Data and Analysis of TW-4 Aquifer Pumping Tests and Water Quality Sampling Near Logan, New Mexico Lake Meridith Salinity Study - Texas and New Mexico

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Bureau of Reclamation
Great Plains Regional Office
Billings, MT

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Introduction

During the period of December 5 to December 9, 1994, the Bureau of Reclamation (Reclamation), conducted 2 aquifer tests in test well (TW)-4 completed in the Trujillo Formation adjacent to the Canadian River, just south and east of the town of Logan, New Mexico. TW-4 is located about 210 feet north of TW-2, in which a pumping test was conducted in April, 1994. The Triassic Trujillo consists of cross-bedded and lenticular sandstone with discontinuous and lenticular shale units. The Trujillo, near Logan, is expected to be unconfined to semi-confined. Ground water in this unit moves toward the Canadian River from both the north and south. Regionally, the Trujillo contains mainly fresh or slightly saline water and is used as a water supply in the local area. However, it appears that water in the Trujillo along the south side of Canadian River in the vicinity of Logan can contain highly saline water. The probable source path for the saline water is upward leakance from the underlying Tecovas Formation. This saline water eventually discharges into the Canadian River. A more detailed description of the regional geology and hydrogeology is included in the "Geologic Report on the Logan, New Mexico Area - Lake Meridith Salinity Study - Texas and New Mexico". The aquifer test was performed to investigate the potential of a pumping well field as a method to remove saline water from aquifers adjacent to the river alluvium, thereby reducing the saline discharge into the river.

Previous Investigations

Previous pumping tests were preformed in wells TW-1 (March, 1979), TW-2 (April, 1994), and TW-3 (April, 1994). TW-1, completed in the Tecovas Fm. and located along the Canadian River about 3,172 feet northwest of TW-4, was pumped at a rate of 475 gallons per minute (GPM) for a period of 97 hours, followed by 68 hours of recovery. Drawdown data were recorded in wells OW-3 and OW-4. Aquifer parameters derived from that test were a hydraulic conductivity of 36 feet per day (ft/day) and a storage coefficient 0.00015. The TW-1 aquifer test is discussed in the "Ground Water Notebook - Canadian River Municipal Water Authority - Lake Meridith Salinity Control Project". TW-2 and TW-3 were completed in the Tecovas Fm. TW-2, located 210 feet south of TW-4, was pumped at a rate of 87-88 GPM for a period of 74.75 hours, followed by 44.6 hours of recovery. Analysis of the test data resulted in a computed transmissivity value of 678 feet squared per day (ft^2/day). Using a aquifer saturated thickness of 119 feet at TW-2, results in a hydraulic conductivity of 5.69 ft/day. TW-3, located along the Canadian River about 6,000 feet north east of TW-4, was pumped at a rate of 105 GPM for a 74.75 hour period, followed by 101.67 hours of recovery. Analysis of the test data resulted in a computed transmissivity value of 1,308 ft^2/day. Using an aquifer saturated thickness of 138 feet, the hydraulic conductivity would be 9.47 ft/day. The TW-2 and TW-3 tests are discussed in detail in the report "Data and Analysis of TW-3 and TW-2 Aquifer Pumping Tests and Water Quality Sampling Near Logan, New Mexico - Lake meridith Salinity Study - Texas and New Mexico". **Figure 1** shows the locations of the test wells and observation wells involved in the pumping and aquifer tests.

TW-4 Aquifer Tests

The objectives of the TW-4 aquifer tests were to obtain transmissivity and storativity for the Trujillo aquifer, and to determine if any leakance was occurring from adjacent aquifers.

The screened interval of TW-4 was set at a depth of 54.4 to 112.9 feet. The screen consists of 0.050-inch slot, 5-inch diameter schedule 40 PVC with 16 square inches of openings per linear foot. The intake for the 5-horsepower Red Jacket pump was set at a depth of 100 feet. See **figure 2** for more details on the construction of TW-4. The screened interval was placed to fully penetrate the Trujillo aquifer which has an estimated saturated thickness of 55 feet at this site (top of aquifer at 51 feet, aquifer bottom at 106 feet). The static water level for TW-4 was 2.3 feet below ground surface. The static piezometric head of TW-2 is about 10 feet higher than the head in the Trujillo aquifer at the time of the aquifer tests.

Three nearby wells, TW-2, OW-7, and OW-8 were used to observe the effects of pumping TW-4. Details of construction of wells TW-2, OW-7, and OW-8 are shown in **figures 3, 4, and 5**, respectively. Water levels were measured in eight other wells in the area to demonstrate the local hydrogeologic conditions. The location of all the wells involved in the aquifer test are shown in **figure 1**. The approximate radial distances from the pumped well to the observation wells and the formation in which the observation well is completed are as follows:

Well	Distance from TW-4 (feet)	Formation	Water level Depth (feet)	Water Level Elev. (feet)
TW-4	0	Trujillo	2.3	3661.1
TW-2	210	Tecovas	17.2	3671.8
TW-3	6,359	Tecovas	19.5	3669.8
OW-5A	4,100	Tecovas	151.1	3665.3
OW-5B	4,116	Trujillo	157.8	3659.4
OW-6A	4,478	Trujillo	90.3	3682.9
OW-6B	4,482	Trujillo	89.3	3684.5
OW-6C	4,471	Tecovas	86.2	3686.9
OW-7	162	Trujillo	1.7	3660.8
OW-8	190	Trujillo	2.6	3661.2
OW-9	7,839	Trujillo	58.2	3675.7

OW-8 is located about 90 feet from the Canadian River, between the pumped well (TW-4) and the Canadian River. OW-7 is located east of TW-4 at a distance from the river approximately equal to that of TW-4. TW-4 is located between the river and TW-2. The relative positions of the wells monitored in the TW-4 tests are shown **figure 3**.

Water samples were obtained during the first aquifer test to determine the major anions and cations, trace metal content, and the presence of mercury. Periodic samples of the discharge water were analyzed for specific conductance throughout the pumping portion of both tests.

Data loggers were used to record the drawdowns and subsequent recoveries within TW-4, TW-2, OW-7, and OW-8. A barometric pressure probe was used during the test to record changes in barometric pressure throughout the test. Water levels in all other wells were obtained manually using electronic water level indicators. Discharge from TW-4 was routed through approximately 25 feet of 2-inch polyethylene pipe and several hundred feet of 6-inch collapsible discharge tubing where it was discharged to the Canadian River. All water level depths referred to in this report are from ground surface unless stated otherwise.

Climatic conditions during both tests consisted of afternoon temperatures ranging from 40 to 70 degrees, calm to windy, with 0.25 and 0.02 inch of precipitation reported December 5 and 6, respectively. Flows in the Canadian River were increased by an additional 4 cubic feet per second during the aquifer tests to dilute the additional saline loading from the pumped well discharge. There were no other known wells pumping from the Trujillo or Tecovas Formations in the vicinity of the aquifer tests.

The initial aquifer test was conducted by pumping for 24 hours followed by an equal period of recovery. After preliminary analysis of the initial test data, it was determined that a second aquifer test with at least 48 hours of pumping would be required to obtain the desired aquifer parameters.

TW-4, First Test

The pump test commenced at 12:00:00 on December 5, 1994. A static water level of 2.3 feet below ground surface was obtained in TW-4 at 10:00 on December 5, prior to the start of the test. Discharge from the well was monitored with a 2-inch cumulative flow meter. The flow meter was indicating a discharge rate of 85 to 82 GPM. A meter-indicated discharge of 83 GPM was checked by timing the flow into a 55-gallon barrel during the second test. The average discharge rate determined with the barrel was about 79 GPM.

TW-4 was pumped at a constant rate of 79 GPM for the duration of the pumping phase of the test. At 220 minutes into the test, the drawdown in the well reached 35.8 feet, at which point the drawdown curve became relatively flat, fluctuating from 35.7 to 36.1 feet for the remainder of the 24 hour test. At the end of that time period, the pump was shut off and recovery data were collected for 24 hours. The water levels in the pumped well and observation wells had recovered to static levels during the recovery period.

The data obtained during the test is presented in tables and plots included Appendix A

of this report. Upon completion of the first test it was decided that a second test of longer duration would be desirable to see if additional changes to the slope of the drawdown curves would occur, enhancing aquifer storativity and leakance calculations.

TW-4, Second Test

The pumping phase for the second test began at 12:00 Noon December 7, 1994. A static water level of 2.3 feet below ground surface was obtained in TW-4 prior to the beginning of the test. A 2-inch cumulative flow meter was used to monitor the discharge from the well. The flow meter was indicating a discharge rate of 84 to 82 GPM. A meter-indicated discharge of 83 GPM was checked by timing the flow into a 55-gallon barrel while the meter indicated a flow rate of 83 GPM. The average discharge rate determined with the barrel was about 79 GPM.

TW-4 was pumped at a constant rate of 79 GPM for at total time of 48.5 hours. The drawdown in the well reached 36.6 feet at 380 minutes at which time the drawdown curve became relatively flat, fluctuating from 38.5 to 37.4 feet for the remainder of the pumping phase of the test. OW-7 reached a maximum drawdown of 3.1 at 520 minutes. OW-8 reached a maximum drawdown of 2.2 at 560 minutes. No obvious drawdown was observed in TW-2. The small changes that were logged in TW-2 were attributed to barometric pressure changes. At the end of 48 hours, the pump was shut off and recovery data were collected. Recovery data were collected for 2 hours. The water level in TW-4 recovered to within 0.6 percent of the prepumped level. After 2 hours, OW-7 and OW-8 water levels recovered to within 3 and 7 percent respectively, of prepumping levels.

Data Analyses

The data obtained during the test are presented in tables and plots included in **appendix A** of this report. Note that the drawdown graphs presented in **appendix A** (with the exception of the graphs for TW-2) are based on observed data which has been corrected for barometric pressure changes. Those corrections were made with an arbitrarily assumed barometric efficiency of 70%.

The semi-logarithmic plots found in **appendix A** showing the drawdowns at TW-4, OW-7, and OW-8 have curves which descend steeply along a relatively straight line during the earlier portions of the tests, and then progressively flatten out near the end of the tests. The curves appear to be still descending slowly at the end of the tests, although the changes are somewhat masked by barometric changes. The overall curve shape for each well was interpretated to represent drawdown curves that are being impacted by leakance from adjacent aquifers. Geologic logs for the wells indicate a shale layer separating the Trujillo and Tecovas formations and some leakance is expected across this aquitard since the head in the Tecovas is estimated to be 6 to 7 feet higher than the static head in the Trujillo at the test site. The geologic logs did not indicate any

continuous confining layer near the top of the Trujillo aquifer and therefore a relatively good hydraulic connection should exist between the Trujillo and the overlying alluvial aquifer. There are indications of some thin shale or clay layers within the Trujillo formation which may be causing localized confining conditions.

The observed drawdowns at OW-7 and OW-8 were approximately the same with OW-8 being about 0.9 feet less than OW-7. That difference could be accounted for due to the difference in radial distance from the test well to the observation wells. It could also reflect additional recharge occuring from the river since OW-8 is much closer to the stream than OW-7. Since OW-8 and OW-7 were placed at roughly a right angle to TW-4, and since the observed drawdowns at both wells were approximately the same, it was assumed for this analysis than there was minimal aquifer anisotropy in the test area. This may be an incorrect assumption considering that there appears to be a great deal of fracturing occuring in the area which could cause significant differences in hydrologic conditions from one area to the next.

The test data were analyzed using several different methods. The drawdown data for OW-7 and OW-8 were evaluated utilizing the analytic method of Hantush and Jacob for unsteady flow to a well under semi-confined conditions with no storage in aquitards. The commercial software program AQTESOLV was utilized for matching the data curves to the type curves and the results are shown in **figures 6 thru 9**. There appears to be a fairly good match between the type curves and data curves. Averaging the results from aquifer test 1 and aquifer test 2 produces the following values:

	OW-7	OW-8
Transmissivity ----------	1,086 ft^2/day	1,100 ft^2/day
Storage Coefficient ------	.00019	.00033

The results are somewhat suspect since one of the assumptions that usage of this analytic method is premised upon is that leakance is occurring verically through an overlying aquitard. As previously stated, there appears to be no overlying aquitard in the Trujillo, and it is felt that a majority of the water 'leaking' from the overlying alluvial aquifer probably has a considerable component of horizontal movement. Another assumption that the method utilizes, but is not represented by field conditions, is that there should be an aquiclude at the bottom of the aquifer being tested. In this case, there is a shale aquitard at the bottom of the Trujillo which allows for additional leakance from the Tecovas.

Recovery data for OW-7, OW-8, and TW-4 were also analyzed with the Theis recovery method to determine transmissivity. It was assumed that the initial straight line portions of the drawdown curve represent the transmissivity of the adjacent aquifer. Averages of results shown in **figures 10 thru 15** are as follows:

	OW-7	OW-8	TW-4
Transmissivity ----------	1,451 ft^2/day	1,640 ft^2/day	120 ft^2/day

The resultant transmissivity for OW-7 and OW-8 are higher than those produced by the Hantush leaky aquitard method. It is possible that the straight line portion of the recovery curve is being influenced by leakance. Note that the transmissivity calculated for TW-4 is a magnitude less than for the observation wells. The exact cause of this is not known, but a possible explanation is that the straight line portion of the recovery curve which occurs early after the pump was shut off is being influenced by equalization of water levels from within the well casing with water levels in the aquifer just adjacent to the casing. Balancing of the water levels causes a rapid rise of the measured water level within the well and produces a transmissivity value lower than that represented by the aquifer.

Since no analytic model or method could be found that acceptably represented the field conditions at the test site, a conceptual finite difference 3-dimensional groundwater flow model was constructed to simulate the aquifer test and therefore allow for the approximation of the parameters of transmissivity and the storage coefficient. The software program MODFLOW was used to solve the flow model. The resultant model consisted of 5 layers with 61 rows by 61 columns of variable grid spacing. The grid covered an area of 1000 feet squared and grid cell size varied from 1 feet wide near the center of the grid to 47 feet wide near the boundaries of the grid. Layers 1 and 2 simulated the alluvial aquifer, layers 3 and 4 simulated the Trujillo aquifer, and layer 5 simulated the underlying Tecovas aquifer. Some of the hydrogeologic parameters assigned in the model are based on best judgement due to the lack of field data. **Figures 16, 17, and 18** show the resultant simulated drawdown curves for OW-7, OW-8, and TW-4, respectively. The simulations were performed with a hydraulic conductivity of 9 feet/day and storage coefficient of .0001 assigned to the Trujillo. With an aquifer thickness of 55 feet, the transmissivity for the Trujillo would be 495 ft^2/day. In **figure 18**, the difference between the simulated and observed drawdown at TW-4 is due to the estimated well efficiency (the water level in the well bore will be lower than the water level in the adjacent aquifer due to head losses which occur as water passes through the well screen). It is felt that the flow model provides the best estimate of hydraulic conductivity at the site.

Water Quality Sampling

Two sets of water quality samples were collected from the discharge of TW-4 during the first test. One sample set was collected 19.5 hours after pumping began and the other set was collected after 23.5 hours of pumping, just 0.5 hours before pumping ceased. Three samples were collected for each sample set including samples for analysis of major cations and anions, trace metals, and mercury.

Samples were collected manually using a plastic container filled from the discharge end of a 2-inch polyethylene pipe approximately 25 feet from the well. The sample for cation/anion analysis was transferred to a 200 milliliter (ml) plastic bottle without preservative. The trace-metals sample was transferred to a 200 ml plastic bottle to which 2 ml of nitric acid was added. The mercury analysis sample was transferred to a 200 ml clear glass bottle to which 2 ml of nitric acid was added.

One quality assurance (QA) sample was prepared at TW-4. The QA sample consisted of a 200 ml field replicate prepared as above for trace-metals analysis. The field identification numbers and sample type are as follows:

Field ID#	Type	Sample Date	Sample Time
TW4-1	Raw	12/06/94	09:00am
TW4-2	Metals	12/06/94	09:00am
TW4-3	Mercury	12/06/94	09:00am
TW4-4	Raw	12/06/94	01:00pm
TW4-5	Metals	12/06/94	01:00pm
TW4-6	Mercury	12/06/94	01:00pm
TW4-7	Metals (QA: split from sample TW4-5)		

The containers were labeled, placed in individual plastic bags and contained in an ice cooler while in the field. Sample containers were transferred to a refrigerator until the completion of the aquifer tests. Upon completion of the tests, the samples were transferred back to the ice cooler along with two "blue-ice" packs and shipped to Reclamation's Great Plains water quality laboratory in Bismarck, North Dakota for analysis. **Appendix B** contains the laboratory reports of the sample analyses. Total dissolved solids for the samples averaged 53,870 milligrams per liter. The predominant ions in the water are sodium and chloride. The trace-metals analyses showed relatively high concentrations of iron and strontium.

Periodic measurements of specific conductance were made of the discharge water from the pumped well (TW-4) during the aquifer tests using a Beckman conductivity bridge (first test) and a YSI 3000 T-L-C meter (second test). The Beckman meter supplied specific conductance values, temperature corrected to 25 ° C, from direct readings of undiluted water samples. The YSI meter was set to the 20 millimhos per centimeter setting and temperature corrected to 25 °C. The samples collected from the discharge for measurement with the YSI meter were diluted with de-ionized water to 1/8 of the original concentration to avoid over-ranging the conductivity meter. The sample collected at 9:30am on December 9, 1994 was replicated and retested in Reclamation's water quality lab in Denver using a YSI model 31-A conductance bridge calibrated to 25 °C. The laboratory specific conductance value of 78 milliSiemans per centimeter compares to the field value of 89.28 millimhos/cm.

The following tables display the specific conductance values obtained during the aquifer

tests. The values have been corrected for the 1/8 dilution factor.

Test	Date	Time	Specific Conductance (millimhos/cm @ 25 °C)
First	12/05/94	01:35pm	66.48
		01:40pm	66.48
		01:51pm	65.68
		02:02pm	64.60
		02:13pm	65.88
		02:30pm	65.48
		02:44pm	64.80
		03:28pm	62.36
		04:00pm	64.00
	12/06/94	08:17am	61.50
		09:00am	62.32
		01:00pm	67.00

Test	Date	Time	(millimhos/cm @ 25 °C)
Second	12/07/94	12:30pm	91.84
		01:00pm	95.60
		02:10pm	92.00
		02:35pm	97.36
		03:10pm	95.68
	12/08/94	07:30am	104.96
		09:15am	102.00
		10:00am	98.88
		11:00am	91.68
		12:00pm	86.72
		01:45pm	86.16
		03:00pm	82.24
		04:00pm	87.68
		05:00pm	93.36
	12/09/94	07:30am	104.00
		09:00am	93.04
		09:30am	89.28
		10:30am	93.60
		12:30pm	94.00

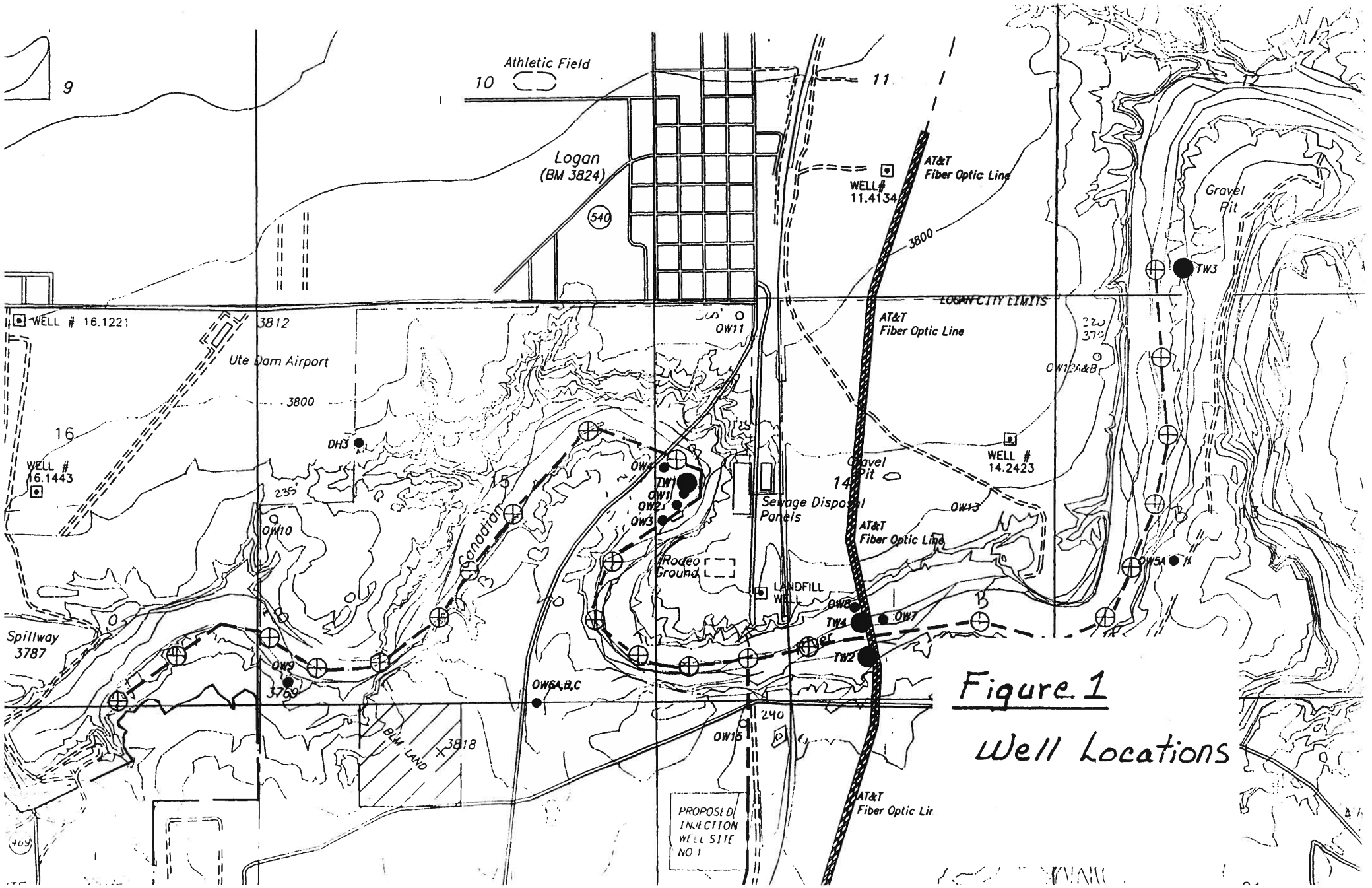
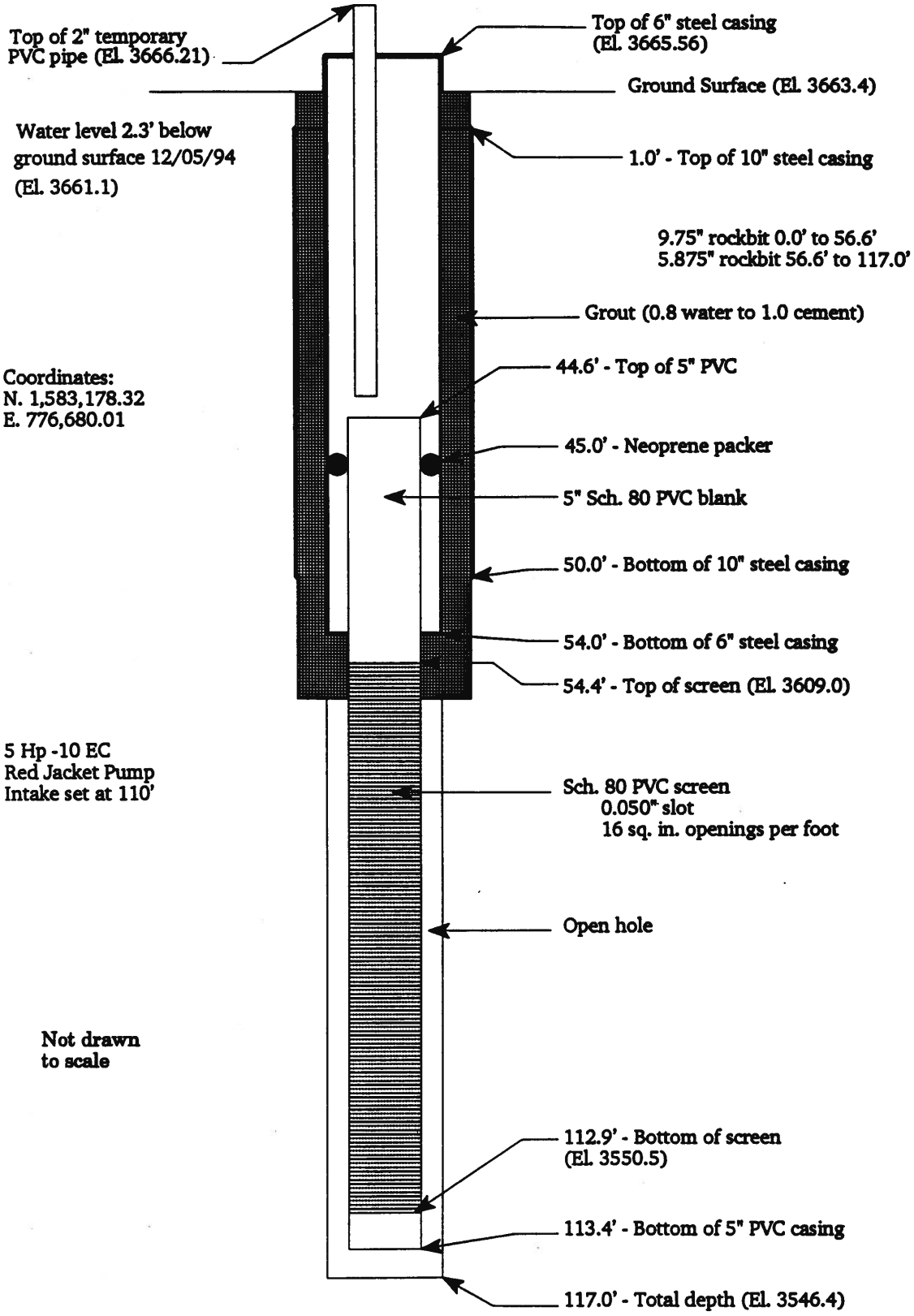


