145
1	58	11	682.5	43.20	675.6	146
1	58	12	682.5	86.40	675.6	147
1	58	13	682.5	86.40	675.2	148
1	59	12	682.5	86.40	674.9	149
1	59	13	682.5	86.40	674.9	150
1	59	14	682.5	86.40	675.0	151
1	60	14	682.5	129.6	674.7	152
1	60	15	682.5	129.6	674.7	153
1	60	16	682.5	129.6	674.7	154
1	61	15	682.5	129.6	674.8	155
1	61	16	682.5	129.6	674.8	156
1	61	17	682.5	129.6	674.8	157
1	62	17	682.5	129.6	675.2	158
1	62	18	682.5	129.6	675.2	159
1	62	19	682.5	129.6	675.2	160
1	63	18	682.5	129.6	674.1	161
1	63	19	682.5	129.6	674.1	162
1	63	20	682.5	129.6	674.1	163
1	63	21	682.5	129.6	674.1	164
1	64	20	682.5	129.6	674.7	165
1	64	21	682.5	129.6	674.9	166
1	64	22	682.5	129.6	674.9	167
1	64	23	682.5	129.6	675.1	168
1	65	25	682.5	129.6	675.6	169
1	65	26	682.5	129.6	675.6	170
1	65	27	682.5	129.6	675.6	171
1	66	27	682.5	129.6	675.1	172
1	66	28	682.5	129.6	675.3	173
1	66	29	682.5	129.6	675.3	174
1	66	30	682.5	129.6	675.3	175
1	66	31	682.5	129.6	675.5	176
1	66	32	682.5	129.6	675.5	177
1	67	30	682.5	129.6	675.3	178
1	67	31	682.5	129.6	675.0	179
1	67	32	682.5	129.6	675.5	180
1	67	33	682.5	129.6	675.5	181
1	67	34	682.5	129.6	675.5	182
1	67	35	682.5	129.6	676.4	183
1	67	36	682.5	129.6	676.4	184
1	68	34	682.5	129.6	676.6	185
1	68	35	682.5	129.6	676.5	186
1	68	36	682.5	129.6	676.6	187
1	68	37	682.5	129.6	676.6	188
1	68	38	682.5	129.6	676.7	189
1	68	39	682.5	129.6	676.7	190
1	68	40	682.5	129.6	676.7	191
1	69	39	682.5	129.6	676.7	192
1	69	40	682.5	129.6	676.6	193
1	69	41	682.5	129.6	676.6	194
1	69	42	682.5	129.6	676.6	195
1	69	43	682.5	129.6	676.6	196
1	70	43	682.5	129.6	676.6	197
1	70	44	682.5	129.6	676.6	198
1	71	42	682.5	129.6	676.6	199
1	71	43	682.5	129.6	676.6	200
1	71	44	682.5	129.6	676.6	201
1	1	36	682.7	43.20	677.0	202
1	4	28	682.7	43.20	679.4	203
1	5	28	682.7	4320.	679.3	204
1	7	25	682.6	4320.	678.5	205
1	8	25	682.6	4320.	678.1	206
1	10	24	682.6	4320.	677.2	207
1	11	24	682.6	7776.	677.2	208
1	13	23	682.5	7776.	677.4	209
1	15	22	682.5	7776.	676.8	210
1	18	24	682.5	1728.	677.1	211
1	19	23	682.5	1728.	676.8	212
1	20	22	682.5	1693.	676.9	213
1	21	21	682.5	1685.	676.5	214

```
          1    22   20  682.5     440.6       676.3      215
          1    23   18  682.5     561.6       676.6      216
          1    23   19  682.5     561.6       676.6      217
          1    24   16  682.5     985.0       676.8      218
          1    24   17  682.5     985.0       676.8      219
          1    25   14  682.5     1158.       675.5      220
          1    25   15  682.5     1158.       675.5      221
          1    26   14  682.5     1564.       675.5      222
          1    27   13  682.5     1028.       675.6      223
          1    30   12  682.5     760.3       674.8      224
          1    33   11  682.5     233.3       674.9      225
          1    34   11  682.5     25.92       674.5      226
          1    38   10  682.5     1590.       674.9      227
          1    39   10  682.5     1426.       674.7      228
          1    40   10  682.5     43.20       674.6      229
          1    41   10  682.5     43.20       674.5      230
          1    42   10  682.5     43.20       675.9      231
          1    51    8  682.5     43.20       675.3      232
          1    52    8  682.5     43.20       674.8      233
          1    53    8  682.5     43.20       674.3      234
          1    55    9  682.5     43.20       674.1      235
          1    55   12  682.5     43.20       674.1      236
          1    58   10  682.5     43.20       675.6      237
          1    59   11  682.5     86.40       674.9      238
          1    60   13  682.5     129.6       674.7      239
          1    62   16  682.5     129.6       675.2      240
          1    65   24  682.5     129.6       675.6      241
          1    65   23  682.5     129.6       675.6      242
0CELL CONVERSIONS FOR ITERATION=  1  LAYER= 2  TIME STEP=  1  STRESS PERIOD=  1     (ROW,COL)
 DRY( 18, 11)
0AVERAGE SEED = 0.00025438
 MINIMUM SEED = 0.00000127
0
  5 ITERATION PARAMETERS CALCULATED FROM AVERAGE SEED:

      0.0000000E+00  0.8737099E+00  0.9840508E+00  0.9979858E+00  0.9997456E+00
0
  142 ITERATIONS FOR TIME STEP  1 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 1    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0      0     0     0
   1 ITERATIONS FOR TIME STEP  2 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0      0     0     0
   1 ITERATIONS FOR TIME STEP  3 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0      0     0     0
   1 ITERATIONS FOR TIME STEP  4 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0      0     0     0
   1 ITERATIONS FOR TIME STEP  5 IN STRESS PERIOD  1
0MAXIMUM HEAD CHANGE FOR EACH ITERATION:
0 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE
LAYER,ROW,COL
 ------------------------------------------------------------------------------------------------------------------
 -0.2115E-04 (  1, 54, 39)
0
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0      0     0     0
   1 ITERATIONS FOR TIME STEP  6 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
```

```
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP  7 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP  8 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP  9 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP 10 IN STRESS PERIOD  1
0MAXIMUM HEAD CHANGE FOR EACH ITERATION:
0 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE
LAYER,ROW,COL
 ------------------------------------------------------------------------------------------------------------
 -0.1400E-04 (  1, 54, 39)
0
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP 11 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP 12 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP 13 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP 14 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP 15 IN STRESS PERIOD  1
0MAXIMUM HEAD CHANGE FOR EACH ITERATION:
0 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE
LAYER,ROW,COL
 ------------------------------------------------------------------------------------------------------------
 -0.1052E-04 (  1, 54, 39)
0
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
   0     0     0     0
   1 ITERATIONS FOR TIME STEP 16 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD   DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE   SAVE
 ----------------------------
```

```
  0     0     0     0
  1 ITERATIONS FOR TIME STEP  17 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
 HEAD   DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE   SAVE
-----------------------------
  0     0     0     0
  1 ITERATIONS FOR TIME STEP  18 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
 HEAD   DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE   SAVE
-----------------------------
  0     0     0     0
  1 ITERATIONS FOR TIME STEP  19 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
 HEAD   DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE   SAVE
-----------------------------
  0     0     0     0
  1 ITERATIONS FOR TIME STEP  20 IN STRESS PERIOD  1
0MAXIMUM HEAD CHANGE FOR EACH ITERATION:
0 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE
LAYER,ROW,COL
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 -0.8493E-05 (  1, 53, 38)
0
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
 HEAD   DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE   SAVE
-----------------------------
  0     0     0     0
  1 ITERATIONS FOR TIME STEP  21 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
 HEAD   DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE   SAVE
-----------------------------
  0     0     0     0
  1 ITERATIONS FOR TIME STEP  22 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
 HEAD   DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE   SAVE
-----------------------------
  0     0     0     0
  1 ITERATIONS FOR TIME STEP  23 IN STRESS PERIOD  1
0HEAD/DRAWDOWN PRINTOUT FLAG = 0    TOTAL BUDGET PRINTOUT FLAG = 0    CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
 HEAD   DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE   SAVE
-----------------------------
  0     0     0     0
  1 ITERATIONS FOR TIME STEP  24 IN STRESS PERIOD  1
0MAXIMUM HEAD CHANGE FOR EACH ITERATION:
0 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE
LAYER,ROW,COL
-----------------------------------------------------------------------------------------------------------
 -0.7421E-05 (  1, 53, 38)
0
0HEAD/DRAWDOWN PRINTOUT FLAG = 1    TOTAL BUDGET PRINTOUT FLAG = 1    CELL-BY-CELL FLOW TERM FLAG = 1
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
 HEAD   DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE   SAVE
-----------------------------
  1     0     1     0
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 26   RATE    459.5990
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 27   RATE    456.3550
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 28   RATE    450.2165
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 29   RATE    553.1006
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 30   RATE    572.5664
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 31   RATE    577.1325
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 32   RATE    574.9744
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 33   RATE    567.7283
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 34   RATE    556.9492
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 35   RATE    544.0294
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 36   RATE    532.3279
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 37   RATE    518.6753
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 38   RATE    504.3058
0  CONSTANT HEAD   PERIOD  1   STEP 24   LAYER  1   ROW  1   COL 39   RATE    488.7891
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0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 40  RATE   473.5467
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 41  RATE   455.9772
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 42  RATE   439.0013
