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WATER RESOURCES
WESTERN REGION

Micron Technology, Inc.
8000 S. Federal Way
P.O. Box 6
Boise, ID 83707-0006
208.368.4000

January 31, 2007

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DEPARTMENT OF
WATER RESOURCES

Mr. John Westra
Western Regional Manager
State of Idaho, Department of Water Resources
2735 Airport Way
Boise, ID 83705-5082

RE: Permit No. 63-31183, Request for Extension of Time and
Analysis of Diversion Rates and Ground Water Levels

Dear Mr. Westra,

Enclosed is the Request for Extension of Time for Water Right Permit 63-31183 from Micron Technology, Inc. The enclosure consists of the State of Idaho Form 2C4 describing the significant work that has been completed toward development of this right, reasons for requesting the extension, and the filing fee.

As you may know, Micron is the largest private employer in the State of Idaho. The semiconductor manufacturing facility in Boise, which relies on a steady supply of high quality water as a critical raw material of production, employs roughly 10,000 people.

Semiconductor manufacturing is extremely capital intensive, requiring large investments of sophisticated facilities and equipment. In addition, to compete in the semiconductor memory industry, the Company must to continue to develop technologically advanced products and process. Research and development expenses were \$656 million, \$604 million, and \$755 million in 2006, 2005, and 2004 respectively.

In addition, Micron has purchased and is installing additional surface water treatment capacity which when placed in service will increase recharge volumes by up to 1 million gallons per day. Affects of this change in operation are anticipated to have measurable positive impacts to local ground water levels which Micron would like the opportunity to consider prior to licensing of Permit 63-31183.

Pursuant to Condition 6 of Water Right Permit 63-31183, also enclosed is the "Analysis of Diversion Rates And Ground Water Levels In The Southeast Boise Ground Water Management Area" report. We respectfully request that IDWR grant the enclosed application for extension of time.

If you have any questions, please call me at 368-4358.

Sincerely,


John Chapman
Water Services Manager
Micron Technology, Inc.

Enclosures

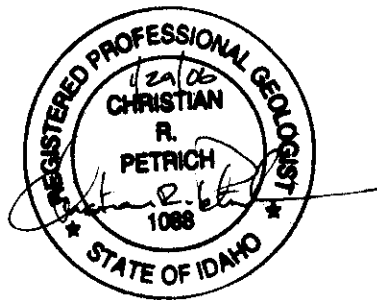
ANALYSIS OF DIVERSION RATES AND GROUND-WATER LEVELS IN THE SOUTHEAST BOISE GROUND WATER MANAGEMENT AREA

Prepared for

Micron Technology, Inc.
8000 South Federal Way
Boise, ID 83706

Prepared by

SPF Water Engineering, LLC
600 East River Park Lane
Boise, ID 83706



January 29, 2007



SPF

Water Engineering, LLC
water resource consultants

Executive Summary

The general conclusion from this effort is that the hydraulic response to decreasing production and Micron aquifer recharge in the Southeast Boise GWMA has been positive. Based on this analysis, we recommend no changes to the current recovery plan. Specific conclusions include the following:

1. Water levels in the deeper Micron area wells have stabilized in response to decreased ground-water pumping and/or Micron recharge.
2. Increasing Micron production since 2002 (mitigated by aquifer injection since 2001) has not adversely impacted water levels in the general Micron area.
3. Water levels near the Micron No. 4 well (based on observed water levels in the Micron Deep well) decreased in response to pumping increases in 1996-1997 and 2002. Water levels in the Micron Deep well stabilized at lower elevations following the production stabilization since 2002. The decline and subsequent water-level stabilization are natural responses to Micron No. 4 production changes. Approximately 40% of the production from the Micron No. 4 well was shifted to Micron No. 6 in October 2006. Water levels in the Micron Deep monitoring well have risen approximately 11 feet in response to the decreased production.
4. Water-level decreases in shallower wells (especially in the Micron No. 4 vicinity) have been a response to water-level decreases in deeper zones. Lower vertical than horizontal hydraulic conductivity values create a delayed yield effect in shallower aquifer zones. Water levels in these wells will likely stabilize (or even rise) with time, especially if deep water levels in the Micron No. 4 area continue to rise.
5. The Micron computer model simulated water levels at similar elevations to measured water levels in most wells. However, the model did not reproduce declining trends observed in the Micron Deep well and several shallow wells. Similarly, the model simulated a faster response to Micron No. 5 injection than was observed in the measured water levels. The differences could be caused by (a) calibrated aquifer parameter values that differ from actual conditions, (b) aquifer heterogeneity not represented in the model, or (c) faulting with structural offset of water-bearing zones between Micron No. 4 and No. 5. Offset aquifer zones could inhibit recharge flow from the Well No. 5 to the Well No. 4 area.
6. If a northwest-southeast trending fault (resulting in stratigraphic offset) separates Wells No. 4 and No. 5, and if Well No. 6 is in the same fault block as Well No. 5, then Well No. 6 may benefit more from the recharge injected into Well No. 5. Water chemistry data suggest more similarities between Well No. 5 injectate (recharge water) and No. 6 ground water than between No. 4 and No. 6 ground waters, which would support the concept of some hydraulic separation between the No. 4 and No. 5 wells.

7. Under Permit 63-31183 the entire volume of water injected (100%) can be re-diverted from the aquifer during the calendar year it is injected. Recharge credits for water not diverted during the year it is injected are reduced by 10% each calendar year following the first calendar year the water is injected. No change is recommended in this strategy until water levels in the Micron area fully stabilize.

Recommendations include the following:

1. Conduct annual comparisons of production volumes and ground-water levels in Micron-area wells.
2. Restore water-level monitoring equipment in the Micron No. 4 well (at the next scheduled pump maintenance).

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1. INTRODUCTION

1.1. Background

Permit 63-31183 (with a priority date of January 24, 2001) authorizes a 10-cfs ground-water diversion by Micron Technology, Inc. (Micron) for irrigation and industrial purposes (Appendix A). Diversions under this permit are to be mitigated by the injection of treated surface water. Micron began an aquifer storage and recovery (ASR) program in April 2001 to mitigate for diversions under Permit 63-31183. Water treated to drinking water standards is injected into the Micron No. 5 well. Monthly injection volumes ranged from about 4.7 million gallons (MG) to 24.7 MG between April 2001 and August 2006, with a median rate of about 13.3 MG per month. These injection volumes are equivalent to flow rates ranging from about 100 to 560 gallons per minute (gpm), with a median flow rate of about 380 gpm.

One of the conditions of approval for water right 63-31183 (Condition No. 6) states that the entire volume of water injected can be re-diverted from the aquifer during the calendar year in which it is injected. Water not diverted in the year in which it was injected can be carried over as recharge credits for future withdrawals, but the authorized diversion amount will be reduced by 10% for each calendar year after the water was injected. This latter condition was based, in part, on previous modeling estimates of retention rates for specific recharge events (Robison and Brockway, 1999).

Condition No. 7 under water right 63-31183 states that Micron is responsible for analyzing the "hydraulic response of the aquifer to injection and recovery activities" and to "assess the appropriateness of the recovery plan." This assessment should include a comparison of water-level hydrographs from local observation wells to recharge/recovery volumes and rates. Based on the results of the analysis, the right holder may propose a revised recovery plan for approval by the Idaho Department of Water Resources (IDWR).

1.2. Purpose and Objectives

The purpose of this analysis is to meet requirements listed under Condition No. 7 of water right 63-31183. Specific objectives include the following:

1. Plot annual production (and injection) for Micron-area wells
2. Plot water levels for wells in the Micron vicinity
3. Evaluate current water-level trends
4. Evaluate water-level trends in the context of Micron injection and production rates

5. Compile monthly data for Micron and United Water Idaho (UWID) production data for incorporation in the Southeast Boise ground-water flow model (Robison and Brockway, 1999).
6. Compare simulated water levels in selected Micron-area wells with observed water levels.
7. Evaluate the recharge credit allowance (i.e., the 10% reduction in authorized recovery withdrawals for every year in which injected water is not withdrawn) based on the updated simulations.

This report presents findings from the above-listed analysis components. Chapter 2 summarizes Micron-area production volumes for the 1996-2006 period. Ground-water levels in the Southeast Boise Ground Water Management Area (GWMA) are reviewed in Chapter 3. Results from recent simulations using the Micron ground-water flow model are summarized in Chapter 4. Conclusions and recommendations are provided in Chapter 5.

2. MICRON AREA PRODUCTION RATES

All water right holders in the Southeast Boise GWMA withdrawing more than 0.2 cfs report annual water use to the Idaho Department of Water Resources (IDWR). These data are compiled in Table 1. Aggregate annual production in the Southeast Boise GWMA decreased from 4,736 acre feet (af) in 1997 to 2,774 af in 2003 (Table 1), a drop of approximately 41%. Total net production in both of the last full years for which production information is available (2004 and 2005) remained steady at approximately 3,000 af.

Micron and United Water Idaho (UWID) account for approximately 98% of the total ground-water withdrawals the Southeast Boise GWMA. Micron, with a net withdrawal volume of 2,246 af in 2005, is the largest user (accounting for 75% of the total production). Locations of primary Southeast Boise GWMA wells are shown in Figure 1.

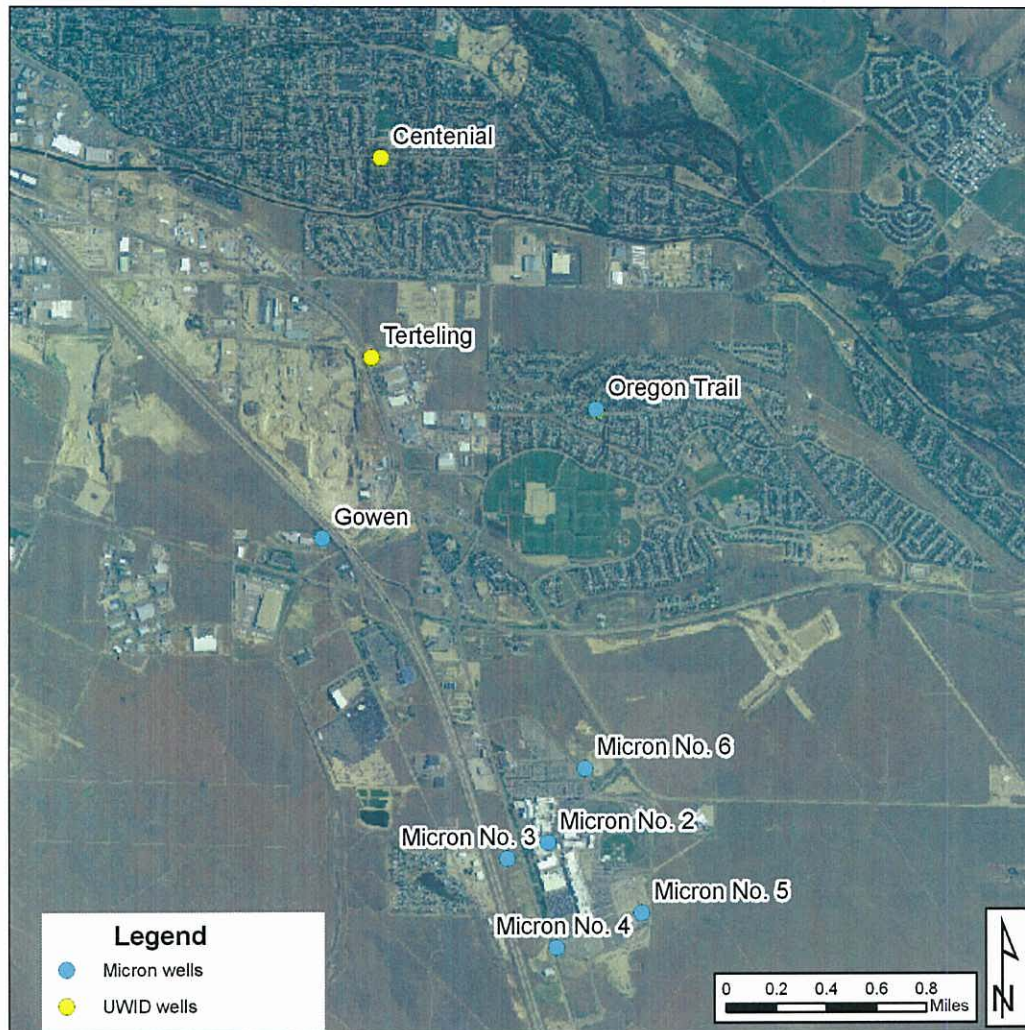


Figure 1: Locations of primary Southeast Boise GWMA production wells.

SE Boise GWMA Ground Water Production (acre feet)														
Calendar Year (ending on)	Boise Parks and Recreation	Idaho Power	JMT Properties	JR Simplot Company	Les Bois Soccer	Micron Total Production	Motive Power	School District	UWID	Corvara LLC (was Wild Shamrock)	Total Production	Micron injection	Micron Net Production	Total Net Production
12/31/1995			57	264	269	1,680	17	13	2,348	4	4,652		1,680	4,652
12/31/1996		3	50	206	308	2,308	14	15	1,895	6	4,805		2,308	4,805
12/31/1997		-	44	205	319	2,204	16	14	1,927	7	4,736		2,204	4,736
12/31/1998		-	15	150	162	2,334	20	14	921	8	3,624		2,334	3,624
12/31/1999		-	-	-	36	2,330	12	28	1,278	3	3,687		2,330	3,687
12/31/2000	14	1	-	-	15	2,297	13	32	922	3	3,297		2,297	3,297
12/31/2001	27	-	-	30	-	2,326	13	25	1,254	1	3,676	(437)	1,889	3,239
12/31/2002	3	-	-	12	20	2,647	14	24	1,259	3	3,982	(459)	2,188	3,523
12/31/2003	2	-	-	11	-	2,626	15	23	884	3	3,564	(787)	1,839	2,777
12/31/2004	5	-	-	15	-	2,562	14	26	959	2	3,583	(609)	1,953	2,974
12/31/2005	*	-	-	19	-	2,665	15	25	686	2	3,412	(419)	2,246	2,993

Table 1: Southeast Boise GWMA annual production and injection volumes (in af/yr).

Micron production remained relatively steady from 1996 to 2001, ranging from 2,204 to 2,334 af/yr (Table 1 and Figure 3). Production in Well No. 4 increased in 1996 as production was shifted from Well No. 2. Micron began injection of treated Boise River water in 2001, with annual injection rates ranging from 419 af/yr in 2005 to 787 af/yr in 2003 (Table 1). Production from Well No. 4 increased in April 2002 following the start of injection in Well No. 5. Micron total production increased from 2,320 af in 2001 to 2,665 af in 2005, but the net production (production less injection) during this 5-year period decreased by approximately 13% from the 1996 through 2000 period.

Micron began operation of Well No. 6 in October 2006. Micron personnel report that approximately 40% of the production from wells No. 3 and No. 4 has now been shifted to well No. 6.

