Aquifer Management Plan for the City of Newark South Well Field Newark, Delaware

Prepared for:

City of Newark
Newark, DE 19715

Submitted by:

TETRA TECH, INC.
56 W. Main Street
Christiana, DE 19702

REUSE REDUCE RECYCLE

RCN 0441

March 1996

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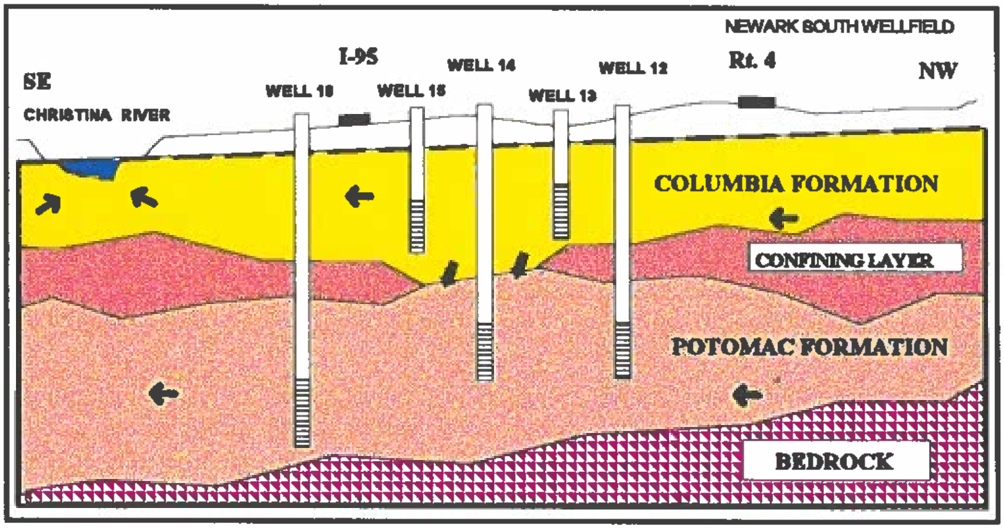

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REPRESENTATIONS

This report was compiled based partially on information supplied to Tetra Tech from outside sources and other information which is in the public domain. The conclusions and recommendations herein are based solely on the information Tetra Tech obtained in compiling the report. Documentation for the statements made in the report is on file at Tetra Tech's Christiana, Delaware office. Tetra Tech makes no warranty as to the accuracy of statements made by others which may be contained in the report, nor are any other warranties or guarantees, expressed or implied, included or intended by the report except that it has been prepared in accordance with the current generally accepted practices and standards consistent with the level of care and skill exercised under similar circumstances by other professional consultants or firms performing the same or similar services. Because the facts forming the basis for the report are subject to professional interpretation, differing conclusions could be reached. Tetra Tech does not assume responsibility for the discovery and elimination of hazards which could possibly cause accidents, injuries or damage. Compliance with submitted recommendations or suggestions does not assure elimination of hazards or the fulfillment of clients' obligations under local, state or federal laws or any modifications or changes to such laws.

None of the work performed hereunder shall constitute or be represented as a legal opinion of any kind or nature, but shall be a representation of findings of fact from records examined.

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SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
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Executive Summary

EXECUTIVE SUMMARY

The City of Newark authorized Tetra Tech, Inc. (Tetra Tech) in June 1995 to develop an Aquifer Management Plan (AMP) for the City of Newark South Wellfield (SWF) to address and minimize the impacts of iron (and to a lesser extent manganese) in the ground water and to optimize overall wellfield operations. The primary objectives for this study were to:

- review and summarize the historical data and reports pertaining to the SWF;
- conduct a hydrologic evaluation of the SWF consisting of field testing and numerical modeling;
- develop a comprehensive pumping approach for the wellfield;
- develop a monitoring schedule for the wellfield;
- evaluate the future potential use of Well 16;
- develop conceptual level recommendations for the automation of the wellfield; and
- answer specific questions posed by the RFP regarding wellfield operations.