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 43  RATE   421.1108
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 44  RATE   400.1917
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 45  RATE   385.4503
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 46  RATE   365.7840
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 47  RATE   346.7682
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 48  RATE   327.5557
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 49  RATE   464.0226
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 50  RATE   430.4388
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 51  RATE   523.6276
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW  1  COL 52  RATE   713.3268
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL  6  RATE  0.0000000
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL  7  RATE  -1173.340
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL  8  RATE  -830.2025
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL  9  RATE  -896.0874
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 10  RATE  -992.1124
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 11  RATE  -1122.118
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 12  RATE  -1219.640
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 13  RATE  -1289.839
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 14  RATE  -1336.463
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 15  RATE  -1362.094
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 16  RATE  -1368.329
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 17  RATE  -1355.881
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 18  RATE  -1324.625
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 19  RATE  -1949.138
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 20  RATE  -1922.176
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 21  RATE  -1906.431
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 22  RATE  -1890.916
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 23  RATE  -1876.402
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 24  RATE  -1850.523
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 25  RATE  -1811.923
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 26  RATE  -1753.767
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 27  RATE  -1668.494
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 28  RATE  -1549.978
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 29  RATE  -1394.192
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 30  RATE  -1207.965
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 31  RATE  -974.1157
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 32  RATE  -724.7357
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 33  RATE  -471.7346
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 34  RATE  -272.5926
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 35  RATE  -215.7273
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 36  RATE  -203.6102
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 37  RATE  -207.4388
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 38  RATE  -249.8060
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 39  RATE  -424.6684
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 40  RATE  -630.4615
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 41  RATE  -813.3076
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 42  RATE  -1000.440
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 43  RATE  -1141.936
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 44  RATE  -934.8638
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 45  RATE  -1030.519
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 46  RATE  -1110.849
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 47  RATE  -1178.063
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 48  RATE  -1234.029
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 49  RATE  -1937.817
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 50  RATE  -2014.738
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 51  RATE  -2771.219
0 CONSTANT HEAD  PERIOD 1  STEP 24  LAYER 1  ROW 71  COL 52  RATE  -4257.445
0       WELLS  PERIOD 1  STEP 24  WELL  1  LAYER 1  ROW  49  COL 29  RATE -71710.00
0       WELLS  PERIOD 1  STEP 24  WELL  2  LAYER 2  ROW  13  COL 22  RATE -126100.0
0       WELLS  PERIOD 1  STEP 24  WELL  3  LAYER 2  ROW  10  COL 21  RATE -126100.0
0       WELLS  PERIOD 1  STEP 24  WELL  4  LAYER 2  ROW   8  COL 20  RATE 0.0000000
0       WELLS  PERIOD 1  STEP 24  WELL  5  LAYER 2  ROW  14  COL 17  RATE 0.0000000
0       WELLS  PERIOD 1  STEP 24  WELL  6  LAYER 2  ROW  69  COL 35  RATE -18060.00
0       WELLS  PERIOD 1  STEP 24  WELL  7  LAYER 2  ROW  69  COL 33  RATE -18060.00
0       WELLS  PERIOD 1  STEP 24  WELL  8  LAYER 2  ROW  69  COL 38  RATE -18060.00
0       WELLS  PERIOD 1  STEP 24  WELL  9  LAYER 2  ROW  70  COL 34  RATE -18060.00
0       WELLS  PERIOD 1  STEP 24  WELL 10  LAYER 2  ROW  70  COL 38  RATE -18060.00
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH  3  LAYER 1  ROW  2  COL 31  RATE -9.352442
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH  4  LAYER 1  ROW  2  COL 32  RATE -9.484278
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH  5  LAYER 1  ROW  2  COL 33  RATE -9.631934
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH  6  LAYER 1  ROW  3  COL 28  RATE -4.321582
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH  7  LAYER 1  ROW  3  COL 29  RATE -4.637989
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH  8  LAYER 1  ROW  3  COL 30  RATE -4.999219
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH  9  LAYER 1  ROW  3  COL 31  RATE -5.394727
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 10  LAYER 1  ROW  4  COL 26  RATE  7.509375
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 11  LAYER 1  ROW  4  COL 27  RATE  5.850879
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 12  LAYER 1  ROW  5  COL 26  RATE  1621.846
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 13  LAYER 1  ROW  5  COL 27  RATE  1345.781
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 14  LAYER 1  ROW  6  COL 26  RATE  2283.135
0 RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 15  LAYER 1  ROW  6  COL 27  RATE  1892.109
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0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 16 LAYER 1 ROW 6 COL 28 RATE 1620.000
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 17 LAYER 1 ROW 7 COL 26 RATE 2571.064
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 18 LAYER 1 ROW 7 COL 27 RATE 2128.887
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 19 LAYER 1 ROW 7 COL 28 RATE 1858.359
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 20 LAYER 1 ROW 8 COL 26 RATE 2702.109
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 21 LAYER 1 ROW 8 COL 27 RATE 2247.275
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 22 LAYER 1 ROW 9 COL 25 RATE 3513.955
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 23 LAYER 1 ROW 9 COL 26 RATE 2667.568
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 24 LAYER 1 ROW 9 COL 27 RATE 2252.549
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 25 LAYER 1 ROW 10 COL 25 RATE 3388.711
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 26 LAYER 1 ROW 10 COL 26 RATE 2620.635
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 27 LAYER 1 ROW 10 COL 27 RATE 2300.010
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 28 LAYER 1 ROW 11 COL 25 RATE 5464.652
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 29 LAYER 1 ROW 11 COL 26 RATE 4385.865
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 30 LAYER 1 ROW 12 COL 24 RATE 7311.357
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 31 LAYER 1 ROW 12 COL 25 RATE 5229.246
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 32 LAYER 1 ROW 12 COL 26 RATE 4432.377
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 33 LAYER 1 ROW 13 COL 24 RATE 6613.207
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 34 LAYER 1 ROW 13 COL 25 RATE 5012.824
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 35 LAYER 1 ROW 14 COL 23 RATE 7869.023
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 36 LAYER 1 ROW 14 COL 24 RATE 5780.742
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 37 LAYER 1 ROW 14 COL 25 RATE 4812.064
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 38 LAYER 1 ROW 15 COL 23 RATE 6158.531
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 39 LAYER 1 ROW 15 COL 24 RATE 5000.959
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 40 LAYER 1 ROW 15 COL 25 RATE 4482.686
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 41 LAYER 1 ROW 16 COL 22 RATE 6427.160
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 42 LAYER 1 ROW 16 COL 23 RATE 5159.953
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 43 LAYER 1 ROW 16 COL 24 RATE 4633.611
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 44 LAYER 1 ROW 17 COL 22 RATE 5644.529
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 45 LAYER 1 ROW 17 COL 23 RATE 4866.645
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 46 LAYER 1 ROW 17 COL 24 RATE 1069.137
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 47 LAYER 1 ROW 18 COL 21 RATE 1476.246
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 48 LAYER 1 ROW 18 COL 22 RATE 1271.215
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 49 LAYER 1 ROW 18 COL 23 RATE 1153.723
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 50 LAYER 1 ROW 19 COL 20 RATE 1498.395
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 51 LAYER 1 ROW 19 COL 21 RATE 1377.844
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 52 LAYER 1 ROW 19 COL 22 RATE 1249.488
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 53 LAYER 1 ROW 20 COL 20 RATE 655.6729
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 54 LAYER 1 ROW 20 COL 21 RATE 616.7074