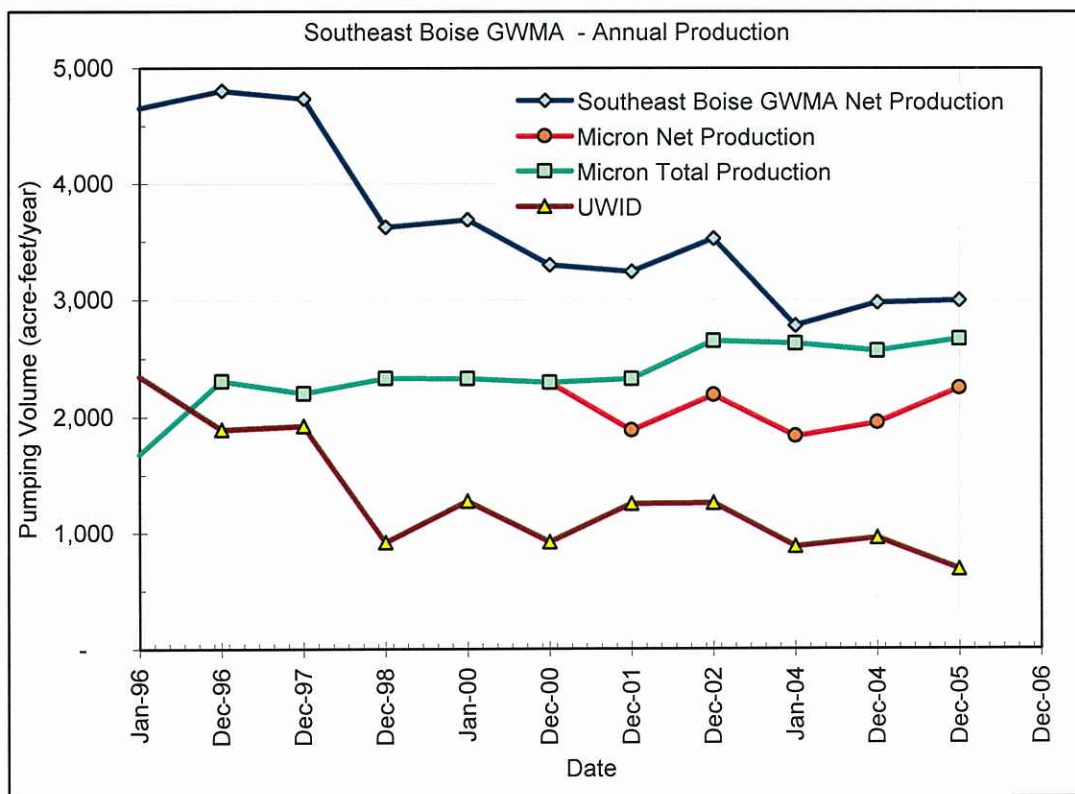


Figure 2: Annual Micron ground-water production.

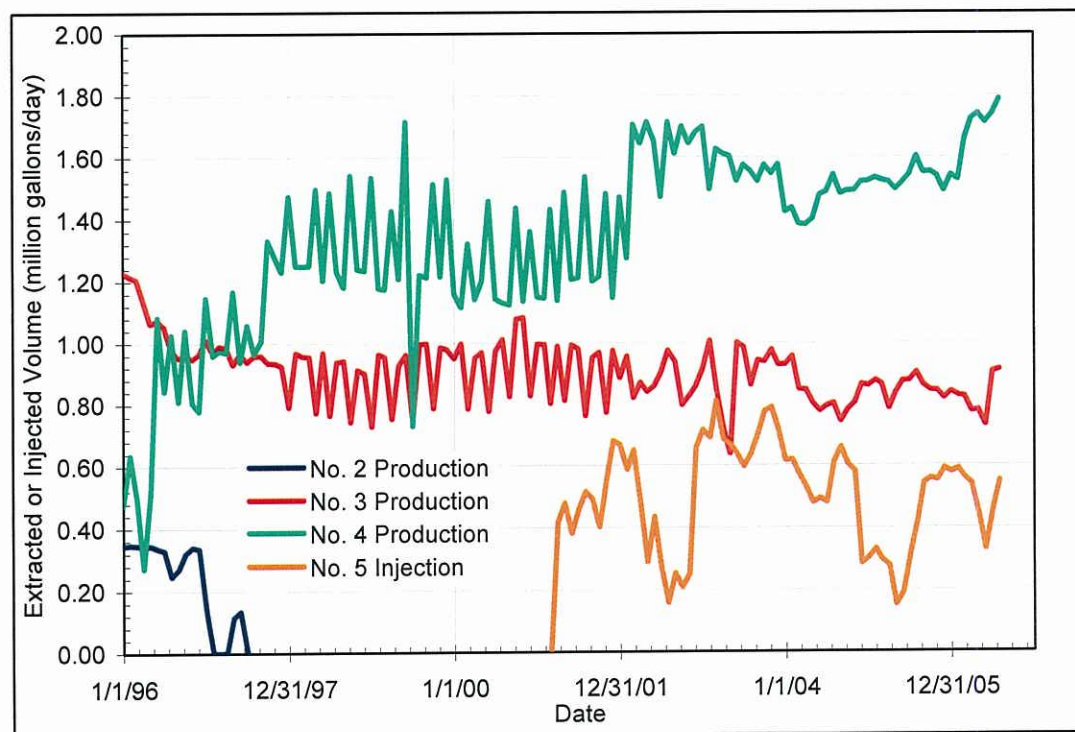


Figure 3: Micron production and injection, 1996-2006.

3. MICRON AREA GROUND-WATER LEVELS

Ground-water-level data for the Southeast Boise GWMA are compiled by IDWR; water-level data are stored in IDWR's Well_Log Database. Water-level data from 1996 (consistent with the starting period for model simulations) through 2005 or 2006 (depending on data availability) are reported herein.

Wells for which water-level data are collected range in depth from 460 to 855 feet (Table 2). Hydrographs based on these water-level data are shown in Figure 4 (page 8).

Ground-water levels in the Southeast Boise GWMA declined in the 1980s and 1990s as a result of increased ground-water withdrawals. Water levels in some wells may have declined by 100 feet or more, although typical declines in Micron-vicinity wells ranged from about 30 to 60 feet (Figure 5, page 9).

Water levels in most of the Micron area wells have stabilized in recent years, especially deeper wells (i.e., those with bottom elevations less than 2,500 feet). Stabilizing water levels correspond with net production decreases over the last 10 years (Figure 5 and Table 2).

Water levels in one deep well (Micron Deep) and several shallower wells show continuing moderate to slight water-level declines through Fall 2006. There are likely two factors that have contributed to these declines: production increases in Micron No. 4 and delayed yield from shallow to deeper zones.

First, production from Micron No. 4 increased in 1996 and 1997 after Well No. 2 was taken off line. Production from Well No. 4 increased again in spring 2002 after injection in Well No. 5 began. Water levels in the Micron Deep well decreased in response to these production increases (Figure 6, page 10) and stabilized during periods when the Micron No. 4 withdrawals stabilized. Recently, water levels have risen approximately 11 feet in response to shifting approximately 40% of the Well No. 4 production to Well No. 6.

Second, water levels in several shallower wells (Guyer, Micron Shallow, Pettibone, and Christiansen) show continuing moderate to slight water-level declines. Water-level declines in these wells, which draw water from above an elevation of 2,500 feet, likely reflect downward leakage and/or delayed yield from shallower aquifer zones to deeper zones. It is likely that shallower aquifers in the vicinity of the Christiansen and Guyer well (with water levels above an elevation of 2,620 feet) likely have not reached equilibrium with historical decreases in the deeper aquifers in this area.

Downward leakage from shallow to deeper zones is also likely responsible for water-level decreases in the Micron Shallow and Pettibone wells (with recent water-level elevations of 2,551 and 2566 feet, respectively – see Figure 6). The Micron Deep and Micron Shallow wells show a historical downward gradient likely caused by

pumping in the Micron No. 4 (and/or other nearby wells). Screened intervals in the Micron Deep and Micron Shallow wells are separated by approximately 240 feet. 2005 water-level measurements (Table 2) indicated a 9-foot higher water level in the Shallow well compared to the Deep well.

The more recent approximate 11-foot rise seen in the Micron Deep well, caused by the decrease in Well No. 4 production, should lead to rising ground-water levels in the shallower Micron Shallow and Pettibone wells. In fact, recent water levels (taken December 28, 2006) in the Micron Shallow well show an approximate 2-foot rise since October 2006.

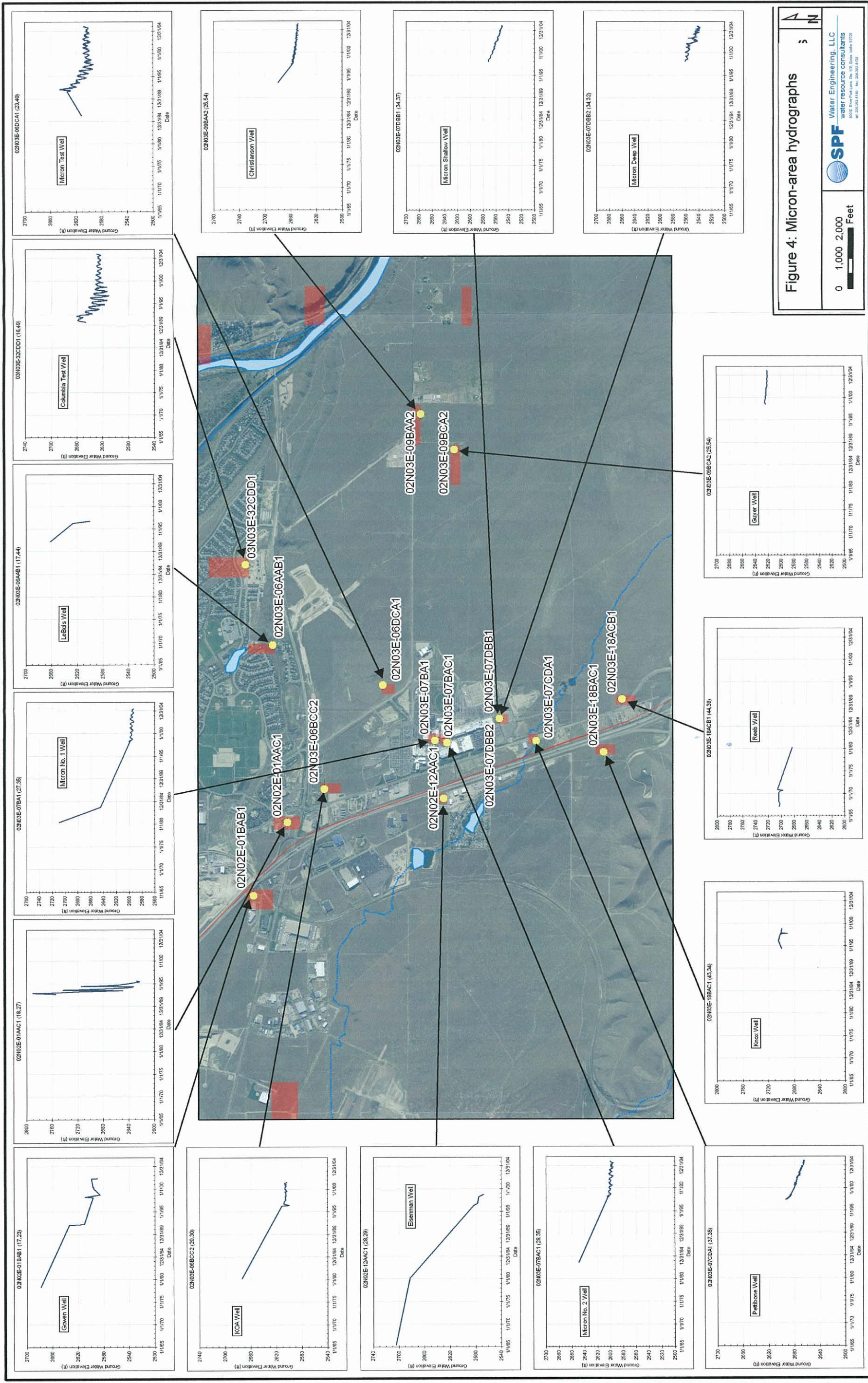
Micron personnel report an approximate 9-foot decrease in the Micron Test Well in response to the initiation of Well No. 6 pumping. This is expected given the relatively short distance between these wells.

Well Number	Common Name	Total Depth (ft)	Top Open Depth (ft)	Lowest Opening Depth (ft)	Land Surface Elev (ft)	Highest Opening Elev (ft)	Lowest Opening Elev (ft)	Recent Water Level		Trend	Model Layer*
								Date	Elev (ft)		
02N03E-06BCC2	KOA	460	335	460	3015	2680	2555	7/17/2001	2604	Stable	1
02N03E-09BAA2	Christiansen	522	499	522	3140	2641	2618	5/24/2006	2649	Slightly down	1
02N03E-07CDA1	Pettibone	549	516	549	3058	2542	2509	12/31/2005	2566	Down	1,2
02N03E-07DBB1	Micron Shallow	561	551	561	3059	2508	2498	12/31/2005	2551	Down	2
02N03E-07BAC1	Micron No. 2	580	553	580	3064	2511	2484	12/29/2005	2600	Stable	2
02N03E-07BA1	Micron No. 1**	514	512	514	3060	2548	2546	7/7/2005	2593	Stable	2
02N03E-09BCA2	Guyer	620	599	620	3135	2536	2515	12/29/2005	2621	Slightly down	1
03N03E-32CDD1	Columbia Test	802	560	731	2965	2405	2234	12/29/2005	2629	Stable	1,2
02N03E-07DBB2	Micron Deep	811	801	811	3059	2258	2248	12/31/2005	2542	Down	2
02N03E-06DCA1	Micron Test	855	609	845	3065	2456	2220	12/31/2005	2608	Stable	2
02N02E-01BAB1	Gowen	702	375	507	2921	2546	2414	6/7/2002	2590	?	2

*See next section

** Well data based on 6/7/91 camera survey

Table 2: Water-level summary for Micron-area wells (sorted by well depth).