Figure 1

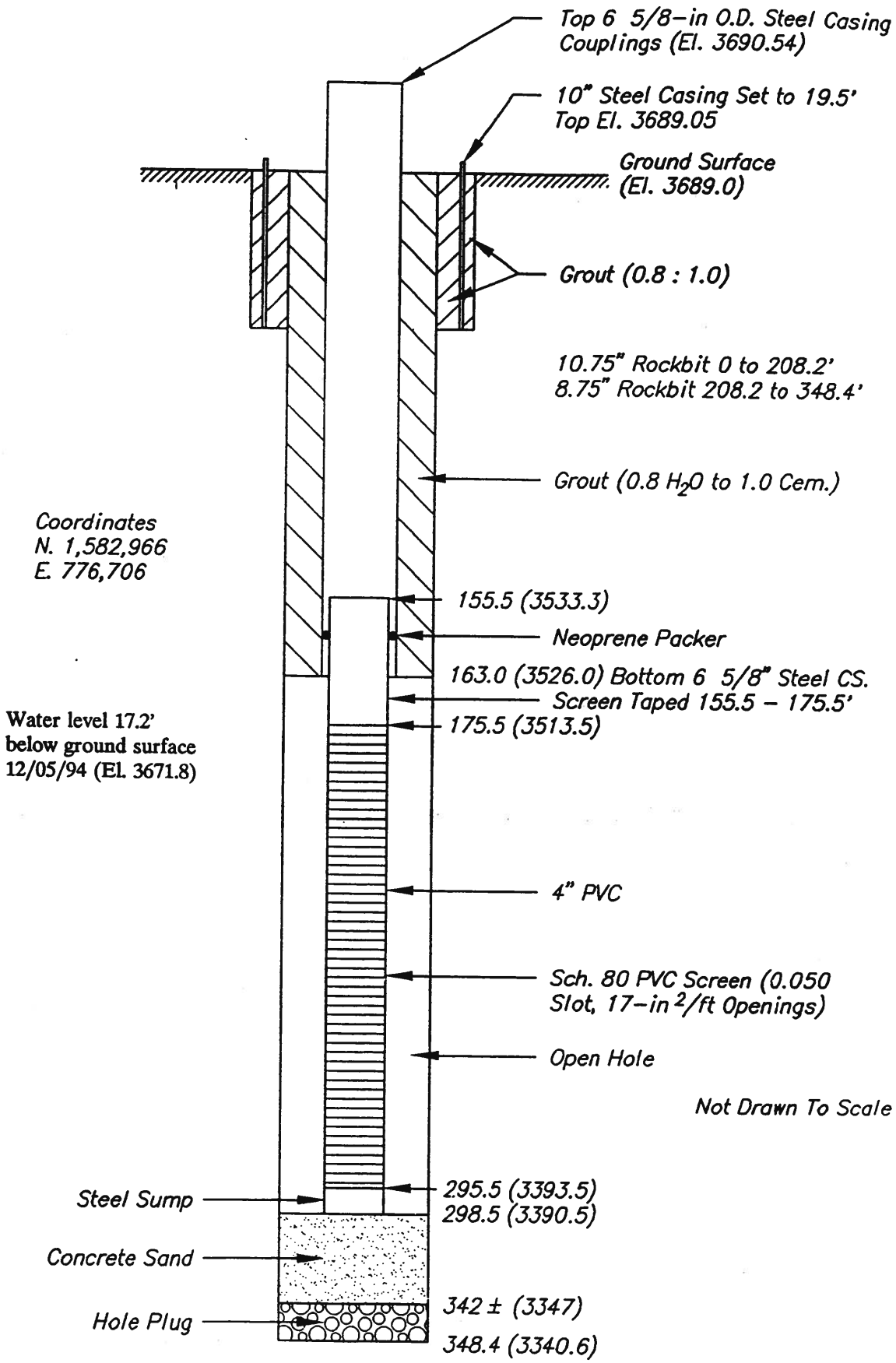
Well Locations



LAKE MEREDITH SALINITY STUDY

TW 4 Completion

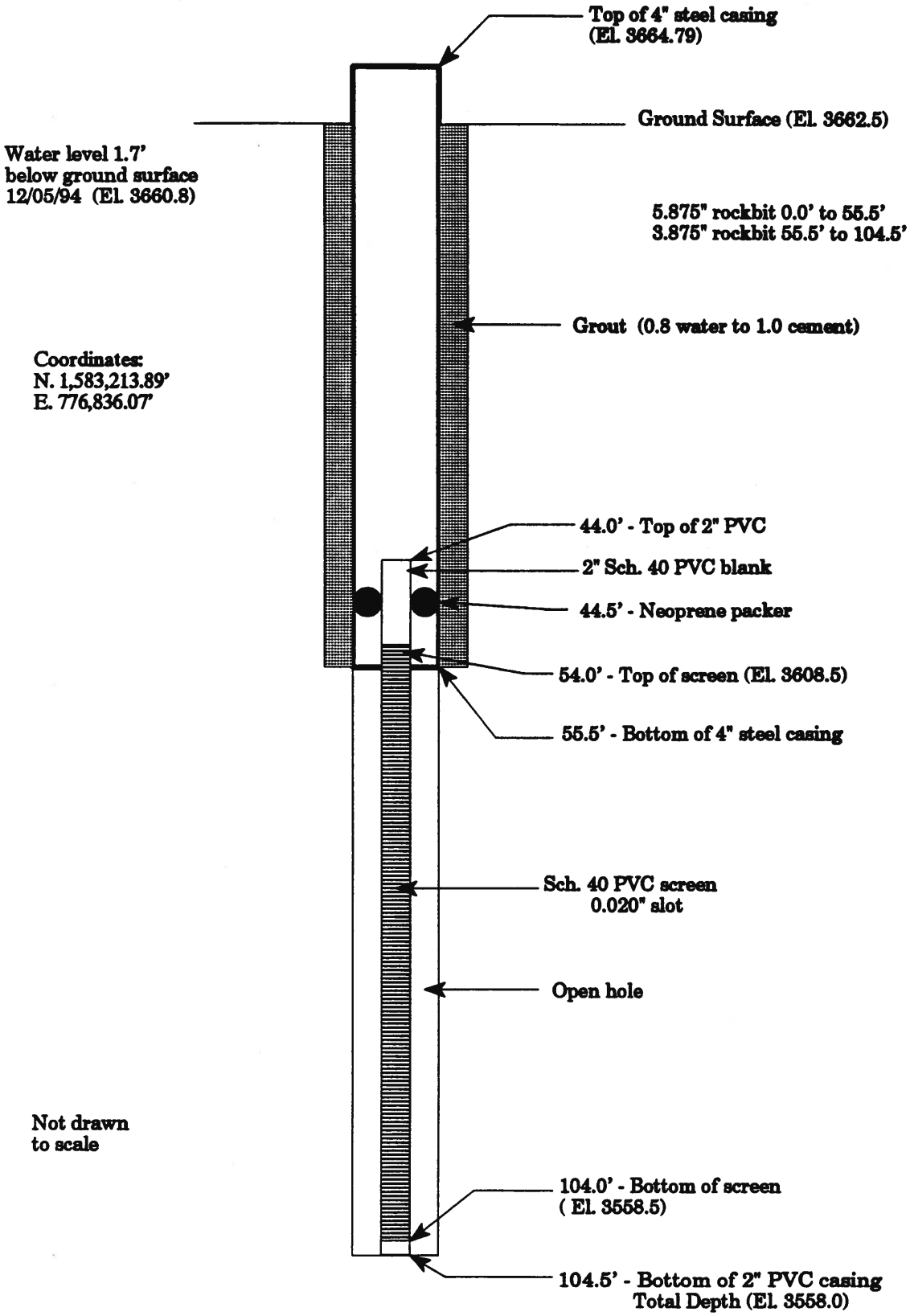
Figure 2



LAKE MEREDITH SALINITY STUDY

TW2 COMPLETION

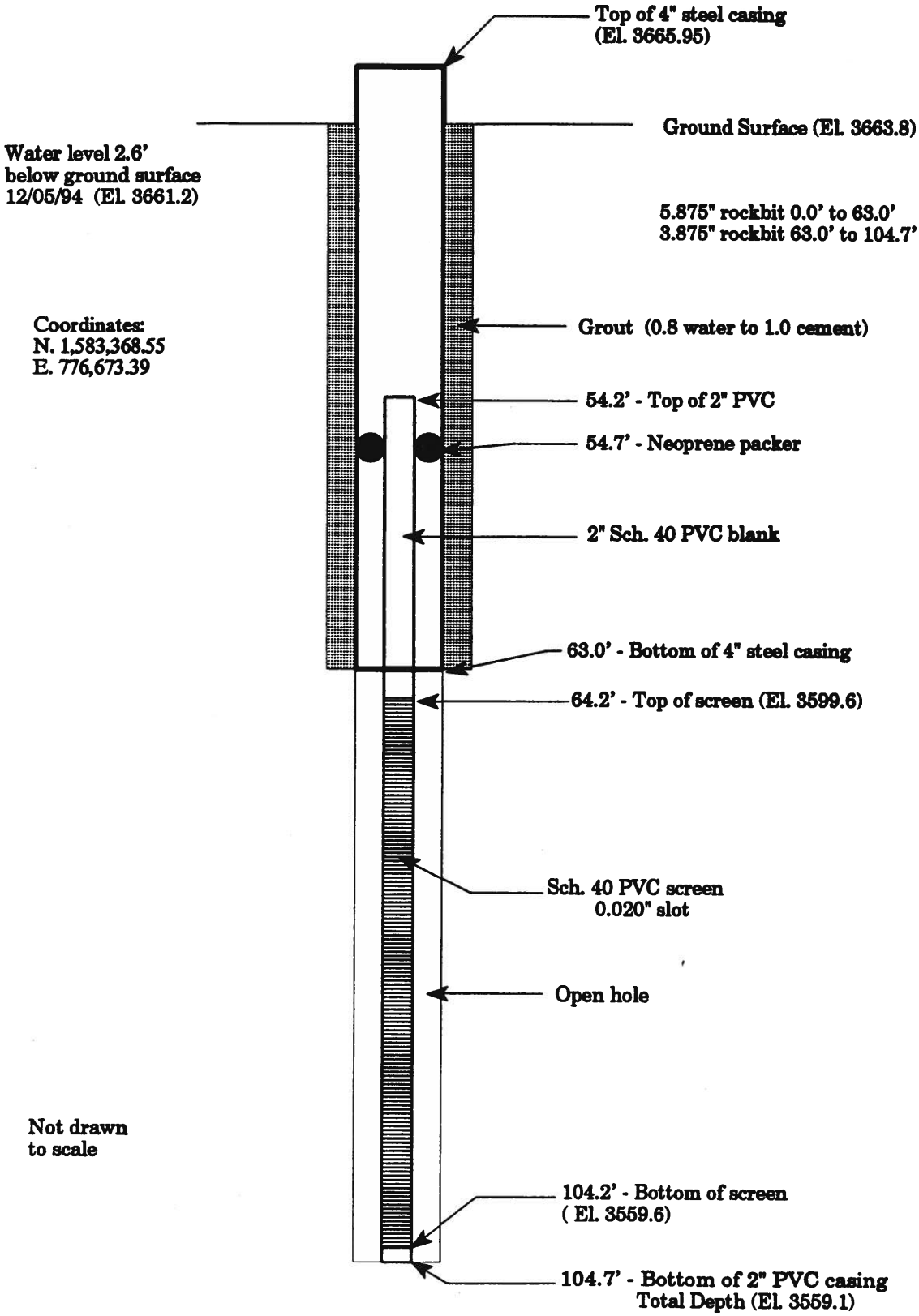
Figure 3



LAKE MEREDITH SALINITY STUDY

OW 7 Completion

Figure 4

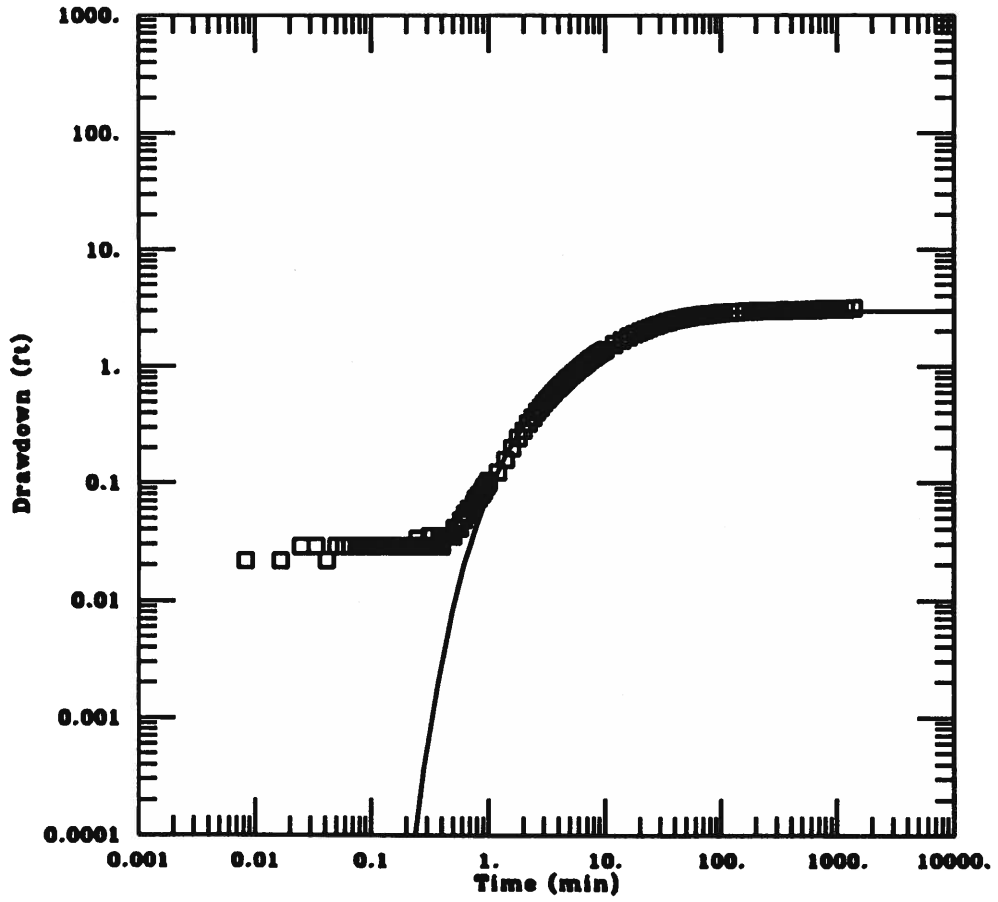


LAKE MEREDITH SALINITY STUDY
OW 8 Completion

Figure 5

Bureau of Reclamation	Client: **Canadian River Water Authority**
	Location: **Logan, NM**

OW-7 @ TW-4 Pumping Test #1



DATA SET:
ow7p1.dat
12/22/94

AQUIFER TYPE:
Leaky
SOLUTION METHOD:
Hantush
TEST DATE:
December 5, 1994
TEST WELL:
TW-4
OBS. WELL:
OW-7

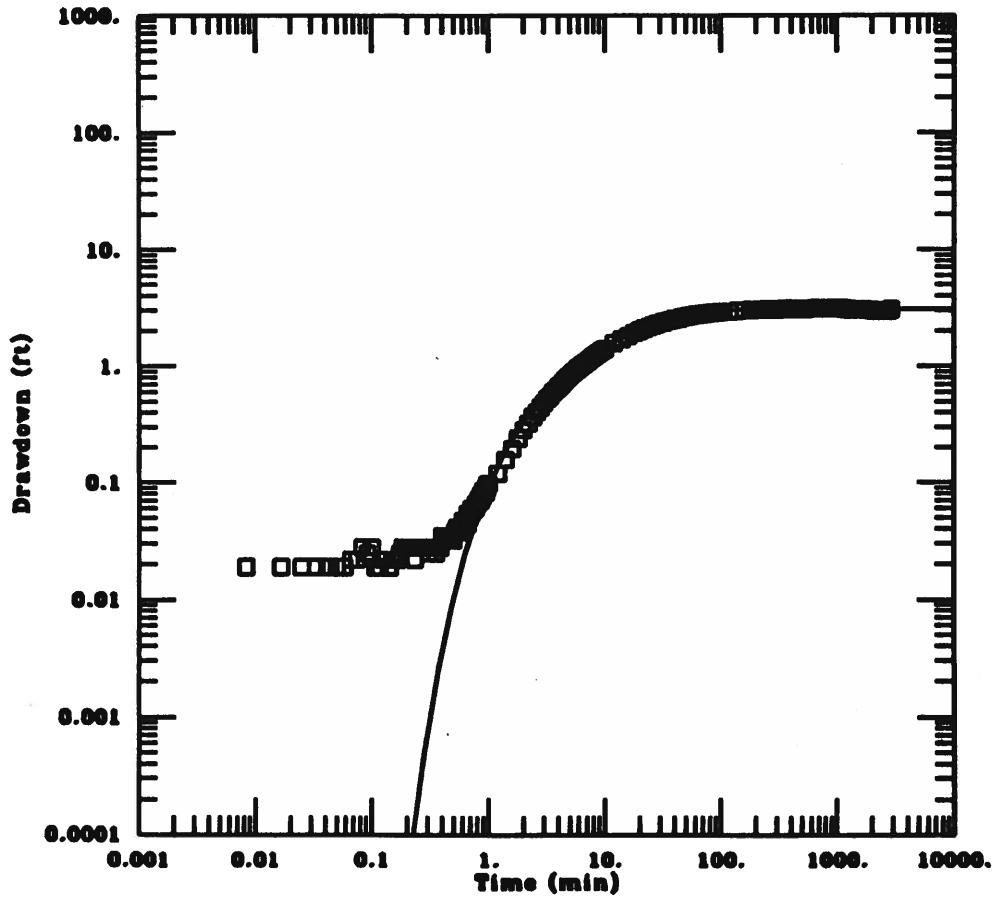
ESTIMATED PARAMETERS:
T = 0.7514 ft^2/min
S = 0.0001963
r/B= 0.32

TEST DATA:
Q = 10.69 ft^3/min
r = 162. ft
rc = 0.208 ft
rw = 0.25 ft

Fig. 6

Bureau of Reclamation	Client: **Canadian River Water Authority**
	Location: **Logan, NM**

OW-7 @ TW-4 Aquifer Test #2



DATA SET:
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12/14/94

AQUIFER TYPE:
Leaky
SOLUTION METHOD:
Hantush
TEST DATE:
December 7, 1994
TEST WELL:
TW-4
OBS. WELL:
OW-7

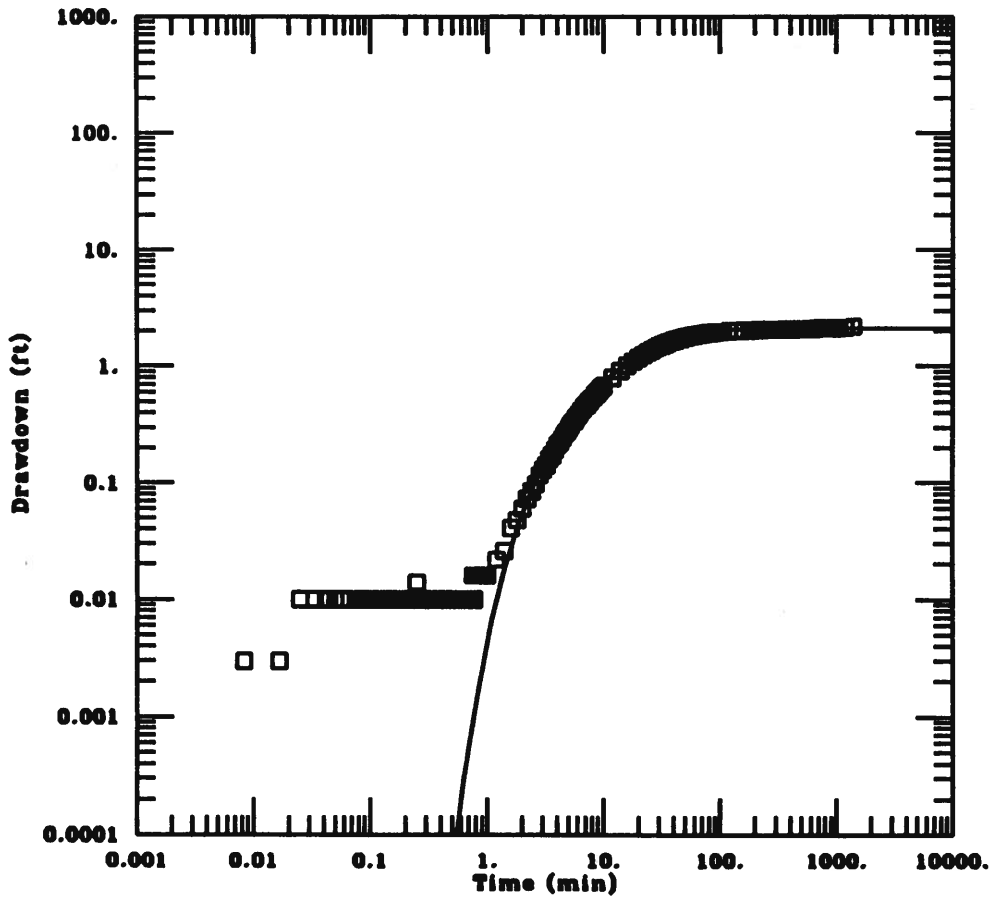
ESTIMATED PARAMETERS:
T = 0.757 ft^2/min
S = 0.0001888
r/B= 0.3

TEST DATA:
Q = 10.69 ft^3/min
r = 162. ft
rc = 0.208 ft
rw = 0.25 ft

Fig. 7

Bureau of Reclamation	Client: **Canadian River Water Authority**
	Location: **Logan, NM**

OW-8 @ TW-4 Pumping Test #1



DATA SET:
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12/22/94

AQUIFER TYPE:
Leaky
SOLUTION METHOD:
Hantush
TEST DATE:
December 5, 1994
TEST WELL:
TW-4
OBS. WELL:
OW-8

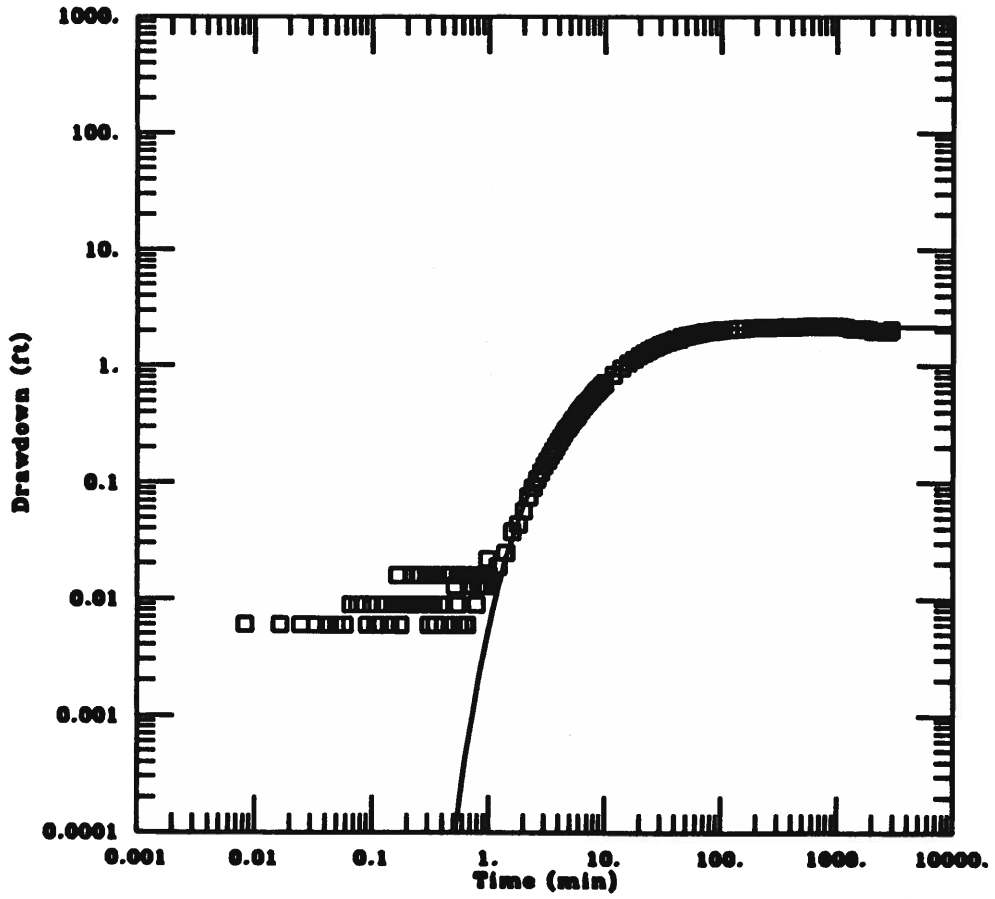
ESTIMATED PARAMETERS:
T = 0.7731 ft^2/min
S = 0.0003376
r/B= 0.48

TEST DATA:
Q = 10.69 ft^3/min
r = 190. ft
rc = 0.208 ft
rw = 0.25 ft

Fig. 8

Bureau of Reclamation	Client: **Canadian River Water Authority**
	Location: **Logan, NM**

OW-8 @ TW-4 Aquifer Test #2



DATA SET:
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12/14/94

AQUIFER TYPE:
Leaky
SOLUTION METHOD:
Hantush
TEST DATE:
December 7, 1994
TEST WELL:
TW-4
OBS. WELL:
OW-8

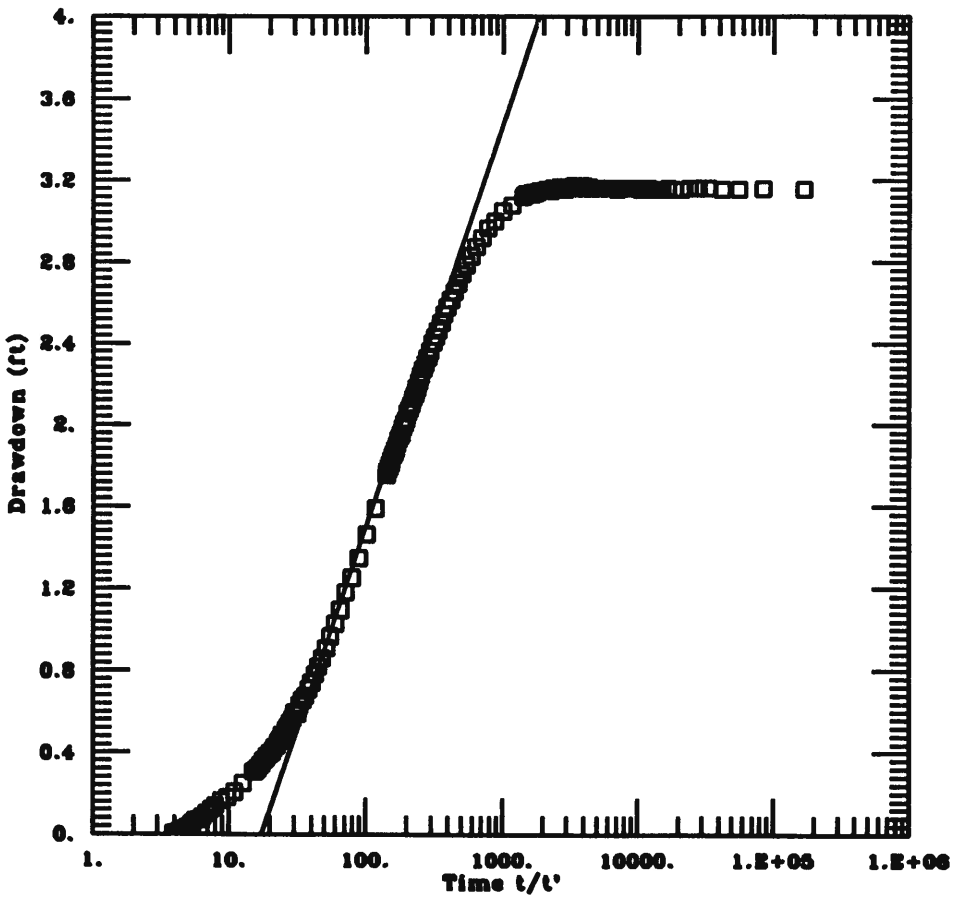
ESTIMATED PARAMETERS:
T = 0.7541 ft^2/min
S = 0.0003133
r/B= 0.48

TEST DATA:
Q = 10.69 ft^3/min
r = 190. ft
rc = 0.208 ft
rw = 0.25 ft

Fig. 9

Bureau of Reclamation	Client: **Canadian River Water Authority**
	Location: **Logan, NM**

OW-7 @ TW-4 Recovery Test #1



DATA SET:
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12/21/94

AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
December 5, 1994
TEST WELL:
TW-4
OBS. WELL:
OW-7

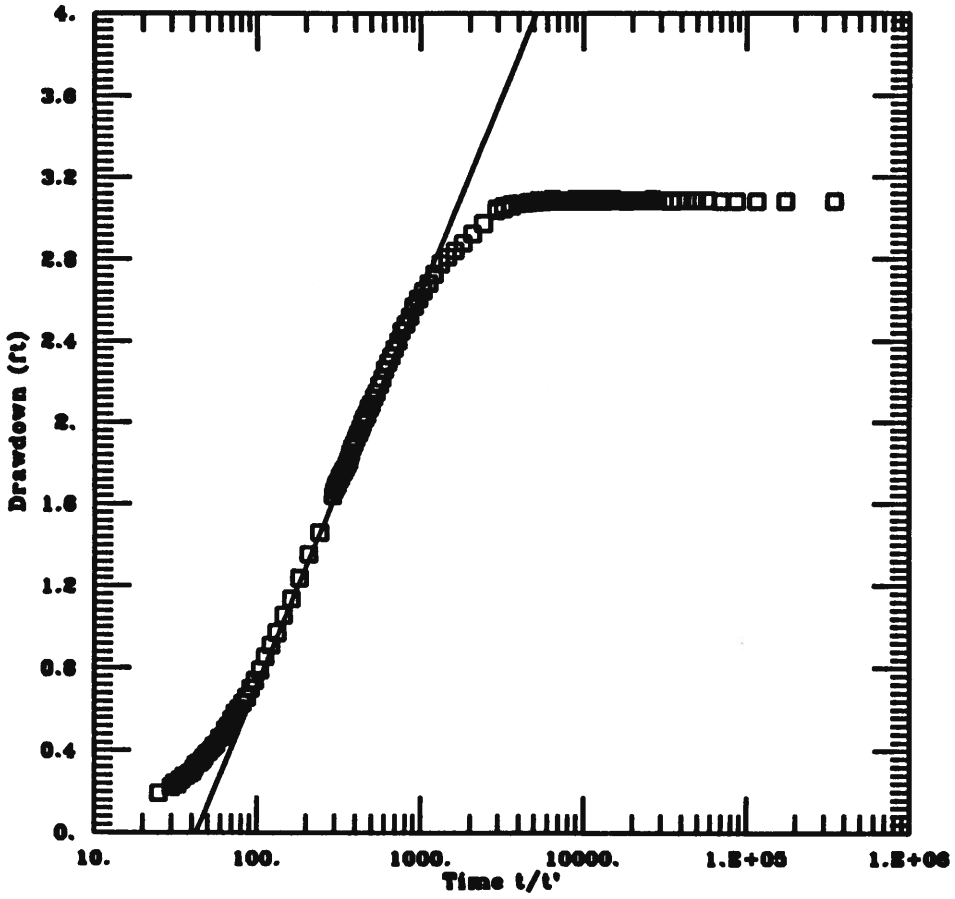
ESTIMATED PARAMETERS:
T = 0.9951 ft^2/min
S' = 17.36

TEST DATA:
Q = 10.69 ft^3/min
t pumping = 1400. min

Fig. 10

Bureau of Reclamation	Client: **Canadian River Water Authority**
	Location: **Logan, NM**

OW-7 @ TW-4 Recovery Test #2



DATA SET:
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12/14/94

AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
December 7, 1994
TEST WELL:
TW-4
OBS. WELL:
OW-7