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 55 LAYER 1 ROW 21 COL 19 RATE 663.5988
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 56 LAYER 1 ROW 21 COL 20 RATE 637.7800
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 57 LAYER 1 ROW 22 COL 18 RATE 229.6666
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 58 LAYER 1 ROW 22 COL 19 RATE 224.4525
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 59 LAYER 1 ROW 23 COL 16 RATE 259.9304
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 60 LAYER 1 ROW 23 COL 17 RATE 257.0695
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 61 LAYER 1 ROW 24 COL 15 RATE 662.2699
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 62 LAYER 1 ROW 25 COL 13 RATE 671.0977
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 63 LAYER 1 ROW 26 COL 12 RATE 681.6814
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 64 LAYER 1 ROW 26 COL 13 RATE 682.4883
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 65 LAYER 1 ROW 27 COL 11 RATE 691.1262
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 66 LAYER 1 ROW 27 COL 12 RATE 693.0246
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 67 LAYER 1 ROW 28 COL 10 RATE 700.3336
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 68 LAYER 1 ROW 28 COL 11 RATE 699.2894
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 69 LAYER 1 ROW 28 COL 12 RATE 707.5476
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 70 LAYER 1 ROW 29 COL 10 RATE 711.1072
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 71 LAYER 1 ROW 29 COL 11 RATE 712.9107
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 72 LAYER 1 ROW 29 COL 12 RATE 724.7285
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 73 LAYER 1 ROW 30 COL 10 RATE 549.3828
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 74 LAYER 1 ROW 30 COL 11 RATE 553.3989
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 75 LAYER 1 ROW 31 COL 9 RATE 743.1908
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 76 LAYER 1 ROW 31 COL 10 RATE 743.8552
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 77 LAYER 1 ROW 31 COL 11 RATE 754.1068
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 78 LAYER 1 ROW 32 COL 9 RATE 432.6400
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 79 LAYER 1 ROW 32 COL 10 RATE 435.3560
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 80 LAYER 1 ROW 32 COL 11 RATE 442.6976
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 81 LAYER 1 ROW 33 COL 9 RATE 148.3525
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 82 LAYER 1 ROW 33 COL 10 RATE 149.9485
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 83 LAYER 1 ROW 34 COL 9 RATE 26.73158
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 84 LAYER 1 ROW 34 COL 10 RATE 27.13975
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 85 LAYER 1 ROW 35 COL 8 RATE 803.3238
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 86 LAYER 1 ROW 35 COL 9 RATE 808.8293
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 87 LAYER 1 ROW 35 COL 10 RATE 824.9660
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 88 LAYER 1 ROW 36 COL 8 RATE 817.6096
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 89 LAYER 1 ROW 36 COL 9 RATE 823.4947
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 90 LAYER 1 ROW 36 COL 10 RATE 841.8621
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 91 LAYER 1 ROW 37 COL 8 RATE 837.2109
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 92 LAYER 1 ROW 37 COL 9 RATE 843.1910
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 93 LAYER 1 ROW 37 COL 10 RATE 861.7482
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 94 LAYER 1 ROW 38 COL 8 RATE 861.9855
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 95 LAYER 1 ROW 38 COL 9 RATE 867.5859
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 96 LAYER 1 ROW 39 COL 8 RATE 894.3539
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 97 LAYER 1 ROW 39 COL 9 RATE 901.9476
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 98 LAYER 1 ROW 40 COL 8 RATE 52.10947
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0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 99 LAYER 1 ROW 40 COL 9 RATE 52.76602
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 100 LAYER 1 ROW 41 COL 8 RATE 54.20039
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 101 LAYER 1 ROW 41 COL 9 RATE 54.97559
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 102 LAYER 1 ROW 42 COL 8 RATE 56.10147
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 103 LAYER 1 ROW 42 COL 9 RATE 56.93203
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 104 LAYER 1 ROW 43 COL 8 RATE 57.87334
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 105 LAYER 1 ROW 43 COL 9 RATE 58.73819
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 106 LAYER 1 ROW 43 COL 10 RATE 59.78233
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 107 LAYER 1 ROW 44 COL 8 RATE 59.70059
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 108 LAYER 1 ROW 44 COL 9 RATE 60.60498
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 109 LAYER 1 ROW 44 COL 10 RATE 61.68340
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 110 LAYER 1 ROW 45 COL 8 RATE 61.60166
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 111 LAYER 1 ROW 45 COL 9 RATE 62.58516
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 112 LAYER 1 ROW 45 COL 10 RATE 63.71104
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 113 LAYER 1 ROW 46 COL 8 RATE 63.49746
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 114 LAYER 1 ROW 46 COL 9 RATE 64.54160
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 115 LAYER 1 ROW 46 COL 10 RATE 65.71494
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 116 LAYER 1 ROW 47 COL 8 RATE 65.38008
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 117 LAYER 1 ROW 47 COL 9 RATE 66.46377
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 118 LAYER 1 ROW 47 COL 10 RATE 67.70831
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 119 LAYER 1 ROW 48 COL 8 RATE 67.32861
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 120 LAYER 1 ROW 48 COL 9 RATE 68.44922
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 121 LAYER 1 ROW 48 COL 10 RATE 69.72540
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 122 LAYER 1 ROW 49 COL 8 RATE 69.38789
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 123 LAYER 1 ROW 49 COL 9 RATE 70.48476
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 124 LAYER 1 ROW 49 COL 10 RATE 71.74512
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 125 LAYER 1 ROW 50 COL 8 RATE 71.40762
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 126 LAYER 1 ROW 50 COL 9 RATE 72.56250
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 127 LAYER 1 ROW 50 COL 10 RATE 73.82549
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 128 LAYER 1 ROW 51 COL 9 RATE 74.74570
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 129 LAYER 1 ROW 51 COL 10 RATE 75.96651
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 130 LAYER 1 ROW 52 COL 9 RATE 77.14776
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 131 LAYER 1 ROW 52 COL 10 RATE 78.18398
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 132 LAYER 1 ROW 53 COL 9 RATE 79.44698
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 133 LAYER 1 ROW 53 COL 10 RATE 80.38301
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 134 LAYER 1 ROW 53 COL 11 RATE 81.56162
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 135 LAYER 1 ROW 54 COL 9 RATE 81.62227
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 136 LAYER 1 ROW 54 COL 10 RATE 82.57149
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 137 LAYER 1 ROW 54 COL 11 RATE 83.70791
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 138 LAYER 1 ROW 55 COL 10 RATE 84.80215
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 139 LAYER 1 ROW 55 COL 11 RATE 85.88584
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 140 LAYER 1 ROW 56 COL 10 RATE 87.20156
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 141 LAYER 1 ROW 56 COL 11 RATE 88.12705
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 142 LAYER 1 ROW 56 COL 12 RATE 89.31094
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 143 LAYER 1 ROW 57 COL 10 RATE 90.31553
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 144 LAYER 1 ROW 57 COL 11 RATE 91.16455
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 145 LAYER 1 ROW 57 COL 12 RATE 92.27461
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 146 LAYER 1 ROW 58 COL 11 RATE 95.52569
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 147 LAYER 1 ROW 58 COL 12 RATE 193.1186
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 148 LAYER 1 ROW 58 COL 13 RATE 195.6393
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 149 LAYER 1 ROW 59 COL 12 RATE 206.0859
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 150 LAYER 1 ROW 59 COL 13 RATE 207.8842
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 151 LAYER 1 ROW 59 COL 14 RATE 210.2150
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 152 LAYER 1 ROW 60 COL 14 RATE 338.9739
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 153 LAYER 1 ROW 60 COL 15 RATE 341.7346
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 154 LAYER 1 ROW 60 COL 16 RATE 344.5822
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 155 LAYER 1 ROW 61 COL 15 RATE 375.1313
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 156 LAYER 1 ROW 61 COL 16 RATE 376.1200
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 157 LAYER 1 ROW 61 COL 17 RATE 377.5755
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 158 LAYER 1 ROW 62 COL 17 RATE 417.1263
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 159 LAYER 1 ROW 62 COL 18 RATE 416.9523
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 160 LAYER 1 ROW 62 COL 19 RATE 417.2528
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 161 LAYER 1 ROW 63 COL 18 RATE 467.9490
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 162 LAYER 1 ROW 63 COL 19 RATE 468.3129