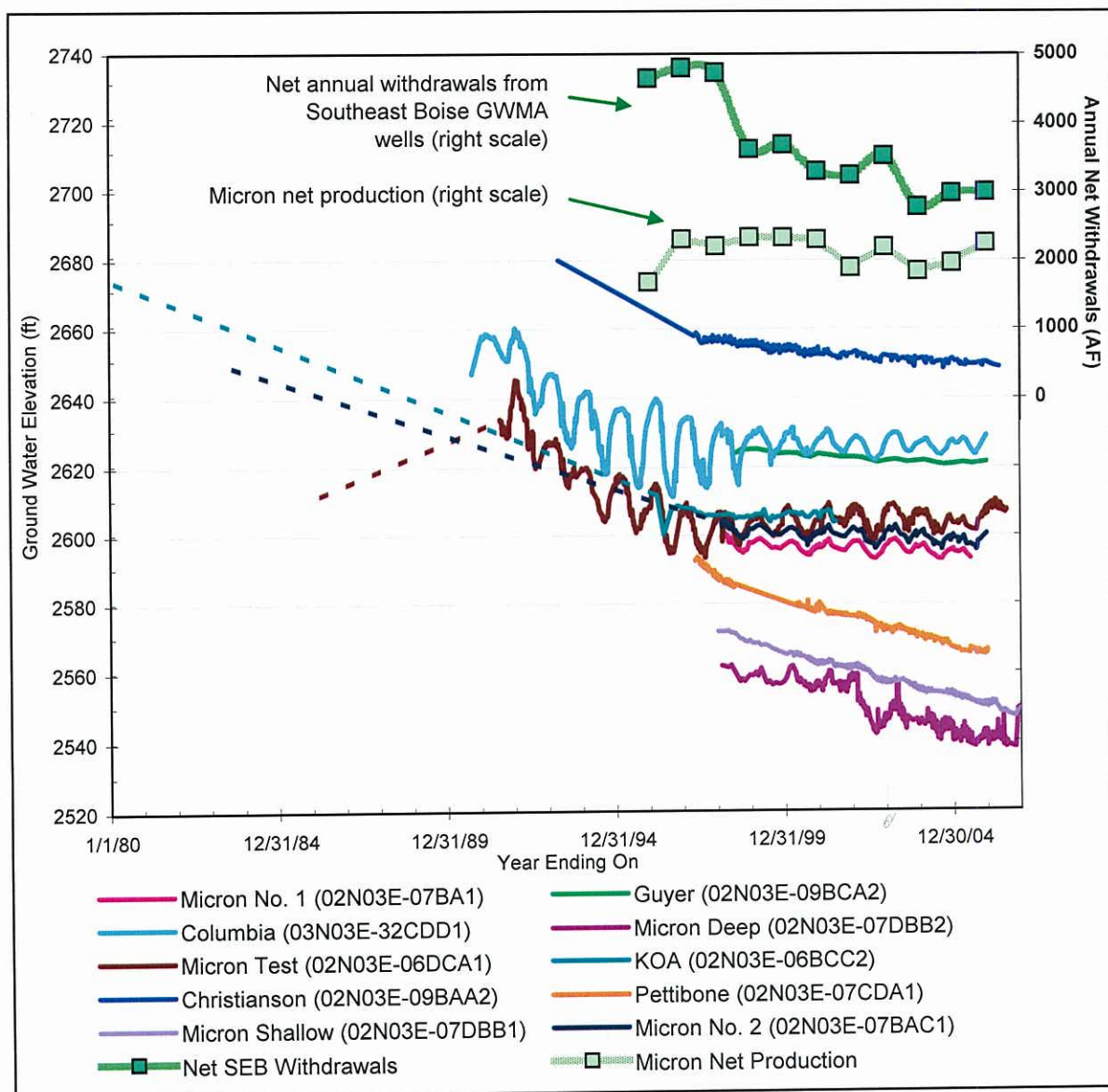


Figure 5: Comparison of Micron vicinity hydrographs and net Southeast Boise GWMA withdrawals.

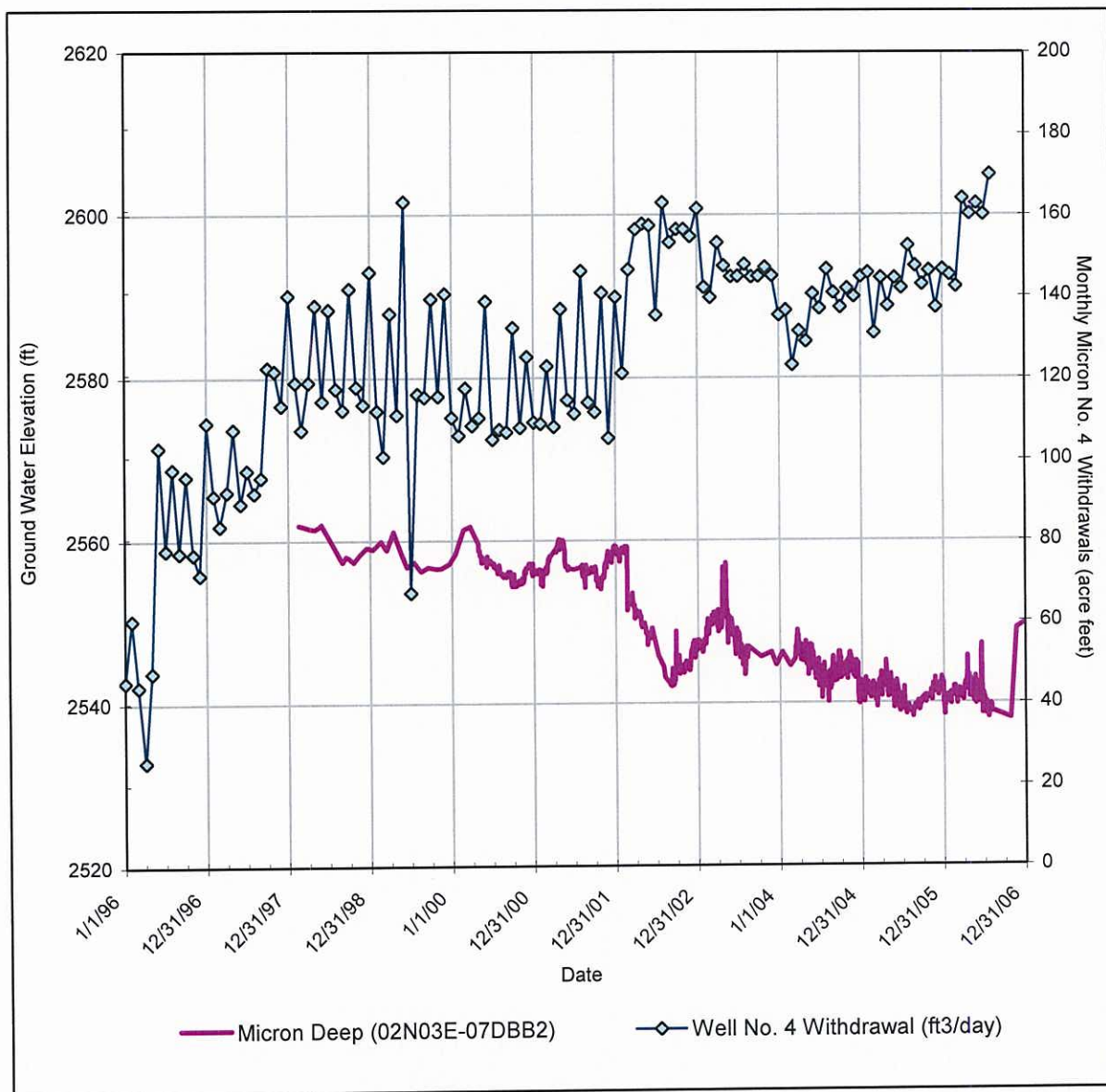


Figure 6: Comparison of Micron No. 4 monthly withdrawals and water levels in the Micron Deep Monitoring Well.

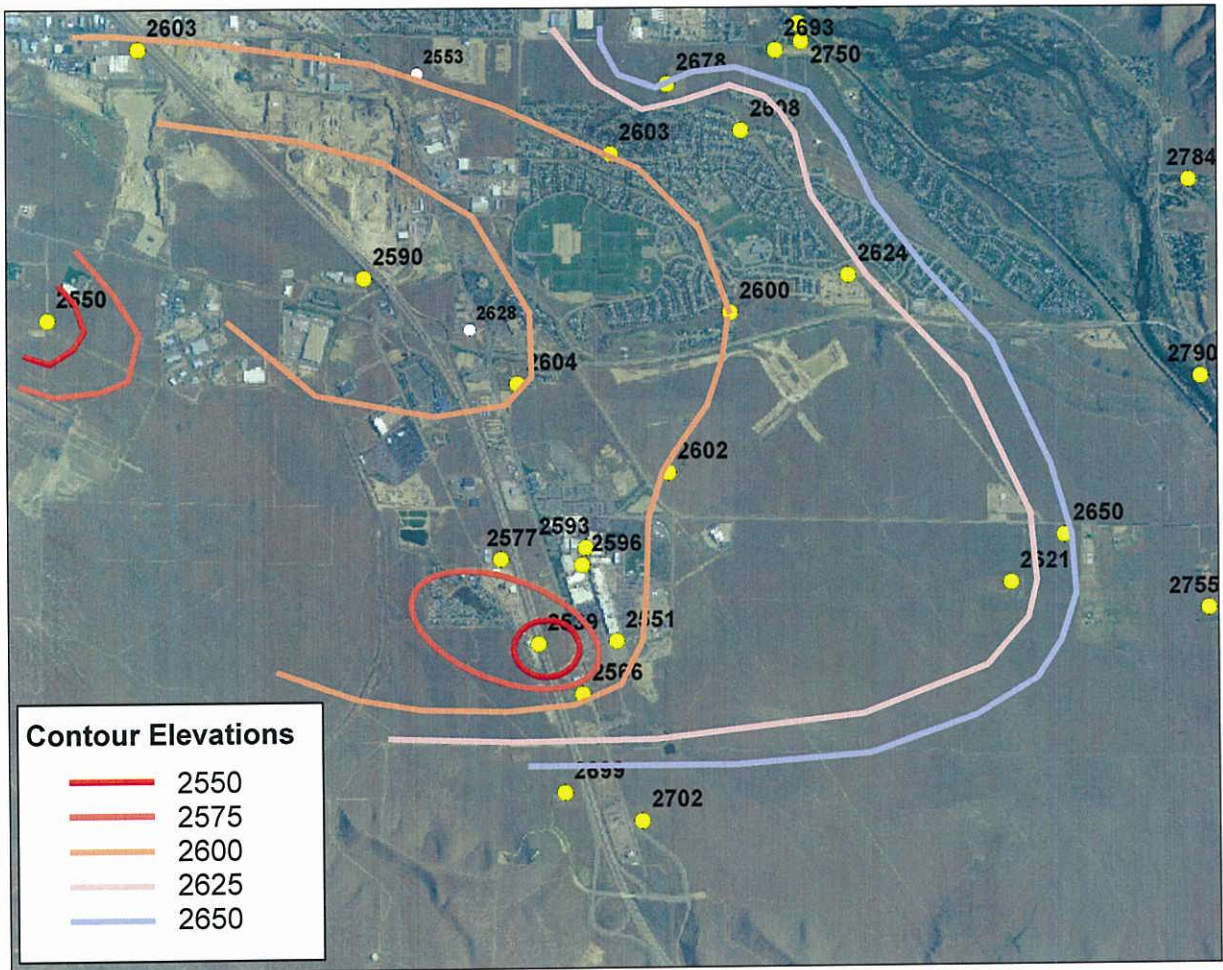


Figure 7: Generalized potentiometric surface contours.

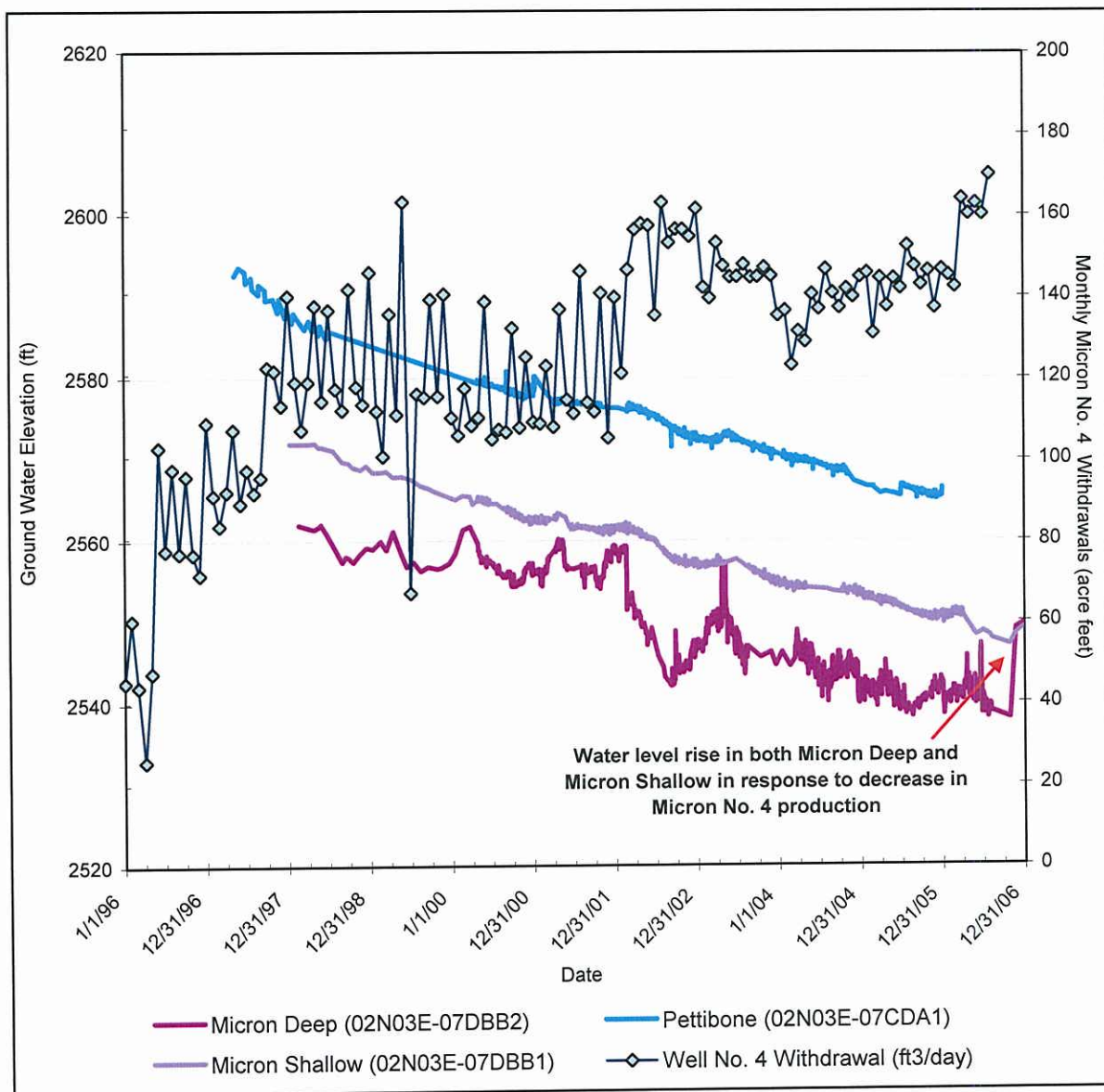


Figure 8: Comparison of Micron No. 4 Production and water levels in the Micron Deep, Micron Shallow, and Pettibone wells.

4. SIMULATIONS WITH 1996-2006 MICRON PRODUCTION DATA

4.1. Introduction

A computer model was developed in the late 1990s to simulate ground-water flow in the Micron area (Robison and Brockway, 1999). Constructed with the MODFLOW code (McDonald and Harbaugh, 1988), the model was used to simulate southeast Boise aquifer responses to various hypothetical recharge and extraction conditions for the time period between 1996 and 2012. The model completion report (Robison and Brockway, 1999) describes hydrogeologic conditions in the southeast Boise area, aquifer inflows and outflows, the model construction (e.g., Figure 9), model calibration, and model scenarios.

A new simulation was conducted for this current study using actual 1996-2005 production data. This section presents comparisons of simulated hydrographs based on the 1996-2005 production and observed water levels for the same time period.

4.2. Data File Preparation

A MODFLOW model uses a well file (*.wel) to input well discharge and injection rates. The well file in the original Micron model was also used to define aquifer boundary conditions (e.g., underflow into and out of the model, river seepage, etc.). Well discharge and injection values (i.e., non-boundary fluxes) in the original Micron model were projected based on historical use. Data file preparation for this new simulation consisted of replacing previous estimates with actual January 1996 through August 2006 discharge and injection rates in selected wells. The well file was modified in the following manner:

1. Well file values were exported into *Textpad* (available from Textpad.com), sorted, and divided into 3 time periods (1996-2001, 2002-2006, and 2007-2011). Well file values from each time period were copied to *WellWorksheet.xls*.
2. Well file values were then sorted by date, layer, row, and column. Actual monthly production values supplied by Micron (compiled in *GW Production and Recharge Summary.xls*) were inserted based on grid location and percentage well completion within model layers. Also included were reported production data from the Gowen, Oregon Trail, Terteling, and Centennial wells. The percentage allocations by model layer were identical to the percentages used in previous model simulations.
3. Well flux values were then referenced in an ASCII-ready worksheet, e.g., the *ASCII(1996-2001)* worksheet in *WellWorksheet.xls*, from which an aggregate ASCII file was prepared for model input. The previous well file was then replaced with the modified well file (i.e., *1996-2005Q.wel*).