This AMP presents a detailed approach for the practical and productive management of the SWF. Specifically, aquifer management recommendations were developed for three SWF operational scenarios, and are summarized on Exhibit A:

- Current wellfield operations - Use of the SWF as a secondary water supply source at current wellfield production rates during times of peak demand several times per year;
- Expanded wellfield operations - Use of the SWF as a secondary water supply source at production rates higher than present (i.e. higher wellfield production) during times of peak demand several times per year; and
- Continuous wellfield operations - Use of the SWF as a primary water supply source continuously throughout the year at maximum allocation rates (i.e. highest allowable wellfield production).

The implementation of these recommendations will improve the performance and effectiveness of the SWF, which is expected to result in an overall improvement in the quantity and overall quality of this water supply.

EXHIBIT A
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
A. CURRENT WELLFIELD OPERATIONS		
GOAL: *To increase operational efficiency and collect necessary aquifer management data.*		
A1. All production wells (wells 11, 12, 13, 14, 15, 16, 17, and 19) and associated observations wells (wells 10 [see Recommendation A7], OW-11, 0W-14, OW-15, OW-16A, OW-17, CH-1A, CH-2A, CH-1, and CH-2) should be specified for monitoring.	N/A	N/A
A2. All designated monitoring locations should be surveyed for vertical control (i.e., elevation) to ensure that all data collected can be accurately compared in the future.	\$3000 - \$5000	\$3000 - \$5000
A3. All production wells should be monitored monthly for pumping rate, total pumpage, water level, and specific water quality parameters (field analytes - pH, conductivity, dissolved oxygen, temperature; laboratory analytes - total iron and manganese), and all designated observation wells should be monitored for water level.	\$340 - 440 per event	\$4080 - \$5280/year
A4. All water quality data, especially volatile organic compound data, collected by the Delaware Department of Health & Social Services should be incorporated into the proposed monitoring program.	\$1000 - \$2000	\$1000 - \$2000
A5. Standard operating procedures should be followed to conduct the monthly monitoring events to ensure comparability of the data.	N/A	N/A

EXHIBIT A (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

	RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
A6.	All monitoring data should be entered into an electronic spreadsheet/database (Excel, Lotus, dBase, FoxPro, etc.) on a monthly basis, and given a cursory review on a quarterly basis and a detailed review and evaluation on an annual basis by the City of Newark or its designate (e.g., Water Resources Agency, Delaware Geological Survey, consultant, etc.) to assess the overall status of the water level and water quality conditions of the SWF.	\$4000 - \$6000/year	\$4000 - \$6000/year
A7.	Well 10 should be removed from service as a production well and designated as a Potomac aquifer observation/monitoring well in the future.	\$500 - \$750	\$500 - \$700
A8.	Wells 11, 13, 14, 15, and 19 should be repaired or retrofitted to provide a water level measurement port to allow for accurate monitoring of pumping water levels.	\$250 - \$4000/well	\$1250 - \$15,000
A9.	A variety of wells, including Wells 14, 13, 11, and 15 (in decreasing order of preference) should be in use in place of Well 11 to provide the necessary continuous flow to the treatment plant. The selection of the most appropriate well for this task should be based on a monthly evaluation of iron, manganese, and other water quality data provided by DDHS.	N/A	N/A
A10.	The optimum sequence for well operations during the one- to three-day, one-month, and three-month pumping scenarios should be Well 13, 14, 11, 15, 12, 16, and 19. This performance sequence is a general guide only and should be reevaluated and adjusted prior to and during each well operation to account for the most recent iron, manganese, and other water quality data provided by DDHS.	N/A	N/A
A11.	All SWF wells, to the extent that water quality permits, should be used more frequently than in the past as part of an attempt to cycle more water through the aquifer system, thereby potentially improving local water quality.	N/A	N/A