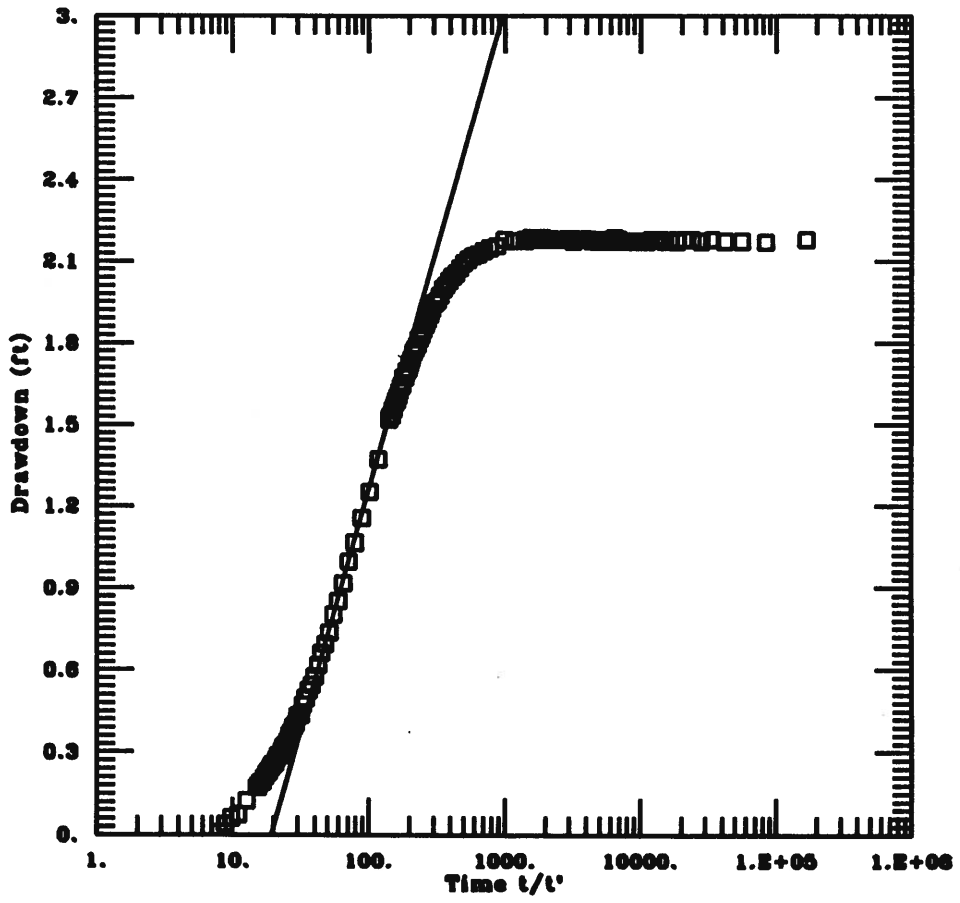
ESTIMATED PARAMETERS:
T = 1.02 ft^2/min
S' = 42.79

TEST DATA:
Q = 10.69 ft^3/min
t pumping = 2900. min
rc = 0.208 ft
rw = 0.25 ft

Fig. 11

Bureau of Reclamation	Client: **Canadian River Water Authority**
	Location: **Logan, NM**

OW-8 @ TW-4 Recovery Test #1



DATA SET:
ow8r1.dat
12/21/94

AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
December 5, 1994
TEST WELL:
TW-4
OBS. WELL:
OW-8

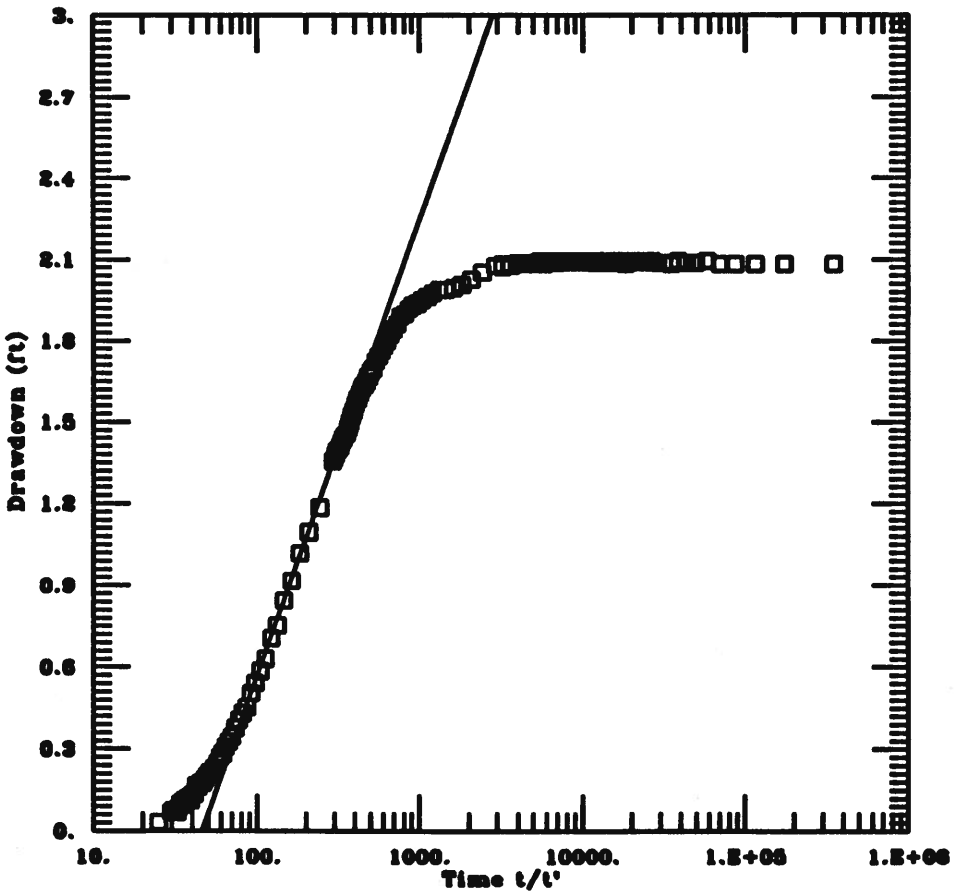
ESTIMATED PARAMETERS:
T = 1.11 ft^2/min
S' = 19.39

TEST DATA:
Q = 10.69 ft^3/min
t pumping = 1400. min
rc = 0.208 ft
rw = 0.25 ft

Fig. 12

Bureau of Reclamation	Client: **Canadian River Water Authority**
	Location: **Logan, NM**

OW-8 @ TW-4 Recovery Test #2



DATA SET:
ow8r2.dat
12/16/94

AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
December 7, 1994
TEST WELL:
TW-4
OBS. WELL:
OW-8

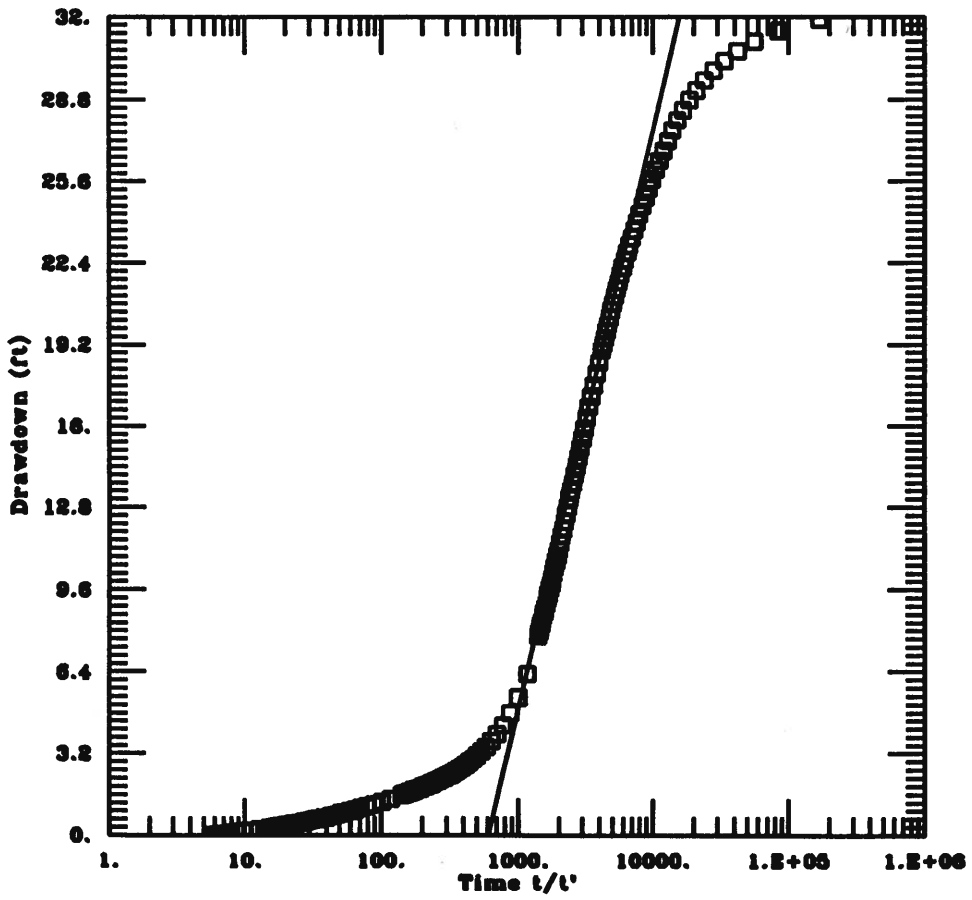
ESTIMATED PARAMETERS:
T = 1.168 ft^2/min
S' = 45.58

TEST DATA:
Q = 10.69 ft^3/min
t pumping = 2900. min

Fig. 13

Bureau of Reclamation	Client: **Canadian River Water Authority**
Project No.: **Lake Meredith Salinity Control**	Location: **Logan, NM**

TW-4 @ TW-4 Recovery Test #1



DATA SET:
tw4r1.dat
12/20/94

AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
December 5, 1994
TEST WELL:
TW-4
OBS. WELL:
TW-4

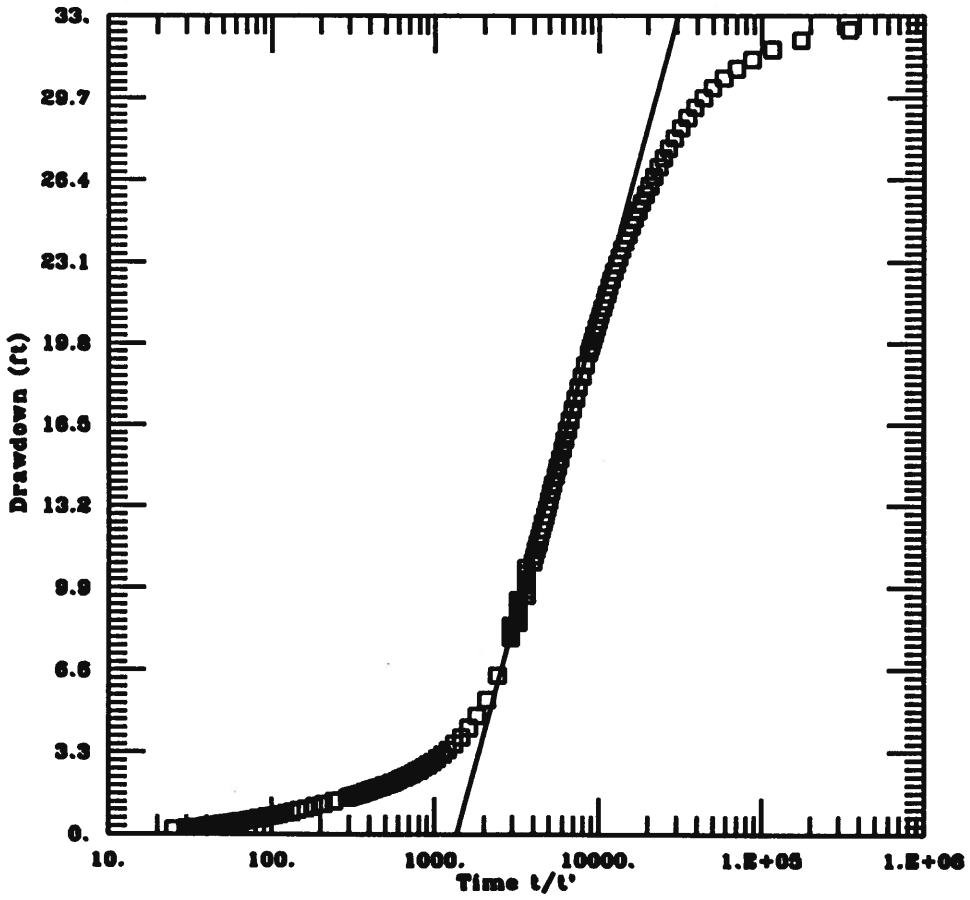
ESTIMATED PARAMETERS:
T = 0.0867 ft^2/min
S' = 603.5

TEST DATA:
Q = 10.69 ft^3/min
t pumping = 1400. min

Fig. 14

Bureau of Reclamation	Client: **Canadian River Water Authority**
Project No.: **Lake Meredith Salinity Control**	Location: **Logan, NM**

TW-4 @ TW-4 Recovery Test #2



DATA SET:
tw4r2.dat
01/03/95

AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
December 7, 1994
TEST WELL:
TW-4
OBS. WELL:
TW-4

ESTIMATED PARAMETERS:
T = 0.08018 ft^2/min
S' = 1363.5

TEST DATA:
Q = 10.69 ft^3/min
t pumping = 2900. min

Fig. 15

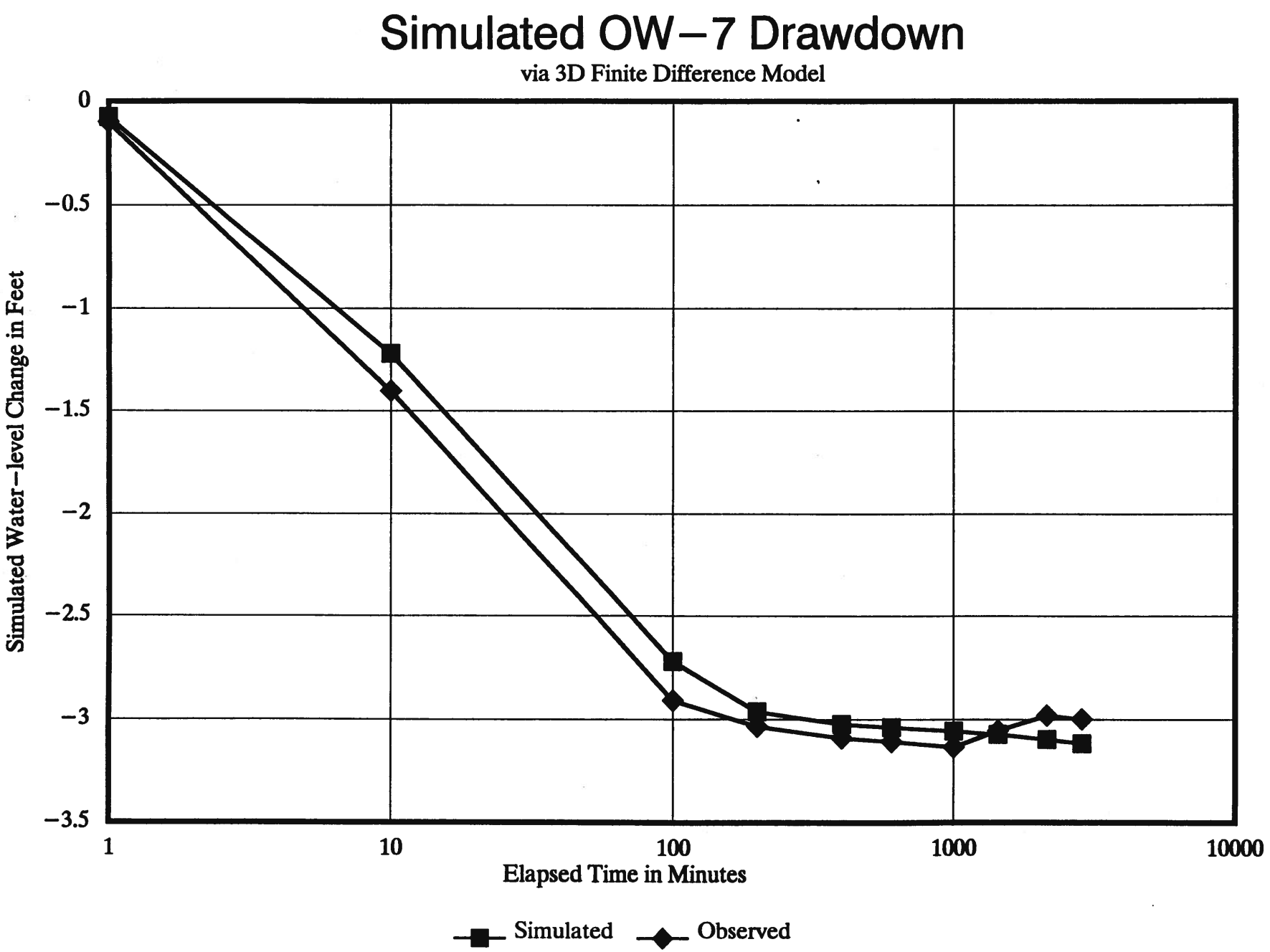

Simulated OW–7 Drawdown
via 3D Finite Difference Model
0
–0.5
–1
–1.5
–2
–2.5
–3
–3.5
Simulated Water–level Change in Feet
1
10
100
1000
10000
Elapsed Time in Minutes
Simulated
Observed

Fig. 16

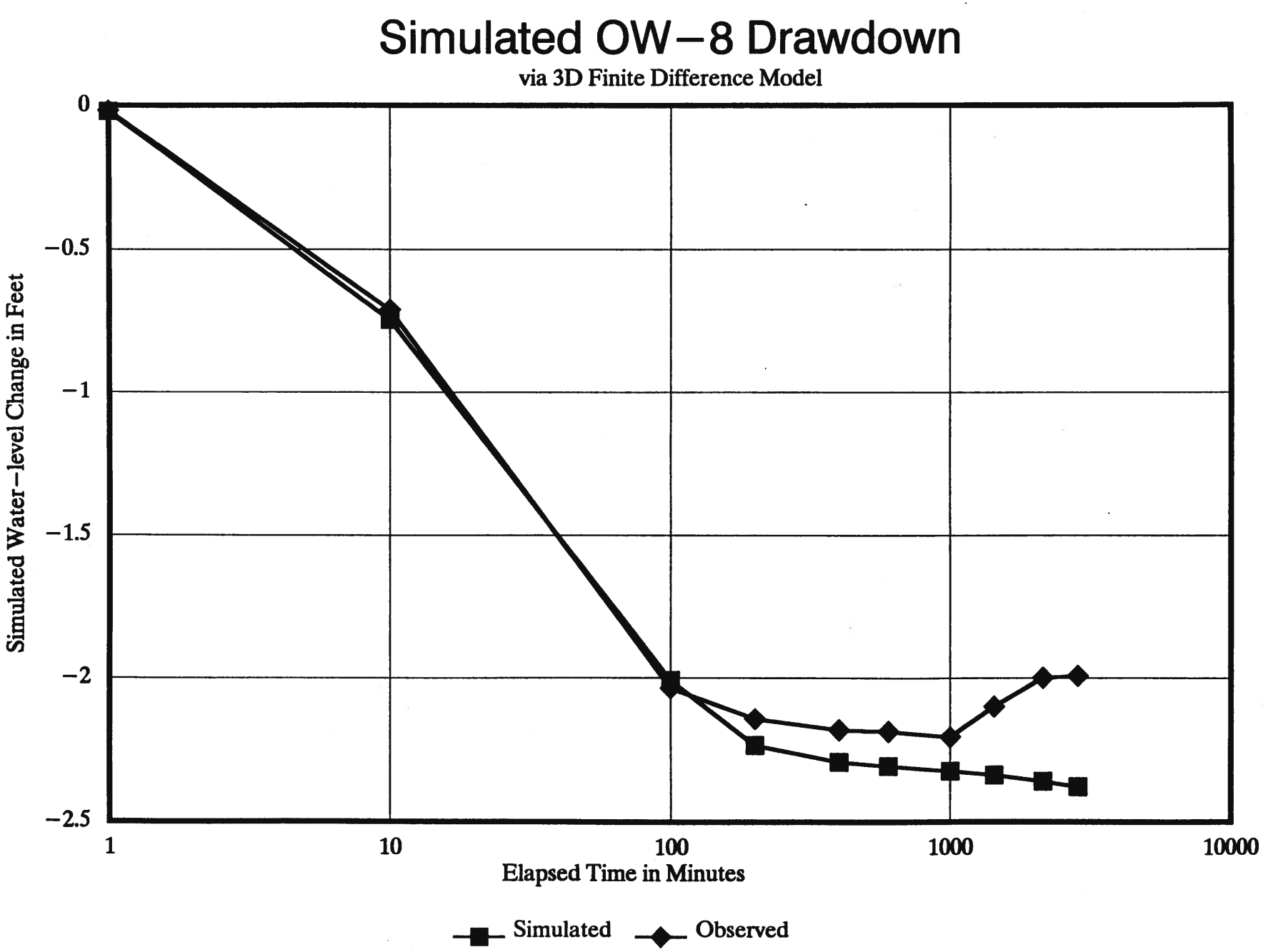

Simulated OW−8 Drawdown
via 3D Finite Difference Model
0
−0.5
−1
−1.5
−2
−2.5
Simulated Water−level Change in Feet
1
10
100
1000
10000
Elapsed Time in Minutes
Simulated
Observed

Fig. 17

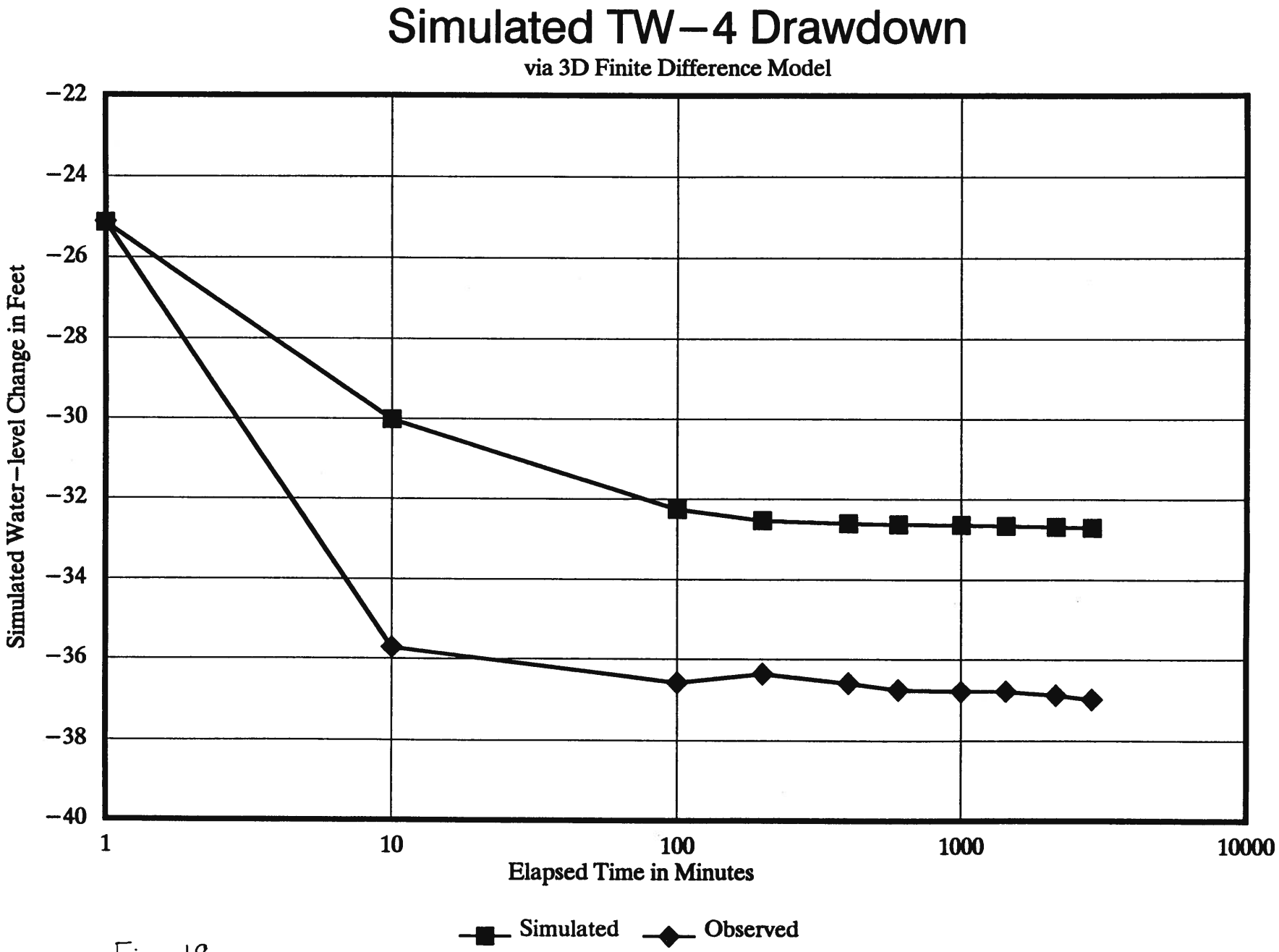

Simulated TW–4 Drawdown
via 3D Finite Difference Model
Simulated Water–level Change in Feet
–22
–24
–26
–28
–30
–32
–34
–36
–38
–40
1
10
100
1000
10000
Elapsed Time in Minutes
Simulated
Observed

Fig. 18

Appendix A

TW−4 Aquifer Test #1 − Pumping Phase
Discharge Rate = 80 gpm
Start of Test: December 5, 1994 − 1:30pm

Time	TW−4: Depth to Water (feet)	TW−4: Barometric Corrected W.L. Change (feet)	OW−8: Depth to Water (feet)	OW−8: Barometric Corrected W.L. Change (feet)	OW−7: Depth to Water (feet)	OW−7: Barometric Corrected W.L. Change (feet)	Barometric Pressure Change (feet H2O)
0.0000	5.100	0.000	4.455	0.000	3.955	0.000	0.000
0.0083	9.360	−4.263	4.455	−0.003	3.974	−0.022	−0.005
0.0166	7.665	−2.568	4.455	−0.003	3.974	−0.022	−0.005
0.0250	7.554	−2.457	4.462	−0.010	3.981	−0.029	−0.005
0.0333	6.762	−1.665	4.462	−0.010	3.981	−0.029	−0.005
0.0416	7.158	−2.061	4.462	−0.010	3.974	−0.022	−0.005
0.0500	7.855	−2.758	4.462	−0.010	3.981	−0.029	−0.005
0.0583	8.568	−3.471	4.462	−0.010	3.981	−0.029	−0.005
0.0666	9.027	−3.930	4.462	−0.010	3.981	−0.029	−0.005
0.0750	9.534	−4.437	4.462	−0.010	3.981	−0.029	−0.005
0.0833	9.708	−4.611	4.462	−0.010	3.981	−0.029	−0.005
0.0916	10.373	−5.276	4.462	−0.010	3.981	−0.029	−0.005
0.1000	10.642	−5.545	4.462	−0.010	3.981	−0.029	−0.005
0.1083	10.975	−5.878	4.462	−0.010	3.981	−0.029	−0.005
0.1166	11.403	−6.306	4.462	−0.010	3.981	−0.029	−0.005
0.1250	11.735	−6.638	4.462	−0.010	3.981	−0.029	−0.005
0.1333	12.084	−6.987	4.462	−0.010	3.981	−0.029	−0.005
0.1416	12.274	−7.177	4.462	−0.010	3.981	−0.029	−0.005
0.1500	12.701	−7.604	4.462	−0.010	3.981	−0.029	−0.005
0.1583	13.018	−7.921	4.462	−0.010	3.981	−0.029	−0.005
0.1666	13.430	−8.333	4.462	−0.010	3.981	−0.029	−0.005
0.1750	13.683	−8.586	4.462	−0.010	3.981	−0.029	−0.005
0.1833	13.937	−8.840	4.462	−0.010	3.981	−0.029	−0.005
0.1916	14.475	−9.378	4.462	−0.010	3.981	−0.029	−0.005
0.2000	14.554	−9.457	4.462	−0.010	3.981	−0.029	−0.005
0.2083	14.950	−9.853	4.462	−0.010	3.981	−0.029	−0.005
0.2166	15.299	−10.202	4.462	−0.010	3.981	−0.029	−0.005
0.2250	15.394	−10.297	4.462	−0.010	3.981	−0.029	−0.005
0.2333	15.837	−10.740	4.462	−0.010	3.981	−0.029	−0.005
0.2416	16.106	−11.009	4.462	−0.010	3.981	−0.029	−0.005
0.2500	16.344	−11.251	4.462	−0.014	3.981	−0.033	−0.010
0.2583	16.692	−11.595	4.462	−0.010	3.981	−0.029	−0.005
0.2666	16.851	−11.754	4.462	−0.010	3.981	−0.029	−0.005
0.2750	17.041	−11.944	4.462	−0.010	3.981	−0.029	−0.005
0.2833	17.247	−12.150	4.462	−0.010	3.981	−0.029	−0.005
0.2916	17.516	−12.419	4.462	−0.010	3.981	−0.029	−0.005
0.3000	17.896	−12.799	4.462	−0.010	3.981	−0.029	−0.005
0.3083	18.007	−12.910	4.462	−0.010	3.981	−0.029	−0.005
0.3166	18.418	−13.321	4.462	−0.010	3.987	−0.035	−0.005
0.3250	18.513	−13.416	4.462	−0.010	3.981	−0.029	−0.005
0.3333	18.593	−13.496	4.462	−0.010	3.981	−0.029	−0.005
0.3500	19.115	−14.018	4.462	−0.010	3.981	−0.029	−0.005
0.3666	19.638	−14.541	4.462	−0.010	3.981	−0.029	−0.005
0.3833	19.986	−14.889	4.462	−0.010	3.987	−0.035	−0.005
0.4000	20.351	−15.254	4.462	−0.010	3.981	−0.029	−0.005