4. A new series of simulations (1996-2005Q.*) were conducted using the Groundwater Vistas (Rumbaugh and Rumbaugh, 2005) pre- and post-processing software. Simulations extended through 128 time periods representing the January 1996 through August 2006 period (as opposed to the previous 192 time periods which represented the 1996-2011 time period).
5. A series of monitoring wells were defined in Groundwater Vistas to collect simulated water-level data for comparison with observed data. Only wells having recently-measured water-level data were used for these comparisons.
6. Simulated ground-water level data were exported to *SEB_GWMA_Hydrographs.xls* for preparing comparison plots.

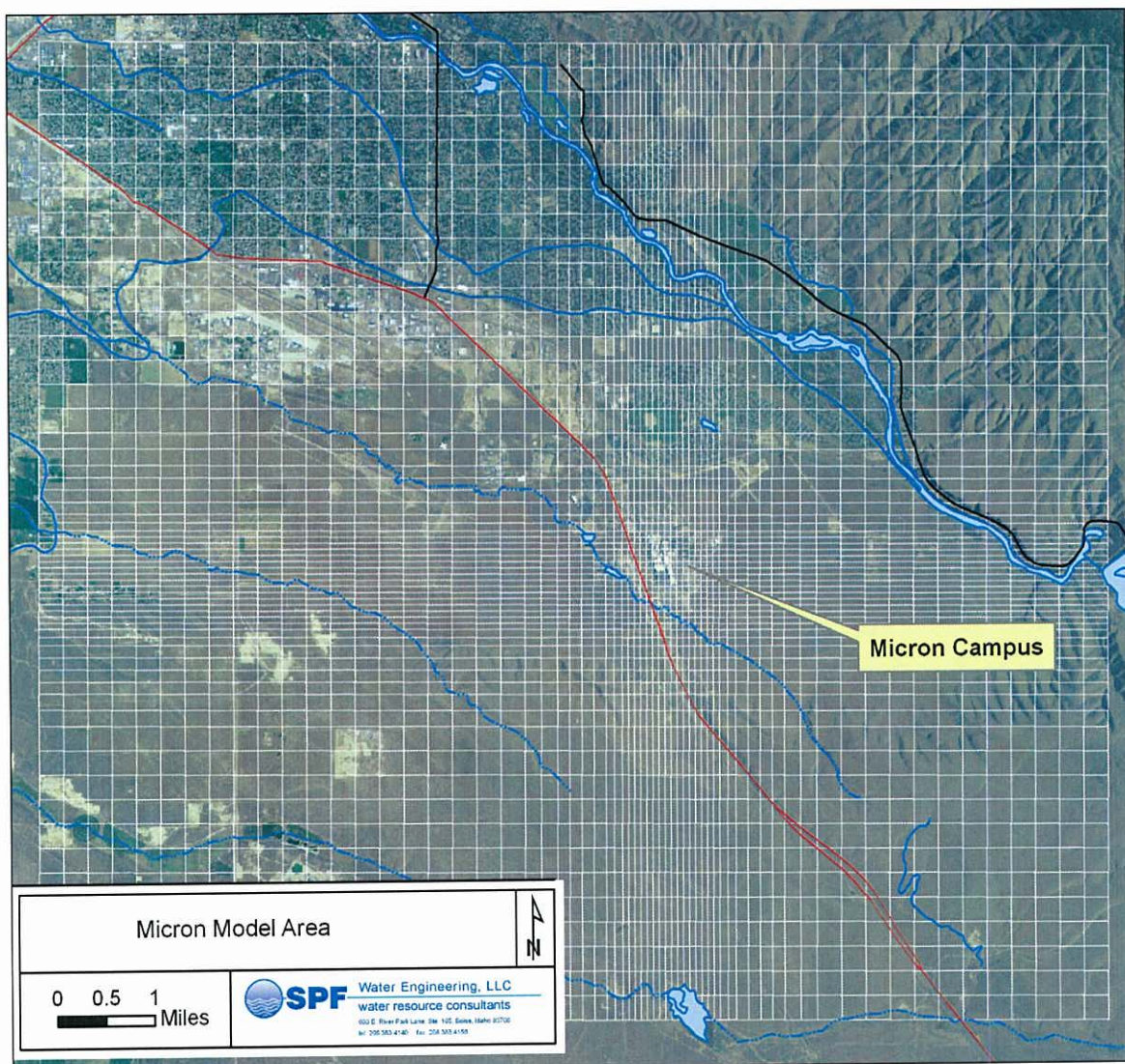


Figure 9: Model area and grid layout.

4.3. Results

Hydrographs comparing observed and simulated water levels in the Micron Test, Micron No. 1, Micron No. 2, Micron Shallow, Micron Deep, Pettibone, Christiansen, Columbia Test, Guyer, and Gowen wells are presented in Figure 10 through Figure 20. Simulated layer 2 and 3 water levels are provided for most of these wells; layer 1 water levels are provided for wells completed in the uppermost model layer (Christiansen, Pettibone, and Guyer). The following observations were made based on these comparisons:

1. The Micron Test well (Figure 10) has relatively stable water levels. Simulated water levels in model layers 2 and 3 approximate the observed water levels, although the simulated layer 2 water-level rises in response to Well No. 5 injection beginning in April 2001 (Figure 3). A similar response is not apparent in the observed data.
2. Simulated Micron No. 1 water levels (Figure 11) generally approximate observed water levels. The simulated layer 2 and 3 water levels reflect Well No. 5 injection, which does not appear to be evident in the observed data.
3. Simulated Micron No. 2 water levels (Figure 12) are similar to simulated water levels in Micron No. 1. The effects of Micron No. 5 injection are apparent in simulated layer 2 and 3 water levels but not the observed data.
4. The simulated Micron Deep water levels (layer 3) show an initial decline (likely associated with a corresponding increase in Micron No. 4 withdrawals in 1996 – see Figure 3) and a clear increase corresponding with the start of Well No. 5 injection. The observed water level responds to Well No. 4 pumping (see Section 3) but does not reflect the Well No. 5 injection.
5. The simulated Micron Shallow well water levels (Figure 14) show a slight rise in response to Micron No. 5 injection. In contrast, observed water levels show a steady, moderate water-level decline.
6. Simulated Pettibone water levels (Figure 15) are relatively steady, showing a very subtle response to Micron No. 5 injection (the simulated water levels are very similar to those observed in the Micron Shallow well (Figure 14). In contrast, measured water levels show a steady, moderate water-level decline.
7. Simulated Christiansen Well water levels (Figure 16) are relatively steady, in contrast to a slight but steady decline observed in measured water levels.
8. The Guyer Well observed and simulated water levels (Figure 17) are relatively steady, but differ by about 70 to 80 feet. The reason for this apparent discrepancy is unclear.

9. The Columbia Test Well simulated and observed hydrographs have similar patterns (Figure 18) but differ in magnitude by about 40 feet. Both simulated and observed water levels are stable.
10. The simulated Gowen Well hydrographs (Figure 19) shows a clear water-level increase following the cessation of pumping from this well. The observed water-level data do not show the same increase.
11. Simulated layer 1 and 2 water levels in the Micron No. 5 well are compared with 2005-2006 measured water levels (Figure 20). The observed water-level measurements fall between the layer 1 and layer 2 simulated water levels. Both the observed and simulated water levels reflect the effects of Micron No. 5 injection.

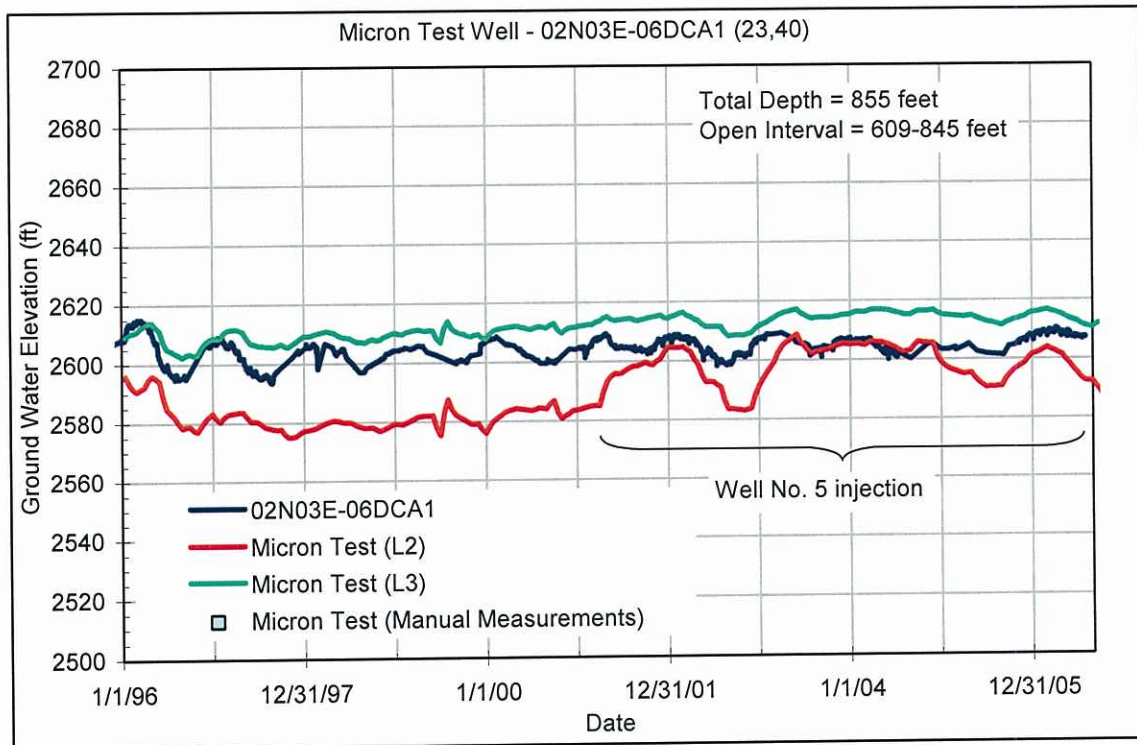


Figure 10: Micron Test Well observed and simulated hydrographs.

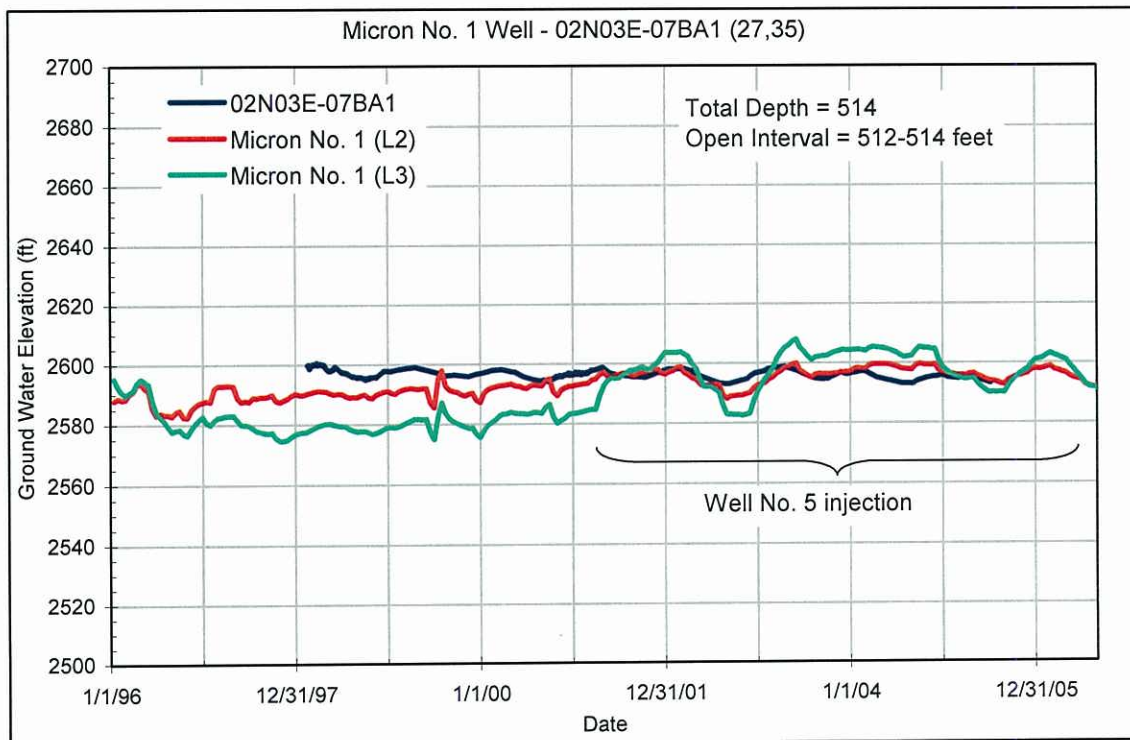


Figure 11: Micron No. 1 Well observed and simulated hydrographs.

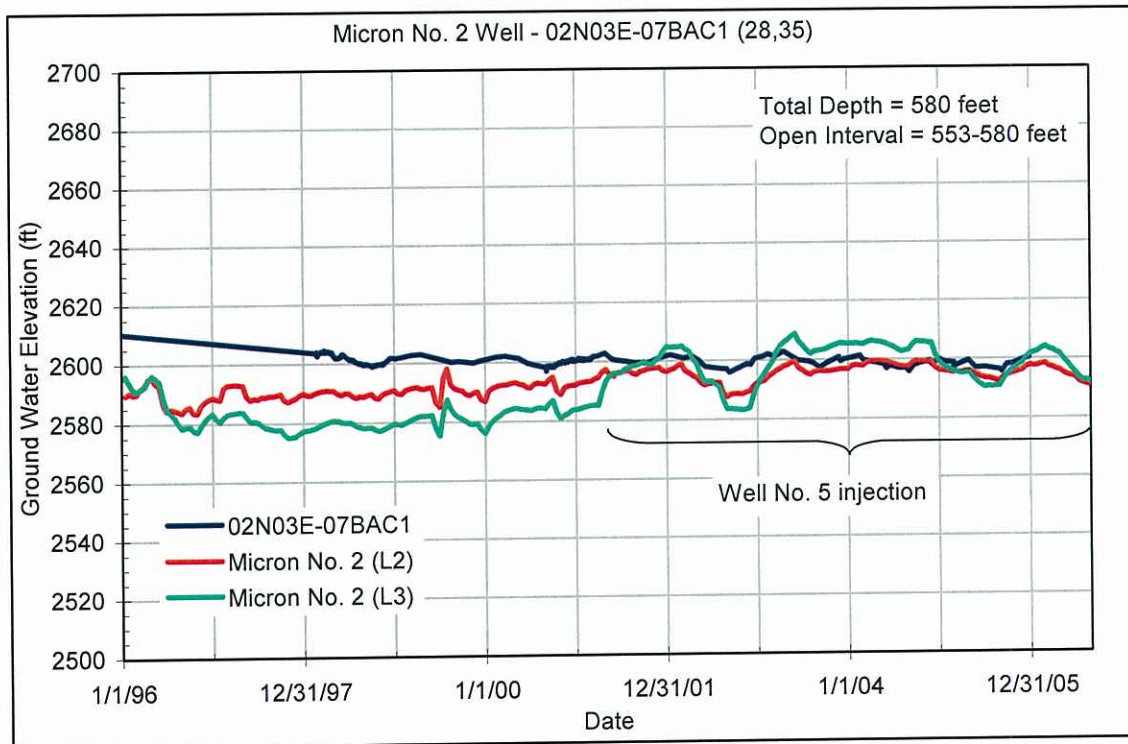


Figure 12: Micron No. 2 observed and simulated hydrographs.