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 163 LAYER 1 ROW 63 COL 20 RATE 469.2147
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 164 LAYER 1 ROW 63 COL 21 RATE 470.8758
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 165 LAYER 1 ROW 64 COL 20 RATE 521.9200
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 166 LAYER 1 ROW 64 COL 21 RATE 522.7664
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 167 LAYER 1 ROW 64 COL 22 RATE 524.1428
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 168 LAYER 1 ROW 64 COL 23 RATE 526.1362
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 169 LAYER 1 ROW 65 COL 25 RATE 588.4286
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 170 LAYER 1 ROW 65 COL 26 RATE 591.1497
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 171 LAYER 1 ROW 65 COL 27 RATE 594.4878
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 172 LAYER 1 ROW 66 COL 27 RATE 660.1026
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 173 LAYER 1 ROW 66 COL 28 RATE 662.4124
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 174 LAYER 1 ROW 66 COL 29 RATE 664.8566
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 175 LAYER 1 ROW 66 COL 30 RATE 667.4432
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 176 LAYER 1 ROW 66 COL 31 RATE 670.2276
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 177 LAYER 1 ROW 66 COL 32 RATE 673.2809
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 178 LAYER 1 ROW 67 COL 30 RATE 739.9161
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 179 LAYER 1 ROW 67 COL 31 RATE 741.5693
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 180 LAYER 1 ROW 67 COL 32 RATE 743.5152
0 RIVER LEAKAGE PERIOD 1 STEP 24 REACH 181 LAYER 1 ROW 67 COL 33 RATE 745.6588
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0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 182  LAYER 1  ROW 67  COL 34  RATE  747.9686
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 183  LAYER 1  ROW 67  COL 35  RATE  750.4682
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 184  LAYER 1  ROW 67  COL 36  RATE  753.1735
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 185  LAYER 1  ROW 68  COL 34  RATE  758.1648
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 186  LAYER 1  ROW 68  COL 35  RATE  776.3107
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 187  LAYER 1  ROW 68  COL 36  RATE  764.6432
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 188  LAYER 1  ROW 68  COL 37  RATE  764.6432
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 189  LAYER 1  ROW 68  COL 38  RATE  752.9757
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 190  LAYER 1  ROW 68  COL 39  RATE  741.3162
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 191  LAYER 1  ROW 68  COL 40  RATE  741.3162
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 192  LAYER 1  ROW 69  COL 39  RATE  747.7946
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 193  LAYER 1  ROW 69  COL 40  RATE  764.6432
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 194  LAYER 1  ROW 69  COL 41  RATE  764.6432
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 195  LAYER 1  ROW 69  COL 42  RATE  764.6432
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 196  LAYER 1  ROW 69  COL 43  RATE  764.6432
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 197  LAYER 1  ROW 70  COL 43  RATE  764.6432
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 198  LAYER 1  ROW 70  COL 44  RATE  764.6432
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 203  LAYER 1  ROW  4  COL 28  RATE  4.355859
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 204  LAYER 1  ROW  5  COL 28  RATE  1134.580
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 205  LAYER 1  ROW  7  COL 25  RATE  3234.463
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 206  LAYER 1  ROW  8  COL 25  RATE  3507.627
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 207  LAYER 1  ROW 10  COL 24  RATE  4793.818
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 208  LAYER 1  ROW 11  COL 24  RATE  7797.832
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 209  LAYER 1  ROW 13  COL 23  RATE  9706.236
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 210  LAYER 1  ROW 15  COL 22  RATE  8035.137
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 211  LAYER 1  ROW 18  COL 24  RATE  1107.633
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 212  LAYER 1  ROW 19  COL 23  RATE  1170.703
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 213  LAYER 1  ROW 20  COL 22  RATE  1262.000
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 214  LAYER 1  ROW 21  COL 21  RATE  1322.988
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 215  LAYER 1  ROW 22  COL 20  RATE  359.7086
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 216  LAYER 1  ROW 23  COL 18  RATE  471.1078
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 217  LAYER 1  ROW 23  COL 19  RATE  464.9036
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 218  LAYER 1  ROW 24  COL 16  RATE  834.8212
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 219  LAYER 1  ROW 24  COL 17  RATE  833.4985
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 220  LAYER 1  ROW 25  COL 14  RATE  997.7007
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 221  LAYER 1  ROW 25  COL 15  RATE  1004.274
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 222  LAYER 1  ROW 26  COL 14  RATE  1382.532
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 223  LAYER 1  ROW 27  COL 13  RATE  927.6094
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 224  LAYER 1  ROW 30  COL 12  RATE  730.4615
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 225  LAYER 1  ROW 33  COL 11  RATE  242.5984
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 226  LAYER 1  ROW 34  COL 11  RATE  27.78680
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 227  LAYER 1  ROW 38  COL 10  RATE  1801.851
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 228  LAYER 1  ROW 39  COL 10  RATE  1680.146
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 229  LAYER 1  ROW 40  COL 10  RATE  53.76270
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 230  LAYER 1  ROW 41  COL 10  RATE  55.99863
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 231  LAYER 1  ROW 42  COL 10  RATE  57.96035
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 232  LAYER 1  ROW 51  COL  8  RATE  73.52227
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 233  LAYER 1  ROW 52  COL  8  RATE  76.43584
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 234  LAYER 1  ROW 53  COL  8  RATE  78.85635
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 235  LAYER 1  ROW 55  COL  9  RATE  83.78438
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 236  LAYER 1  ROW 55  COL 12  RATE  87.14883
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 237  LAYER 1  ROW 58  COL 10  RATE  94.54746
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 238  LAYER 1  ROW 59  COL 11  RATE  204.8414
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 239  LAYER 1  ROW 60  COL 13  RATE  336.7433
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 240  LAYER 1  ROW 62  COL 16  RATE  417.5139
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 241  LAYER 1  ROW 65  COL 24  RATE  586.3562
0  RIVER LEAKAGE  PERIOD 1  STEP 24  REACH 242  LAYER 1  ROW 65  COL 23  RATE  584.8611
1              HEAD IN LAYER  1 AT END OF TIME STEP 24 IN STRESS PERIOD  1
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       1      2      3      4      5      6      7      8      9     10
      11     12     13     14     15     16     17     18     19     20
      21     22     23     24     25     26     27     28     29     30
      31     32     33     34     35     36     37     38     39     40
      41     42     43     44     45     46     47     48     49     50
      51     52
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	682.6	682.7	682.7	682.7	682.7	682.7	682.8	682.8	682.8	682.8
	682.8	682.8	682.8	682.8	682.9	682.9	682.9	682.9	682.9	682.9
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	681.9	682.0	682.0	682.1	682.2	682.3	682.3	682.4	682.4	682.5
	682.5	682.5	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7
	682.7	682.7	682.8	682.8	682.8	682.8	682.8	682.8	682.8	682.8
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	681.5	681.6	681.7	681.9	682.0	682.1	682.2	682.3	682.3	682.3
	682.4	682.4	682.5	682.5	682.5	682.6	682.6	682.6	682.6	682.6
	682.7	682.7	682.7	682.7	682.7	682.8	682.8	682.8	682.8	682.8
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	681.1	681.3	681.5	681.7	681.9	682.0	682.1	682.2	682.2	682.3
	682.3	682.4	682.4	682.4	682.5	682.5	682.5	682.6	682.6	682.6
	682.6	682.7	682.7	682.7	682.7	682.7	682.7	682.8	682.8	682.8
	682.8	682.8								
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	680.7	680.9	681.2	681.5	681.8	682.0	682.1	682.1	682.2	682.2
	682.3	682.3	682.3	682.4	682.4	682.5	682.5	682.5	682.6	682.6
	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.7	682.8	682.8
	682.8	682.8								
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	680.3	680.6	681.0	681.4	681.8	682.0	682.1	682.1	682.1	682.2
	682.2	682.3	682.3	682.4	682.4	682.4	682.5	682.5	682.5	682.6
	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.7	682.8	682.8
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	680.0	680.4	680.9	681.5	681.8	682.0	682.1	682.1	682.1	682.2
	682.2	682.3	682.3	682.3	682.4	682.4	682.5	682.5	682.5	682.5
	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.7	682.8
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	680.2	680.5	681.0	681.6	681.9	682.0	682.0	682.0	682.1	682.1
	682.2	682.2	682.3	682.3	682.4	682.4	682.4	682.5	682.5	682.5
	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.7	682.8
	682.8	682.8								
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	680.4	680.6	681.1	681.6	681.9	682.0	682.0	682.0	682.1	682.1
	682.2	682.2	682.3	682.3	682.3	682.4	682.4	682.5	682.5	682.5
	682.5	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.8