EXHIBIT A (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
A12. The operation sequence should be reevaluated and updated for applicability on a quarterly basis if the wellfield is used extensively, or on an annual basis if the wellfield is used only periodically by the City of Newark or its designate.	Cost included as part of Recommendation A6	
A13. Well 16 should be pumped continuously for a period of 6 weeks as part of an attempt to improve the water quality (with respect to iron and manganese) in the Potomac aquifer in this portion of the SWF. If water quality improves to acceptable levels during the extended pump test, then this well should be pumped continuously at a rate of 100 to 200 gpm to maintain flow through this aquifer system. More frequent pumping of other Potomac wells (including Wells 12 and 14) should also be implemented, whenever possible to promote the cycling of water through the Potomac aquifer.	\$1600 - \$2200	\$1600 - \$2200
A14. No automation of the wellfield is recommended under the current operation scenario, as the cost of automation outweighs the benefits given the infrequent operation of the SWF.	N/A	N/A
CURRENT WELLFIELD OPERATIONS - ESTIMATED COST	Capital Cost Annual O&M Cost	\$7,350 - \$25,000 \$8,080 - \$11,280/yr

EXHIBIT A (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
B. EXPANDED WELLFIELD OPERATIONS		
GOAL: To increase reliable production capacity of the SWF from 915 gpm (current) to 1230 gpm (normal capacity) or 1600 gpm (emergency operating conditions, exclusive of Wells 12, 16, and 19) or to 1630 gpm (normal operating conditions) and 2000 gpm (emergency operating conditions), inclusive of Well 16.		
B1. All recommendations presented for the current wellfield operations (A1-A14) should be implemented.	N/A	$7350 - $25,000 $8000 - $11,280/yr (O&M)
B2. All primary production wells (11, 13, 14, and 15) should be inspected and rehabilitated to improve overall well efficiency by 15 to 20% and to increase wellfield production potential.	$2000 - $6000/well	$8000 - $24,000
B3. Well 17 should be repaired, rehabilitated, and placed back into service as part of the SWF.	$1000 - $10,000	$1000 - $10,000
B4. All primary production well pumps should be repaired/retrofitted to ensure that the pump capacity exceeds (by at least 20%) the DNREC allocation limits for each well.	$500 - $3000/pump	$2000 - $12,000
B5. Larger size pumps should be considered for Well 13 (300 gpm) and Well 17 (400 gpm) for expanded production capacity during drought emergency conditions.	$2000 - $3000/pump	$4000 - $6000

EXHIBIT A (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
B6. Well 17 should be incorporated into the well sequence (Wells 17, 14, 13, 11, and 15—in decreasing order of preference) to provide the necessary continuous flow to the treatment plant, and incorporated into the well sequence (Wells 13, 14, 17, 11, 15, 12, 16, and 19—in decreasing order of preference) for one- to three-day, one-month, and three-month pumping scenarios.	N/A	N/A
B7. A limited application aquifer storage recovery (ASR) approach should be considered to enhance the short-term periodic pumping utility of Well 16. However, the actual implementation of the ASR system should be based on a detailed cost/benefit assessment of the ASR approach versus other water supply alternatives (such as conjunctive use with other water purveyors).	N/A	\$300,000 - \$800,000 (capital cost) \$8000 - \$80,000/yr (O&M)
B8. Some, or all, of the primary production wells (Wells 17, 14, 15, 11, and 13—in decreasing order of preference) should be automated for remote monitoring and pump control (on/off) to improve operation efficiency and data collection efforts.	\$12,000 - \$15,000/well	\$60,000 - \$75,000
EXPANDED WELLFIELD OPERATIONS ESTIMATED COST	Capital Cost (excluding Well 16 ASR)	\$82,350 - \$152,000
	Capital Cost (including Well 16 ASR)	\$382,350 - \$952,000
	Annual O&M Cost (excluding Well 16 ASR)	\$8080 - \$11,280/yr
	Annual O&M Cost (including Well 16 ASR)	\$16,000 - \$91,000/yr