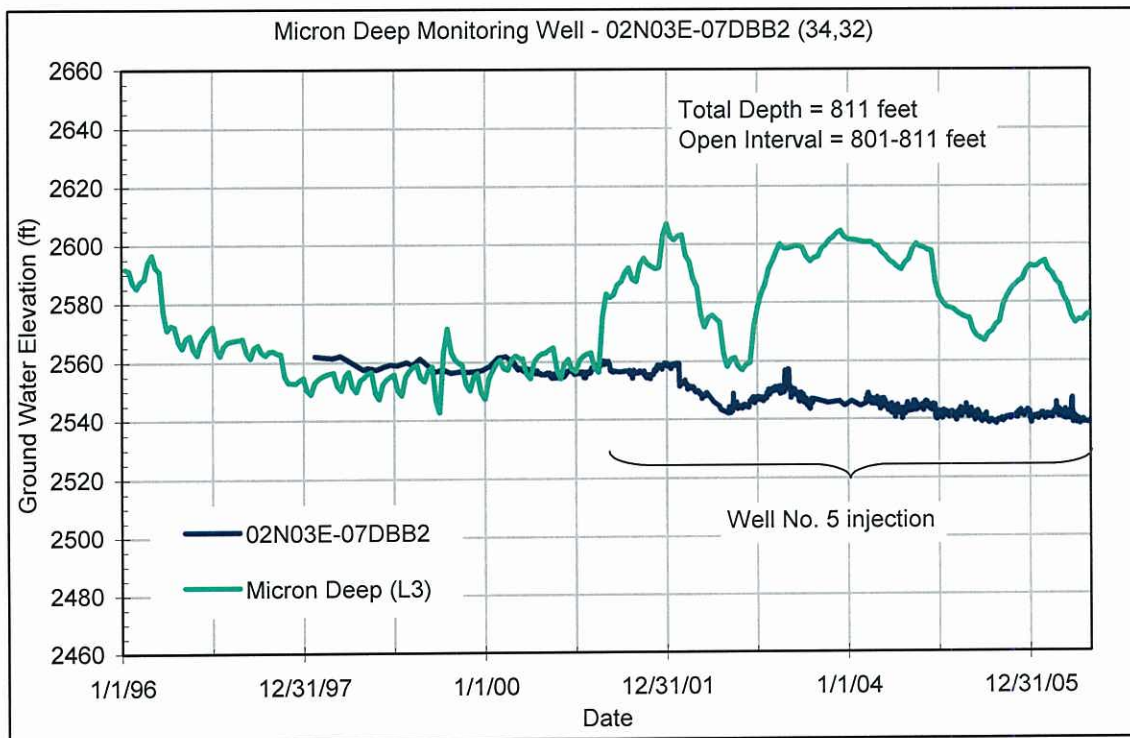


Figure 13: Micron Deep monitoring well observed and simulated hydrographs.

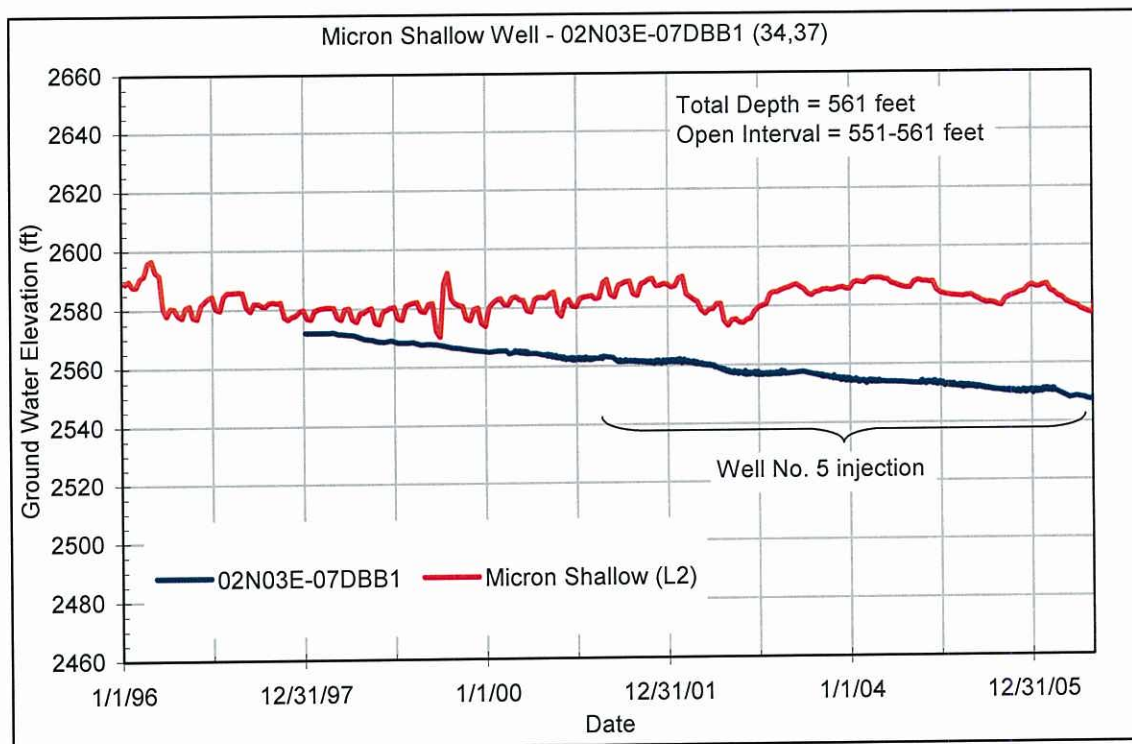


Figure 14: Micron Shallow monitoring well observed and simulated hydrographs.

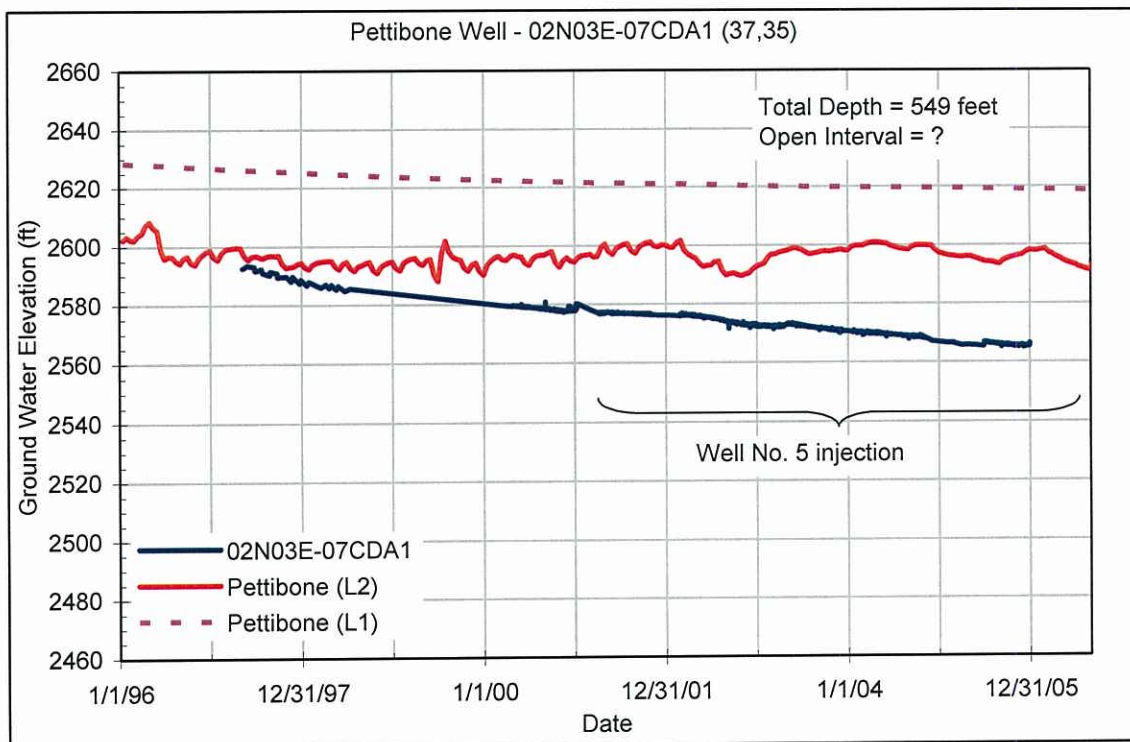


Figure 15: Pettibone Well observed and simulated hydrographs.

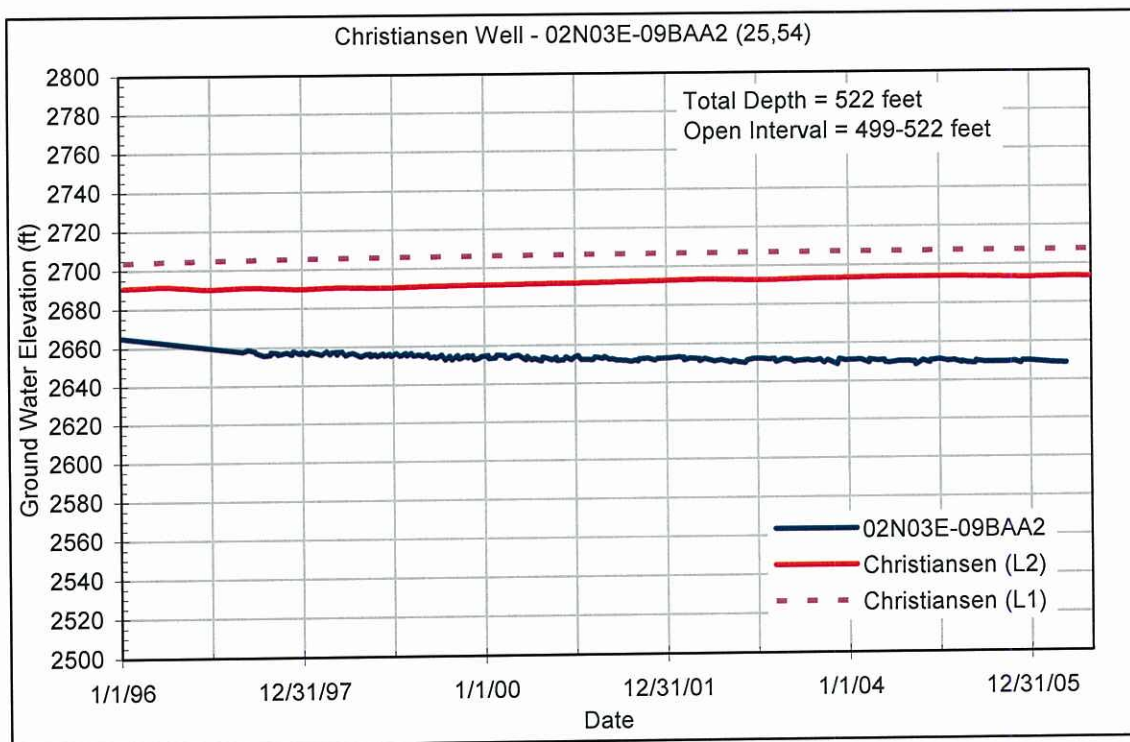


Figure 16: Christiansen Well observed and simulated hydrographs.

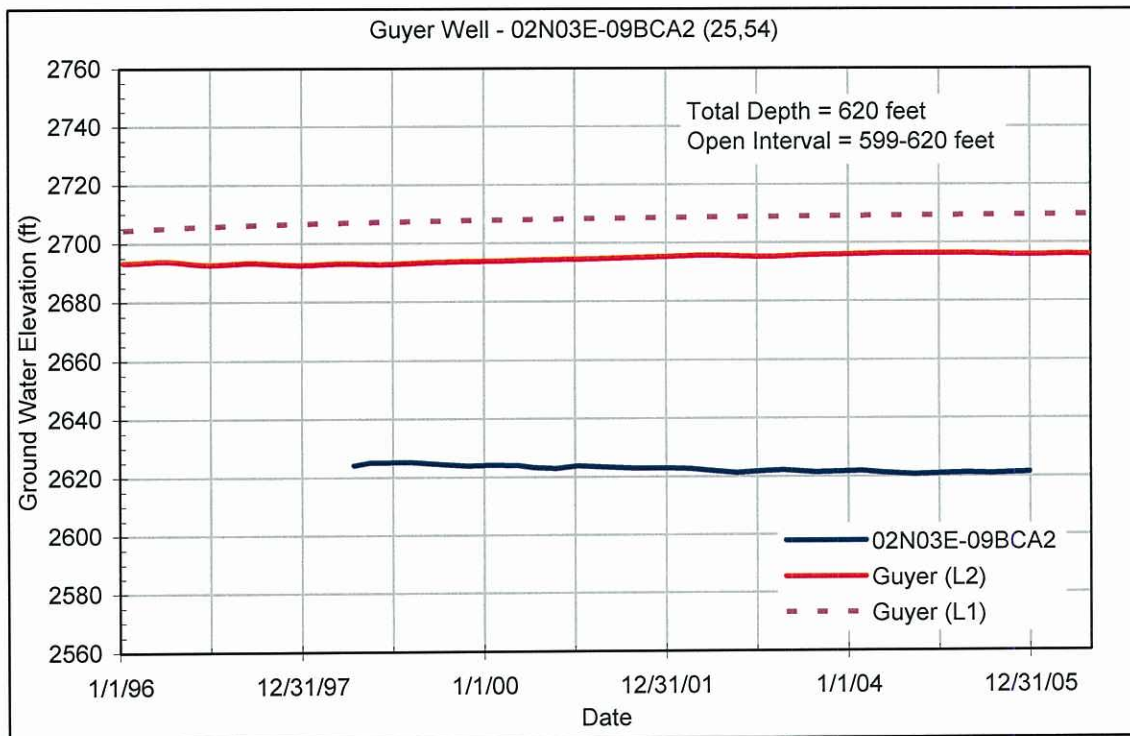


Figure 17: Guyer Well observed and simulated hydrographs.