	682.8	682.8								
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	681.2	681.1	681.1	681.0	681.0	680.9	680.8	680.7	680.7	680.6
	680.6	680.7	681.3	681.7	681.9	681.9	681.9	682.0	682.0	682.1
	682.1	682.2	682.2	682.3	682.3	682.4	682.4	682.4	682.5	682.5
	682.5	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.7
	682.8	682.8								
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	681.2	681.2	681.1	681.1	681.0	681.0	680.9	680.9	680.8	680.8
	680.9	681.1	681.5	681.8	681.9	681.9	681.9	682.0	682.0	682.1
	682.1	682.2	682.2	682.3	682.3	682.4	682.4	682.4	682.5	682.5
	682.5	682.5	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.7
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	681.3	681.2	681.2	681.2	681.1	681.1	681.1	681.0	681.0	681.1
	681.2	681.5	681.7	681.9	681.9	681.9	681.9	682.0	682.0	682.1
	682.1	682.2	682.2	682.3	682.3	682.3	682.4	682.4	682.4	682.5
	682.5	682.5	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7
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	681.4	681.7	681.8	681.9	681.9	681.9	681.9	682.0	682.0	682.0
	682.1	682.1	682.2	682.2	682.3	682.3	682.4	682.4	682.4	682.5
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	681.5	681.8	681.9	681.9	681.9	681.9	681.9	681.9	682.0	682.0

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	681.5	681.4	681.4	681.4	681.3	681.3	681.3	681.3	681.3	681.2
	681.2	681.2	681.2	681.2	681.1	681.1	681.1	681.0	681.0	681.0
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	681.4	681.4	681.4	681.3	681.3	681.3	681.3	681.2	681.2	681.2
	681.2	681.2	681.1	681.1	681.1	681.1	681.0	681.0	681.0	681.0
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	681.4	681.4	681.3	681.3	681.3	681.3	681.2	681.2	681.2	681.2
	681.1	681.1	681.1	681.1	681.1	681.0	681.0	681.0	681.0	681.0
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	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 35	1000.	1000.	1000.	1000.	681.4	681.4	681.4	681.4	681.4	681.4
	681.4	681.3	681.3	681.3	681.2	681.2	681.2	681.2	681.1	681.1
	681.1	681.1	681.1	681.0	681.0	681.0	681.0	681.0	681.0	681.0
	681.0	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 36	1000.	1000.	1000.	1000.	681.4	681.4	681.4	681.4	681.4	681.4
	681.3	681.3	681.3	681.2	681.2	681.2	681.1	681.1	681.1	681.1
	681.0	681.0	681.0	681.0	681.0	681.0	680.9	680.9	680.9	681.0
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 37	1000.	1000.	1000.	1000.	681.4	681.4	681.4	681.4	681.4	681.4
	681.3	681.3	681.2	681.2	681.2	681.1	681.1	681.1	681.1	681.0
	681.0	681.0	681.0	681.0	681.0	680.9	680.9	680.9	680.9	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 38	1000.	1000.	1000.	1000.	681.4	681.4	681.3	681.4	681.3	681.3
	681.3	681.2	681.2	681.2	681.1	681.1	681.1	681.0	681.0	681.0
	681.0	680.9	680.9	680.9	680.9	680.9	680.8	680.8	680.8	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 39	1000.	1000.	1000.	1000.	681.4	681.3	681.3	681.3	681.3	681.3
	681.2	681.2	681.2	681.1	681.1	681.1	681.0	681.0	681.0	680.9
	680.9	680.9	680.9	680.9	680.8	680.8	680.8	680.7	680.7	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 40	1000.	1000.	1000.	1000.	681.4	681.3	681.3	681.3	681.2	681.2
	681.2	681.1	681.1	681.1	681.0	681.0	681.0	681.0	680.9	680.9
	680.9	680.8	680.8	680.8	680.8	680.7	680.7	680.6	680.6	680.5
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 41	1000.	1000.	1000.	1000.	1000.	681.2	681.2	681.2	681.2	681.2
	681.1	681.1	681.1	681.0	681.0	681.0	680.9	680.9	680.9	680.8
	680.8	680.8	680.8	680.7	680.7	680.7	680.6	680.6	680.5	680.5
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 42	1000.	1000.	1000.	1000.	1000.	681.2	681.2	681.2	681.1	681.1
	681.1	681.1	681.0	681.0	681.0	680.9	680.9	680.9	680.8	680.8
	680.8	680.7	680.7	680.7	680.6	680.6	680.5	680.5	680.4	680.4
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 43	1000.	1000.	1000.	1000.	1000.	681.2	681.1	681.1	681.1	681.1
	681.0	681.0	681.0	681.0	680.9	680.9	680.9	680.8	680.8	680.7
	680.7	680.7	680.6	680.6	680.6	680.5	680.4	680.4	680.3	680.2
	680.2	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 44	1000.	1000.	1000.	1000.	1000.	681.1	681.1	681.1	681.1	681.0
	681.0	681.0	680.9	680.9	680.9	680.8	680.8	680.8	680.7	680.7
	680.7	680.6	680.6	680.5	680.5	680.4	680.3	680.2	680.2	680.1
	680.1	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 45	1000.	1000.	1000.	1000.	1000.	681.1	681.1	681.0	681.0	681.0

	681.0	680.9	680.9	680.9	680.8	680.8	680.8	680.7	680.7	680.6
	680.6	680.5	680.5	680.4	680.4	680.3	680.2	680.1	680.0	680.0
	679.9	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 46	1000.	1000.	1000.	1000.	1000.	681.0	681.0	681.0	681.0	680.9
	680.9	680.9	680.8	680.8	680.8	680.7	680.7	680.7	680.6	680.6
	680.5	680.5	680.4	680.4	680.3	680.2	680.1	680.0	679.9	679.8
	679.8	679.7	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 47	1000.	1000.	1000.	1000.	1000.	681.0	681.0	680.9	680.9	680.9
	680.9	680.8	680.8	680.8	680.7	680.7	680.6	680.6	680.6	680.5
	680.5	680.4	680.4	680.3	680.2	680.1	680.0	679.8	679.6	679.6
	679.6	679.6	679.6	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 48	1000.	1000.	1000.	1000.	1000.	681.0	680.9	680.9	680.9	680.8
	680.8	680.8	680.7	680.7	680.7	680.6	680.6	680.6	680.5	680.5
	680.4	680.4	680.3	680.2	680.2	680.0	679.8	679.6	679.3	679.4
	679.5	679.5	679.6	679.6	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 49	1000.	1000.	1000.	1000.	1000.	1000.	680.9	680.9	680.8	680.8
	680.8	680.7	680.7	680.7	680.6	680.6	680.5	680.5	680.5	680.4
	680.4	680.3	680.3	680.2	680.1	680.0	679.7	679.3	678.4	679.2
	679.4	679.5	679.5	679.6	679.6	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 50	1000.	1000.	1000.	1000.	1000.	1000.	680.8	680.8	680.8	680.8
	680.7	680.7	680.7	680.6	680.6	680.5	680.5	680.5	680.4	680.4
	680.3	680.3	680.2	680.1	680.1	680.0	679.8	679.5	679.2	679.4
	679.5	679.5	679.6	679.6	679.6	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 51	1000.	1000.	1000.	1000.	1000.	1000.	680.8	680.8	680.7	680.7
	680.7	680.6	680.6	680.6	680.5	680.5	680.5	680.4	680.4	680.3
	680.3	680.2	680.2	680.1	680.1	680.0	679.8	679.7	679.5	679.5
	679.5	679.6	679.6	679.6	679.6	679.6	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 52	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.7	680.7	680.7
	680.6	680.6	680.6	680.5	680.5	680.4	680.4	680.4	680.3	680.3
	680.2	680.2	680.1	680.1	680.1	680.0	679.9	679.8	679.7	679.6
	679.6	679.6	679.6	679.6	679.6	679.6	679.6	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 53	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.6	680.6	680.6
	680.6	680.5	680.5	680.5	680.4	680.4	680.4	680.3	680.3	680.2
	680.2	680.2	680.1	680.1	680.0	680.0	679.9	679.8	679.7	679.7
	679.7	679.7	679.7	679.6	679.6	679.6	679.6	679.6	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 54	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.6	680.6	680.5
	680.5	680.5	680.5	680.4	680.4	680.3	680.3	680.3	680.2	680.2
	680.2	680.1	680.1	680.1	680.0	680.0	679.9	679.8	679.8	679.7
	679.7	679.7	679.7	679.7	679.6	679.6	679.6	679.6	679.6	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 55	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.6	680.5	680.5
	680.5	680.4	680.4	680.4	680.3	680.3	680.3	680.2	680.2	680.2
	680.1	680.1	680.1	680.0	680.0	680.0	679.9	679.9	679.8	679.8
	679.7	679.7	679.7	679.7	679.7	679.6	679.6	679.6	679.6	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 56	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.5	680.4
	680.4	680.4	680.4	680.3	680.3	680.3	680.2	680.2	680.1	680.1
	680.1	680.1	680.0	680.0	680.0	680.0	679.9	679.9	679.8	679.8
	679.7	679.7	679.7	679.7	679.7	679.6	679.6	679.6	679.6	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 57	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.4	680.4
	680.3	680.3	680.3	680.3	680.2	680.2	680.1	680.1	680.1	680.1
	680.0	680.0	680.0	680.0	680.0	679.9	680.0	679.9	679.8	679.8
	679.7	679.7	679.7	679.7	679.6	679.6	679.6	679.6	679.6	679.6
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 58	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.3	680.3
	680.2	680.2	680.2	680.2	680.1	680.1	680.1	680.0	680.0	680.0
	680.0	679.9	679.9	679.9	679.9	679.9	679.9	679.8	679.8	679.7
	679.7	679.7	679.7	679.6	679.6	679.6	679.6	679.6	679.6	679.6
	679.6	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								

0 59	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.1
	680.1	680.1	680.1	680.0	680.0	680.0	679.9	679.9	679.9	679.9
	679.9	679.8	679.8	679.8	679.8	679.8	679.8	679.7	679.7	679.7
	679.6	679.6	679.6	679.6	679.6	679.6	679.6	679.6	679.5	679.5
	679.5	679.5	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 60	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	679.9
	679.9	679.9	679.9	679.8	679.8	679.8	679.8	679.8	679.7	679.7
	679.7	679.7	679.7	679.7	679.7	679.6	679.6	679.6	679.6	679.5
	679.5	679.5	679.5	679.5	679.5	679.5	679.5	679.5	679.4	679.4
	679.4	679.4	679.4	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 61	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	679.6	679.6	679.6	679.6	679.6	679.6	679.5	679.5	679.5	679.5
	679.5	679.5	679.5	679.5	679.4	679.4	679.4	679.4	679.3	679.3
	679.3	679.3	679.3	679.3	679.3	679.3	679.3	679.3	679.3	679.2
	679.3	679.3	679.3	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 62	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	679.2	679.2	679.2	679.2	679.2	679.2	679.2	679.2	679.2	679.2
	679.2	679.2	679.2	679.1	679.1	679.1	679.1	679.0	679.0	679.0
	679.0	679.0	679.0	679.0	678.9	678.9	678.9	678.9	678.9	678.9
	678.9	679.0	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 63	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	678.8	678.8	678.8	678.8	678.8	678.8	678.8	678.8	678.8	678.8
	678.8	678.8	678.8	678.8	678.7	678.7	678.7	678.7	678.7	678.6
	678.6	678.6	678.6	678.6	678.6	678.5	678.5	678.5	678.5	678.5
	678.5	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 64	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	678.5	678.5	678.5	678.4	678.4	678.4	678.4	678.4	678.4	678.4
	678.4	678.4	678.4	678.4	678.4	678.3	678.3	678.3	678.3	678.2
	678.2	678.2	678.2	678.1	678.1	678.1	678.0	678.0	677.9	677.9
	677.8	677.7	677.7	677.6	677.5	677.5	677.5	677.4	677.4	677.4
	1000.	1000.								