0.4166	20.889	−15.792	4.462	−0.010		3.987	−0.035	−0.005
0.4333	21.206	−16.109	4.462	−0.010		3.987	−0.035	−0.005
0.4500	21.649	−16.552	4.462	−0.010		3.987	−0.035	−0.005
0.4666	21.744	−16.647	4.462	−0.010		3.987	−0.035	−0.005
0.4833	22.124	−17.027	4.462	−0.010		3.987	−0.035	−0.005
0.5000	22.568	−17.471	4.462	−0.010		3.987	−0.035	−0.005
0.5166	22.869	−17.772	4.462	−0.010		3.993	−0.041	−0.005
0.5333	23.280	−18.183	4.462	−0.010		3.993	−0.041	−0.005
0.5500	23.502	−18.405	4.462	−0.010		3.993	−0.041	−0.005
0.5666	23.771	−18.674	4.462	−0.010		3.993	−0.041	−0.005
0.5833	24.199	−19.102	4.462	−0.010		4.000	−0.048	−0.005
0.6000	24.373	−19.276	4.462	−0.010		4.000	−0.048	−0.005
0.6166	24.785	−19.688	4.462	−0.010		4.000	−0.048	−0.005
0.6333	25.038	−19.941	4.462	−0.010		4.006	−0.054	−0.005
0.6500	25.007	−19.910	4.462	−0.010		4.006	−0.054	−0.005
0.6666	25.292	−20.195	4.462	−0.010		4.006	−0.054	−0.005
0.6833	25.751	−20.654	4.462	−0.010		4.012	−0.060	−0.005
0.7000	26.115	−21.018	4.462	−0.010		4.012	−0.060	−0.005
0.7166	26.163	−21.066	4.462	−0.010		4.012	−0.060	−0.005
0.7333	26.416	−21.319	4.462	−0.010		4.012	−0.060	−0.005
0.7500	26.590	−21.493	4.468	−0.016		4.018	−0.066	−0.005
0.7666	26.955	−21.858	4.462	−0.010		4.018	−0.066	−0.005
0.7833	27.113	−22.016	4.468	−0.016		4.025	−0.073	−0.005
0.8000	27.256	−22.159	4.468	−0.016		4.025	−0.073	−0.005
0.8166	27.493	−22.396	4.468	−0.016		4.025	−0.073	−0.005
0.8333	27.889	−22.792	4.468	−0.016		4.031	−0.079	−0.005
0.8500	27.984	−22.887	4.468	−0.016		4.031	−0.079	−0.005
0.8666	28.047	−22.950	4.468	−0.016		4.031	−0.079	−0.005
0.8833	28.190	−23.093	4.468	−0.016		4.037	−0.085	−0.005
0.9000	28.396	−23.299	4.468	−0.016		4.037	−0.085	−0.005
0.9166	28.839	−23.742	4.468	−0.016		4.044	−0.092	−0.005
0.9333	28.934	−23.837	4.468	−0.016		4.044	−0.092	−0.005
0.9500	29.045	−23.948	4.468	−0.016		4.044	−0.092	−0.005
0.9666	29.172	−24.075	4.468	−0.016		4.050	−0.098	−0.005
0.9833	29.425	−24.328	4.468	−0.016		4.050	−0.098	−0.005
1.00	29.346	−24.249	4.468	−0.016		4.056	−0.104	−0.005
1.20	31.278	−26.181	4.474	−0.022		4.075	−0.123	−0.005
1.40	32.529	−27.429	4.481	−0.026		4.113	−0.158	0.000
1.60	33.654	−28.557	4.493	−0.041		4.151	−0.199	−0.005
1.80	34.398	−29.301	4.500	−0.048		4.196	−0.244	−0.005
2.00	35.285	−30.188	4.512	−0.060		4.234	−0.282	−0.005
2.20	35.681	−30.584	4.525	−0.073		4.278	−0.326	−0.005
2.40	36.108	−31.011	4.537	−0.085		4.316	−0.364	−0.005
2.60	36.726	−31.629	4.550	−0.098		4.360	−0.408	−0.005
2.80	36.964	−31.867	4.569	−0.117		4.398	−0.446	−0.005
3.00	35.776	−30.679	4.582	−0.130		4.436	−0.484	−0.005
3.20	35.744	−30.647	4.594	−0.142		4.474	−0.522	−0.005
3.40	36.362	−31.265	4.613	−0.161		4.506	−0.554	−0.005
3.60	36.884	−31.787	4.626	−0.174		4.544	−0.592	−0.005
3.80	37.360	−32.263	4.645	−0.193		4.582	−0.630	−0.005
4.00	37.613	−32.516	4.664	−0.212		4.613	−0.661	−0.005
4.20	37.882	−32.785	4.676	−0.224		4.645	−0.693	−0.005
4.40	38.183	−33.086	4.695	−0.243		4.677	−0.725	−0.005
4.60	38.199	−33.102	4.714	−0.262		4.708	−0.756	−0.005
4.80	38.405	−33.308	4.727	−0.275		4.740	−0.788	−0.005
5.00	38.563	−33.466	4.746	−0.294		4.771	−0.819	−0.005

5.20	38.722	−33.625	4.765	−0.313	4.797	−0.845	−0.005
5.40	38.627	−33.530	4.784	−0.332	4.828	−0.876	−0.005
5.60	38.817	−33.720	4.796	−0.344	4.854	−0.902	−0.005
5.80	38.975	−33.878	4.815	−0.363	4.885	−0.933	−0.005
6.00	38.959	−33.862	4.828	−0.376	4.911	−0.959	−0.005
6.20	38.991	−33.894	4.847	−0.395	4.936	−0.984	−0.005
6.40	39.007	−33.910	4.866	−0.414	4.961	−1.009	−0.005
6.60	39.213	−34.116	4.878	−0.426	4.987	−1.035	−0.005
6.80	39.197	−34.100	4.897	−0.445	5.012	−1.060	−0.005
7.00	39.308	−34.211	4.916	−0.464	5.044	−1.092	−0.005
7.20	39.228	−34.131	4.922	−0.470	5.063	−1.111	−0.005
7.40	39.276	−34.183	4.941	−0.493	5.094	−1.146	−0.010
7.60	39.308	−34.215	4.948	−0.500	5.107	−1.159	−0.010
7.80	39.434	−34.341	4.967	−0.519	5.132	−1.184	−0.010
8.00	39.323	−34.230	4.979	−0.531	5.151	−1.203	−0.010
8.20	39.482	−34.389	4.992	−0.544	5.170	−1.222	−0.010
8.40	39.466	−34.373	5.011	−0.563	5.195	−1.247	−0.010
8.60	39.529	−34.436	5.023	−0.575	5.214	−1.266	−0.010
8.80	39.545	−34.452	5.036	−0.588	5.233	−1.285	−0.010
9.00	39.561	−34.468	5.055	−0.607	5.252	−1.304	−0.010
9.20	39.608	−34.515	5.068	−0.620	5.271	−1.323	−0.010
9.40	39.608	−34.515	5.080	−0.632	5.290	−1.342	−0.010
9.60	39.735	−34.642	5.099	−0.651	5.309	−1.361	−0.010
9.80	39.624	−34.531	5.105	−0.657	5.328	−1.380	−0.010
10	39.561	−34.468	5.124	−0.676	5.341	−1.393	−0.010
12	39.846	−34.753	5.244	−0.796	5.499	−1.551	−0.010
14	40.020	−34.927	5.358	−0.910	5.632	−1.684	−0.010
16	40.226	−35.133	5.459	−1.011	5.752	−1.804	−0.010
18	40.274	−35.181	5.547	−1.099	5.854	−1.906	−0.010
20	40.369	−35.276	5.623	−1.175	5.942	−1.994	−0.010
22	40.432	−35.339	5.692	−1.244	6.024	−2.076	−0.010
24	40.337	−35.244	5.755	−1.307	6.088	−2.140	−0.010
26	40.432	−35.342	5.812	−1.367	6.151	−2.206	−0.015
28	40.464	−35.378	5.869	−1.428	6.208	−2.267	−0.020
30	40.495	−35.405	5.913	−1.468	6.259	−2.314	−0.015
32	40.590	−35.497	5.957	−1.509	6.303	−2.355	−0.010
34	40.527	−35.437	5.995	−1.550	6.347	−2.402	−0.015
36	40.590	−35.500	6.033	−1.588	6.385	−2.440	−0.015
38	40.685	−35.595	6.065	−1.620	6.423	−2.478	−0.015
40	40.670	−35.577	6.096	−1.648	6.455	−2.507	−0.010
42	40.495	−35.402	6.121	−1.673	6.480	−2.532	−0.010
44	40.685	−35.588	6.147	−1.695	6.512	−2.560	−0.005
46	40.638	−35.541	6.166	−1.714	6.531	−2.579	−0.005
48	40.495	−35.402	6.191	−1.743	6.556	−2.608	−0.010
50	40.590	−35.493	6.210	−1.758	6.575	−2.623	−0.005
52	40.590	−35.493	6.229	−1.777	6.600	−2.648	−0.005
54	40.733	−35.633	6.241	−1.786	6.613	−2.658	0.000
56	40.559	−35.459	6.260	−1.805	6.632	−2.677	0.000
58	40.638	−35.538	6.273	−1.818	6.651	−2.696	0.000
60	40.654	−35.554	6.285	−1.830	6.663	−2.708	0.000
62	40.733	−35.630	6.298	−1.840	6.676	−2.718	0.005
64	40.638	−35.535	6.311	−1.853	6.689	−2.731	0.005
66	40.638	−35.535	6.317	−1.859	6.701	−2.743	0.005
68	40.606	−35.503	6.330	−1.872	6.714	−2.756	0.005
70	40.765	−35.662	6.336	−1.878	6.720	−2.762	0.005
72	40.606	−35.503	6.342	−1.884	6.727	−2.769	0.005

74	40.622	−35.522	6.349	−1.894	6.733	−2.778	0.000
76	40.622	−35.522	6.355	−1.900	6.739	−2.784	0.000
78	40.670	−35.570	6.361	−1.906	6.752	−2.797	0.000
80	40.543	−35.446	6.374	−1.922	6.758	−2.806	−0.005
82	40.479	−35.379	6.374	−1.919	6.771	−2.816	0.000
84	40.575	−35.475	6.374	−1.919	6.771	−2.816	0.000
86	40.479	−35.379	6.386	−1.931	6.777	−2.822	0.000
88	40.575	−35.475	6.386	−1.931	6.784	−2.829	0.000
90	40.670	−35.570	6.393	−1.938	6.790	−2.835	0.000
92	40.670	−35.570	6.399	−1.944	6.796	−2.841	0.000
94	40.622	−35.522	6.399	−1.944	6.803	−2.848	0.000
96	40.638	−35.538	6.405	−1.950	6.809	−2.854	0.000
98	40.654	−35.554	6.412	−1.957	6.815	−2.860	0.000
100	40.765	−35.665	6.418	−1.963	6.822	−2.867	0.000
120	40.590	−35.497	6.437	−1.989	6.853	−2.905	−0.010
140	40.701	−35.604	6.462	−2.010	6.885	−2.933	−0.005
160	40.654	−35.551	6.475	−2.017	6.904	−2.946	0.005
180	40.780	−35.680	6.475	−2.020	6.917	−2.962	0.000
200	40.701	−35.608	6.481	−2.033	6.923	−2.975	−0.010
220	40.907	−35.817	6.487	−2.042	6.929	−2.984	−0.015
240	40.844	−35.761	6.494	−2.056	6.936	−2.998	−0.025
260	40.923	−35.830	6.506	−2.058	6.955	−3.007	−0.010
280	40.955	−35.858	6.513	−2.061	6.961	−3.009	−0.005
300	40.891	−35.791	6.506	−2.051	6.955	−3.000	0.000
320	41.097	−35.994	6.519	−2.061	6.967	−3.009	0.005
340	40.828	−35.725	6.513	−2.055	6.961	−3.003	0.005
360	40.828	−35.738	6.506	−2.061	6.961	−3.016	−0.015
380	40.875	−35.796	6.506	−2.072	6.961	−3.027	−0.031
400	41.002	−35.919	6.519	−2.081	6.967	−3.029	−0.025
420	40.907	−35.817	6.519	−2.074	6.974	−3.029	−0.015
440	41.002	−35.909	6.525	−2.077	6.974	−3.026	−0.010
460	40.986	−35.900	6.519	−2.078	6.967	−3.026	−0.020
480	40.891	−35.808	6.519	−2.081	6.967	−3.029	−0.025
500	40.907	−35.828	6.513	−2.079	6.967	−3.033	−0.031
520	41.034	−35.959	6.513	−2.083	6.967	−3.037	−0.035
540	41.002	−35.923	6.519	−2.085	6.974	−3.040	−0.031
560	41.081	−36.006	6.513	−2.083	6.967	−3.037	−0.035
580	40.796	−35.721	6.513	−2.083	6.974	−3.044	−0.035
600	40.939	−35.871	6.513	−2.090	6.974	−3.051	−0.045
620	40.923	−35.855	6.519	−2.096	6.974	−3.051	−0.045
640	40.844	−35.783	6.513	−2.097	6.967	−3.051	−0.056
660	40.923	−35.869	6.513	−2.104	6.967	−3.058	−0.066
680	40.923	−35.876	6.506	−2.104	6.961	−3.059	−0.076
700	40.986	−35.950	6.506	−2.115	6.961	−3.070	−0.092
720	40.812	−35.783	6.500	−2.116	6.955	−3.071	−0.102
740	40.970	−35.955	6.500	−2.130	6.955	−3.085	−0.121
760	40.812	−35.797	6.506	−2.136	6.955	−3.085	−0.121
780	41.081	−36.066	6.506	−2.136	6.955	−3.085	−0.121
800	41.018	−36.021	6.487	−2.135	6.948	−3.096	−0.147
820	41.129	−36.132	6.487	−2.135	6.948	−3.096	−0.147
840	40.939	−35.942	6.487	−2.135	6.948	−3.096	−0.147
860	40.970	−35.969	6.494	−2.138	6.955	−3.099	−0.142
880	40.907	−35.906	6.494	−2.138	6.948	−3.092	−0.142
900	40.907	−35.913	6.481	−2.132	6.948	−3.099	−0.152
920	40.970	−35.976	6.487	−2.138	6.942	−3.093	−0.152
940	40.907	−35.910	6.487	−2.135	6.948	−3.096	−0.147

960	41.034	−36.019	6.494	−2.124	6.948	−3.078	−0.121
980	41.081	−36.073	6.475	−2.112	6.942	−3.079	−0.131
1000	40.939	−35.931	6.475	−2.112	6.942	−3.079	−0.131
1200	41.240	−36.246	6.481	−2.132	6.948	−3.099	−0.152
1400	40.860	−35.927	6.462	−2.174	6.936	−3.148	−0.238

TW−4 Aquifer Test #1 – Recovery Phase
Start of Test: December 6, 1994 – 1:30pm

0.0000	37.265	−32.332	6.456	−2.168	6.929	−3.141	−0.238
0.0083	36.837	−31.908	6.462	−2.178	6.942	−3.158	−0.244
0.0166	36.394	−31.461	6.456	−2.168	6.948	−3.160	−0.238
0.0250	35.982	−31.053	6.456	−2.172	6.942	−3.158	−0.244
0.0333	35.602	−30.673	6.456	−2.172	6.942	−3.158	−0.244
0.0416	35.222	−30.293	6.462	−2.178	6.948	−3.164	−0.244
0.0500	34.857	−29.928	6.456	−2.172	6.948	−3.164	−0.244
0.0583	34.477	−29.548	6.462	−2.178	6.948	−3.164	−0.244
0.0666	34.097	−29.168	6.462	−2.178	6.942	−3.158	−0.244
0.0750	33.717	−28.788	6.456	−2.172	6.942	−3.158	−0.244
0.0833	33.321	−28.392	6.462	−2.178	6.948	−3.164	−0.244
0.0916	32.925	−27.996	6.456	−2.172	6.942	−3.158	−0.244
0.1000	32.529	−27.600	6.462	−2.178	6.942	−3.158	−0.244
0.1083	32.118	−27.189	6.462	−2.178	6.942	−3.158	−0.244
0.1166	31.722	−26.793	6.462	−2.178	6.948	−3.164	−0.244
0.1250	31.342	−26.413	6.456	−2.172	6.948	−3.164	−0.244
0.1333	30.977	−26.048	6.456	−2.172	6.942	−3.158	−0.244
0.1416	30.597	−25.668	6.456	−2.172	6.948	−3.164	−0.244
0.1500	30.249	−25.320	6.456	−2.172	6.948	−3.164	−0.244
0.1583	29.900	−24.971	6.456	−2.172	6.948	−3.164	−0.244
0.1666	29.568	−24.639	6.456	−2.172	6.948	−3.164	−0.244
0.1750	29.235	−24.306	6.456	−2.172	6.948	−3.164	−0.244
0.1833	28.918	−23.989	6.456	−2.172	6.948	−3.164	−0.244
0.1916	28.618	−23.689	6.456	−2.172	6.948	−3.164	−0.244
0.2000	28.317	−23.388	6.462	−2.178	6.942	−3.158	−0.244
0.2083	28.032	−23.103	6.462	−2.178	6.948	−3.164	−0.244
0.2166	27.746	−22.817	6.468	−2.184	6.948	−3.164	−0.244
0.2250	27.446	−22.517	6.462	−2.178	6.948	−3.164	−0.244
0.2333	27.161	−22.232	6.462	−2.178	6.948	−3.164	−0.244
0.2416	26.875	−21.946	6.456	−2.172	6.948	−3.164	−0.244
0.2500	26.575	−21.646	6.456	−2.172	6.948	−3.164	−0.244
0.2583	26.289	−21.360	6.462	−2.178	6.948	−3.164	−0.244
0.2666	26.020	−21.091	6.462	−2.178	6.948	−3.164	−0.244
0.2750	25.719	−20.790	6.462	−2.178	6.948	−3.164	−0.244
0.2833	25.450	−20.521	6.456	−2.172	6.948	−3.164	−0.244
0.2916	25.181	−20.252	6.456	−2.172	6.948	−3.164	−0.244
0.3000	24.896	−19.967	6.462	−2.178	6.948	−3.164	−0.244
0.3083	24.642	−19.713	6.462	−2.178	6.948	−3.164	−0.244
0.3166	24.373	−19.447	6.456	−2.175	6.948	−3.167	−0.248
0.3250	24.136	−19.207	6.462	−2.178	6.948	−3.164	−0.244
0.3333	23.898	−18.969	6.462	−2.178	6.948	−3.164	−0.244
0.3500	23.423	−18.497	6.462	−2.181	6.955	−3.174	−0.248
0.3666	22.980	−18.054	6.462	−2.181	6.948	−3.167	−0.248
0.3833	22.520	−17.591	6.462	−2.178	6.948	−3.164	−0.244
0.4000	22.093	−17.164	6.462	−2.178	6.955	−3.171	−0.244
0.4166	21.665	−16.739	6.462	−2.181	6.955	−3.174	−0.248
0.4333	21.237	−16.308	6.456	−2.172	6.948	−3.164	−0.244

0.4500	20.826	−15.897	6.462	−2.178		6.948	−3.164	−0.244
0.4666	20.430	−15.501	6.462	−2.178		6.948	−3.164	−0.244
0.4833	20.050	−15.121	6.462	−2.178		6.942	−3.158	−0.244
0.5000	19.685	−14.756	6.462	−2.178		6.942	−3.158	−0.244
0.5166	19.337	−14.408	6.462	−2.178		6.948	−3.164	−0.244
0.5333	19.004	−14.078	6.462	−2.181		6.948	−3.167	−0.248
0.5500	18.672	−13.743	6.462	−2.178		6.942	−3.158	−0.244
0.5666	18.371	−13.445	6.462	−2.181		6.942	−3.161	−0.248
0.5833	18.070	−13.144	6.462	−2.181		6.942	−3.161	−0.248
0.6000	17.737	−12.808	6.462	−2.178		6.948	−3.164	−0.244
0.6166	17.452	−12.523	6.462	−2.178		6.936	−3.152	−0.244
0.6333	17.152	−12.223	6.462	−2.178		6.942	−3.158	−0.244
0.6500	16.866	−11.937	6.462	−2.178		6.942	−3.158	−0.244
0.6666	16.613	−11.684	6.462	−2.178		6.942	−3.158	−0.244
0.6833	16.344	−11.415	6.462	−2.178		6.936	−3.152	−0.244
0.7000	16.090	−11.161	6.462	−2.178		6.936	−3.152	−0.244
0.7166	15.853	−10.924	6.462	−2.178		6.936	−3.152	−0.244
0.7333	15.631	−10.702	6.468	−2.184		6.936	−3.152	−0.244
0.7500	15.394	−10.465	6.462	−2.178		6.936	−3.152	−0.244
0.7666	15.172	−10.243	6.462	−2.178		6.929	−3.145	−0.244
0.7833	14.950	−10.021	6.462	−2.178		6.929	−3.145	−0.244
0.8000	14.744	−9.815	6.462	−2.178		6.923	−3.139	−0.244
0.8166	14.554	−9.625	6.462	−2.178		6.923	−3.139	−0.244
0.8333	14.348	−9.419	6.468	−2.184		6.923	−3.139	−0.244
0.8500	14.158	−9.229	6.462	−2.178		6.917	−3.133	−0.244
0.8666	13.968	−9.039	6.462	−2.178		6.923	−3.139	−0.244
0.8833	13.810	−8.881	6.462	−2.178		6.917	−3.133	−0.244
0.9000	13.636	−8.707	6.468	−2.184		6.917	−3.133	−0.244
0.9166	13.477	−8.548	6.462	−2.178		6.917	−3.133	−0.244
0.9333	13.303	−8.374	6.462	−2.178		6.917	−3.133	−0.244
0.9500	13.161	−8.232	6.462	−2.178		6.917	−3.133	−0.244
0.9666	13.002	−8.073	6.462	−2.178		6.910	−3.126	−0.244
0.9833	12.860	−7.927	6.462	−2.174		6.910	−3.122	−0.238
1.0	12.717	−7.788	6.462	−2.178		6.904	−3.120	−0.244
1.2	11.244	−6.311	6.462	−2.174		6.866	−3.078	−0.238
1.4	10.326	−5.397	6.462	−2.178		6.834	−3.050	−0.244
1.6	9.724	−4.791	6.443	−2.155		6.790	−3.002	−0.238
1.8	9.249	−4.320	6.431	−2.147		6.752	−2.968	−0.244
2.0	8.900	−3.967	6.424	−2.136		6.708	−2.920	−0.238
2.2	8.631	−3.698	6.412	−2.124		6.663	−2.875	−0.238
2.4	8.409	−3.476	6.405	−2.117		6.619	−2.831	−0.238
2.6	8.219	−3.286	6.393	−2.105		6.575	−2.787	−0.238
2.8	8.061	−3.128	6.380	−2.092		6.531	−2.743	−0.238
3.0	7.918	−2.985	6.361	−2.073		6.486	−2.698	−0.238
3.2	7.808	−2.875	6.342	−2.054		6.442	−2.654	−0.238
3.4	7.697	−2.764	6.330	−2.042		6.404	−2.616	−0.238
3.6	7.602	−2.673	6.311	−2.027		6.366	−2.582	−0.244
3.8	7.523	−2.590	6.298	−2.010		6.334	−2.546	−0.238
4.0	7.443	−2.510	6.285	−1.997		6.290	−2.502	−0.238
4.2	7.380	−2.447	6.260	−1.972		6.252	−2.464	−0.238
4.4	7.317	−2.384	6.241	−1.953		6.221	−2.433	−0.238
4.6	7.269	−2.340	6.229	−1.945		6.189	−2.405	−0.244
4.8	7.206	−2.273	6.210	−1.922		6.151	−2.363	−0.238
5.0	7.174	−2.241	6.191	−1.903		6.119	−2.331	−0.238
5.2	7.127	−2.194	6.172	−1.884		6.088	−2.300	−0.238
5.4	7.079	−2.146	6.153	−1.865		6.062	−2.274	−0.238

5.6	7.047	−2.114	6.134	−1.846	6.031	−2.243	−0.238
5.8	7.000	−2.067	6.115	−1.827	5.999	−2.211	−0.238
6.0	6.968	−2.035	6.102	−1.814	5.967	−2.179	−0.238
6.2	6.937	−2.000	6.084	−1.792	5.942	−2.150	−0.233
6.4	6.905	−1.968	6.071	−1.779	5.923	−2.131	−0.233
6.6	6.873	−1.936	6.058	−1.766	5.891	−2.099	−0.233
6.8	6.857	−1.920	6.033	−1.741	5.866	−2.074	−0.233
7.0	6.826	−1.893	6.014	−1.726	5.847	−2.059	−0.238
7.2	6.778	−1.841	5.995	−1.703	5.816	−2.024	−0.233
7.4	6.762	−1.825	5.989	−1.697	5.797	−2.005	−0.233
7.6	6.731	−1.794	5.964	−1.672	5.778	−1.986	−0.233
7.8	6.731	−1.794	5.964	−1.672	5.746	−1.954	−0.233
8.0	6.683	−1.746	5.938	−1.646	5.733	−1.941	−0.233
8.2	6.683	−1.750	5.926	−1.638	5.714	−1.926	−0.238
8.4	6.652	−1.715	5.913	−1.621	5.695	−1.903	−0.233
8.6	6.636	−1.699	5.894	−1.602	5.670	−1.878	−0.233
8.8	6.620	−1.683	5.882	−1.590	5.651	−1.859	−0.233
9.0	6.588	−1.651	5.869	−1.577	5.638	−1.846	−0.233
9.2	6.572	−1.635	5.856	−1.564	5.619	−1.827	−0.233
9.4	6.557	−1.620	5.844	−1.552	5.600	−1.808	−0.233
9.6	6.541	−1.604	5.825	−1.533	5.581	−1.789	−0.233
9.8	6.525	−1.592	5.818	−1.530	5.562	−1.774	−0.238
10	6.509	−1.576	5.806	−1.518	5.543	−1.755	−0.238
12	6.366	−1.425	5.667	−1.371	5.385	−1.589	−0.228
14	6.240	−1.299	5.547	−1.251	5.259	−1.463	−0.228
16	6.145	−1.204	5.452	−1.156	5.145	−1.349	−0.228
18	6.066	−1.129	5.358	−1.066	5.044	−1.252	−0.233
20	6.002	−1.065	5.288	−0.996	4.974	−1.182	−0.233
22	5.939	−0.998	5.213	−0.917	4.892	−1.096	−0.228
24	5.891	−0.947	5.150	−0.851	4.828	−1.029	−0.223
26	5.844	−0.903	5.099	−0.803	4.765	−0.969	−0.228
28	5.796	−0.852	5.036	−0.737	4.708	−0.909	−0.223
30	5.749	−0.801	4.998	−0.695	4.664	−0.861	−0.218
32	5.717	−0.773	4.960	−0.661	4.620	−0.821	−0.223
34	5.685	−0.741	4.916	−0.617	4.582	−0.783	−0.223
36	5.638	−0.690	4.878	−0.575	4.544	−0.741	−0.218
38	5.638	−0.690	4.847	−0.544	4.512	−0.709	−0.218
40	5.590	−0.642	4.828	−0.525	4.480	−0.677	−0.218
42	5.575	−0.631	4.796	−0.497	4.455	−0.656	−0.223
44	5.559	−0.615	4.771	−0.472	4.430	−0.631	−0.223
46	5.543	−0.595	4.739	−0.436	4.392	−0.589	−0.218
48	5.511	−0.570	4.727	−0.431	4.392	−0.596	−0.228
50	5.495	−0.547	4.708	−0.405	4.367	−0.564	−0.218
52	5.480	−0.532	4.695	−0.392	4.348	−0.545	−0.218
54	5.464	−0.516	4.676	−0.373	4.329	−0.526	−0.218
56	5.448	−0.500	4.664	−0.361	4.316	−0.513	−0.218
58	5.432	−0.481	4.645	−0.339	4.297	−0.491	−0.213
60	5.432	−0.481	4.632	−0.326	4.291	−0.485	−0.213
62	5.416	−0.465	4.626	−0.320	4.272	−0.466	−0.213
64	5.400	−0.446	4.613	−0.304	4.259	−0.450	−0.208
66	5.385	−0.427	4.600	−0.287	4.246	−0.433	−0.203
68	5.369	−0.411	4.600	−0.287	4.240	−0.427	−0.203
70	5.369	−0.411	4.588	−0.275	4.227	−0.414	−0.203
72	5.353	−0.392	4.575	−0.259	4.215	−0.399	−0.198
74	5.353	−0.392	4.569	−0.253	4.215	−0.399	−0.198
76	5.337	−0.376	4.569	−0.253	4.202	−0.386	−0.198