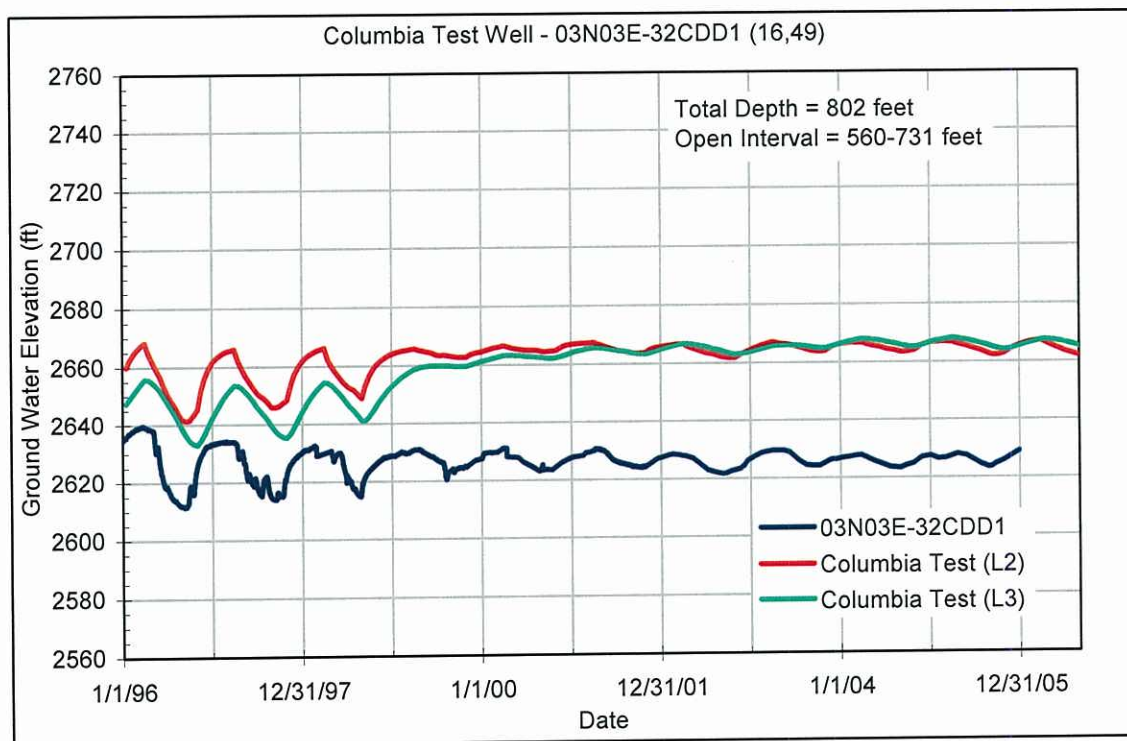


Figure 18: Columbia Test Well observed and simulated hydrographs.

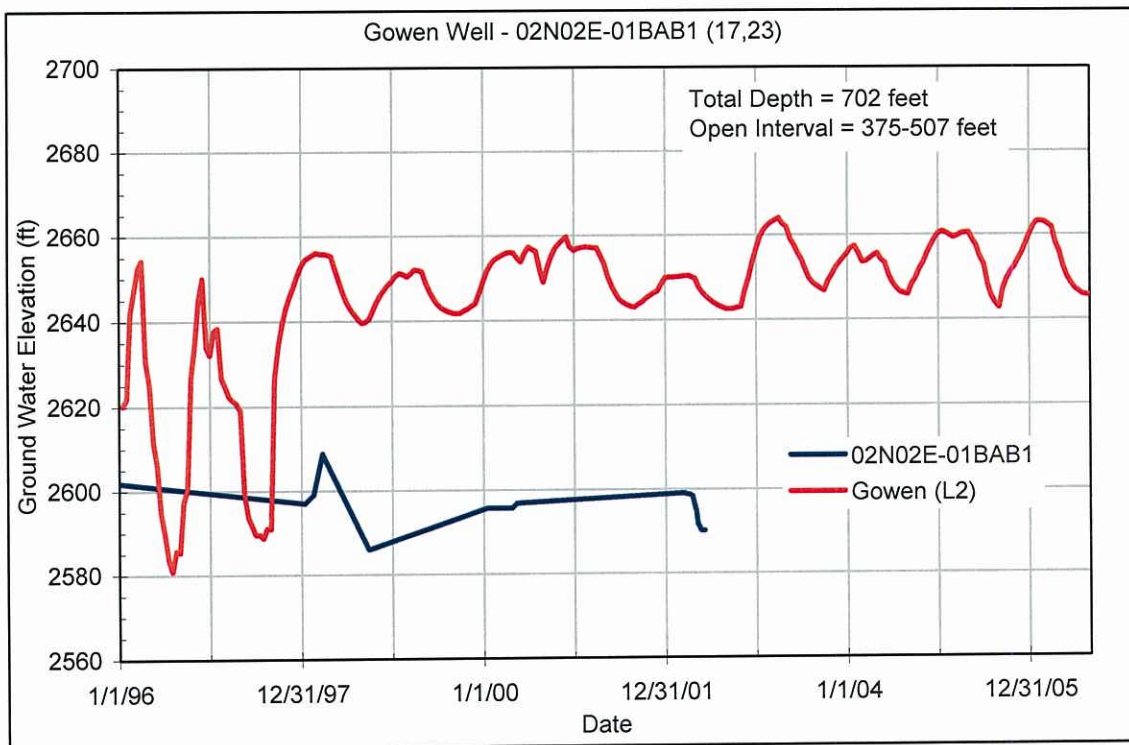


Figure 19: Gowen Well observed and simulated hydrographs.

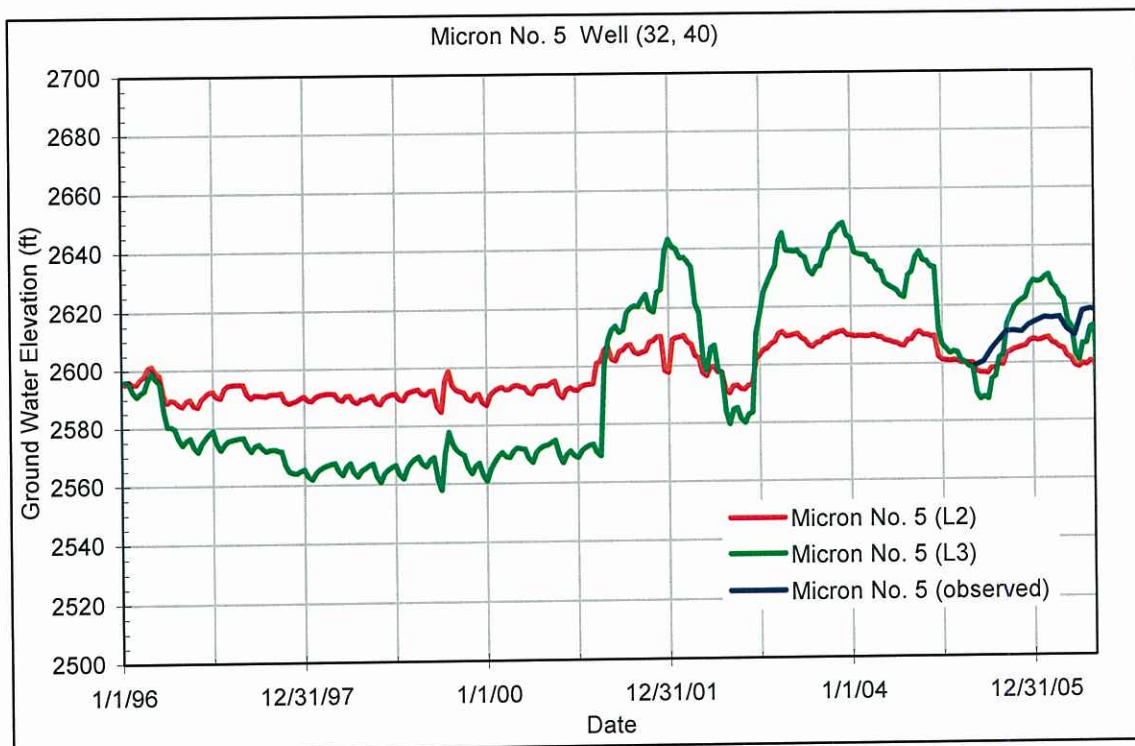


Figure 20: Micron No. 5 observed and simulated hydrographs.

4.4. Discussion

Simulations using actual 1996-2006 production data resulted in simulated water levels that are similar in elevation to measured water levels in most wells. However, the model did not reproduce declines observed in the Micron Deep well and several shallow wells. Similarly, the model produced a greater simulated response to Micron No. 5 injection in several wells than was actually observed.

These discrepancies could be caused by calibrated hydraulic conductivity values that are greater than actual conditions or calibrated storativity values that are lower than actual conditions. Model aquifer parameter values were originally defined using a cell-by-cell calibration approach (parameter values were not re-calibrated for the current simulation). Cell-by-cell calibration can result in non-unique, correlated aquifer parameter values that limit the model's predictive capacity. Limitations associated with this calibration approach and with the resulting parameter values could easily contribute to the differences in simulated and observed water levels.

Faulting in the Micron vicinity that is not represented in the model could also result in differences between observed and simulated water levels. A series of southeast-northwest trending faults are present along the Boise Front and extending into the valley. It is plausible that offset strata between the No. 4 and No. 5 wells would contribute to the differences between observed and simulated water levels. Water chemistry data (Appendix C) suggest more similarities between the Micron No. 5 injectate and No. 6 ground water than between the No. 4 ground water and No. 5 injectate, supporting the concept of some degree of hydraulic separation between Wells No. 4 and No. 5.

Use of the model as a management tool in the Micron area should be tempered with a recognition of its limitations. Although very useful as a tool for understanding ground-water flow in complex aquifer environment, actual water-level observations present a more reliable basis for management decisions. In this case, relatively stable water levels in deep wells, a shift in production from Micron No. 3 and No. 4 to Micron No. 6, and continued injection into Well No. 5 bode well for the continuing development of Permit 63-31183.

5. CONCLUSIONS AND RECOMMENDATIONS

The general conclusion from this effort is that the hydraulic response to decreasing production and Micron aquifer recharge in the Southeast Boise GWMA has been positive. Based on this analysis, we recommend no changes to the current recovery plan. Specific conclusions include the following:

1. Water levels in the deeper Micron area wells have stabilized in response to decreased ground-water pumping and/or Micron recharge.
2. Increasing Micron production since 2002 (mitigated by aquifer injection since 2001) has not adversely impacted water levels in the general Micron area.
3. Water levels near the Micron No. 4 well (based on observed water levels in the Micron Deep well) decreased in response to pumping increases in 1996-1997 and 2002. Water levels in the Micron Deep well stabilized at lower elevations following the production stabilization since 2002. The decline and subsequent water-level stabilization are natural responses to Micron No. 4 production changes. Approximately 40% of the production from the Micron No. 4 well was shifted to Micron No. 6 in October 2006. Water levels in the Micron Deep monitoring well have risen approximately 11 feet in response to the decreased production.
4. Water-level decreases in shallower wells (especially in the Micron No. 4 vicinity) have been a response to water-level decreases in deeper zones. Lower vertical than horizontal hydraulic conductivity values create a delayed yield effect in shallower aquifer zones. Water levels in these wells will likely stabilize (or even rise) with time, especially if deep water levels in the Micron No. 4 area continue to rise.
5. The Micron computer model simulated water levels at similar elevations to measured water levels in most wells. However, the model did not reproduce declining trends observed in the Micron Deep well and several shallow wells. Similarly, the model simulated a faster response to Micron No. 5 injection than was observed in the measured water levels. The differences could be caused by (a) calibrated aquifer parameter values that differ from actual conditions, (b) aquifer heterogeneity not represented in the model, or (c) faulting with structural offset of water-bearing zones between Micron No. 4 and No. 5. Offset aquifer zones could inhibit recharge flow from the Well No. 5 to the Well No. 4 area.
6. If a northwest-southeast trending fault (resulting in stratigraphic offset) separates Wells No. 4 and No. 5, and if Well No. 6 is in the same fault block as Well No. 5, then Well No. 6 may benefit more from the recharge injected into Well No. 5. Water chemistry data suggest more similarities between Well No. 5 injectate (recharge water) and No. 6 ground water than between No. 4 and No. 6 ground waters, which would support the concept of some hydraulic separation between the No. 4 and No. 5 wells.

7. Under Permit 63-31183 the entire volume of water injected (100%) can be re-diverted from the aquifer during the calendar year it is injected. Recharge credits for water not diverted during the year it is injected are reduced by 10% each calendar year following the first calendar year the water is injected. No change is recommended in this strategy until water levels in the Micron area fully stabilize.

Recommendations include the following:

1. Conduct annual comparisons of production volumes and ground-water levels in Micron-area wells.
2. Restore water-level monitoring equipment in the Micron No. 4 well (at the next scheduled pump maintenance).

6. REFERENCES

- McDonald, M.G. and Harbaugh, A.W., 1988. A modular three-dimensional finite difference ground-water flow model. Techniques of Water-Resources Investigation of the United States Geological Survey. Book 6: Modeling Techniques.
- Robison, C.W. and Brockway, C.E., 1999. Southeast Boise Aquifer Simulation and Aquifer Recharge and Recovery Evaluation, Brockway Engineering, prepared for Micron Technology, Inc.
- Rumbaugh, J.A. and Rumbaugh, D.B., 2005. A Guide to Using Groundwater Vistas, Environmental Simulations, Inc., P.O. Box 156, Reinholds, PA.

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Pages: 30

Appendix A:
63-31183 Water Right Report

[Close](#)IDAHO DEPARTMENT OF WATER RESOURCES
Water Permit Report

01/21/2007

WATER RIGHT NO. 63-31183

<u>Owner Type</u>	<u>Name and Address</u>
Current Owner	MICRON TECHNOLOGY INC 2805 E COLUMBIA RD BOISE, ID 83706 (208)368-4358

Priority Date: 01/24/2001
Status: Active

<u>Source</u>	<u>Tributary</u>
GROUND WATER	

<u>Beneficial Use</u>	<u>From</u>	<u>To</u>	<u>Diversion Rate</u>	<u>Volume</u>
IRRIGATION	03/01	11/15	2 CFS	
INDUSTRIAL	01/01	12/31	10 CFS	
Total Diversion			10 CFS	

Location of Point(s) of Diversion:

GROUND WATER	SESW	Sec. 06	Township 02N	Range 03E	ADA County
GROUND WATER	SWNE	Sec. 07	Township 02N	Range 03E	ADA County
GROUND WATER	SWNW Lt 2	Sec. 07	Township 02N	Range 03E	ADA County
GROUND WATER	NESW	Sec. 07	Township 02N	Range 03E	ADA County

Place(s) of use:

Place of Use Legal Description: IRRIGATION ADA County

<u>Township</u>	<u>Range</u>	<u>Section</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>
02N	03E	6		NESW	3	6	NWSW	3	7	SWSW	8		SESW	6
				NESE	3		NWSE	3		SWSE	10		SESE	3
		7		NENE	4		NWNE	10		SWNE	3		SENE	4
				NENW	3	1	NWNW	5	2	SWNW	2		SENW	5
				NESW	3		SESW	4						
				NESE	4		NWSE	3		SWSE	3		SESE	4
		18		NWNE	3		SWNE	1						

Place of Use Legal Description: INDUSTRIAL ADA County

<u>Township</u>	<u>Range</u>	<u>Section</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>	<u>Lot</u>	<u>Tract</u>	<u>Acres</u>
02N	03E	6		NESW		6	NWSW		7	SWSW			SESW	
				NESE			NWSE			SWSE			SESE	
		7		NENE			NWNE			SWNE			SENE	
				NENW		1	NWNW		2	SWNW			SENW	
				NESW			SESW							
				NESE			NWSE			SWSE			SESE	
		8		SWSW										
		18		NWNE			SWNE							
				NENW										

Total Acres: 100

Conditions of Approval:

1. 26A Project construction shall commence within one year from the date of permit issuance and shall proceed diligently to completion unless it can be shown to the satisfaction of the Director of the Department of Water Resources that delays were due to circumstances over which permit holder had no control.
2. 046 Right holder shall comply with the drilling permit requirements of Section 42-235, Idaho Code.
3. 100 The right holder shall use the full allotment of appurtenant surface water rights in conjunction with groundwater diverted for irrigation purposes under this right and shall only divert groundwater under this right for irrigation purposes when water from the appurtenant surface water rights cannot be delivered to the right holder.
4. 105 If the surface water right(s) appurtenant to the place of use is sold, transferred, leased or used on any other place of use, this right to divert groundwater shall not be used for irrigation purposes without an approved transfer pursuant to Section 42-222, Idaho Code, or approval

- of the Department if a transfer is not required.
5. WB7 This right when combined with all other rights shall provide no more than 0.02 cfs per acre nor exceed a combined annual maximum diversion volume of 450.0 af at the field headgate for the lands above.
6. The entire volume of water injected (100%) can be re-diverted from the aquifer under this permit during the calendar year it is injected. Water not diverted during the year it is injected can be carried over as recharge credits for future withdrawal and beneficial use. The volume authorized for withdrawal by the recharge credits will be reduced by 10% each calendar year following the first calendar year the water is injected.
7. The right holder will analyze hydraulic response of the aquifer to injection and recovery activities to assess the appropriateness of the recovery plan initially set forth in condition no. 8. The assessment will compare water-level hydrographs from local observation wells to recharge/recovery volumes and rates. An analysis of the recharge/recovery volumes and associated aquifer water levels will be provided to the Department on an annual basis throughout the permit development period. Based on the results of the annual analysis, the right holder may propose a revised recovery plan for approval by the Department. The Department on its own may also require a revised recovery plan based upon its review of the data at any time throughout the permit development period and at the time of license issuance.
8. Water diverted from Micron well nos. 3 through 6 shall be considered water authorized for withdrawal under existing water rights to the full extent of the water right, as deliverable, unless otherwise requested by the water right holder.
9. The water right holder must comply with the measuring and reporting requirements of the Southeast Boise Groundwater Management Area and any management plan adopted by the director.
10. In the event of water right curtailments in the Southeast Boise Groundwater Management Area, out-of-priority diversions may be allowed under this permit to the extent that (1) the diversions under this permit are mitigated by groundwater recharge activities, and (2) diversions under this permit do not injure senior water rights through direct well interference.
11. Industrial use is for semiconductor and related manufacturing.