0 65	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	678.1	678.0	678.0	678.0	678.0	678.0	678.0	678.0	678.0	678.0
	678.0	678.0	677.9	677.9	677.9	677.9	677.9	677.8	677.8	677.8
	677.8	677.7	677.7	677.7	677.7	677.6	677.6	677.6	677.5	677.5
	677.5	677.4	677.4	677.3	677.3	677.3	677.2	677.2	677.2	677.1
	677.1	677.0								
0 66	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	677.5	677.5	677.5	677.5	677.5	677.5	677.5	677.5	677.5
	677.5	677.4	677.4	677.4	677.4	677.4	677.4	677.3	677.3	677.3
	677.3	677.3	677.2	677.2	677.2	677.2	677.1	677.1	677.1	677.1
	677.1	677.0	677.0	677.0	677.0	677.0	676.9	676.9	676.9	676.9
	676.9	676.8								
0 67	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	677.0	677.0	677.0	677.0	677.0	677.0	676.9	674.9	676.9
	676.9	676.9	676.9	676.9	676.8	676.8	676.8	676.8	676.8	676.8
	676.7	676.7	676.7	676.7	676.7	676.6	676.6	676.6	676.6	676.6
	676.6	676.6	676.6	676.6	676.6	676.6	676.6	676.6	676.6	676.6
	676.5	676.5								
0 68	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	676.4	676.4	676.4	676.4	676.4	676.4	676.4	676.4	676.4
	676.3	676.3	676.3	676.3	676.2	676.2	676.2	676.2	676.1	676.1
	676.1	676.1	676.1	676.1	676.1	676.0	676.0	676.0	676.0	676.0
	676.0	676.1	676.1	676.1	676.1	676.1	676.1	676.2	676.2	676.2
	676.2	676.2								
0 69	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	675.8	675.8	675.9	675.9	675.9	675.9	675.9	675.9	675.8	675.8
	675.8	675.8	675.7	675.7	675.7	675.7	675.6	675.6	675.6	675.5
	675.5	675.4	675.4	675.4	675.3	675.3	675.4	675.4	675.4	675.5
	675.5	675.5	675.6	675.6	675.7	675.7	675.7	675.7	675.8	675.8
	675.8	675.8								
0 70	1000.	1000.	1000.	1000.	1000.	1000.	675.2	675.2	675.3	675.3
	675.3	675.3	675.4	675.4	675.4	675.4	675.4	675.4	675.4	675.4
	675.3	675.3	675.3	675.3	675.3	675.3	675.3	675.2	675.2	675.2
	675.2	675.1	675.1	675.1	675.0	675.0	675.0	675.1	675.1	675.1
	675.2	675.2	675.2	675.3	675.3	675.3	675.3	675.4	675.4	675.4
	675.4	675.4								
0 71	1000.	1000.	1000.	1000.	1000.	675.0	675.0	675.0	675.0	675.0
	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0
	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0
	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0
	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0	675.0
	675.0	675.0								

1 HEAD IN LAYER 2 AT END OF TIME STEP 24 IN STRESS PERIOD 1

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47	48	49	50
	51	52								
0 1	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	683.0	683.0
	683.0	683.0	683.0	683.0	683.0	683.0	683.0	683.0	683.0	683.0
	683.0	683.0	683.0	683.0	683.0	683.0	683.0	683.0	683.0	683.0
	683.0	683.0								
0 2	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	682.9	682.9
	682.9	682.9	682.9	682.9	682.9	682.9	682.9	682.9	682.9	682.9
	682.9	683.0	683.0	683.0	683.0	683.0	683.0	683.0	683.0	683.0
	683.0	683.0								
0 3	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	682.8	682.8	682.8	682.8
	682.8	682.8	682.8	682.8	682.8	682.9	682.9	682.9	682.9	682.9
	682.9	682.9	682.9	682.9	682.9	682.9	682.9	682.9	682.9	682.9
	682.9	682.9								
0 4	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	682.5	682.5	682.5	682.6	682.6	682.6
	682.6	682.7	682.7	682.7	682.7	682.7	682.8	682.8	682.8	682.8
	682.8	682.8	682.8	682.8	682.9	682.9	682.9	682.9	682.9	682.9
	682.9	682.9								
0 5	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	682.0	682.0	682.1	682.2	682.3	682.3	682.4	682.4	682.5
	682.5	682.5	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7
	682.7	682.7	682.8	682.8	682.8	682.8	682.8	682.8	682.8	682.8
	682.9	682.9								
0 6	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	681.3	681.4
	681.5	681.6	681.7	681.9	682.0	682.1	682.2	682.2	682.3	682.3
	682.4	682.4	682.5	682.5	682.5	682.5	682.6	682.6	682.6	682.6
	682.7	682.7	682.7	682.7	682.7	682.8	682.8	682.8	682.8	682.8
	682.8	1000.								
0 7	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.9	680.9	681.0
	681.1	681.2	681.4	681.6	681.8	682.0	682.1	682.2	682.2	682.3
	682.3	682.4	682.4	682.4	682.5	682.5	682.5	682.6	682.6	682.6
	682.6	682.6	682.7	682.7	682.7	682.7	682.7	682.8	682.8	682.8
	1000.	1000.								
0 8	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	680.7	680.7	680.6	680.5
	680.6	680.8	681.1	681.4	681.7	681.9	682.0	682.1	682.1	682.2
	682.3	682.3	682.3	682.4	682.4	682.5	682.5	682.5	682.5	682.6
	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.7	682.8	1000.
	1000.	1000.								
0 9	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	680.7	680.6	680.5	680.3	680.0
	679.6	680.3	680.8	681.3	681.6	681.8	681.9	682.0	682.1	682.2
	682.2	682.3	682.3	682.4	682.4	682.4	682.5	682.5	682.5	682.6
	682.6	682.6	682.6	682.7	682.7	682.7	682.7	682.7	682.8	1000.
	1000.	1000.								
0 10	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	680.7	680.6	680.4	680.1	679.5
	677.7	679.7	680.6	681.2	681.5	681.8	681.9	682.0	682.1	682.1
	682.2	682.3	682.3	682.3	682.4	682.4	682.5	682.5	682.5	682.5
	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7	1000.	1000.
	1000.	1000.								