78	5.337	−0.372	4.563	−0.243	4.202	−0.382	−0.193
80	5.321	−0.356	4.550	−0.230	4.189	−0.369	−0.193
82	5.321	−0.360	4.544	−0.228	4.177	−0.361	−0.198
84	5.321	−0.360	4.537	−0.221	4.177	−0.361	−0.198
86	5.305	−0.340	4.531	−0.211	4.164	−0.344	−0.193
88	5.305	−0.340	4.525	−0.205	4.158	−0.338	−0.193
90	5.290	−0.325	4.512	−0.192	4.151	−0.331	−0.193
92	5.290	−0.325	4.512	−0.192	4.139	−0.319	−0.193
94	5.274	−0.306	4.512	−0.189	4.139	−0.316	−0.188
96	5.274	−0.306	4.506	−0.183	4.132	−0.309	−0.188
98	5.274	−0.302	4.500	−0.173	4.132	−0.305	−0.182
100	5.274	−0.302	4.500	−0.173	4.132	−0.305	−0.182
120	5.226	−0.236	4.468	−0.123	4.094	−0.249	−0.157
140	5.195	−0.201	4.424	−0.075	4.056	−0.207	−0.152
160	5.163	−0.162	4.417	−0.061	4.037	−0.181	−0.142
180	5.147	−0.136	4.405	−0.039	4.031	−0.165	−0.127
200	5.131	−0.109	4.386	−0.009	4.018	−0.141	−0.111
220	5.115	−0.079	4.380	0.011	4.012	−0.121	−0.092
240	5.100	−0.057	4.361	0.037	4.000	−0.102	−0.082
260	5.084	−0.030	4.354	0.055	3.993	−0.084	−0.066
280	5.084	−0.023	4.354	0.062	3.987	−0.071	−0.056
300	5.084	−0.020	4.354	0.065	3.987	−0.068	−0.051
320	5.068	0.007	4.348	0.082	3.981	−0.051	−0.035
340	5.068	0.018	4.348	0.093	3.981	−0.040	−0.020
360	5.068	0.018	4.335	0.106	3.974	−0.033	−0.020
380	5.052	0.038	4.335	0.110	3.968	−0.023	−0.015
400	5.052	0.041	4.323	0.125	3.962	−0.014	−0.010
420	5.052	0.045	4.329	0.123	3.968	−0.016	−0.005
440	5.052	0.048	4.329	0.126	3.962	−0.007	0.000
460	5.052	0.051	4.323	0.135	3.962	−0.004	0.005
480	5.036	0.067	4.323	0.135	3.962	−0.004	0.005
500	5.036	0.071	4.323	0.139	3.955	0.007	0.010
520	5.036	0.074	4.323	0.142	3.962	0.003	0.015
540	5.036	0.078	4.316	0.153	3.955	0.014	0.020
560	5.036	0.089	4.329	0.151	3.955	0.025	0.035
580	5.036	0.089	4.323	0.157	3.955	0.025	0.035
600	5.020	0.101	4.310	0.166	3.949	0.027	0.031
620	5.036	0.093	4.316	0.168	3.949	0.035	0.041
640	5.036	0.096	4.316	0.171	3.949	0.038	0.045
660	5.020	0.109	4.310	0.174	3.943	0.041	0.041
680	5.020	0.105	4.310	0.170	3.936	0.044	0.035
700	5.020	0.112	4.304	0.183	3.943	0.044	0.045
720	5.020	0.112	4.304	0.183	3.936	0.051	0.045
740	5.020	0.112	4.304	0.183	3.936	0.051	0.045
760	5.020	0.112	4.304	0.183	3.930	0.057	0.045
780	5.004	0.117	4.298	0.178	3.924	0.052	0.031
800	5.004	0.121	4.291	0.189	3.924	0.056	0.035
820	5.004	0.117	4.298	0.178	3.924	0.052	0.031
840	5.004	0.113	4.291	0.181	3.924	0.048	0.025
860	5.004	0.113	4.291	0.181	3.917	0.055	0.025
880	4.989	0.125	4.291	0.178	3.917	0.052	0.020
900	4.989	0.121	4.291	0.174	3.911	0.054	0.015
920	4.989	0.128	4.285	0.187	3.911	0.061	0.025
940	4.989	0.128	4.291	0.181	3.911	0.061	0.025
960	4.989	0.147	4.298	0.193	3.924	0.067	0.051
980	4.989	0.157	4.291	0.210	3.924	0.077	0.066

1000	5.004	0.153	4.304	0.208	3.924	0.088	0.082
1200	5.004	0.195	4.285	0.269	3.917	0.137	0.142

TW-4 Aquifer Test #2 Pumping Phase
Discharge Rate = 80 gpm
Start of Test: December 7, 1994 – 12:00 noon

	TW-4:		OW-8:		OW-7:		
Time	Depth to Water (feet)	Barometric Corrected W.L. Change (feet)	Depth to Water (feet)	Barometric Corrected W.L. Change (feet)	Depth to Water (feet)	Barometric Corrected W.L. Change (feet)	Barometric Pressure Change (feet H2O)
0.0000	5.084	0.000	4.487	0.000	3.993	0.000	0.000
0.0083	11.830	−6.746	4.493	−0.006	4.012	−0.019	0.000
0.0166	8.156	−3.072	4.493	−0.006	4.012	−0.019	0.000
0.0250	7.459	−2.375	4.493	−0.006	4.012	−0.019	0.000
0.0333	7.158	−2.074	4.493	−0.006	4.012	−0.019	0.000
0.0416	7.206	−2.122	4.493	−0.006	4.012	−0.019	0.000
0.0500	8.156	−3.072	4.493	−0.006	4.012	−0.019	0.000
0.0583	8.631	−3.547	4.493	−0.006	4.012	−0.019	0.000
0.0666	9.296	−4.215	4.493	−0.009	4.012	−0.022	−0.005
0.0750	9.629	−4.548	4.493	−0.009	4.012	−0.022	−0.005
0.0833	9.930	−4.849	4.493	−0.009	4.018	−0.028	−0.005
0.0916	10.484	−5.400	4.493	−0.006	4.018	−0.025	0.000
0.1000	10.627	−5.546	4.493	−0.009	4.018	−0.028	−0.005
0.1083	11.308	−6.224	4.493	−0.006	4.012	−0.019	0.000
0.1166	11.735	−6.651	4.493	−0.006	4.012	−0.019	0.000
0.1250	11.925	−6.844	4.493	−0.009	4.012	−0.022	−0.005
0.1333	12.369	−7.288	4.493	−0.009	4.012	−0.022	−0.005
0.1416	12.575	−7.491	4.493	−0.006	4.012	−0.019	0.000
0.1500	12.828	−7.747	4.493	−0.009	4.012	−0.022	−0.005
0.1583	13.461	−8.380	4.493	−0.009	4.012	−0.022	−0.005
0.1666	13.382	−8.301	4.500	−0.016	4.012	−0.022	−0.005
0.1750	13.857	−8.773	4.493	−0.006	4.018	−0.025	0.000
0.1833	14.158	−9.077	4.493	−0.009	4.018	−0.028	−0.005
0.1916	14.649	−9.568	4.493	−0.009	4.018	−0.028	−0.005
0.2000	14.713	−9.632	4.493	−0.009	4.018	−0.028	−0.005
0.2083	15.109	−10.028	4.493	−0.009	4.018	−0.028	−0.005
0.2166	15.425	−10.344	4.493	−0.009	4.018	−0.028	−0.005
0.2250	15.964	−10.883	4.500	−0.016	4.018	−0.028	−0.005
0.2333	16.027	−10.946	4.493	−0.009	4.012	−0.022	−0.005
0.2416	16.566	−11.485	4.493	−0.009	4.018	−0.028	−0.005
0.2500	16.740	−11.659	4.500	−0.016	4.018	−0.028	−0.005
0.2583	16.914	−11.833	4.500	−0.016	4.018	−0.028	−0.005
0.2666	16.977	−11.896	4.493	−0.009	4.018	−0.028	−0.005
0.2750	17.516	−12.435	4.493	−0.009	4.018	−0.028	−0.005
0.2833	17.722	−12.641	4.493	−0.009	4.018	−0.028	−0.005
0.2916	18.023	−12.942	4.500	−0.016	4.018	−0.028	−0.005
0.3000	18.149	−13.068	4.493	−0.009	4.018	−0.028	−0.005
0.3083	18.292	−13.208	4.493	−0.006	4.018	−0.025	0.000
0.3166	18.735	−13.654	4.493	−0.009	4.018	−0.028	−0.005
0.3250	18.894	−13.813	4.500	−0.016	4.018	−0.028	−0.005
0.3333	19.147	−14.066	4.493	−0.009	4.018	−0.028	−0.005
0.3500	19.495	−14.411	4.493	−0.006	4.018	−0.025	0.000
0.3666	20.050	−14.969	4.500	−0.016	4.018	−0.028	−0.005
0.3833	20.319	−15.238	4.493	−0.009	4.018	−0.028	−0.005
0.4000	20.842	−15.761	4.493	−0.009	4.025	−0.035	−0.005
0.4166	21.237	−16.156	4.500	−0.016	4.025	−0.035	−0.005

0.4333	21.744	−16.663	4.500	−0.016	4.025	−0.035	−0.005
0.4500	22.093	−17.012	4.500	−0.016	4.025	−0.035	−0.005
0.4666	22.314	−17.230	4.493	−0.006	4.025	−0.032	0.000
0.4833	22.568	−17.487	4.500	−0.016	4.025	−0.035	−0.005
0.5000	23.122	−18.038	4.493	−0.006	4.025	−0.032	0.000
0.5166	23.597	−18.513	4.500	−0.013	4.031	−0.038	0.000
0.5333	23.629	−18.548	4.493	−0.009	4.031	−0.041	−0.005
0.5500	24.041	−18.960	4.493	−0.009	4.031	−0.041	−0.005
0.5666	24.437	−19.353	4.493	−0.006	4.031	−0.038	0.000
0.5833	24.801	−19.720	4.500	−0.016	4.031	−0.041	−0.005
0.6000	25.070	−19.989	4.500	−0.016	4.037	−0.047	−0.005
0.6166	25.133	−20.052	4.500	−0.016	4.037	−0.047	−0.005
0.6333	25.482	−20.398	4.493	−0.006	4.037	−0.044	0.000
0.6500	25.878	−20.794	4.493	−0.006	4.037	−0.044	0.000
0.6666	25.957	−20.876	4.500	−0.016	4.044	−0.054	−0.005
0.6833	26.321	−21.237	4.500	−0.013	4.044	−0.051	0.000
0.7000	26.590	−21.509	4.500	−0.016	4.044	−0.054	−0.005
0.7166	26.812	−21.731	4.500	−0.016	4.050	−0.060	−0.005
0.7333	27.066	−21.982	4.500	−0.013	4.050	−0.057	0.000
0.7500	27.414	−22.333	4.500	−0.016	4.050	−0.060	−0.005
0.7666	27.667	−22.586	4.500	−0.016	4.050	−0.060	−0.005
0.7833	27.905	−22.824	4.493	−0.009	4.056	−0.066	−0.005
0.8000	28.063	−22.982	4.500	−0.016	4.056	−0.066	−0.005
0.8166	28.174	−23.090	4.500	−0.013	4.063	−0.070	0.000
0.8333	28.523	−23.442	4.500	−0.016	4.063	−0.073	−0.005
0.8500	28.649	−23.565	4.500	−0.013	4.063	−0.070	0.000
0.8666	28.728	−23.647	4.500	−0.016	4.069	−0.079	−0.005
0.8833	29.061	−23.977	4.500	−0.013	4.069	−0.076	0.000
0.9000	29.188	−24.107	4.500	−0.016	4.075	−0.085	−0.005
0.9166	29.378	−24.297	4.500	−0.016	4.075	−0.085	−0.005
0.9333	29.789	−24.705	4.500	−0.013	4.075	−0.082	0.000
0.9500	29.774	−24.693	4.500	−0.016	4.082	−0.092	−0.005
0.9666	29.853	−24.769	4.500	−0.013	4.082	−0.089	0.000
0.9833	30.075	−24.994	4.506	−0.022	4.088	−0.098	−0.005
1.0	30.185	−25.104	4.500	−0.016	4.088	−0.098	−0.005
1.2	32.181	−27.097	4.506	−0.019	4.113	−0.120	0.000
1.4	33.670	−28.586	4.512	−0.025	4.151	−0.158	0.000
1.6	34.746	−29.662	4.525	−0.038	4.189	−0.196	0.000
1.8	35.427	−30.343	4.531	−0.044	4.234	−0.241	0.000
2.0	36.203	−31.119	4.544	−0.057	4.278	−0.285	0.000
2.2	36.995	−31.911	4.563	−0.076	4.316	−0.323	0.000
2.4	37.296	−32.215	4.575	−0.091	4.360	−0.370	−0.005
2.6	37.724	−32.640	4.594	−0.107	4.398	−0.405	0.000
2.8	38.120	−33.039	4.607	−0.123	4.436	−0.446	−0.005
3.0	38.326	−33.242	4.626	−0.139	4.480	−0.487	0.000
3.2	38.658	−33.577	4.638	−0.154	4.518	−0.528	−0.005
3.4	38.848	−33.764	4.657	−0.170	4.550	−0.557	0.000
3.6	39.054	−33.973	4.670	−0.186	4.588	−0.598	−0.005
3.8	39.260	−34.179	4.689	−0.205	4.620	−0.630	−0.005
4.0	39.308	−34.227	4.708	−0.224	4.658	−0.668	−0.005
4.2	39.387	−34.306	4.727	−0.243	4.689	−0.699	−0.005
4.4	39.640	−34.559	4.746	−0.262	4.727	−0.737	−0.005
4.6	39.624	−34.543	4.765	−0.281	4.759	−0.769	−0.005
4.8	39.735	−34.654	4.777	−0.293	4.790	−0.800	−0.005
5.0	39.909	−34.828	4.796	−0.312	4.822	−0.832	−0.005
5.2	39.894	−34.813	4.815	−0.331	4.854	−0.864	−0.005

5.4	39.941	−34.860	4.834	−0.350	4.879	−0.889	−0.005
5.6	40.115	−35.034	4.847	−0.363	4.911	−0.921	−0.005
5.8	40.131	−35.050	4.866	−0.382	4.936	−0.946	−0.005
6.0	40.353	−35.272	4.884	−0.400	4.961	−0.971	−0.005
6.2	40.274	−35.193	4.903	−0.419	4.987	−0.997	−0.005
6.4	40.305	−35.224	4.916	−0.432	5.012	−1.022	−0.005
6.6	40.353	−35.272	4.935	−0.451	5.037	−1.047	−0.005
6.8	40.226	−35.145	4.954	−0.470	5.063	−1.073	−0.005
7.0	40.495	−35.414	4.967	−0.483	5.088	−1.098	−0.005
7.2	40.622	−35.541	4.979	−0.495	5.107	−1.117	−0.005
7.4	40.670	−35.589	4.998	−0.514	5.132	−1.142	−0.005
7.6	40.448	−35.367	5.011	−0.527	5.157	−1.167	−0.005
7.8	40.559	−35.478	5.030	−0.546	5.176	−1.186	−0.005
8.0	40.559	−35.482	5.049	−0.569	5.202	−1.216	−0.010
8.2	40.575	−35.494	5.061	−0.577	5.221	−1.231	−0.005
8.4	40.590	−35.509	5.080	−0.596	5.246	−1.256	−0.005
8.6	40.828	−35.751	5.093	−0.613	5.259	−1.273	−0.010
8.8	40.717	−35.636	5.105	−0.621	5.284	−1.294	−0.005
9.0	40.749	−35.668	5.124	−0.640	5.297	−1.307	−0.005
9.2	40.796	−35.719	5.137	−0.657	5.322	−1.336	−0.010
9.4	40.654	−35.577	5.150	−0.670	5.341	−1.355	−0.010
9.6	40.780	−35.703	5.162	−0.682	5.360	−1.374	−0.010
9.8	40.765	−35.688	5.175	−0.695	5.379	−1.393	−0.010
10	40.796	−35.715	5.194	−0.710	5.392	−1.402	−0.005
12	40.812	−35.735	5.314	−0.834	5.556	−1.570	−0.010
14	41.176	−36.099	5.434	−0.954	5.683	−1.697	−0.010
16	41.081	−36.004	5.535	−1.055	5.803	−1.817	−0.010
18	41.271	−36.194	5.623	−1.143	5.910	−1.924	−0.010
20	41.271	−36.197	5.705	−1.228	5.999	−2.016	−0.015
22	41.398	−36.324	5.774	−1.297	6.075	−2.092	−0.015
24	41.335	−36.261	5.831	−1.354	6.138	−2.155	−0.015
26	41.382	−36.312	5.901	−1.428	6.208	−2.229	−0.020
28	41.541	−36.471	5.938	−1.465	6.265	−2.286	−0.020
30	41.319	−36.249	5.989	−1.516	6.309	−2.330	−0.020
32	41.303	−36.233	6.027	−1.554	6.353	−2.374	−0.020
34	41.351	−36.281	6.065	−1.592	6.398	−2.419	−0.020
36	41.287	−36.217	6.096	−1.623	6.429	−2.450	−0.020
38	41.224	−36.154	6.134	−1.661	6.467	−2.488	−0.020
40	41.335	−36.268	6.159	−1.689	6.505	−2.529	−0.025
42	41.430	−36.363	6.166	−1.696	6.524	−2.548	−0.025
44	41.256	−36.186	6.172	−1.699	6.531	−2.552	−0.020
46	41.287	−36.220	6.260	−1.790	6.594	−2.618	−0.025
48	41.319	−36.252	6.267	−1.797	6.607	−2.631	−0.025
50	41.351	−36.288	6.286	−1.820	6.626	−2.654	−0.031
52	41.351	−36.284	6.298	−1.828	6.632	−2.656	−0.025
54	41.461	−36.394	6.317	−1.847	6.663	−2.687	−0.025
56	41.446	−36.383	6.323	−1.857	6.682	−2.710	−0.031
58	41.572	−36.509	6.336	−1.870	6.689	−2.717	−0.031
60	41.446	−36.387	6.349	−1.887	6.708	−2.740	−0.035
62	41.414	−36.351	6.368	−1.902	6.727	−2.755	−0.031
64	41.398	−36.343	6.361	−1.903	6.720	−2.756	−0.041
66	41.525	−36.466	6.380	−1.918	6.746	−2.778	−0.035
68	41.303	−36.248	6.393	−1.935	6.752	−2.788	−0.041
70	41.430	−36.375	6.405	−1.947	6.765	−2.801	−0.041
72	41.556	−36.501	6.424	−1.966	6.777	−2.813	−0.041
74	41.398	−36.343	6.418	−1.960	6.784	−2.820	−0.041

76	41.461	−36.406	6.437	−1.979	6.790	−2.826	−0.041
78	41.556	−36.501	6.437	−1.979	6.790	−2.826	−0.041
80	41.335	−36.280	6.431	−1.973	6.803	−2.839	−0.041
82	41.525	−36.470	6.450	−1.992	6.803	−2.839	−0.041
84	41.493	−36.441	6.450	−1.995	6.809	−2.848	−0.045
86	41.351	−36.296	6.456	−1.998	6.828	−2.864	−0.041
88	41.240	−36.185	6.462	−2.004	6.828	−2.864	−0.041
90	41.414	−36.362	6.469	−2.014	6.841	−2.880	−0.045
92	41.398	−36.346	6.462	−2.007	6.841	−2.880	−0.045
94	41.335	−36.286	6.469	−2.017	6.847	−2.889	−0.050
96	41.556	−36.507	6.481	−2.029	6.847	−2.889	−0.050
98	41.303	−36.254	6.487	−2.035	6.853	−2.895	−0.050
100	41.620	−36.571	6.487	−2.035	6.866	−2.908	−0.050
120	41.271	−36.226	6.513	−2.065	6.891	−2.937	−0.056
140	41.192	−36.154	6.538	−2.097	6.929	−2.982	−0.066
160	41.572	−36.534	6.551	−2.110	6.942	−2.995	−0.066
180	41.382	−36.351	6.563	−2.129	6.961	−3.021	−0.076
200	41.382	−36.351	6.576	−2.142	6.974	−3.034	−0.076
220	41.430	−36.395	6.582	−2.144	6.986	−3.042	−0.070
240	41.224	−36.189	6.588	−2.150	6.993	−3.049	−0.070
260	41.287	−36.252	6.588	−2.150	6.999	−3.055	−0.070
280	41.287	−36.249	6.595	−2.154	7.005	−3.058	−0.066
300	41.446	−36.408	6.595	−2.154	7.005	−3.058	−0.066
320	41.588	−36.553	6.607	−2.169	7.018	−3.074	−0.070
340	41.509	−36.474	6.607	−2.169	7.018	−3.074	−0.070
360	41.588	−36.553	6.614	−2.176	7.024	−3.080	−0.070
380	41.667	−36.632	6.620	−2.182	7.030	−3.086	−0.070
400	41.620	−36.582	6.620	−2.179	7.037	−3.090	−0.066
420	41.715	−36.677	6.620	−2.179	7.037	−3.090	−0.066
440	41.588	−36.543	6.620	−2.172	7.037	−3.083	−0.056
460	41.857	−36.812	6.626	−2.178	7.043	−3.089	−0.056
480	41.746	−36.697	6.633	−2.181	7.049	−3.091	−0.050
500	41.731	−36.686	6.633	−2.185	7.049	−3.095	−0.056
520	41.841	−36.792	6.633	−2.181	7.056	−3.098	−0.050
540	41.794	−36.745	6.633	−2.181	7.056	−3.098	−0.050
560	41.588	−36.539	6.652	−2.200	7.068	−3.110	−0.050
580	41.556	−36.507	6.645	−2.193	7.062	−3.104	−0.050
600	41.794	−36.742	6.639	−2.184	7.068	−3.107	−0.045
620	41.794	−36.745	6.639	−2.187	7.068	−3.110	−0.050
640	41.683	−36.634	6.639	−2.187	7.075	−3.117	−0.050
660	41.746	−36.701	6.645	−2.197	7.075	−3.121	−0.056
680	41.905	−36.863	6.639	−2.194	7.075	−3.124	−0.060
700	42.000	−36.958	6.645	−2.200	7.075	−3.124	−0.060
720	41.968	−36.926	6.652	−2.207	7.075	−3.124	−0.060
740	42.063	−37.025	6.645	−2.204	7.081	−3.134	−0.066
760	42.016	−36.974	6.645	−2.200	7.081	−3.130	−0.060
780	41.857	−36.819	6.652	−2.211	7.081	−3.134	−0.066
800	41.952	−36.914	6.652	−2.211	7.081	−3.134	−0.066
820	41.984	−36.949	6.652	−2.214	7.081	−3.137	−0.070
840	42.000	−36.962	6.645	−2.204	7.081	−3.134	−0.066
860	41.968	−36.926	6.652	−2.207	7.087	−3.136	−0.060
880	42.127	−37.089	6.652	−2.211	7.081	−3.134	−0.066
900	41.905	−36.867	6.652	−2.211	7.087	−3.140	−0.066
920	42.127	−37.089	6.652	−2.211	7.081	−3.134	−0.066
940	41.952	−36.914	6.652	−2.211	7.087	−3.140	−0.066
960	41.968	−36.930	6.652	−2.211	7.087	−3.140	−0.066

980	42.095	−37.057	6.652	−2.211	7.087	−3.140	−0.066
1000	41.826	−36.781	6.652	−2.204	7.087	−3.133	−0.056
1100	42.095	−37.036	6.658	−2.196	7.094	−3.126	−0.035
1200	42.364	−37.255	6.664	−2.152	7.113	−3.095	0.036
1300	42.269	−37.121	6.658	−2.107	7.119	−3.062	0.092
1400	41.921	−36.770	6.652	−2.098	7.113	−3.053	0.096
1500	42.190	−37.060	6.652	−2.119	7.113	−3.074	0.066
1600	42.190	−37.056	6.658	−2.121	7.119	−3.076	0.071
1700	42.206	−37.051	6.658	−2.100	7.125	−3.061	0.102
1800	42.222	−37.045	6.652	−2.072	7.125	−3.039	0.133
1900	42.158	−36.961	6.652	−2.052	7.132	−3.026	0.162
2000	42.047	−36.810	6.652	−2.012	7.138	−2.992	0.219
2100	42.111	−36.867	6.645	−1.998	7.132	−2.979	0.229
2200	42.285	−37.055	6.633	−2.000	7.125	−2.986	0.208
2300	42.332	−37.102	6.633	−2.000	7.125	−2.986	0.208
2400	42.158	−36.932	6.626	−1.997	7.125	−2.990	0.203
2500	42.348	−37.118	6.626	−1.993	7.125	−2.986	0.208
2600	42.475	−37.231	6.626	−1.979	7.132	−2.979	0.229
2700	42.253	−37.009	6.626	−1.979	7.132	−2.979	0.229
2800	42.190	−36.971	6.614	−1.992	7.125	−2.997	0.193
2900	42.285	−37.122	6.607	−2.041	7.119	−3.047	0.112

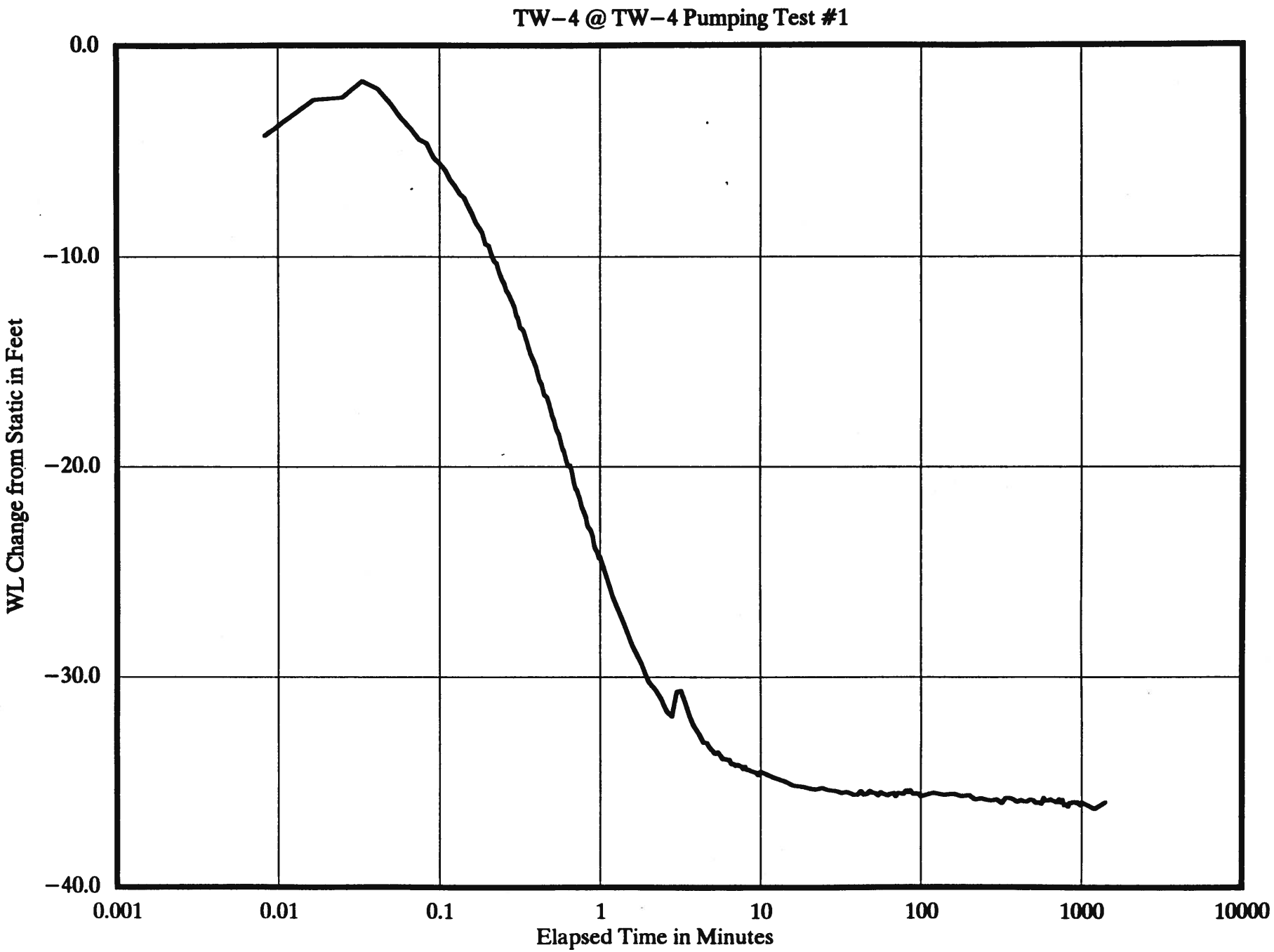
TW−4 Aquifer Test #2 Recovery Phase
Start of Recovery: December 9, 1994 – 12:30pm