Dates:

Proof Due Date: 02/01/2007

Proof Made Date:

Approved Date: 02/14/2002

Moratorium Expiration Date:

Enlargement Use Priority Date:

Enlargement Statute Priority Date:

Application Received Date: 01/24/2001

Protest Deadline Date: 06/11/2001

Number of Protests: 0

Field Exam Date::

Date Sent to State Off:

Date Received at State Off:

Other Information:

State or Federal:

Owner Name Connector:

Water District Number:

Generic Max Rate per Acre: 0.02

Generic Max Volume per Acre: 4.5

Swan Falls Trust or Nontrust:

Swan Falls Dismissed:

DLE Act Number:

Cary Act Number:

Mitigation Plan: True

Close

Appendix B:

Copies of Drillers' Reports

Form 238-7

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCESUSE TYPEWRITER OR
BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources
within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Owner: Don Vank
 Address: House, 110 W
 Owner's Permit No. _____

7. WATER LEVEL

Static water level 50 feet below land surface
 Flowing? ☐ Yes ☒ No G.P.M. flow _____
 Artesian closed-in pressure _____ p.s.i.
 Controlled by: ☐ Valve ☐ Cap ☐ Plug
 Temperature _____ of Quality _____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning) _____

8. WELL TEST DATA

☐ Pump ☐ Baller ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
<u>300</u>	<u>400</u>	<u>3</u>
<u>450</u>	<u>200</u>	<u>1</u>

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type) _____

9. LITHOLOGIC LOG

Hole Diam.	Depth		Material	Water	
	From	To		Yes	No
17"	0	1	Brown clay		
17"	1	40	Black rock		
17"	40	58	Black granular rock		
17"	58	110	Black rock		
12"	110	125	Red clay		
12"	125	140	Black rock		
12"	140	165	Black rock		
10"	165	370	Cemented gravel		
10"	370	410	Cemented gravel		
10"	410	420	Cemented gravel		
10"	420	460	Cemented gravel		
10"	460	465	Cemented gravel		
10"	465	470	Sand & gravel		
10"	470	480	Sand & gravel		
10"	480	485	Sand & gravel		
10"	485	490	Sand & gravel		
10"	490	496	Sand & gravel		
10"	496	514	Sand & gravel		

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To	Feet
1.50 inches	12 inches	1	58	57
1.50 inches	10 inches	2	508	506
1.50 inches	10 inches	3	508	506
1.50 inches	10 inches	4	508	506

Was casing drive shoe used? ☒ Yes ☐ No
 Was a packer or seal used? ☐ Yes ☒ No
 Perforated? ☐ Yes ☒ No
 How perforated? ☐ Factory ☐ Knife ☐ Torch
 Size of perforation _____ inches by _____ inches
 Number _____ perforations _____ feet _____ feet
 _____ perforations _____ feet _____ feet
 _____ perforations _____ feet _____ feet

Well screen installed? ☐ Yes ☒ No

Manufacturer's name _____

Type _____

Model No. _____

Diameter _____ Slot size _____ Set from _____ feet to _____ feet

Diameter _____ Slot size _____ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☒ No Size of gravel _____

Placed from _____ feet to _____ feet

Surface seal depth 58 Material used in seal: ☒ Cement grout

☐ Pudding clay ☒ Well cuttings

Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing

☒ Overbore to seal depth

Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent

Weld

☐ Cemented between stringers

Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____

Lot No. _____

Block No. _____

County _____

10.

Work started 4/6/80 finished 6/6/80

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Don Vank Firm No. 212

Address House, 110 W Date 7/2/80

Signed by (Firm Official) Don Vank

and _____

MICRON NO. 1

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORTState law requires that this report be filed with the Director, Department of Water Resources
within 30 days after the completion or abandonment of the well.US EWRITER OR
POINT PEN

RECEIVED

OCT 5 1983

1. WELL OWNER

Name MICRON Technology Inc.
Address 2805 E. Columbia Boise, Idaho
Owner's Permit No. _____

7. WATER LEVEL

Static water level 415 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ OF. Quality good
Describe artesian or temperature zones below.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
<u>100</u>	<u>55.3</u>	<u>4</u>

85229

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

9. LITHOLOGIC LOG

Bore Diam.	Depth		Material	Water	
	From	To		Yes	No
17	0	3	BROWN CLAY		X
17	3	20	BLACK BASALT		X
17	20	50	BROKEN BASALT		X
17	50	52	BLACK BASALT		X
12	52	145	BLACK BASALT		X
10	145	495	CEMENTED SAND, GRAVEL + BOULDERS		X
8	495	495	CEMENTED SAND, GRAVEL + BOULDERS		X
8	495	510	BROWN SAND W/ CLAY		X
8	510	515	SAND, GRAVEL + BOULDERS		X
8	515	537	FINE GRAY SAND + SMALL GRAVEL		X
8	537	548	SAND, GRAVEL + BOULDERS		X
8	548	580	FINE GRAY SAND		X

RECEIVED
OCT 05 1983Department of Water Resources
Western Regional Office

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
<u>250</u> inches	<u>12</u> inches	<u>1</u> feet	<u>52</u> feet
<u>250</u> inches	<u>10</u> inches	<u>30</u> feet	<u>380</u> feet
<u>250</u> inches	<u>8</u> inches	<u>2</u> feet	<u>55.3</u> feet

Was casing drive shoe used? ☒ Yes ☐ NoWas a packer or seal used? ☐ Yes ☒ NoPerforated? ☐ Yes ☒ NoHow perforated? ☐ Factory ☐ Knife ☐ Torch

Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No

Manufacturer's name _____

Type _____ Model No. _____

Diameter _____ Slot size _____ Set from _____ feet to _____ feet

Diameter _____ Slot size _____ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____

Placed from _____ feet to _____ feet

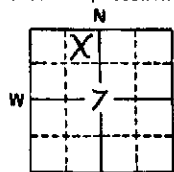
Surface seal depth 52 Material used in seal: ☒ Cement grout☐ Bentonite ☐ Pudding clay ☐ _____Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing☒ Overbore to seal depthMethod of joining casing: ☐ Threaded ☒ Welded ☐ Solvent

Weld _____

☐ Cemented between strataDescribe access port SANITARY WELL SEAL

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____

Lot No. _____ Block No. _____

County AdaNE 1/4 NW 1/4 Sec. 7, T. 2N, N/S, R. 3E E/W.

10.

Work started 7-11-83 finished 9-15-83

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name ASTRIN & YANKE DRILLING Firm No. 408Address RT 1, Donnelly, Idaho Date 9-15-83Signed by (Firm Official) Robert W. Statton

and

(Operator) Robert W. Statton

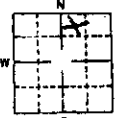
WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

[illegible]

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORTUSE TYPEWRITER OR
BALLPOINT PENState law requires that this report be filed with the Director, Department of Water Resources
within 30 days after the completion or abandonment of the well.

1. WELL OWNER Name <u>MICRON,</u> Address <u>MAILSTOP 602</u> <u>BOISE, ID 83706 63-93-W-0098-000</u> Drilling Permit No. <u>63-93-W-0000</u> Water Right Permit No. _____	7. WATER LEVEL Static water level <u>460</u> feet below land surface. Flowing? ☐ Yes ☒ No G.P.M. flow _____ Artesian closed-in pressure _____ p.s.i. Controlled by: ☐ Valve ☐ Cap ☐ Plug Temperature _____ °F. Quality _____ Describe artesian or temperature zones below.																																																																												
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Well diameter increase ☐ Modification ☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)	8. WELL TEST DATA ☐ Pump ☐ Bailer ☒ Air ☐ Other _____ <table border="1" style="width:100%"><tr><th>Discharge G.P.M.</th><th>Pumping Level</th><th>Hours Pumped</th></tr><tr><td><u>NO</u></td><td><u>TEST</u></td><td></td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr></table>	Discharge G.P.M.	Pumping Level	Hours Pumped	<u>NO</u>	<u>TEST</u>																																																																							
Discharge G.P.M.	Pumping Level	Hours Pumped																																																																											
<u>NO</u>	<u>TEST</u>																																																																												
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5. WELL CONSTRUCTION Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____ <table border="1" style="width:100%"><tr><th>Thickness</th><th>Diameter</th><th>From</th><th>To</th></tr><tr><td><u>250</u> inches</td><td><u>6</u> inches</td><td><u>1</u> feet</td><td><u>388</u> feet</td></tr><tr><td><u>250</u> inches</td><td><u>5</u> inches</td><td><u>1</u> feet</td><td><u>50</u> feet</td></tr><tr><td>_____ inches</td><td>_____ inches</td><td>_____ feet</td><td>_____ feet</td></tr></table> Was casing drive shoe used? ☒ Yes ☐ No Was a packer or seal used? ☐ Yes ☒ No Perforated? ☐ Yes ☒ No How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun Size of perforation? _____ inches by _____ inches <table border="1" style="width:100%"><tr><th>Number</th><th>From</th><th>To</th></tr><tr><td>_____ perforations</td><td>_____ feet</td><td>_____ feet</td></tr><tr><td>_____ perforations</td><td>_____ feet</td><td>_____ feet</td></tr><tr><td>_____ perforations</td><td>_____ feet</td><td>_____ feet</td></tr></table> Well screen installed? ☐ Yes ☒ No Manufacturer _____ Type _____ Top Packer or Headpipe _____ Bottom of Tailpipe _____ Diameter _____ Slot size _____ Set from _____ feet to _____ feet Diameter _____ Slot size _____ Set from _____ feet to _____ feet Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____ Placed from _____ feet to _____ feet Surface seal depth <u>125</u> Material used in seal: ☐ Cement grout ☒ Bentonite ☐ Puddling clay ☐ _____ Sealing procedure used: ☐ Slurry pit ☐ Overbore to seal depth ☐ Temp. surface casing ☒ Threaded ☒ Welded Method of joining casing: ☐ Solvent Weld ☐ Cemented between strata Describe access port _____	Thickness	Diameter	From	To	<u>250</u> inches	<u>6</u> inches	<u>1</u> feet	<u>388</u> feet	<u>250</u> inches	<u>5</u> inches	<u>1</u> feet	<u>50</u> feet	_____ inches	_____ inches	_____ feet	_____ feet	Number	From	To	_____ perforations	_____ feet	_____ feet	_____ perforations	_____ feet	_____ feet	_____ perforations	_____ feet	_____ feet																																																	
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6. LOCATION OF WELL Sketch map location must agree with written location.  Subdivision Name _____ Lot No. _____ Block No. _____ County <u>ADA</u> Address of Well Site <u>COLUMBIA RD</u> (give at least name of road) T. <u>2</u> N. ☒ or S ☐ NW <u>1/4</u> NE <u>1/4</u> Sec. <u>9</u> R. <u>3</u> E ☒ or W ☐	10. Work started <u>3/26/93</u> finished <u>5/1/93</u> 11. DRILLER'S CERTIFICATION I/We certify that all minimum well construction standards were complied with at the time the rig was removed. Firm Name <u>SOS Well Drilling</u> Firm No. <u>212</u> Address <u>4145 N. Blackbelt Road</u> Signed by Drilling Supervisor <u>[Signature]</u> and (Operator) <u>[Signature]</u> (If different than the Drilling Supervisor)																																																																												

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

RECEIVED

JUN 17 1993

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR
BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

[illegible]

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

1. DRILLING PERMIT NO. 63-94-W-0409-001
Other IDWR No. _____

2. OWNER:

Name Harold Pettibone
Address 9145 Federal Way
City Boise State ID Zip 83706

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.



Twp. 2 North ☒ or South ☐
 Rge. 3 East ☒ or West ☐
 Sec. 7 1/4 1/4 S/W 1/4
 Gov't Lot _____ County Ada

Address of Well Site 9145 Federal Way
City Boise

(Give at least name of road + Distance to Road or Landmark)

Lt. 15 Blk. Sub. Name Harlan Sub

4. PROPOSED USE:

☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK *deepen*

☐ New Well ☒ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD

☒ Mud Rotary ☐ Air Rotary ☒ Cable ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
#8-12 Colorado sand			500#	

Was drive shoe used? Y ☐ N ☒

Was drive shoe seal tested? Y ☐ N ☒ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
4"	445	485	.250	steel	☐	☒	☒	☐
4"	515	516'	.250	steel	☐	☒	☒	☐
					☐	☐	☐	☐

Length of Headpipe 40' Length of Tailpipe 1'6"

9. PERFORATIONS/SCREENS

☐ Perforations Method _____

☒ Screens Screen Type Johnson stainless

From	To	Shot Size	Number	Diameter	Material	Casing	liner
						☐	☐
485	515	30		4"	stnls	☐	☒
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

430 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or
control devices: _____

11. WELL TESTS:

☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. _____ Bottom hole temp. _____

Water Quality test or comments: _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment) Water

[illegible]

13. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Stevens & Sons Firm No. 153

Firm Official Wayne Stevens Date 1/11/01

and
Supervisor or Operator [Signature]

(Sign only if Firm Official or Operator)

FORWARD WHITE COPY TO WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

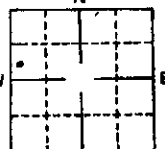
[illegible]

USE ADDITIONAL SHEETS IF NECESSARY

FORWARD THE WHITE COPY TO THE DEPARTMENT

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources
within 30 days after the completion or abandonment of the well.