EXHIBIT A (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
C. CONTINUOUS WELLFIELD OPERATIONS		
GOAL: To operate the SWF on a continuous basis to obtain the highest quantity of water at the highest quality.		
C1. All recommendations presented for current and expanded wellfield operations (A1-A14 and B1- B8 [excluding B7 - ASR at Well 16]) should be implemented.	N/A	\$82,350 - \$152,000 \$8080 - \$11,280/yr (O&M)
C2. Any expanded wellfield operations should be maintained within the allocated 2.76 MGD pumping rate, which is determined to be the approximate safe yield of the SWF in an average water year. However, during periods of water shortage, as defined by the Water Conditions Index (WCI) for Northern New Castle County, wellfield operations should be reduced to specified rates to ensure conservation of water resources.	N/A	N/A
C3. The optimum sequence for any long-term continuous operations should be Wells 17, 13, 14, 11, 15, 12, 19, and 16. As with all other pumping scenarios, this sequence should be reevaluated and adjusted during operations to account for the most recent iron, manganese, and other water quality data provided by DDHS.	N/A	N/A
C4. An iron treatment plant should be considered as part of any plan for the continuous operation of the SWF.	N/A	\$1.9M to \$3.3M (capital cost) \$100,000 - \$150,000 per year (O&M)

EXHIBIT A (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
C5. Automation of all of the wellfield for remote monitoring and pump control (Wells 12, 16, and 19 only given that other wells are proposed for automation under expanded operations) should be implemented as part of any plan to maximize the water production potential of the SWF.	$12,000 - $15,000/well	$36,000 - $45,000
CONTINUOUS WELLFIELD OPERATIONS ESTIMATED COST	Capital Cost (All A, B, and C recommendations except Well 16 ASR)	$2.018M - $3.495M
	Annual O&M Cost	$108,080 - $161,280/yr

It should be noted that a major factor affecting the development of this AMP is that the exact cause of the elevated iron concentrations in the SWF is not specifically known, but appears to be related to aquifer-wide changes in hydrogeochemistry over an extensive area. These changes likely came about as a result of a complex combination of several natural (such as climatic changes which affected ground-water recharge rates) and possibly man-induced factors (such as overpumping during low-precipitation/recharge periods) on both the large and small scale. The SWF high iron event of the late 1980's/early 1990's appears to have been a random event; however, given the general lack of understanding regarding the exact cause of the event, it is unlikely that another such high iron event could be predicted with any confidence in the future. Therefore, it is possible that another high iron event could occur in the SWF in the future under certain natural and/or man-induced conditions.

It should be further noted that given the complex nature of the aquifer system at the SWF and the large degree of uncertainty regarding the exact cause of the iron problem, it is unlikely that any specific wellfield management procedures would be completely successful in eliminating the potential for the reoccurrence of elevated iron concentrations in the SWF. **However, the AMP recommendations are designed to minimize the impact of elevated iron concentrations on the City of Newark water supply.**

Although it is not possible to predict or prevent the iron problem with any confidence at present, the long-term data collected as a result of the implementation of the AMP recommendations will allow for a better understanding of the SWF, such that reliable prediction or prevention measures can be developed in the future.

Aquifer Management Plan

1.0 INTRODUCTION

1.1 PURPOSE AND ORGANIZATION OF THE REPORT

The City of Newark authorized Tetra Tech, Inc. (Tetra Tech) in June 1995 to develop an aquifer management plan for the City of Newark South Wellfield (SWF) to address and minimize the impacts of iron (and to a lesser extent manganese) in the ground water and to optimize overall wellfield operations. This study was conducted according to the basic scope of work presented in the City of Newark's South Wellfield Management Plan Request for Proposal (RFP-City of Newark, 1995), as described in Tetra Tech's technical proposal for the project (Tetra Tech, 1995). The primary objectives for this study were to:

- review and summarize all of the historical data and reports pertaining to the SWF;
- conduct a hydrologic evaluation of the SWF consisting of field testing and numerical modeling;
- develop a comprehensive pumping schedule for each well;
- develop a monitoring schedule for the wellfield;
- evaluate the future potential use of Well 16;
- develop conceptual level recommendations for the automation of the wellfield; and
- answer specific questions posed by the RFP regarding wellfield operations.