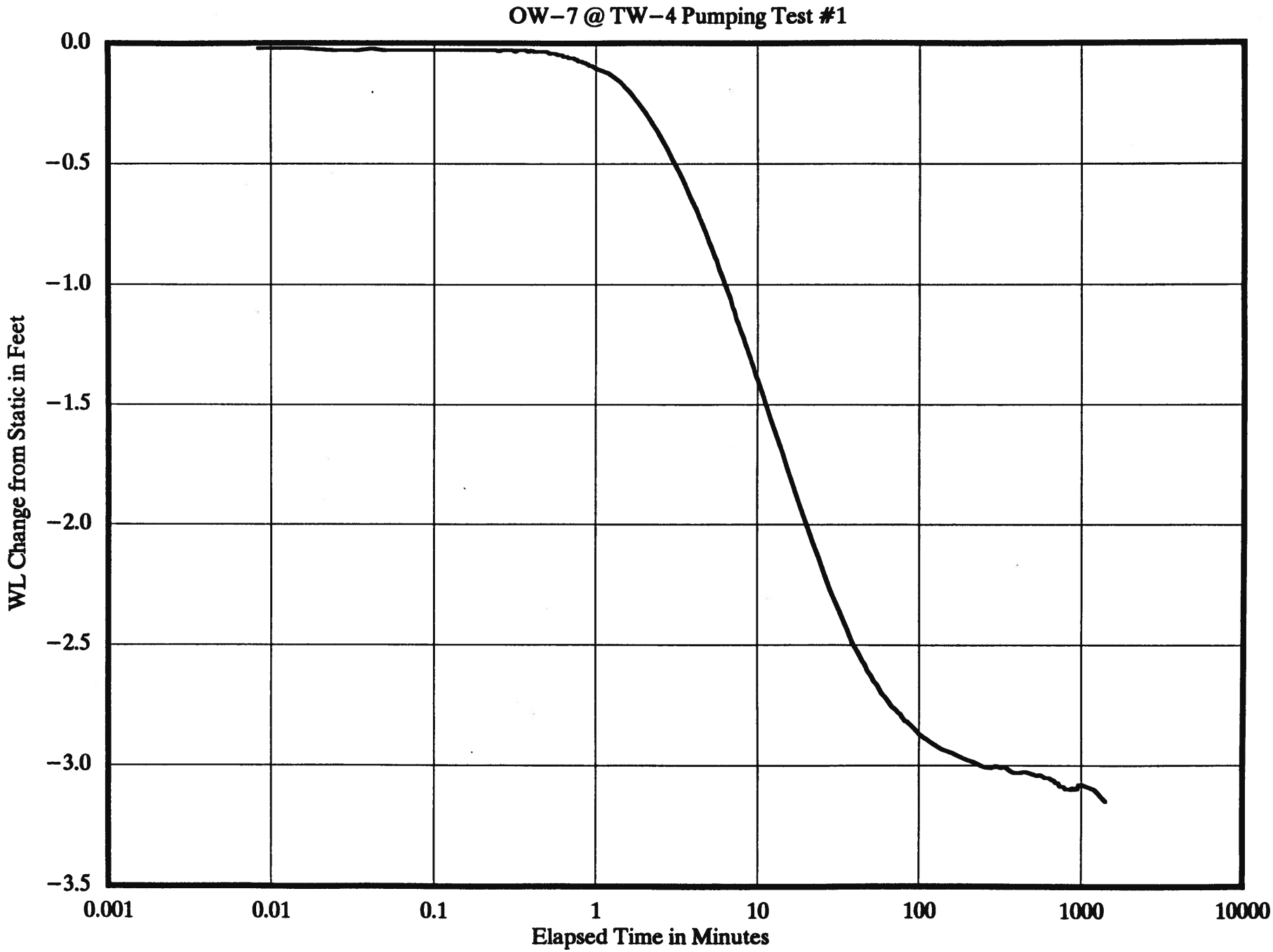
0.0000	38.041	−32.882	6.645	−2.083	7.132	−3.064	0.107
0.0083	37.597	−32.438	6.645	−2.083	7.151	−3.083	0.107
0.0166	37.185	−32.026	6.645	−2.083	7.151	−3.083	0.107
0.0250	36.805	−31.646	6.645	−2.083	7.151	−3.083	0.107
0.0333	36.409	−31.250	6.645	−2.083	7.151	−3.083	0.107
0.0416	36.029	−30.870	6.645	−2.083	7.151	−3.083	0.107
0.0500	35.649	−30.494	6.652	−2.094	7.151	−3.087	0.102
0.0583	35.269	−30.114	6.645	−2.087	7.151	−3.087	0.102
0.0666	34.857	−29.702	6.645	−2.087	7.151	−3.087	0.102
0.0750	34.461	−29.306	6.652	−2.094	7.151	−3.087	0.102
0.0833	34.065	−28.906	6.645	−2.083	7.151	−3.083	0.107
0.0916	33.654	−28.499	6.645	−2.087	7.151	−3.087	0.102
0.1000	33.242	−28.087	6.645	−2.087	7.151	−3.087	0.102
0.1083	32.830	−27.675	6.652	−2.094	7.157	−3.093	0.102
0.1166	32.450	−27.291	6.652	−2.090	7.157	−3.089	0.107
0.1250	32.070	−26.915	6.652	−2.094	7.151	−3.087	0.102
0.1333	31.690	−26.535	6.652	−2.094	7.151	−3.087	0.102
0.1416	31.326	−26.167	6.652	−2.090	7.157	−3.089	0.107
0.1500	30.977	−25.818	6.652	−2.090	7.157	−3.089	0.107
0.1583	30.645	−25.486	6.645	−2.083	7.151	−3.083	0.107
0.1666	30.312	−25.157	6.652	−2.094	7.151	−3.087	0.102
0.1750	29.995	−24.840	6.652	−2.094	7.151	−3.087	0.102
0.1833	29.679	−24.524	6.652	−2.094	7.151	−3.087	0.102
0.1916	29.362	−24.207	6.652	−2.094	7.157	−3.093	0.102
0.2000	29.061	−23.906	6.645	−2.087	7.151	−3.087	0.102
0.2083	28.760	−23.605	6.652	−2.094	7.151	−3.087	0.102
0.2166	28.459	−23.300	6.652	−2.090	7.151	−3.083	0.107
0.2250	28.158	−23.003	6.652	−2.094	7.157	−3.093	0.102
0.2333	27.857	−22.702	6.652	−2.094	7.157	−3.093	0.102
0.2416	27.556	−22.401	6.645	−2.087	7.157	−3.093	0.102
0.2500	27.256	−22.101	6.652	−2.094	7.151	−3.087	0.102

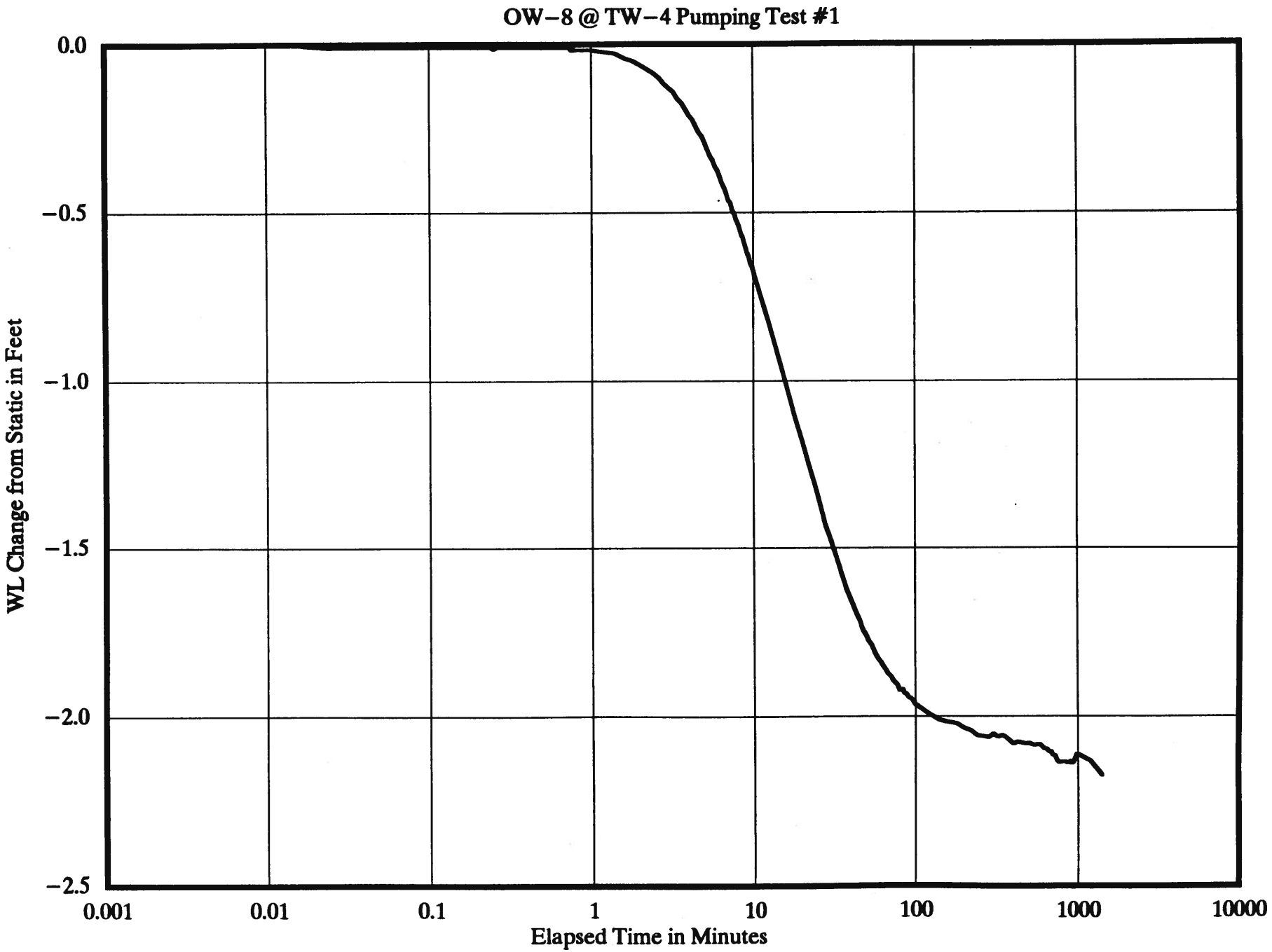
0.2583	26.955	−21.796	6.652	−2.090	7.151	−3.083	0.107
0.2666	26.670	−21.515	6.652	−2.094	7.157	−3.093	0.102
0.2750	26.385	−21.230	6.652	−2.094	7.157	−3.093	0.102
0.2833	26.099	−20.944	6.652	−2.094	7.157	−3.093	0.102
0.2916	25.846	−20.687	6.652	−2.090	7.151	−3.083	0.107
0.3000	25.577	−20.422	6.652	−2.094	7.151	−3.087	0.102
0.3083	25.308	−20.149	6.652	−2.090	7.151	−3.083	0.107
0.3166	25.054	−19.899	6.652	−2.094	7.157	−3.093	0.102
0.3250	24.801	−19.646	6.652	−2.094	7.157	−3.093	0.102
0.3333	24.563	−19.408	6.652	−2.094	7.151	−3.087	0.102
0.3500	24.072	−18.917	6.652	−2.094	7.151	−3.087	0.102
0.3666	23.613	−18.454	6.652	−2.090	7.151	−3.083	0.107
0.3833	23.170	−18.011	6.652	−2.090	7.151	−3.083	0.107
0.4000	22.710	−17.551	6.652	−2.090	7.151	−3.083	0.107
0.4166	22.283	−17.128	6.645	−2.087	7.151	−3.087	0.102
0.4333	21.839	−16.684	6.652	−2.094	7.151	−3.087	0.102
0.4500	21.428	−16.273	6.652	−2.094	7.157	−3.093	0.102
0.4666	21.032	−15.877	6.652	−2.094	7.151	−3.087	0.102
0.4833	20.636	−15.481	6.652	−2.094	7.151	−3.087	0.102
0.5000	20.271	−15.112	6.645	−2.083	7.151	−3.083	0.107
0.5166	19.923	−14.768	6.645	−2.087	7.144	−3.080	0.102
0.5333	19.575	−14.420	6.652	−2.094	7.151	−3.087	0.102
0.5500	19.226	−14.071	6.645	−2.087	7.151	−3.087	0.102
0.5666	18.909	−13.754	6.645	−2.087	7.144	−3.080	0.102
0.5833	18.577	−13.418	6.645	−2.083	7.144	−3.076	0.107
0.6000	18.260	−13.105	6.645	−2.087	7.144	−3.080	0.102
0.6166	17.959	−12.804	6.645	−2.087	7.144	−3.080	0.102
0.6333	17.658	−12.503	6.645	−2.087	7.144	−3.080	0.102
0.6500	17.373	−12.218	6.645	−2.087	7.138	−3.074	0.102
0.6666	17.088	−11.933	6.645	−2.087	7.138	−3.074	0.102
0.6833	16.835	−11.680	6.645	−2.087	7.138	−3.074	0.102
0.7000	16.581	−11.426	6.645	−2.087	7.138	−3.074	0.102
0.7166	16.328	−11.169	6.645	−2.083	7.138	−3.070	0.107
0.7333	16.090	−10.935	6.645	−2.087	7.138	−3.074	0.102
0.8	15.853	−10.694	6.645	−2.083	7.132	−3.064	0.107
0.8	15.631	−10.476	6.639	−2.081	7.132	−3.068	0.102
0.8	15.394	−10.239	6.639	−2.081	7.125	−3.061	0.102
0.8	15.172	−10.017	6.639	−2.081	7.132	−3.068	0.102
0.8	14.966	−9.807	6.639	−2.077	7.125	−3.057	0.107
0.8	14.760	−9.605	6.639	−2.081	7.125	−3.061	0.102
0.9	14.570	−9.415	6.639	−2.081	7.125	−3.061	0.102
0.9	14.396	−9.241	6.639	−2.081	7.119	−3.055	0.102
0.9	14.206	−9.047	6.639	−2.077	7.119	−3.051	0.107
0.9	14.032	−8.873	6.639	−2.077	7.119	−3.051	0.107
0.9	13.857	−8.702	6.633	−2.075	7.113	−3.049	0.102
0.9	13.683	−8.524	6.633	−2.071	7.113	−3.045	0.107
1.0	13.525	−8.370	6.633	−2.075	7.113	−3.049	0.102
1.0	13.366	−8.211	6.633	−2.075	7.106	−3.042	0.102
1.0	13.208	−8.053	6.633	−2.075	7.106	−3.042	0.102
1.0	13.066	−7.911	6.633	−2.075	7.100	−3.036	0.102
1.2	11.529	−6.370	6.614	−2.052	7.043	−2.975	0.107
1.4	10.563	−5.404	6.588	−2.026	6.993	−2.925	0.107
1.6	9.914	−4.755	6.569	−2.007	6.948	−2.880	0.107
1.8	9.439	−4.280	6.557	−1.995	6.910	−2.842	0.107
2.0	9.075	−3.916	6.551	−1.989	6.879	−2.811	0.107
2.2	8.790	−3.631	6.551	−1.989	6.847	−2.779	0.107

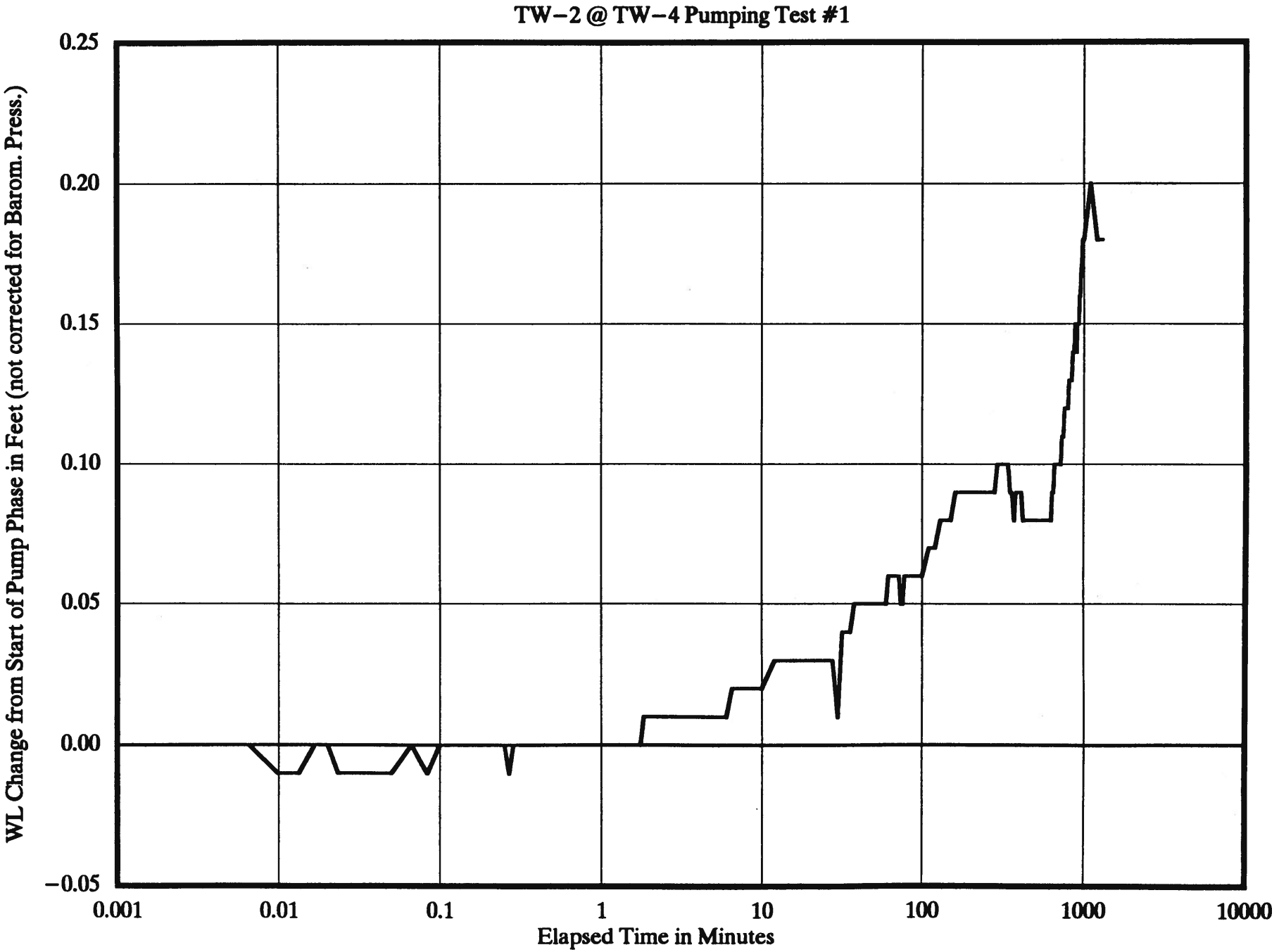
2.4	8.552	−3.393	6.538	−1.976	6.796	−2.728	0.107
2.6	8.378	−3.219	6.525	−1.963	6.752	−2.684	0.107
2.8	8.204	−3.045	6.513	−1.951	6.714	−2.646	0.107
3.0	8.077	−2.918	6.500	−1.938	6.676	−2.608	0.107
3.2	7.950	−2.791	6.494	−1.932	6.638	−2.570	0.107
3.4	7.855	−2.696	6.481	−1.919	6.588	−2.520	0.107
3.6	7.744	−2.585	6.462	−1.900	6.550	−2.482	0.107
3.8	7.681	−2.526	6.450	−1.892	6.512	−2.448	0.102
4.0	7.586	−2.427	6.424	−1.862	6.467	−2.399	0.107
4.2	7.523	−2.364	6.405	−1.843	6.429	−2.361	0.107
4.4	7.459	−2.300	6.386	−1.824	6.391	−2.323	0.107
4.6	7.412	−2.253	6.361	−1.799	6.360	−2.292	0.107
4.8	7.348	−2.189	6.342	−1.780	6.328	−2.260	0.107
5.0	7.301	−2.142	6.323	−1.761	6.284	−2.216	0.107
5.2	7.238	−2.079	6.304	−1.742	6.252	−2.184	0.107
5.4	7.206	−2.047	6.286	−1.724	6.214	−2.146	0.107
5.6	7.158	−1.999	6.260	−1.698	6.189	−2.121	0.107
5.8	7.142	−1.983	6.248	−1.686	6.157	−2.089	0.107
6.0	7.095	−1.936	6.229	−1.667	6.138	−2.070	0.107
6.2	7.063	−1.904	6.210	−1.648	6.107	−2.039	0.107
6.4	7.032	−1.873	6.197	−1.635	6.088	−2.020	0.107
6.6	7.000	−1.841	6.185	−1.623	6.062	−1.994	0.107
6.8	6.984	−1.825	6.166	−1.604	6.037	−1.969	0.107
7	6.952	−1.793	6.147	−1.585	6.012	−1.944	0.107
7.2	6.921	−1.762	6.128	−1.566	5.986	−1.918	0.107
7.4	6.889	−1.730	6.103	−1.541	5.961	−1.893	0.107
7.6	6.857	−1.698	6.084	−1.522	5.942	−1.874	0.107
7.8	6.842	−1.687	6.058	−1.500	5.910	−1.846	0.102
8	6.810	−1.651	6.039	−1.477	5.879	−1.811	0.107
8.2	6.778	−1.619	6.020	−1.458	5.860	−1.792	0.107
8.4	6.762	−1.607	6.008	−1.450	5.835	−1.771	0.102
8.6	6.747	−1.588	6.002	−1.440	5.828	−1.760	0.107
8.8	6.731	−1.572	5.989	−1.427	5.816	−1.748	0.107
9	6.715	−1.556	5.970	−1.408	5.797	−1.729	0.107
9.2	6.699	−1.544	5.957	−1.399	5.778	−1.714	0.102
9.4	6.667	−1.512	5.951	−1.393	5.759	−1.695	0.102
9.6	6.652	−1.497	5.938	−1.380	5.746	−1.682	0.102
9.8	6.636	−1.481	5.919	−1.361	5.727	−1.663	0.102
10	6.620	−1.465	5.913	−1.355	5.702	−1.638	0.102
12	6.477	−1.322	5.743	−1.185	5.524	−1.460	0.102
14	6.366	−1.211	5.654	−1.096	5.417	−1.353	0.102
16	6.271	−1.120	5.572	−1.018	5.297	−1.237	0.096
18	6.176	−1.025	5.471	−0.917	5.195	−1.135	0.096
20	6.113	−0.965	5.396	−0.845	5.113	−1.056	0.092
22	6.034	−0.883	5.307	−0.753	5.031	−0.971	0.096
24	5.986	−0.838	5.257	−0.706	4.968	−0.911	0.092
26	5.939	−0.791	5.181	−0.630	4.911	−0.854	0.092
28	5.891	−0.743	5.137	−0.586	4.847	−0.790	0.092
30	5.860	−0.712	5.093	−0.542	4.797	−0.740	0.092
32	5.828	−0.680	5.055	−0.504	4.759	−0.702	0.092
34	5.780	−0.632	5.004	−0.453	4.715	−0.658	0.092
36	5.765	−0.621	4.979	−0.432	4.683	−0.630	0.086
38	5.733	−0.589	4.954	−0.407	4.658	−0.605	0.086
40	5.701	−0.560	4.922	−0.378	4.632	−0.582	0.082
42	5.685	−0.544	4.891	−0.347	4.601	−0.551	0.082
44	5.654	−0.513	4.872	−0.328	4.569	−0.519	0.082

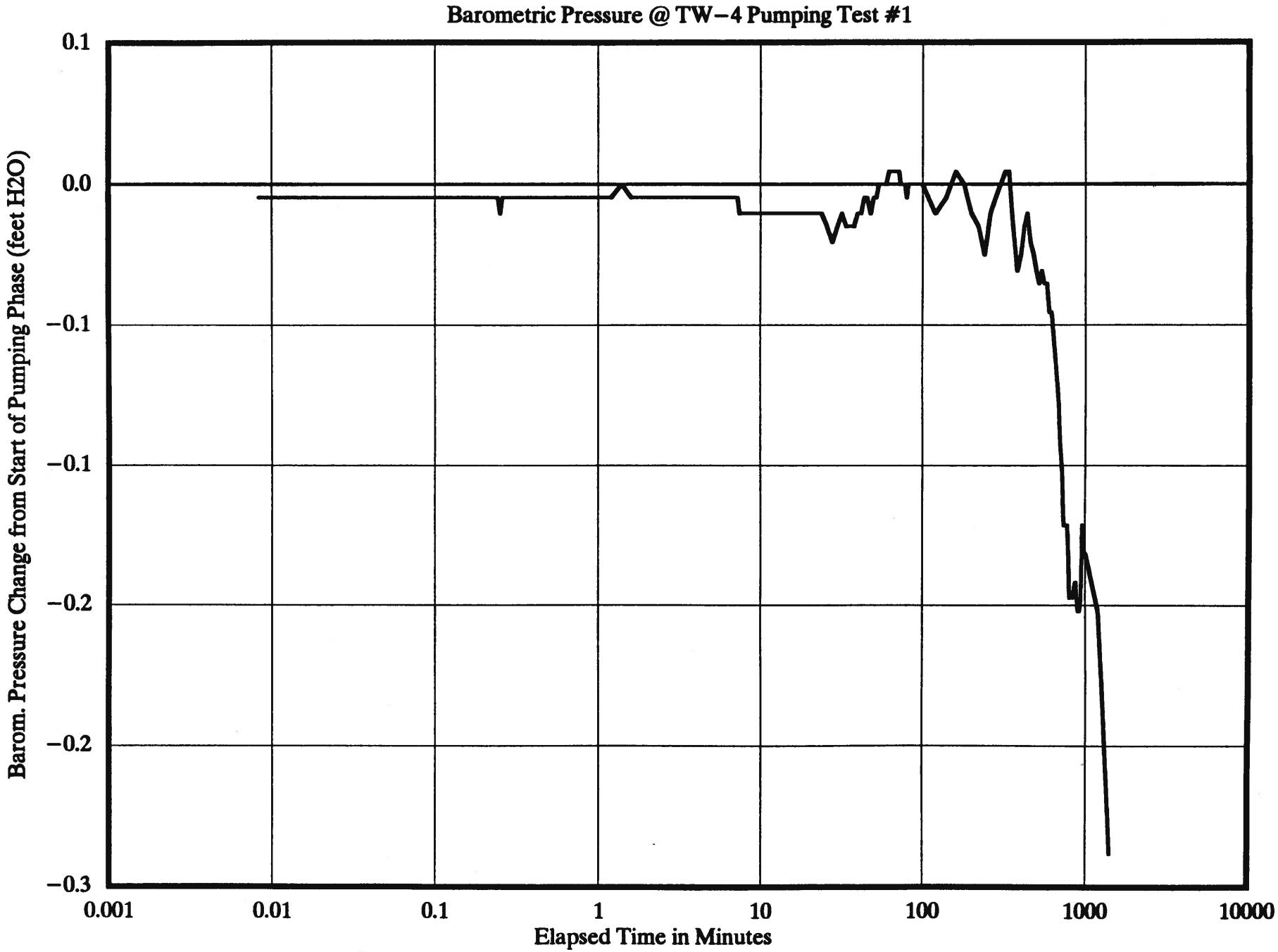
46	5.638	−0.497	4.853	−0.309	4.550	−0.500	0.082
48	5.622	−0.481	4.828	−0.284	4.518	−0.468	0.082
50	5.606	−0.465	4.815	−0.271	4.512	−0.462	0.082
52	5.590	−0.453	4.790	−0.250	4.480	−0.434	0.076
54	5.575	−0.438	4.771	−0.231	4.468	−0.422	0.076
56	5.559	−0.422	4.758	−0.218	4.455	−0.409	0.076
58	5.543	−0.409	4.752	−0.215	4.436	−0.393	0.071
60	5.527	−0.393	4.739	−0.202	4.430	−0.387	0.071
62	5.511	−0.377	4.727	−0.190	4.411	−0.368	0.071
64	5.495	−0.361	4.714	−0.177	4.398	−0.355	0.071
66	5.495	−0.361	4.714	−0.177	4.385	−0.342	0.071
68	5.480	−0.350	4.695	−0.162	4.379	−0.340	0.066
70	5.480	−0.350	4.701	−0.168	4.373	−0.334	0.066
72	5.464	−0.334	4.670	−0.137	4.354	−0.315	0.066
74	5.464	−0.330	4.670	−0.133	4.341	−0.298	0.071
76	5.432	−0.302	4.645	−0.112	4.329	−0.290	0.066
78	5.432	−0.302	4.657	−0.124	4.329	−0.290	0.066
80	5.416	−0.286	4.651	−0.118	4.316	−0.277	0.066
82	5.416	−0.282	4.632	−0.095	4.316	−0.273	0.071
84	5.416	−0.286	4.645	−0.112	4.316	−0.277	0.066
86	5.416	−0.286	4.638	−0.105	4.297	−0.258	0.066
88	5.400	−0.270	4.632	−0.099	4.297	−0.258	0.066
90	5.400	−0.270	4.619	−0.086	4.284	−0.245	0.066
92	5.385	−0.255	4.600	−0.067	4.272	−0.233	0.066
94	5.385	−0.255	4.600	−0.067	4.272	−0.233	0.066
96	5.385	−0.258	4.600	−0.070	4.278	−0.242	0.061
98	5.385	−0.258	4.607	−0.077	4.265	−0.229	0.061
100	5.369	−0.242	4.600	−0.070	4.259	−0.223	0.061
120	5.321	−0.201	4.556	−0.033	4.221	−0.192	0.051