1. WELL OWNER Name <u>K.O.A. Campground</u> Address <u>Bowen Road, Boise, Idaho</u> Owner's Permit No. _____		7. WATER LEVEL Static water level <u>343.5</u> feet below land surface. Flowing? ☐ Yes ☒ No G.P.M. flow _____ Artesian closed-in pressure _____ p.s.i. Controlled by: ☐ Valve ☐ Cap ☐ Plug Temperature _____ °F. Quality _____																																																																																																					
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Abandoned (describe method of abandoning) _____		8. WELL TEST DATA ☒ Pump ☐ Bailer ☐ Air ☐ Other _____ <table border="1"><thead><tr><th>Discharge G.P.M.</th><th>Pumping Level</th><th>Hours Pumped</th></tr></thead><tbody><tr><td><u>285</u></td><td><u>-</u></td><td><u>1</u></td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr></tbody></table>		Discharge G.P.M.	Pumping Level	Hours Pumped	<u>285</u>	<u>-</u>	<u>1</u>																																																																																														
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IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Use Typewriter or Ballpoint Pen

061039

Office Use Only

Inspected by _____
Twp _____ Rge _____ Sec _____
1/4 1/4 1/4
Lat: _____ Long: _____
☐ Pump ☐ Bailor ☐ Air ☐ Flowing Artesian

1. DRILLING PERMIT NO. 63-97-C-0652-000

Other IDWR No. D0000182

2. OWNER:

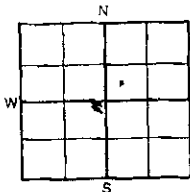
Name Micron Technology

Address 8000 South Federal Way

City Boise State ID Zip 83907-006

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.



061040

16-inch casing and screen schedule, Micron Well No. 5

screen			blank casing	
interval	length	slot size	interval	length
630-660	30	70	600-630	30
675-705	30	70	660-675	15
715-750	35	70	705-715	10
809-834	25	70	750-809	59
859-879	20	70	834-859	25
895-905	10	70	879-895	16
917-947	30	70	905-917	12
962-977	15	70	947-962	15
995-1015	20	70	977-995	18
1046-1056	10	70	1015-1046	31
1091-1101	10	70	1056-1091	35
1110-1170	60	70	1101-1110	9
1183-1203	20	70	1170-1183	13
			1203-1210	7
Total	315			295

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APR 07 1998 APR 09 1998

WATER RESOURCES
WESTERN REGION
Department of Water Resources

WELL DRILLER'S REPORT 49328 WED

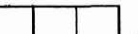
1. DRILLING PERMIT NO. 63-95-C-0179-000
Other IDWR No. 63-09357

2. OWNER:

2. OWNER: MICRON TECHNOLOGY, INC.
Name
Address 2805 E. COLUMBIA ROAD
City BOISE State ID Zip 83706

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.



Twp. _____ North ☐ or South ☐
 Rge. _____ East ☐ or West ☐
 Sec. _____ 1/4 1/4 1/4
 Gov't Lot _____ County _____

Address of Well Site

(Give at least name of road + Distance to Road or Landmark)

Lt. Blk. Sub. Name

4. PROPOSED USE:

☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK

☐ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD

☐ Mud Rotary ☐ Air Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES

[illegible]

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s) _____
Was drive shoe seal tested? Y ☐ N ☐ How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS

☐ Perforations Method _____

☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

_____ ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or
control devices: _____

11. WELL TESTS:

☐ Pump ☐ Baildown ☐ Dependent Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. _____ Bottom hole temp. _____

Water Quality test or comments: _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
20	664	680	coarse brown gravel		
		660	w/clay	X	
20	680	695	coarse brown gravel	X	
20	695	710	brown clay w/trace of		
		710	gravel		
20	710	720	coarse brown gravel-		
		720	dirty	X	
20	720	756	coarse brown gravel	X	
20	756	761	brown clay w/sand and		
		761	gravel		
20	761	768	brown sand & small		
		768	gravel w/streaks of clay	X	
20	768	777	brown sand & gravel	X	
20	777	784	brown sand & smaller		
		784	gravel w/traces of clay	X	
20	784	795	tan-brown sandy clay		
20	795	811	brown sand & gravel	Y	
		811	w/thin layers of clay		
20	811	820	brown sandy clay		
20	820	828	coarse gravel	X	
20	828	842	brown sandy clay		
20	842	856	coarse gravel & sand	X	
20	856	860	sandy brown clay		
20	860	891	coarse brown sand	X	
		891	brown sand & gravel		
		891	w/traces of clay -		
		891	boulders @ 877-888	X	
20	891	892	sandy brown clay		
20	892	896	sand & gravel w/layers		
		896	of clay	X	
20	896	899	sand & gravel w/more		
		899	clay	X	
			PAGE 3 OF 5		

Completed Depth 1090' (Measurable)
Date: Started 4/28/95 Completed 6/30/95

13. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name FIDDLESTON & SON, INC. Firm No. 35

Firm Official Mark S. Nadeau Date 8/17/05
and

Supervisor or Operator _____ Date _____

(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Depth
(feet)

49330

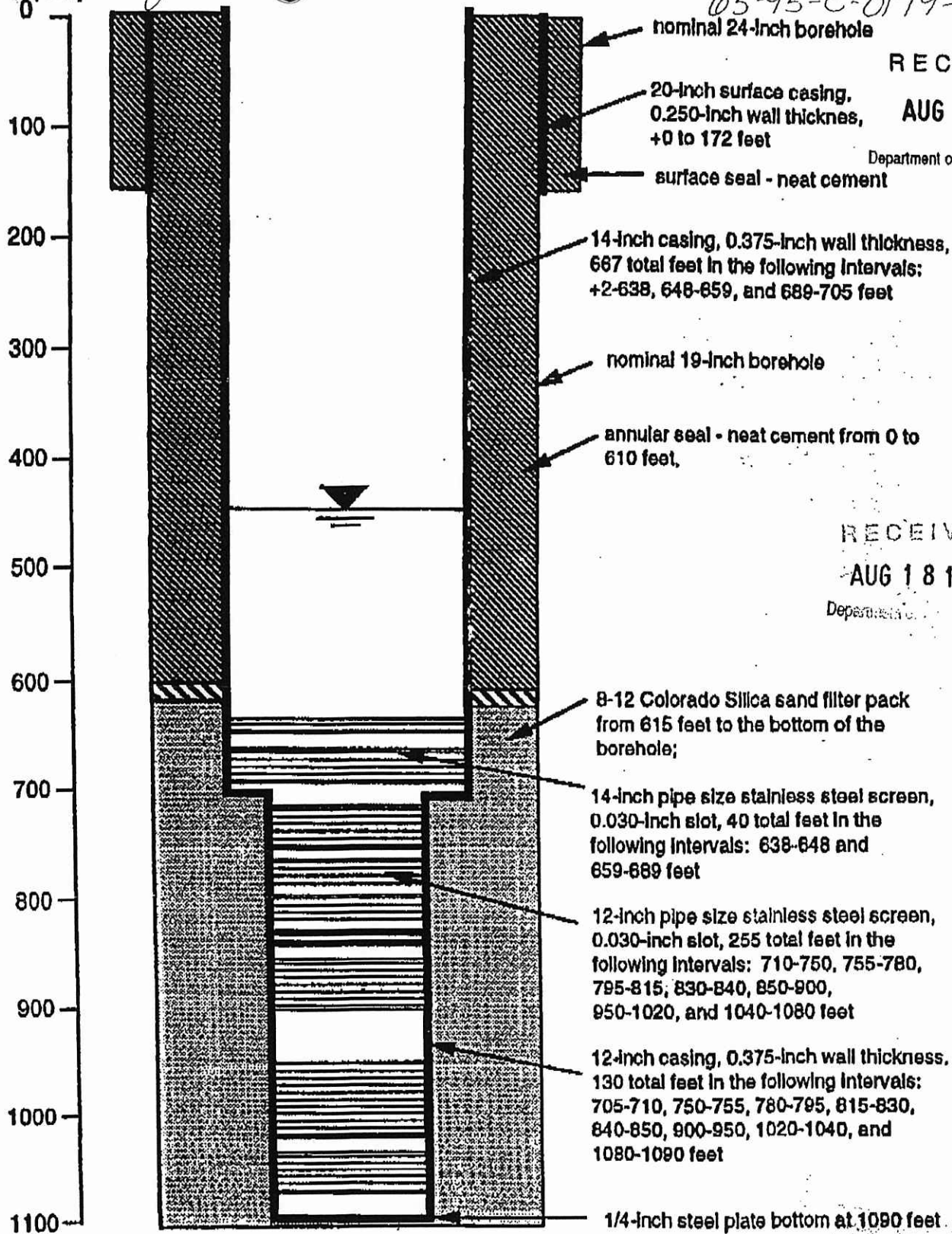
PAGE 5 OF 5

63-95-C-0179-200

RECEIVED

AUG 31 1995

Department of Water Resources



RECEIVED

AUG 18 1995

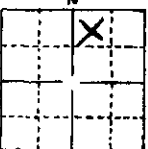
Department of Water Resources

MICRON WELL NO. 4 - FINAL WELL DESIGN

OCT 22 1995

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER Name <u>Dennis Christensen</u> Address <u>Bonney, Idaho</u> Owner's Permit No. _____	7. WATER LEVEL Static water level <u>435</u> feet below land surface Flowing? ☐ Yes ☒ No G.P.M. flow _____ Temperature _____ ° F. Quality _____ Artesian closed-in pressure _____ p.s.i. Controlled by ☐ Valve ☐ Cap ☐ Plug																																										
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Abandoned (describe method of abandoning) _____	8. WELL TEST DATA ☐ Pump ☐ Bailer ☒ Other Discharge G.P.M. <u>20</u> Draw Down <u>10'</u> Hours Pumped <u>1</u>																																										
3. PROPOSED USE ☒ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type) _____ ☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection	9. LITHOLOGIC LOG 106040 <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th rowspan="2">Hole Diam.</th><th colspan="2">Depth</th><th rowspan="2">Material</th><th rowspan="2">Water Yes/No</th></tr><tr><th>From</th><th>To</th></tr></thead><tbody><tr><td>9"</td><td>0</td><td>1</td><td>Brown topsoil</td><td>☒</td></tr><tr><td>9"</td><td>1</td><td>5</td><td>Brown clay</td><td>☒</td></tr><tr><td>9"</td><td>5</td><td>20</td><td>Broken black shale</td><td>☒</td></tr><tr><td>8"</td><td>20</td><td>125</td><td>"</td><td>☒</td></tr><tr><td>6"</td><td>125</td><td>225</td><td>Brown cemented gravel & boulders</td><td>☒</td></tr><tr><td>6"</td><td>425</td><td>475</td><td>Brown cemented gravel</td><td>☒</td></tr><tr><td>6"</td><td>475</td><td>-</td><td>Brown clay</td><td>☒</td></tr></tbody></table>	Hole Diam.	Depth		Material	Water Yes/No	From	To	9"	0	1	Brown topsoil	☒	9"	1	5	Brown clay	☒	9"	5	20	Broken black shale	☒	8"	20	125	"	☒	6"	125	225	Brown cemented gravel & boulders	☒	6"	425	475	Brown cemented gravel	☒	6"	475	-	Brown clay	☒
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6"	425	475	Brown cemented gravel	☒																																							
6"	475	-	Brown clay	☒																																							
4. METHOD DRILLED ☐ Cable ☒ Rotary ☐ Dug ☐ Other	10. Work started <u>7/29/77</u> finished <u>8/9/77</u>																																										
5. WELL CONSTRUCTION Diameter of hole <u>6</u> inches Total depth <u>485</u> feet Casing schedule: ☒ Steel ☐ Concrete Thickness <u>250</u> inches Diameter <u>6</u> inches From <u>1</u> feet To <u>465 1/2</u> feet Was casing drive shoe used? ☒ Yes ☐ No Was a packer or seal used? ☐ Yes ☒ No Perforated? ☐ Yes ☒ No How perforated? ☐ Factory ☐ Knife ☐ Torch Size of perforation _____ inches by _____ inches Number _____ From _____ To _____ _____ perforations _____ feet _____ feet _____ perforations _____ feet _____ feet _____ perforations _____ feet _____ feet Well screen installed? ☐ Yes ☒ No Manufacturer's name _____ Type _____ Model No. _____ Diameter _____ Slot size _____ Set from _____ feet to _____ feet Diameter _____ Slot size _____ Set from _____ feet to _____ feet Gravel packed? ☐ Yes ☒ No Size of gravel _____ Placed from _____ feet to _____ feet Surface seal depth <u>20'</u> Material used in seal ☐ Cement grout ☐ Puddling clay ☒ Well cuttings Sealing procedure used ☐ Slurry pit ☐ Temporary surface casing ☒ Overbore to seal depth	11. DRILLERS CERTIFICATION Firm Name <u>S.G.S. Well Drilling Firm</u> No. <u>212</u> <u>2323 Canine Dr</u> Address <u>Meridian, Idaho</u> Date <u>8/15/77</u> Signed by (Firm Official) <u>Frank Shimmer</u> and Operator <u>Frank Shimmer</u>																																										
6. LOCATION OF WELL 63 Sketch map location must agree with written location.  County <u>Ada</u> Subdivision Name _____ Lot No. _____ Block No. _____ PW <u>NE</u> Sec. <u>9</u> T. <u>2</u> N. R. <u>3</u> E.																																											

Appendix C:

Water Chemistry Data

Fluoride (ppm)	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Phosphate (ppm)	Ammonia (ppm)	Al (ppm)	Ca (ppm)	Cu (ppm)	Fe (ppm)	Mg (ppm)	Na (ppm)	Si (ppm)	Zn (ppm)	Total Hardness (mg/l as CaCO3)	Ca Hardness (mg/l as CaCO3)	Mg Hardness (mg/l as CaCO3)	TOC (ppm)	NPOC (ppm)	Total Alkalinity (mg/l as CaCO3)	Bicarbonate Alkalinity (mg/l as CaCO3)	Remarks
	0.034		0.02	0.013	0.04	0.017	0.025	0.001	0.003	0.018	0.001	0.01	0.05	0.003	0.002	0.001	0.05				
0.213	28	71.2	28	<0.040	0.048	<0.0250	43.1	<0.003	<0.0180	11.4	27.3	24.7	0.408	154	108	46.8	6.33		90.3	90.3	Well 2
0.516	6.96	17.1	8.74	<0.040	0.04	<0.0250	11.4	<0.003	<0.0180	0.557	45.1	13.9	0.007	30.7	28.4	2.29	6.32		94.5	85.3	Well 3
1.05	3.45	9.57	5.97	<0.040	0.032	<0.0250	5.24	<0.003	<0.0180	0.178	48.1	12.7	0.007	13.8	13.1	0.733	6.11		95.2	79.5	Well 4
0.29	0.735	3.61	0.462	<0.040	0.045	0.067	9.7	<0.003	<0.0180	1.2	4.73	6.22	0.017	29.2	24.2	4.93	1.78		35.8	35.8	Well 5
0.248	2.99	5.17	7.78	<0.040	0.033	<0.0250	10.7	<0.003	<0.0180	1.38	22.6	19.2	0.003	32.5	26.8	5.66	4.81		66.2	66.2	Well 6
0.553	3.09	7.91	6.47	<0.040	0.049	<0.0250	7.22	<0.003	0.066	0.118	43.5	14	0.025	18.5	18	0.486	6.05		94.9	84.1	Deep Obs
0.274	4.63	8.86	9.55	<0.040	0.041	<0.0250	17.3	<0.003	0.102	4.75	23.6	23.7	0.22	62.9	43.3	19.6	6.12		95.3	95.3	Shallow Obs