0 11	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	680.8	680.7	680.6	680.5	680.2	679.9
	679.4	679.9	680.6	681.1	681.5	681.7	681.9	682.0	682.1	682.1
	682.2	682.2	682.3	682.3	682.4	682.4	682.4	682.5	682.5	682.5
	682.6	682.6	682.6	682.6	682.7	682.7	682.7	682.7	1000.	1000.
	1000.	1000.								
0 12	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	680.9	680.8	680.7	680.6	680.4	680.1
	679.8	679.8	680.5	681.1	681.5	681.7	681.9	682.0	682.0	682.1
	682.2	682.2	682.3	682.3	682.3	682.4	682.4	682.5	682.5	682.5
	682.5	682.6	682.6	682.6	682.6	682.7	1000.	1000.	1000.	1000.
	1000.	1000.								
0 13	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	681.0	681.0	680.9	680.8	680.7	680.5	680.3
	679.8	678.5	680.3	681.1	681.5	681.7	681.9	681.9	682.0	682.1
	682.1	682.2	682.2	682.3	682.3	682.4	682.4	682.4	682.5	682.5
	682.5	682.6	682.6	682.6	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								

0 14	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	681.1	681.0	681.0	680.9	680.9	680.8	680.6
	680.4	680.2	680.8	681.3	681.6	681.7	681.9	681.9	682.0	682.1
	682.1	682.2	682.2	682.3	682.3	682.4	682.4	682.4	682.5	682.5
	682.5	682.5	682.6	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 15	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	681.2	681.2	681.1	681.1	681.1	681.0	681.0	680.9
	680.9	680.9	681.2	681.5	681.7	681.8	681.9	681.9	682.0	682.1
	682.1	682.2	682.2	682.3	682.3	682.3	682.4	682.4	682.5	682.5
	682.5	682.5	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 16	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	681.3	681.3	681.3	681.2	681.2	681.2	681.2	681.1	681.2
	681.2	681.3	681.5	681.6	681.7	681.8	681.9	681.9	682.0	682.0
	682.1	682.1	682.2	682.2	682.3	682.3	682.4	682.4	682.4	682.5
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 17	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	681.4	681.3	681.3	681.3	681.3	681.3	681.3	681.3	681.3
	681.4	681.5	681.6	681.7	681.8	681.8	681.9	681.9	682.0	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 18	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	681.4	681.4	681.4	681.4	681.4	681.4	681.4	681.4	681.5
	681.5	681.6	681.7	681.8	681.8	681.8	681.9	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 19	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	681.5
	681.5	681.5	681.5	681.4	681.4	681.4	681.4	681.5	681.5	681.5
	681.6	681.6	681.7	681.8	681.8	681.8	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 20	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	681.5	681.5
	681.5	681.5	681.5	681.5	681.5	681.5	681.5	681.5	681.5	681.6
	681.6	681.7	681.7	681.8	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 21	1000.	1000.	1000.	1000.	1000.	1000.	1000.	681.5	681.5	681.5
	681.5	681.5	681.5	681.5	681.5	681.5	681.5	681.6	681.6	681.6
	681.6	681.7	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 22	1000.	1000.	1000.	1000.	1000.	1000.	681.6	681.6	681.6	681.6
	681.6	681.6	681.6	681.6	681.6	681.6	681.6	681.6	681.6	681.6
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 23	1000.	1000.	1000.	1000.	1000.	1000.	681.6	681.6	681.6	681.6
	681.6	681.6	681.6	681.6	681.6	681.6	681.6	681.6	681.6	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 24	1000.	1000.	1000.	1000.	1000.	681.6	681.6	681.6	681.6	681.6
	681.6	681.6	681.6	681.6	681.6	681.6	681.6	681.6	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 25	1000.	1000.	1000.	1000.	1000.	681.6	681.6	681.6	681.6	681.6
	681.6	681.6	681.6	681.6	681.6	681.6	681.6	681.6	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 26	1000.	1000.	1000.	1000.	1000.	681.6	681.6	681.6	681.6	681.6
	681.6	681.6	681.6	681.6	681.5	681.5	681.5	681.5	681.5	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 27	1000.	1000.	1000.	1000.	1000.	681.5	681.5	681.5	681.5	681.5
	681.5	681.5	681.5	681.5	681.5	681.5	681.5	681.5	681.4	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.

	1000.	1000.								
0 28	1000.	1000.	1000.	1000.	1000.	681.5	681.5	681.5	681.5	681.5
	681.5	681.5	681.5	681.5	681.5	681.5	681.4	681.4	681.4	681.4
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 29	1000.	1000.	1000.	1000.	1000.	681.5	681.5	681.5	681.5	681.5
	681.5	681.5	681.5	681.5	681.4	681.4	681.4	681.4	681.4	681.4
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 30	1000.	1000.	1000.	1000.	1000.	681.5	681.5	681.5	681.5	681.5
	681.5	681.5	681.5	681.4	681.4	681.4	681.4	681.4	681.3	681.3
	681.3	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000,	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 31	1000.	1000.	1000.	1000.	1000.	681.5	681.5	681.5	681.5	681.5
	681.5	681.4	681.4	681.4	681.4	681.4	681.3	681.3	681.3	681.3
	681.3	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 32	1000.	1000.	1000.	1000.	1000.	681.5	681.5	681.5	681.5	681.4
	681.4	681.4	681.4	681.4	681.3	681.3	681.3	681.3	681.3	681.2
	681.2	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 33	1000.	1000.	1000.	1000.	1000.	681.5	681.4	681.4	681.4	681.4
	681.4	681.4	681.4	681.3	681.3	681.3	681.3	681.2	681.2	681.2
	681.2	681.2	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 34	1000.	1000.	1000.	1000.	1000.	681.4	681.4	681.4	681.4	681.4
	681.4	681.3	681.3	681.3	681.3	681.2	681.2	681.2	681.2	681.2
	681.1	681.1	681.1	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 35	1000.	1000.	1000.	1000.	1000.	681.4	681.4	681.4	681.4	681.4
	681.3	681.3	681.3	681.3	681.2	681.2	681.2	681.2	681.1	681.1
	681.1	681.1	681.0	681.0	681.0	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 36	1000.	1000.	1000.	1000.	1000.	1000.	681.4	681.4	681.4	681.3
	681.3	681.3	681.3	681.2	681.2	681.2	681.1	681.1	681.1	681.1
	681.0	681.0	681.0	681.0	681.0	681.0	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 37	1000.	1000.	1000.	1000.	1000.	1000.	681.4	681.3	681.3	681.3
	681.3	681.2	681.2	681.2	681.2	681.1	681.1	681.1	681.0	681.0
	681.0	681.0	681.0	681.0	681.0	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 38	1000.	1000.	1000.	1000.	1000.	1000.	681.3	681.3	681.3	681.3
	681.2	681.2	681.2	681.2	681.1	681.1	681.1	681.0	681.0	681.0
	681.0	680.9	680.9	680.9	680.9	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 39	1000.	1000.	1000.	1000.	1000.	1000.	681.3	681.3	681.3	681.2
	681.2	681.2	681.1	681.1	681.1	681.1	681.0	681.0	681.0	680.9
	680.9	680.9	680.9	680.9	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 40	1000.	1000.	1000.	1000.	1000.	1000.	681.3	681.2	681.2	681.2
	681.2	681.1	681.1	681.1	681.0	681.0	681.0	680.9	680.9	680.9
	680.9	680.8	680.8	680.8	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 41	1000.	1000.	1000.	1000.	1000.	1000.	681.2	681.2	681.2	681.2
	681.1	681.1	681.1	681.0	681.0	681.0	680.9	680.9	680.9	680.8
	680.8	680.8	680.8	680.7	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.