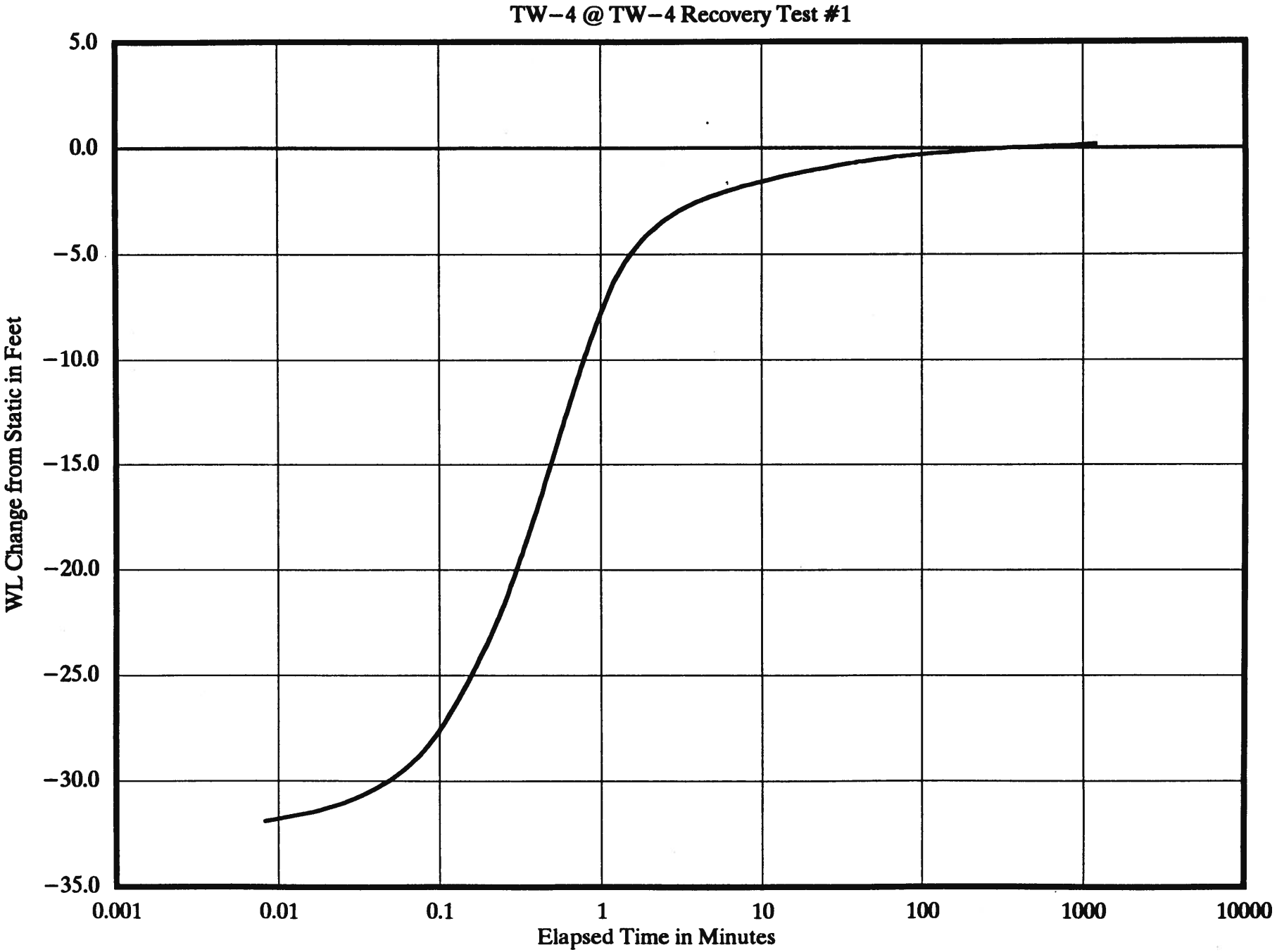

TW−4 @ TW−4 Pumping Test #1
0.0
−10.0
−20.0
−30.0
−40.0
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

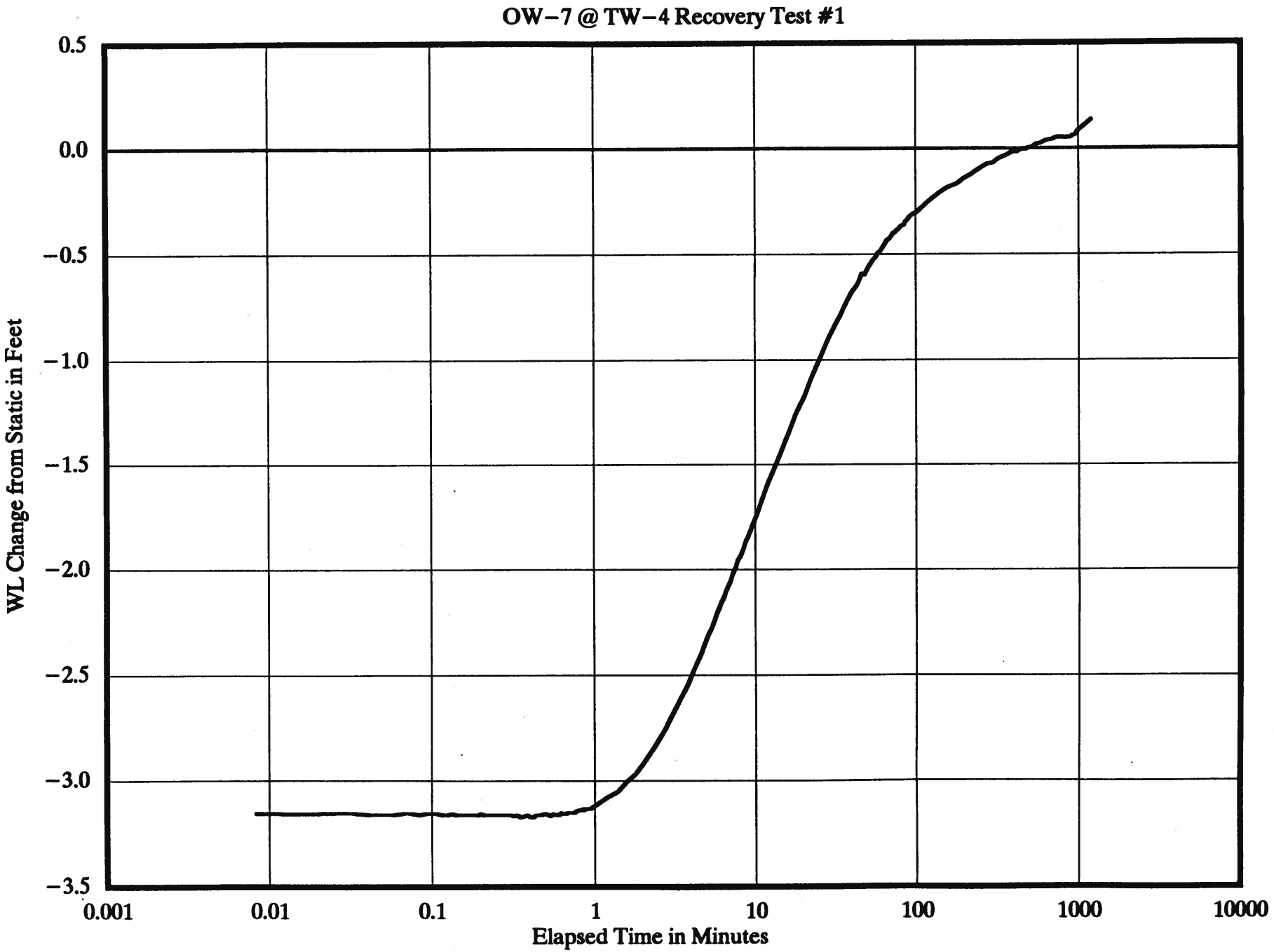

OW–7 @ TW–4 Pumping Test #1
0.0
–0.5
–1.0
–1.5
–2.0
–2.5
–3.0
–3.5
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

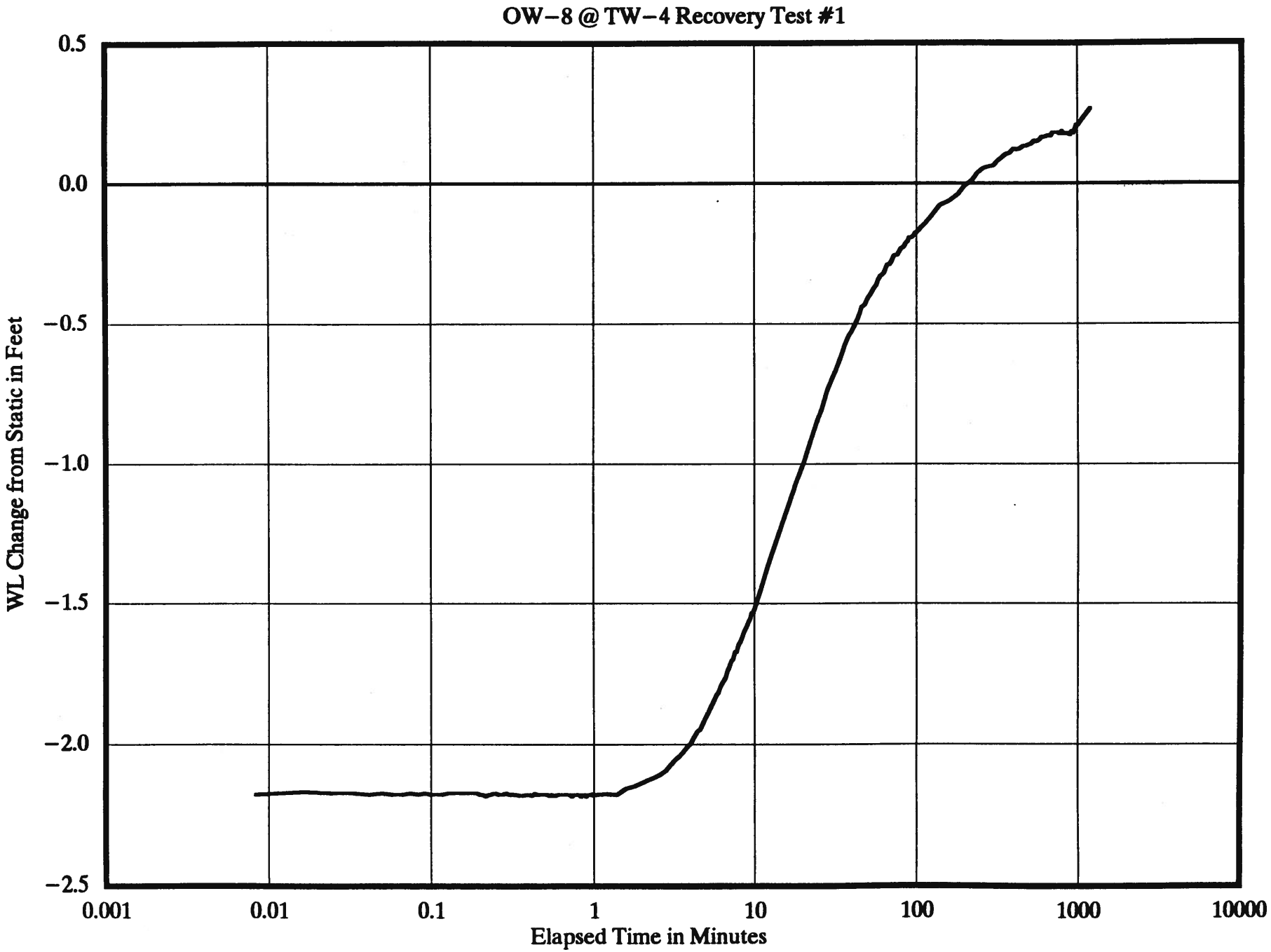

OW–8 @ TW–4 Pumping Test #1
0.0
–0.5
–1.0
–1.5
–2.0
–2.5
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

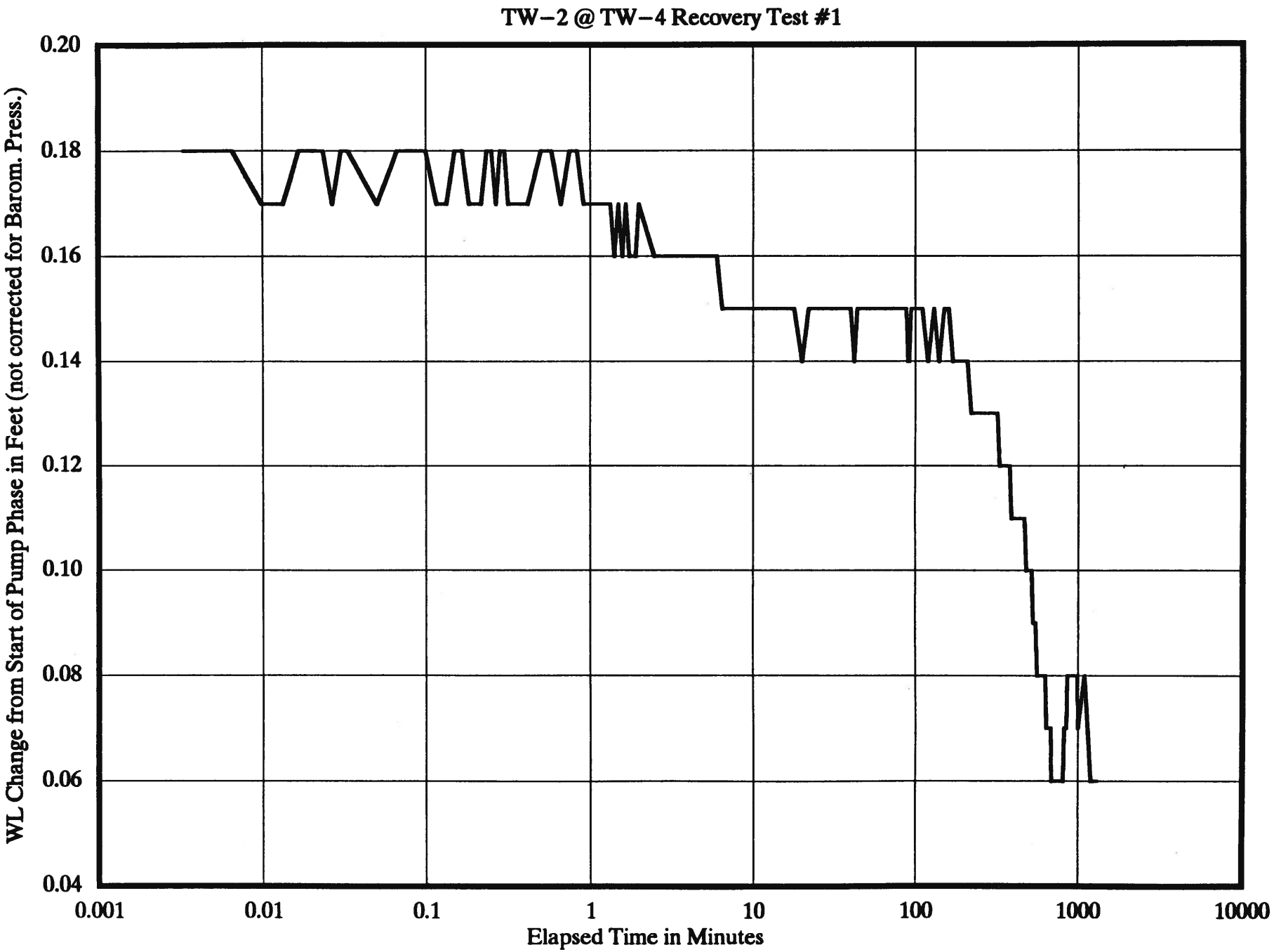

TW−2 @ TW−4 Pumping Test #1
WL Change from Start of Pump Phase in Feet (not corrected for Barom. Press.)
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

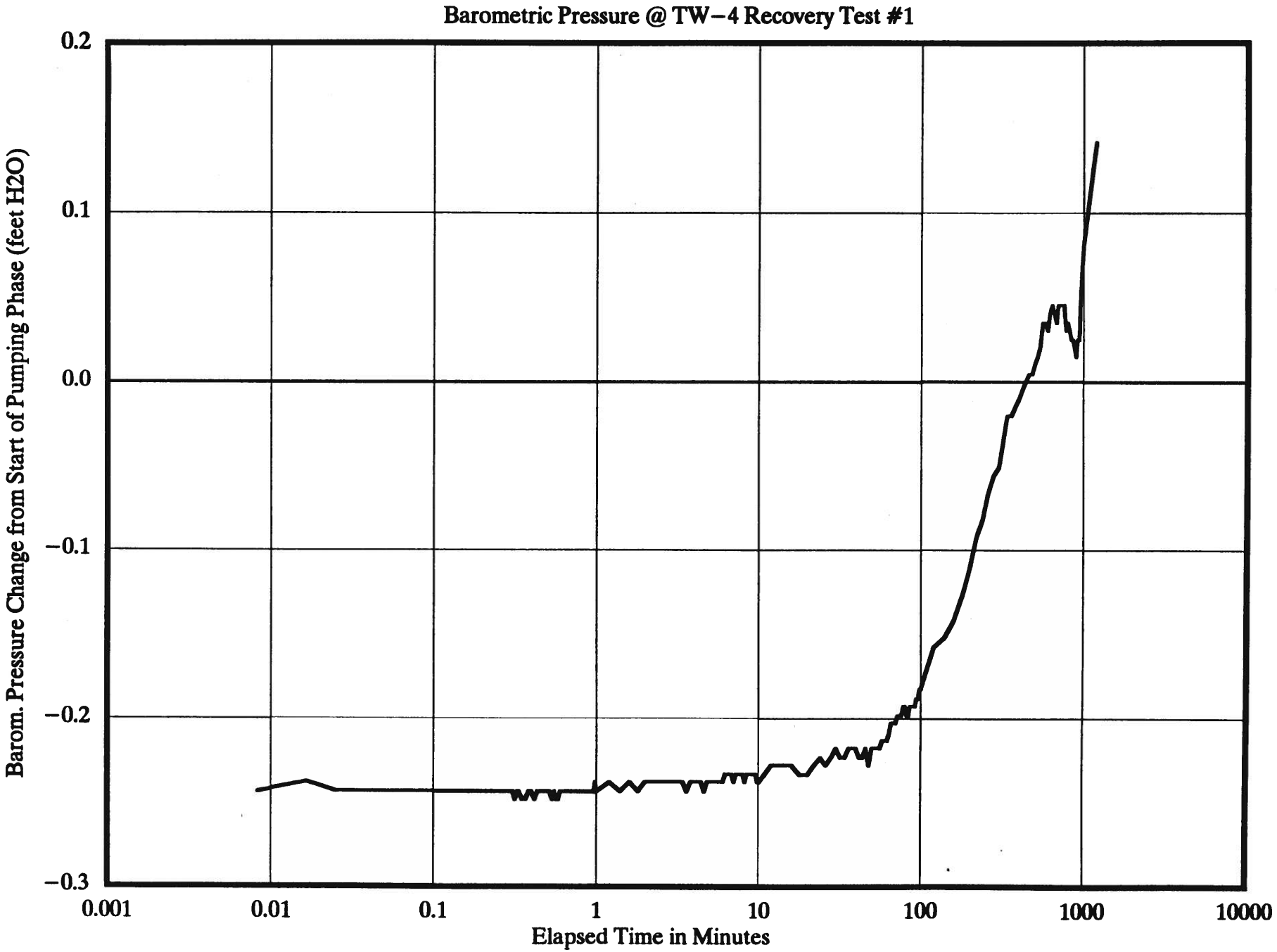

Barometric Pressure @ TW−4 Pumping Test #1
Barom. Pressure Change from Start of Pumping Phase (feet H2O)
0.1
0.0
−0.1
−0.1
−0.2
−0.2
−0.3
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

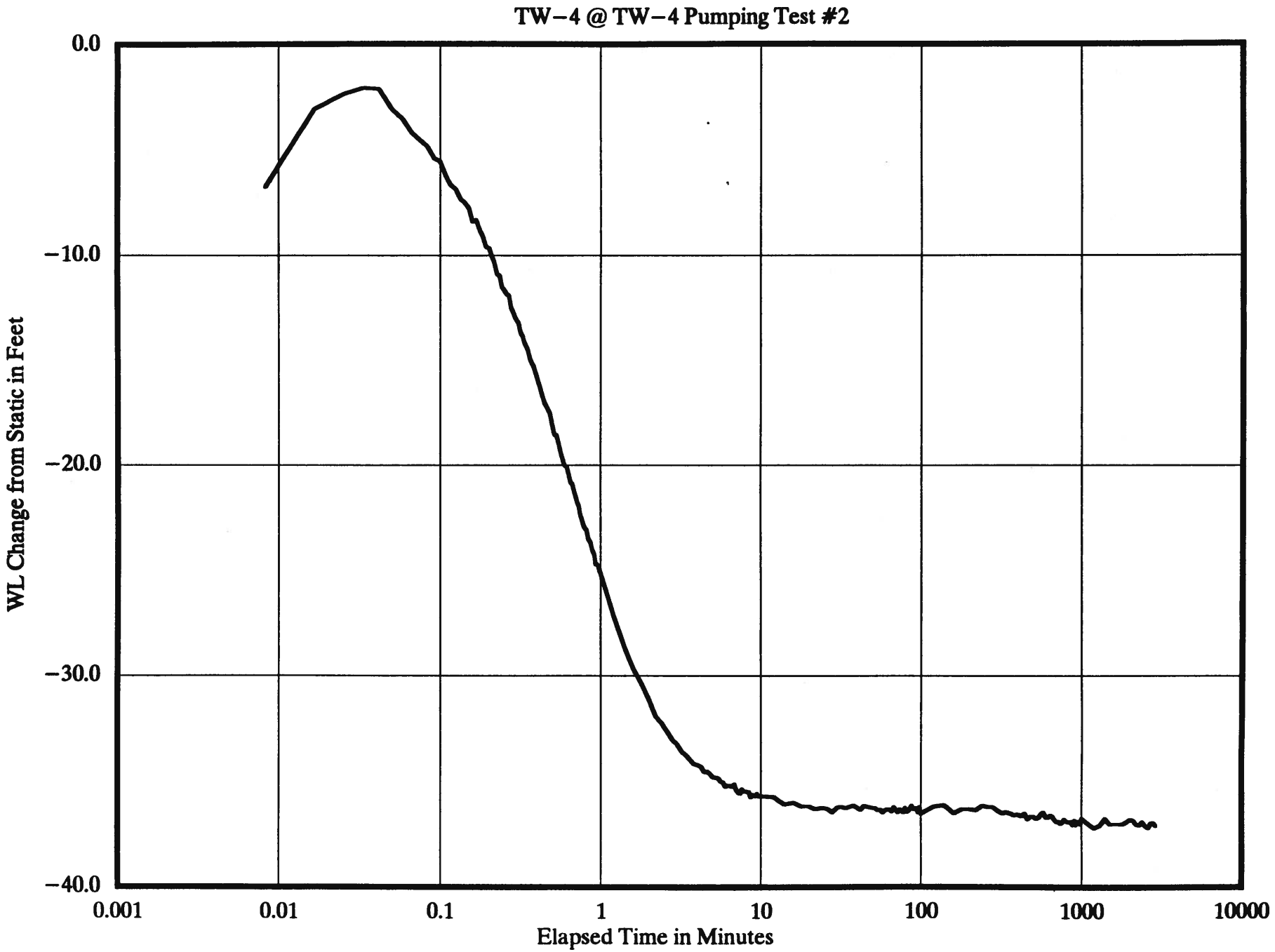

TW-4 @ TW-4 Recovery Test #1
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

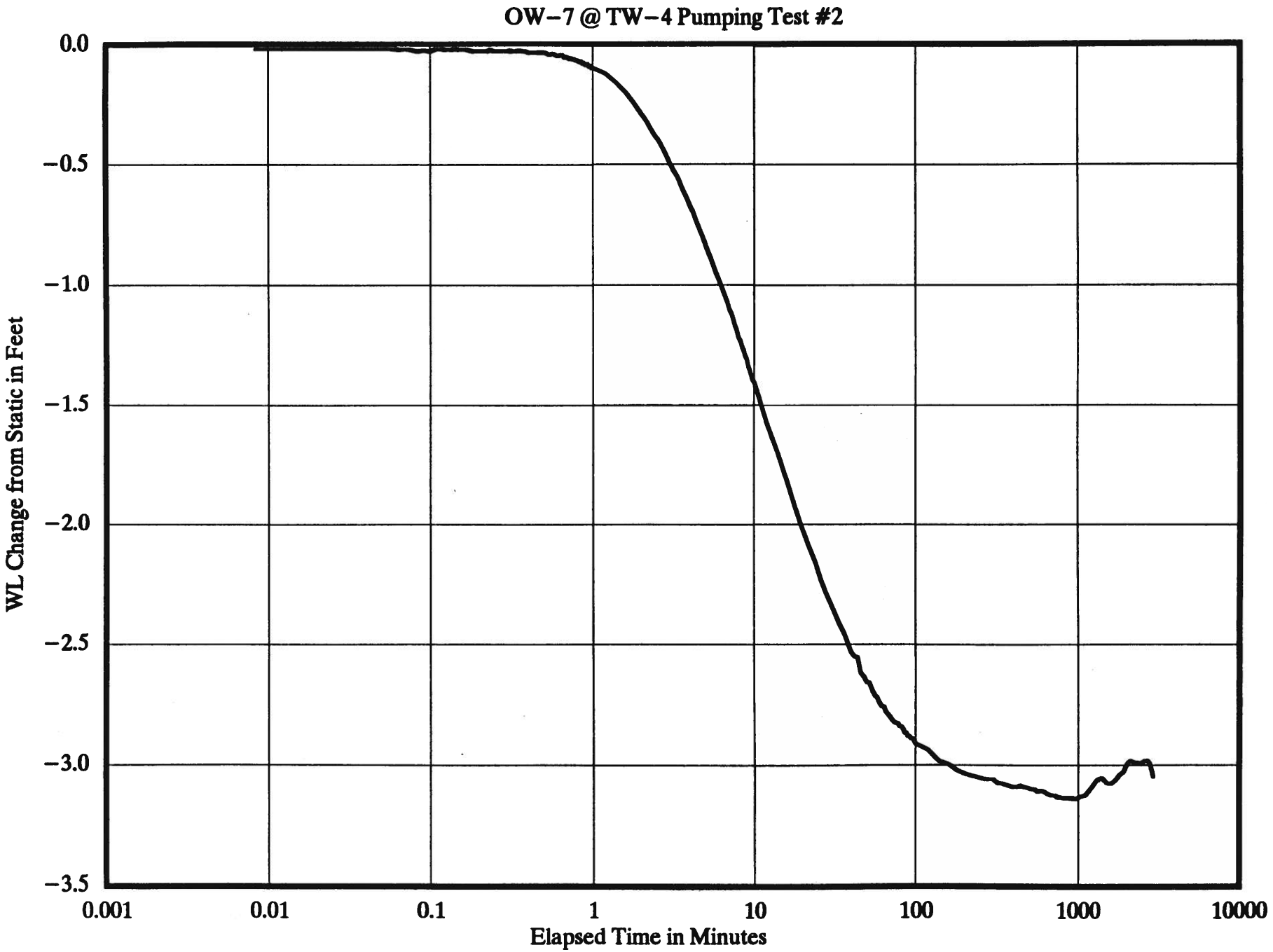

OW−7 @ TW−4 Recovery Test #1
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
−3.0
−3.5
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

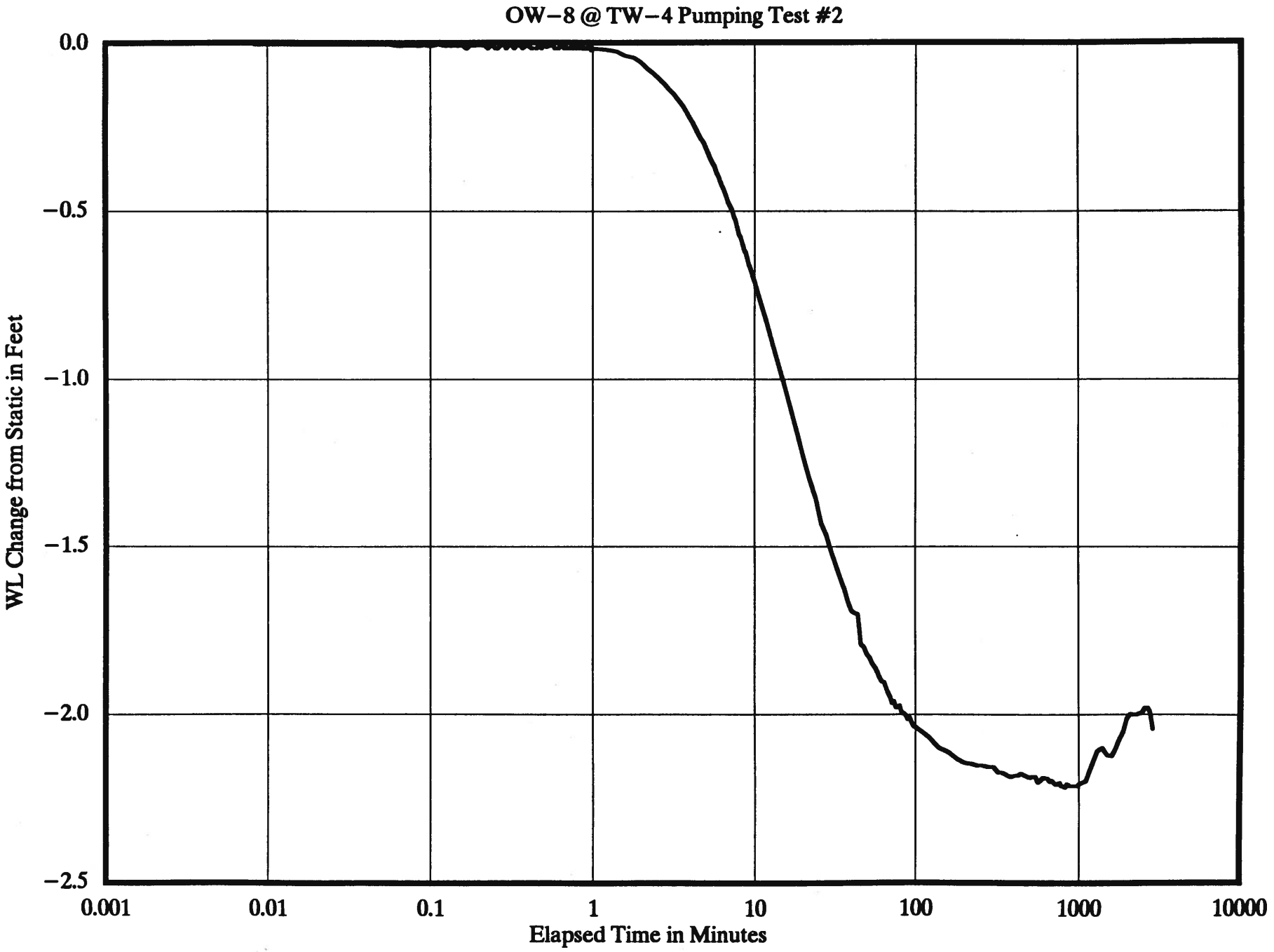

OW−8 @ TW−4 Recovery Test #1
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