The information contained in this Aquifer Management Plan (AMP) includes:

- a detailed description of the scope of work;
- a summary and general evaluation of the background information on the SWF and the iron problem;
- a description of the field program and general findings;
- a description of the ground-water modeling program and general findings;
- an assessment of Well 16 with respect to future use;
- a wellfield automation study; and
- specific recommendations regarding the principal AMP items:
    - wellfield monitoring;
    - pumping schedules;
    - Well 16; and
    - wellfield automation.

This study was conducted during the period June 1995 through March 1996.

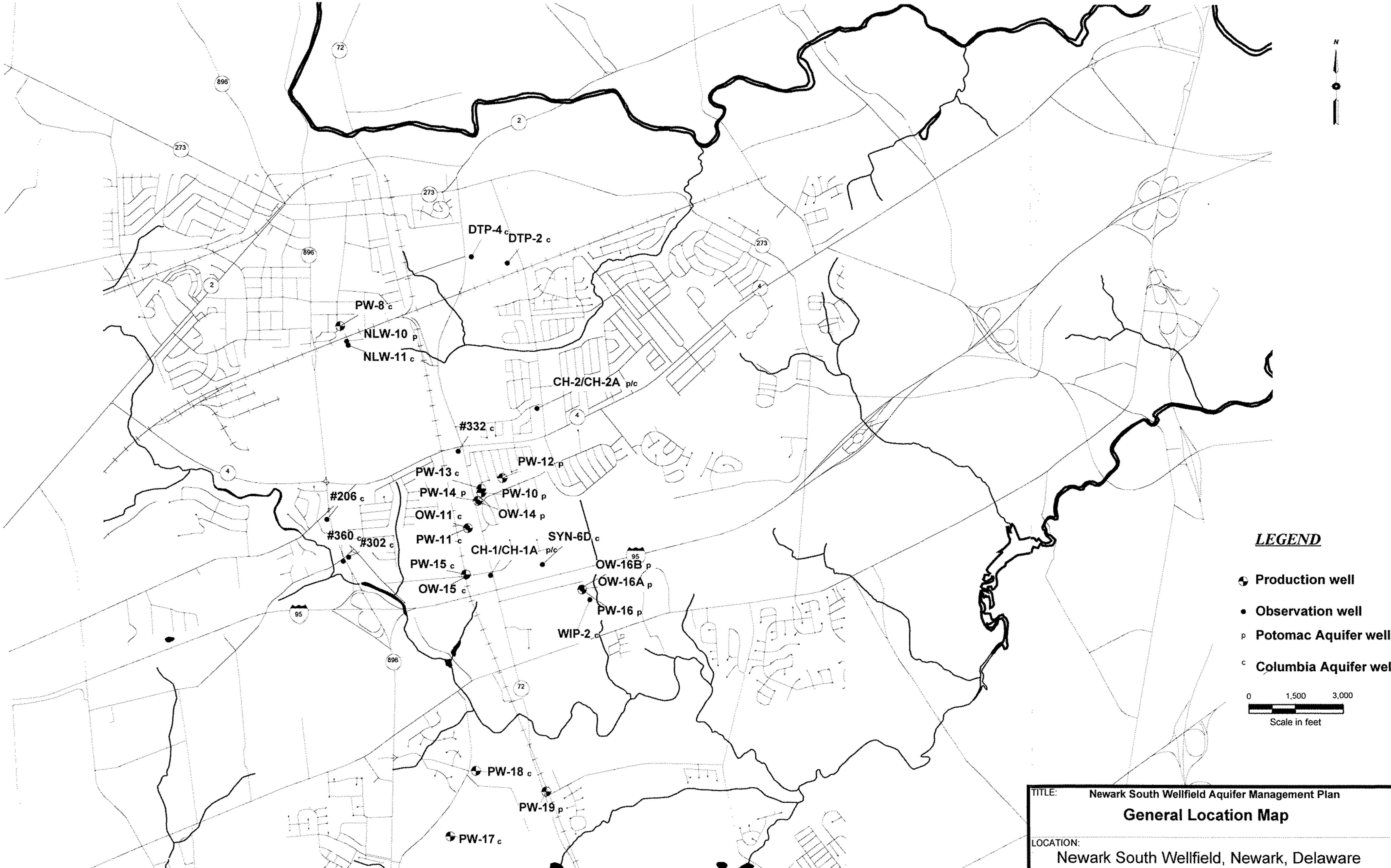
1.2 GENERAL SITE BACKGROUND SUMMARY

The Newark South Wellfield is located south of the City of Newark, extending along Delaware Rt. 72 from near the community of Scottfield (Wells 10, 12 and 13) to an area just south of the Christina River and in the vicinity of Glasgow High School (Wells 17 and 19) (Figure 1). The wellfield consists of nine wells, four of which are screened in the Columbia Aquifer (Wells 11,.13, 15, 17) and five of which are screened in the deeper Potomac Aquifer (Wells 10, 12, 14, 16, and 19). Presently, all wells are operational with the exception of Well 17, which has been out of service since early 1994 after reportedly pumping sand, as well as former Well 18, which was reportedly abandoned as a supply well in the early 1980's.

The SWF was historically the City of Newark's most productive ground-water source, with a permit allocated total yield of 2.76 million gallons per day (MGD). Nearly every well within the wellfield was pumped continuously from the start of service in the late 1960's/early 1970's through the late 1980's, as this was the primary source of water for city residents. In late 1989/early 