	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 42	1000.	1000.	1000.	1000.	1000.	1000.	681.2	681.2	681.1	681.1
	681.1	681.1	681.0	681.0	681.0	680.9	680.9	680.9	680.8	680.8
	680.8	680.7	680.7	680.7	680.6	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 43	1000.	1000.	1000.	1000.	1000.	1000.	681.1	681.1	681.1	681.1
	681.0	681.0	681.0	681.0	680.9	680.9	680.9	680.8	680.8	680.7
	680.7	680.7	680.6	680.6	680.5	680.5	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 44	1000.	1000.	1000.	1000.	1000.	1000.	1000.	681.1	681.1	681.0
	681.0	681.0	680.9	680.9	680.9	680.8	680.8	680.8	680.7	680.7
	680.6	680.6	680.6	680.5	680.5	680.4	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 45	1000.	1000.	1000.	1000.	1000.	1000.	1000.	681.0	681.0	681.0
	681.0	680.9	680.9	680.9	680.8	680.8	680.7	680.7	680.7	680.6
	680.6	680.5	680.5	680.4	680.4	680.3	680.2	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 46	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	681.0	680.9
	680.9	680.9	680.8	680.8	680.8	680.7	680.7	680.7	680.6	680.6
	680.5	680.5	680.4	680.4	680.3	680.2	680.1	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 47	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.9	680.9
	680.9	680.8	680.8	680.8	680.7	680.7	680.6	680.6	680.6	680.5
	680.5	680.4	680.4	680.3	680.2	680.1	680.1	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 48	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.8
	680.8	680.8	680.7	680.7	680.7	680.6	680.6	680.6	680.5	680.5
	680.4	680.4	680.3	680.2	680.2	680.1	680.0	679.7	1000.	679.4
	679.5	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 49	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	680.8
	680.8	680.7	680.7	680.7	680.6	680.6	680.5	680.5	680.5	680.4
	680.4	680.3	680.2	680.2	680.1	680.0	679.9	679.5	679.0	679.3
	679.4	679.5	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 50	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	680.7	680.7	680.7	680.6	680.6	680.5	680.5	680.5	680.4	680.4
	680.3	680.3	680.2	680.1	680.1	680.0	679.9	679.7	679.5	679.5
	679.5	679.5	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 51	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	680.7	680.6	680.6	680.6	680.5	680.5	680.4	680.4	680.4	680.3
	680.3	680.2	680.2	680.1	680.0	680.0	679.9	679.7	679.6	679.6
	679.6	679.6	679.6	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 52	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	680.6	680.6	680.5	680.5	680.4	680.4	680.4	680.3	680.3
	680.2	680.2	680.1	680.1	680.0	680.0	679.9	679.8	679.7	679.7
	679.6	679.6	679.6	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 53	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	680.5	680.5	680.4	680.4	680.4	680.3	680.3	680.2
	680.2	680.1	680.1	680.1	680.0	679.9	679.9	679.8	679.8	679.7
	679.7	679.7	679.7	679.6	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 54	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	680.4	680.4	680.4	680.3	680.3	680.2	680.2
	680.1	680.1	680.1	680.0	680.0	679.9	679.9	679.8	679.8	679.7
	679.7	679.7	679.7	679.7	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 55	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	680.3	680.3	680.2	680.2	680.1
	680.1	680.1	680.0	680.0	680.0	679.9	679.9	679.8	679.8	679.8

	679.7	679.7	679.7	679.7	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 56	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	680.2	680.2	680.1	680.1
	680.1	680.0	680.0	680.0	679.9	679.9	679.9	679.8	679.8	679.8
	679.7	679.7	679.7	679.7	679.7	679.6	679.6	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 57	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	680.2	680.1	680.1	680.1	680.0
	680.0	680.0	680.0	679.9	679.9	679.9	679.9	679.8	679.8	679.8
	679.7	679.7	679.7	679.7	679.6	679.6	679.6	679.6	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 58	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	680.1	680.1	680.0	680.0	680.0	680.0
	680.0	679.9	679.9	679.9	679.9	679.8	679.8	679.8	679.8	679.7
	679.7	679.7	679.7	679.6	679.6	679.6	679.6	679.6	679.6	679.6
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 59	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	680.0	680.0	679.9	679.9	679.9	679.9
	679.8	679.8	679.8	679.8	679.8	679.7	679.7	679.7	679.7	679.7
	679.6	679.6	679.6	679.6	679.6	679.6	679.6	679.6	679.6	679.5
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 60	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	679.8	679.8	679.8	679.8	679.7	679.7
	679.7	679.7	679.7	679.6	679.6	679.6	679.6	679.6	679.5	679.5
	679.5	679.5	679.5	679.5	679.5	679.5	679.5	679.5	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 61	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	679.6	679.5	679.5	679.5	679.5
	679.5	679.5	679.5	679.4	679.4	679.4	679.4	679.4	679.3	679.3
	679.3	679.3	679.3	679.3	679.3	679.3	679.3	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 62	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	679.2	679.2	679.2
	679.2	679.2	679.2	679.1	679.1	679.1	679.1	679.0	679.0	679.0
	679.0	679.0	679.0	679.0	679.0	678.9	678.9	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 63	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	678.8
	678.8	678.8	678.8	678.8	678.7	678.7	678.7	678.7	678.7	678.6
	678.6	678.6	678.6	678.6	678.6	678.5	678.5	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 64	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	678.4	678.4	678.4	678.4	678.3	678.3	678.3	678.3	678.2
	678.2	678.2	678.2	678.1	678.1	678.1	678.1	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 65	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	677.9	677.9	677.9	677.9	677.8	677.8	677.8
	677.8	677.7	677.7	677.7	677.7	677.6	677.6	677.6	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 66	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	677.4	677.4	677.3	677.3	677.3
	677.3	677.3	677.2	677.2	677.2	677.2	677.1	677.1	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 67	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	676.8	676.8	676.8	676.8	676.7
	676.7	676.7	676.7	676.7	676.7	676.6	676.6	676.6	676.6	676.6
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 68	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	676.3	676.2	676.2	676.2	676.2	676.1	676.1
	676.1	676.1	676.1	676.0	676.0	676.0	676.0	676.0	676.0	676.0
	676.0	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.								
0 69	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.
	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1000.	675.8

```
     675.8    675.8    675.7    675.7    675.7    675.7    675.6    675.6    675.6    675.5
     675.4    675.4    675.3    675.3    675.2    675.3    675.3    675.3    675.3    675.4
     675.4    675.5    675.6    1000.    1000.    1000.    1000.    1000.    1000.    1000.
     1000.    1000.
0 70  1000.    1000.    1000.    1000.    1000.    1000.    1000.    1000.    1000.    1000.
     1000.    1000.    1000.    1000.    1000.    1000.    1000.    1000.    675.3    675.3
     675.3    675.3    675.3    675.3    675.3    675.3    675.3    675.2    675.2    675.2
     675.1    675.1    675.0    675.0    675.0    675.0    675.0    675.0    675.0    675.1
     675.1    675.2    675.2    1000.    1000.    1000.    1000.    1000.    1000.    1000.
     1000.    1000.
0 71  1000.    1000.    1000.    1000.    1000.    1000.    1000.    1000.    1000.    1000.
     1000.    1000.    1000.    1000.    1000.    1000.    1000.    1000.    675.0    675.0
     675.0    675.0    675.0    675.0    675.0    675.0    675.0    675.0    675.0    675.0
     675.0    675.0    675.0    675.0    675.0    675.0    675.0    675.0    675.0    675.0
     675.0    675.0    675.0    1000.    1000.    1000.    1000.    1000.    1000.    1000.
     1000.    1000.
0HEAD WILL BE SAVED ON UNIT 30 AT END OF TIME STEP 24, STRESS PERIOD  1
0


                VOLUMETRIC BUDGET FOR ENTIRE MODEL AT END OF TIME STEP 24 IN STRESS PERIOD  1

0          CUMULATIVE VOLUMES     L**3                    RATES FOR THIS TIME STEP     L**3/T
           ------------------                             ------------------------

             IN:                                          IN:
             ---                                          ---
               STORAGE =  0.00000                           STORAGE =  0.00000
           CONSTANT HEAD =   13104.                       CONSTANT HEAD =   13104.
               WELLS =  0.00000                           WELLS =  0.00000
             RECHARGE =  0.19550E+06                        RECHARGE =  0.19550E+06
           RIVER LEAKAGE =  0.26444E+06                   RIVER LEAKAGE =  0.26444E+06
0            TOTAL IN =  0.47303E+06                      TOTAL IN =  0.47304E+06
0            OUT:                                         OUT:
             ---                                          ---
               STORAGE =  0.00000                           STORAGE =  0.00000
           CONSTANT HEAD =   58853.                       CONSTANT HEAD =   58853.
               WELLS =  0.41421E+06                         WELLS =  0.41421E+06
             RECHARGE =  0.00000                            RECHARGE =  0.00000
           RIVER LEAKAGE =   47.825                       RIVER LEAKAGE =   47.822
0            TOTAL OUT =  0.47311E+06                     TOTAL OUT =  0.47311E+06
0             IN - OUT =  -76.375                         IN - OUT =  -74.969
0        PERCENT DISCREPANCY =          -0.02            PERCENT DISCREPANCY =          -0.02


0

      TIME SUMMARY AT END OF TIME STEP 24 IN STRESS PERIOD  1
                  SECONDS      MINUTES      HOURS       DAYS        YEARS
                  -------------------------------------------------------
   TIME STEP LENGTH      3600.00      60.0000      1.00000     0.416667E-01  0.114077E-03
  STRESS PERIOD TIME     86400.0      1440.00      24.0000      1.00000      0.273785E-02
 TOTAL SIMULATION TIME   86400.0      1440.00      24.0000      1.00000      0.273785E-02
1
```