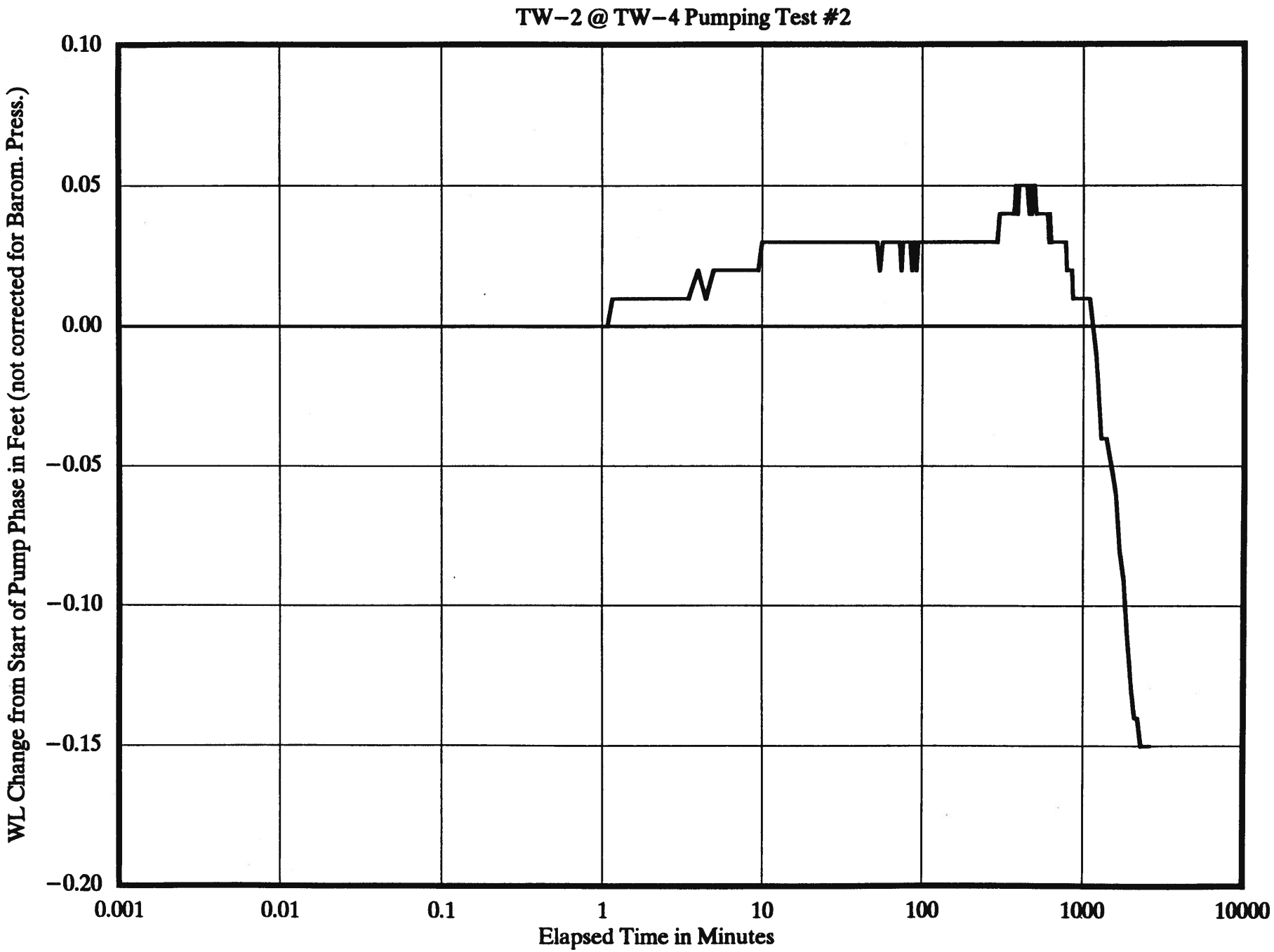

TW−2 @ TW−4 Recovery Test #1
WL Change from Start of Pump Phase in Feet (not corrected for Barom. Press.)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

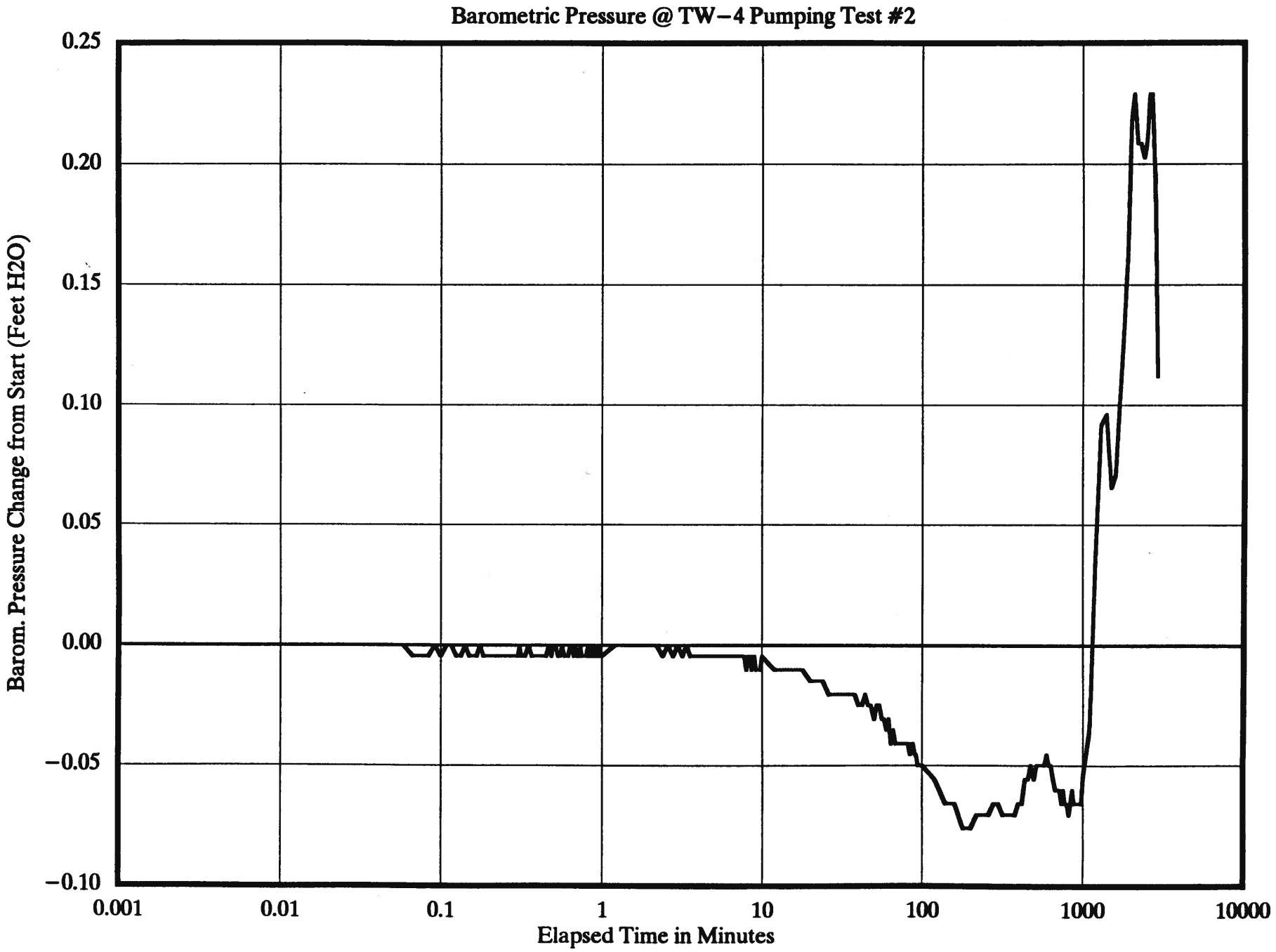

Barometric Pressure @ TW−4 Recovery Test #1
Barom. Pressure Change from Start of Pumping Phase (feet H2O)
0.2
0.1
0.0
−0.1
−0.2
−0.3
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

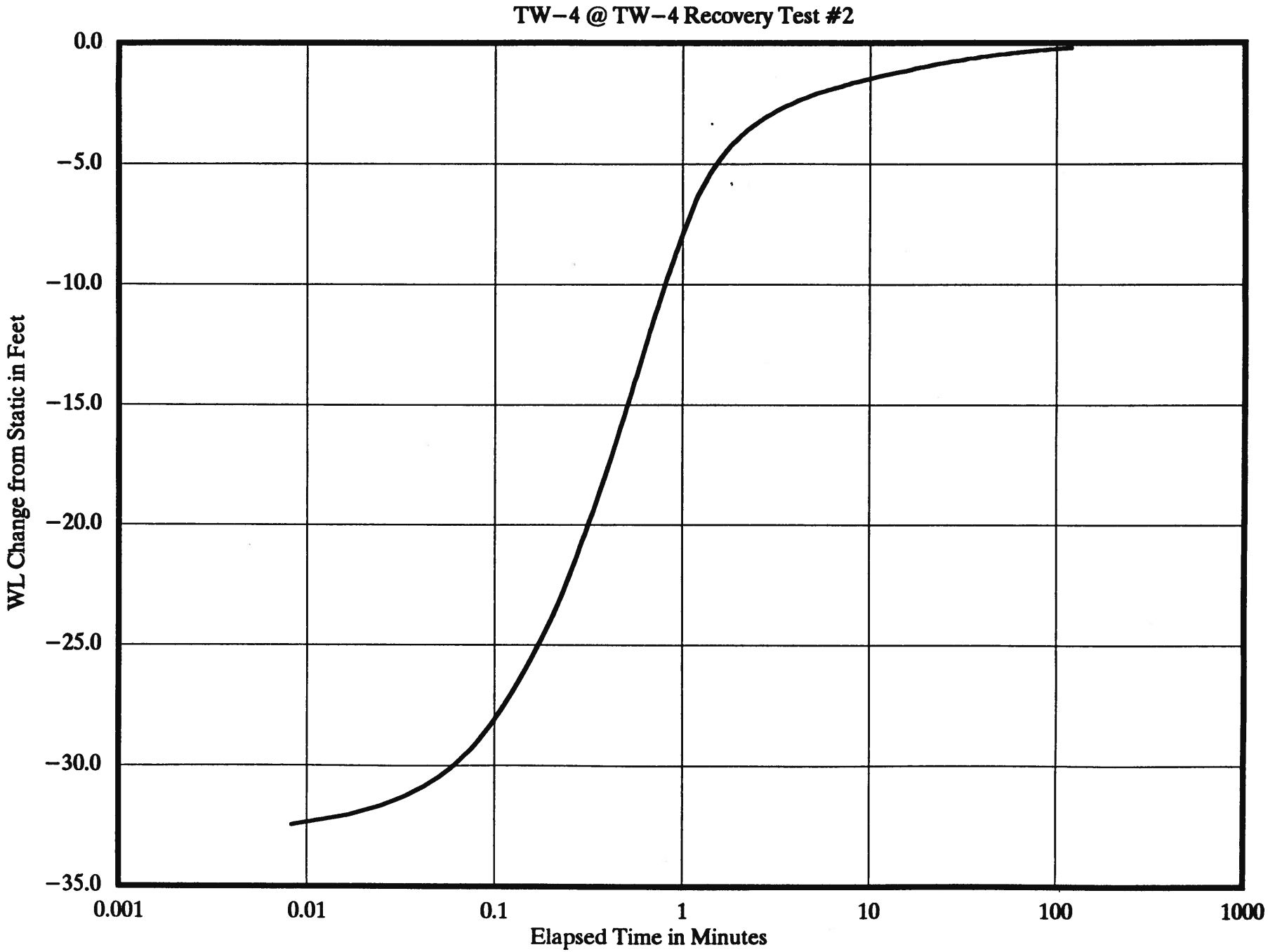

TW−4 @ TW−4 Pumping Test #2
0.0
−10.0
−20.0
−30.0
−40.0
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

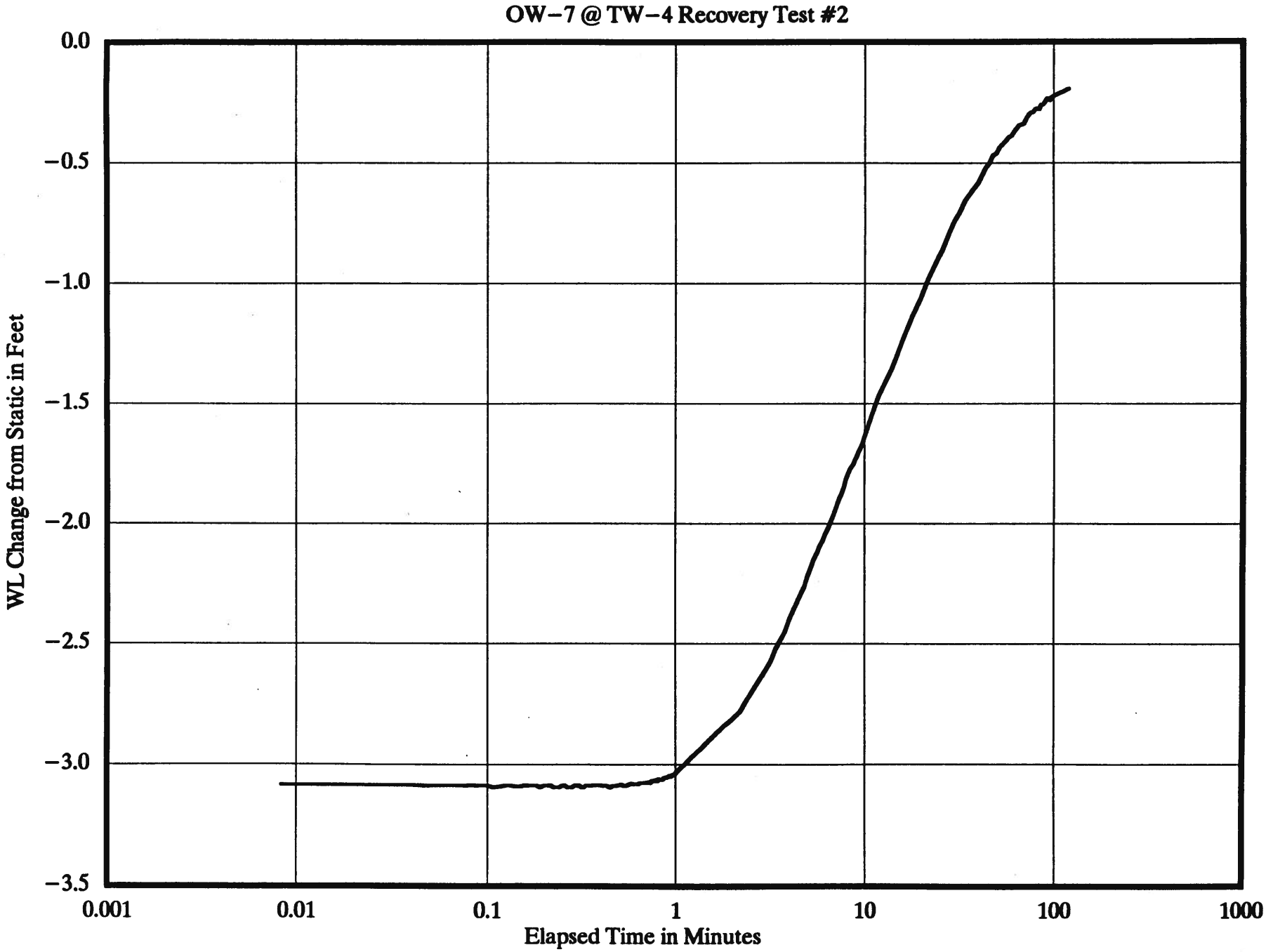

OW-7 @ TW-4 Pumping Test #2
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

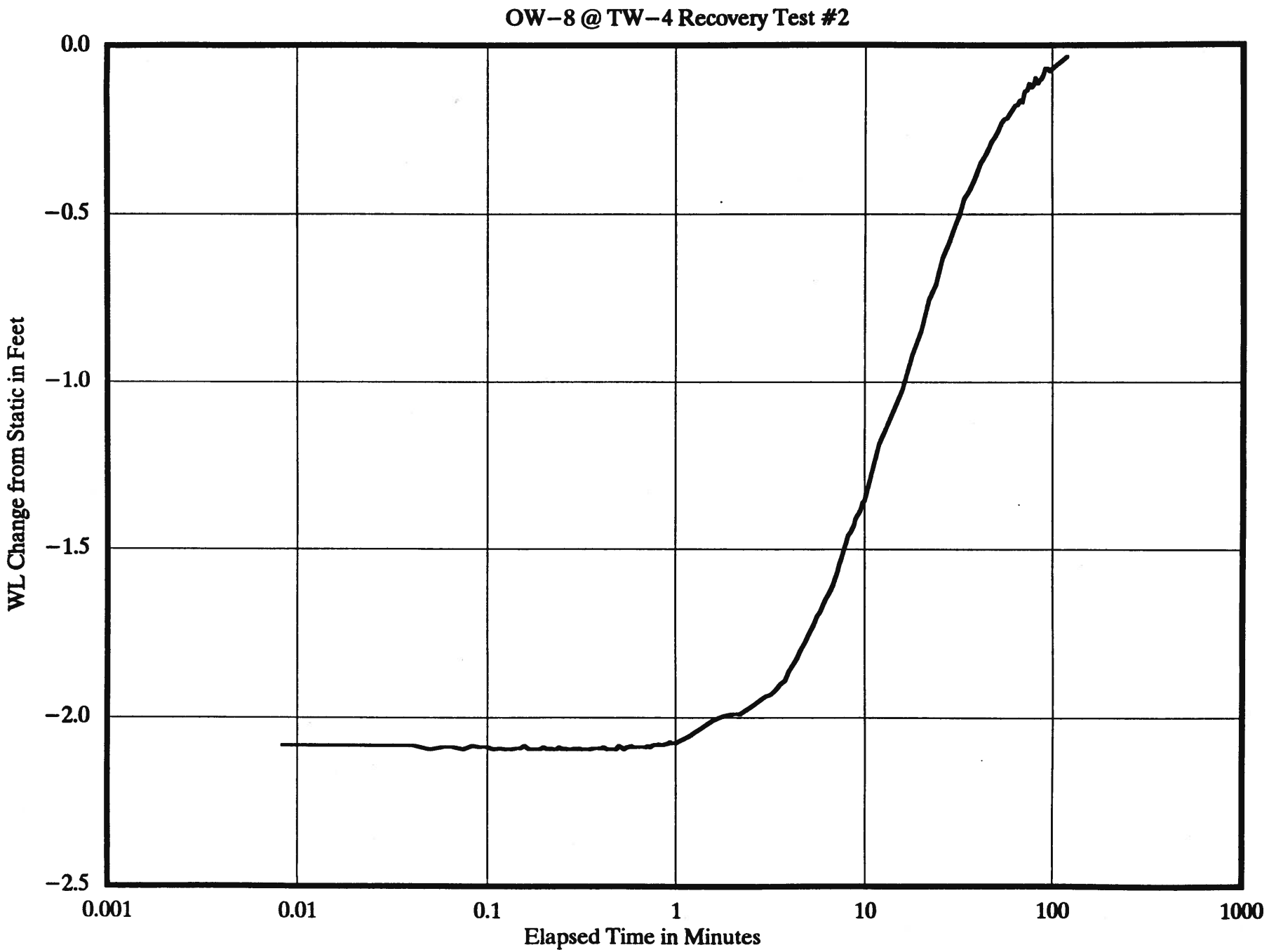

OW−8 @ TW−4 Pumping Test #2
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes

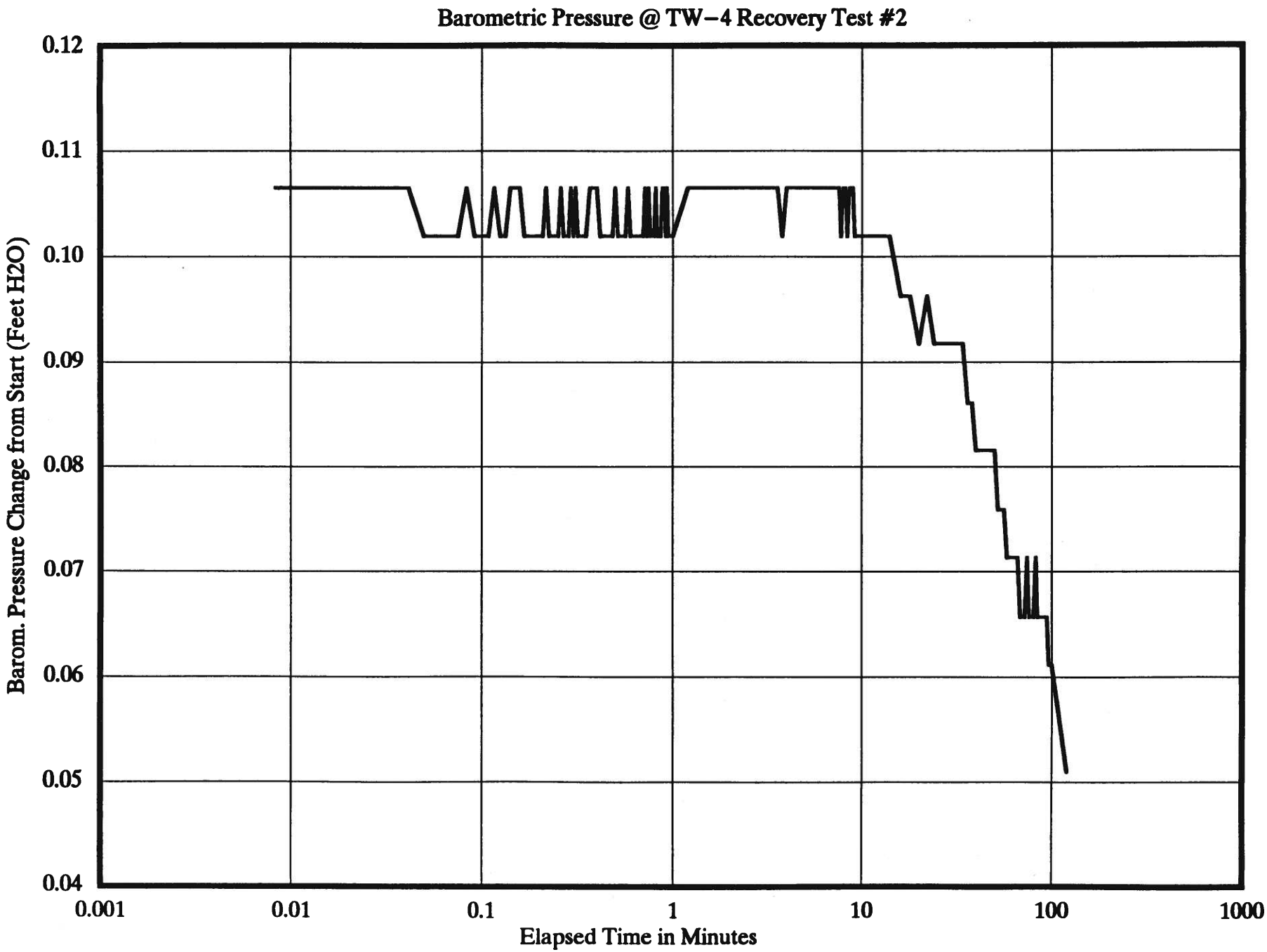

TW−2 @ TW−4 Pumping Test #2
WL Change from Start of Pump Phase in Feet (not corrected for Barom. Press.)
0.10
0.05
0.00
−0.05
−0.10
−0.15
−0.20
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes


Barometric Pressure @ TW−4 Pumping Test #2
Barom. Pressure Change from Start (Feet H2O)
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
0.001
0.01
0.1
1
10
100
1000
10000
Elapsed Time in Minutes


TW−4 @ TW−4 Recovery Test #2
0.0
−5.0
−10.0
−15.0
−20.0
−25.0
−30.0
−35.0
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
Elapsed Time in Minutes


OW−7 @ TW−4 Recovery Test #2
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
−3.0
−3.5
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
Elapsed Time in Minutes


OW−8 @ TW−4 Recovery Test #2
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
WL Change from Static in Feet
0.001
0.01
0.1
1
10
100
1000
Elapsed Time in Minutes


Barometric Pressure @ TW-4 Recovery Test #2
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
Barom. Pressure Change from Start (Feet H2O)
0.001
0.01
0.1
1
10
100
1000
Elapsed Time in Minutes

Appendix B

United States Department of the Interior

BUREAU OF RECLAMATION
Dakotas Area Office
P.O. Box 1017
Bismarck, North Dakota 58502

IN REPLY REFER TO:
DK-573
RES-3

FEB 13 1995

MEMORANDUM

To: Water Resources Services, Billings, Montana
Attention: GP-2500 (JLucero)

From: Tim Keller
Chief, Support Services, Bismarck

Subject: Lake Meridith

As requested, attached are the results of analyses performed on Lake Meridith salinity study samples. Samples were collected on August 29 and December 6, 1994, by GP-2500 (DJewell and GStallman) and received in our laboratory August 31 and December 12, 1994.

Analyses were performed by EPA approved Methodologies.

If you have any questions please call David Hartman, Physical Scientist, at (701) 250-4547.

Attachment

02/10/95

Approved: _____

Report of Water Analysis
Dakotas Area Office
Soil and Water Laboratory
U. S. Bureau of Reclamation
Bismarck, ND 58501

Study Area: LAKE MERIDITH SALINITY STUDY
Description:

Laboratory Number		9409334	9409335
Site ID		TW4-1	TW4-4
Date Collected		12/06/94	12/06/94
Major Cations:			
Calcium	(mg/l)	710	737
Magnesium	(mg/l)	268	268
Potassium	(mg/l)	56.2	56.0
Sodium	(mg/l)	18539	18280
Major Anions:			
Alkalinity (as CaCO3	mg/l)	533.8	532.3
Chloride	(mg/l)	31309	31709
Sulfate	(mg/l)	2592.6	2571.1
Calculated Values:			
TDS	(mg/l)	53795	53940
SAR		150.43	146.66
Hardness as mg CaCO3/l		2876.5	2942.3
Cation/Anion Balance	(%)	-4.5	-5.7

02/07/95

Report of Water Analysis
Dakotas Area Office
Soil and Water Laboratory
U. S. Bureau of Reclamation
Bismarck, ND 58501

Approved: _____

Study Area: LAKE MERIDITH
Description:

Laboratory Number	9409331	9409332	9409333	9409329	9409330
Site ID	TW4-2	TW4-5	TW4-7	TW4-3	TW4-6
Date Collected	12/06/94	12/06/94	12/06/94	12/06/94	12/06/94

Dissolved Trace Metals:

Al	(mg/l)	<0.15	<0.15	<0.15		
B	(mg/l)	2.07	2.04	2.04		
Be	(mg/l)	<0.0025	<0.0025	<0.0025		
Cd	(mg/l)	<0.01	<0.01	<0.01		
Cr	(mg/l)	<0.01	<0.01	<0.01		
Co	(mg/l)	<0.01	<0.01	<0.01		
Cu	(mg/l)	<0.01	<0.01	<0.01		
Fe	(mg/l)	7.30	7.39	7.23		
Mn	(mg/l)	0.420	0.434	0.438		
Ni	(mg/l)	<0.01	<0.01	<0.01		
Pb	(mg/l)	<0.05	<0.05	<0.05		
Ag	(mg/l)	<0.01	<0.01	<0.01		
V	(mg/l)	0.026	0.029	0.031		
Zn	(mg/l)	0.620	0.643	0.649		
As	(mg/l)	<0.08	<0.08	<0.08		
Se	(mg/l)	<0.05	<0.05	<0.05		
Sr	(mg/l)	15.60	15.40	15.40		
Hg	(mg/l)				<0.0002	<0.0002

Note: TW4-7 is split QA/QC sample from TW4-5