1990, however, the City of Newark began to experience significant increases of iron concentrations in the water being pumped from four of the production wells (Wells 12, 14, 15, and 16), and smaller but detectable increases in iron concentration in the remainder of the wells. This prompted the City of Newark to curtail pumping operations from its SWF, including its largest production wells (Wells 15 and 16), to address continuously increasing iron concentrations and customer complaints regarding poor water quality. Continuous pumping operations at the SWF ceased in December 1992 when the new White Clay Creek Newark Water Plant went on-line. Since that time through the present, the SWF has only been operated infrequently to meet temporary, short-term water supply demands.

In 1992, the City of Newark retained an environmental consultant (Duffield Associates/CH2M Hill) to investigate the cause of the increase of iron concentrations at the SWF. The resulting report, titled "Newark South Well Field Evaluation" (Duffield/CH2M Hill, 1994), concluded that the increased iron was a result of several factors including: a prolonged dry-weather/reduced recharge period; increased pumping from some of the wells; and an unusually high recharge event during the summer of 1989. The report also recommended that the City of Newark develop a comprehensive aquifer management plan for the SWF to limit the potential for reoccurrence of the elevated iron concentrations in the ground water.

Based on the recommendations of the wellfield evaluation report, the City of Newark issued a Request for Proposal (RFP) in early 1995 to develop an aquifer management plan for the SWF. Tetra Tech was selected by the City in June 1995 to develop this aquifer management plan, which has been devised according to the scope of work described in the following section.



Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

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TITLE: Newark South Wellfield Aquifer Management Plan	
General Location Map	
LOCATION: Newark South Wellfield, Newark, Delaware	
TETRA TECH, INC.	CHECKED: JJB; DRAFTED: STG; FILE: FIG1.WOR; DATE: 29-Dec-1995
FIGURE:	1

1.3 AQUIFER MANAGEMENT PLAN SCOPE OF WORK

The scope of work completed to develop the AMP included 5 major tasks:

Task 1 Background Review/Data Compilation

The first task was the background review phase that included a detailed compilation and review of all data pertaining to the SWF. As part of the background data collection and evaluation phase, Tetra Tech implemented a geographic information system (GIS) to organize all pertinent data into a form that allowed for meaningful review, management, and display of the SWF data. Tetra Tech utilized MapInfo, a PC-based mapping software, and SiteGIS, a MapInfo based application software package conceived and developed by Tetra Tech's subsidiary GeoTrans, for this project.

A summary of the background review and data compilation activities, including graphical presentations of the historical water level, pumping, and water quality data are presented in **Appendix A (Background Data Review/Compilation Summary).**

Task 2 Hydrologic Evaluation -- Conceptual Model/Field Testing/Ground-Water Modeling

The purpose of this task was to further evaluate the hydrogeologic properties of the SWF. This task included: the development of a conceptual model of the hydrogeology of the SWF based on the background data review; a field testing program to further investigate water level, pumping responses, and water quality in the vicinity of the SWF; and the development of a ground-water flow model to improve the understanding of the ground-water flow system.

A summary of field testing activities is presented in **Appendix B (Field Testing Program Summary)**, and a summary of the conceptual site model and ground-water flow model is presented in **Appendix C (South Wellfield Ground-Water Model Study)**.

Task 3 Wellfield Management Plan Development -- Pumping and Monitoring Schedule

A summary of the development of the monitoring and pumping schedule recommendations is presented in **Appendix D (South Wellfield Monitoring Program and Pumping Schedule Development Summary).**

Task 4 Well 16 Assessment

The purpose of this task was to specifically evaluate Well 16 in terms of future use given its favorable production potential but high iron concentration. Future uses evaluated included: aquifer storage recovery (ASR); managed pumping; and wellhead/aquifer system treatment.

The Well 16 assessment study is presented in **Appendix E (Well 16 Assessment Study).**

Task 5 Wellfield Automation Feasibility Study

A feasibility study was conducted to assess the practicability and cost associated with automating the operation of the SWF. Elements considered as part of this study included: an assessment of existing structures/facilities; identification of automated well system alternatives; and a comparative analysis.

The complete wellfield automation feasibility study is provided in **Appendix F (Wellfield Automation Feasibility Study).**

These five tasks were conducted, in part, to answer the following principal questions presented in the original RFP (City of Newark, 1995):

1. What wellfield management procedures should Newark implement in an attempt to limit the potential for reoccurrence of elevated iron concentrations in the water of the South Wellfield?
2. When additional supply is needed for one to three days, what is the optimal sequence for turning on the wells?
3. At what drawdown level should Newark turn off a particular well? Can the well be throttled back to reduce drawdown or should the well be turned off to facilitate recovery of the aquifer?
4. If every drop of water is needed for one month, how will the start-up sequence and pumping duration of each well change?
5. If every drop of water is needed for three months, how will the start-up sequence and pumping duration for each well change?
6. If the wells are needed continuously, what procedures should be followed on a continuous basis to limit the resulting reduction in potentiometric levels in each aquifer?
7. If the wells are not needed for one to three months, how should the wells be exercised/cycled in any particular order; run for any particular length of time; operated how often?

A summary of the major geologic and hydrogeologic considerations which form the basis for this AMP are presented in Section 2 (Summary of Key Newark South Wellfield Considerations). The major recommendations for each of the principal aquifer management areas are presented in Section 3 (Monitoring Program Recommendations), Section 4 (Pumping Program Recommendations), Section 5 (Well 16 Recommendations), and Section 6 (Wellfield Automation Recommendations), respectively. In addition, answers to the RFP questions are provided in Section 7 (Aquifer Management Plan Summary).

The detailed technical analysis which supports the recommendations presented in the main body of the report is provided in the following key appendices:

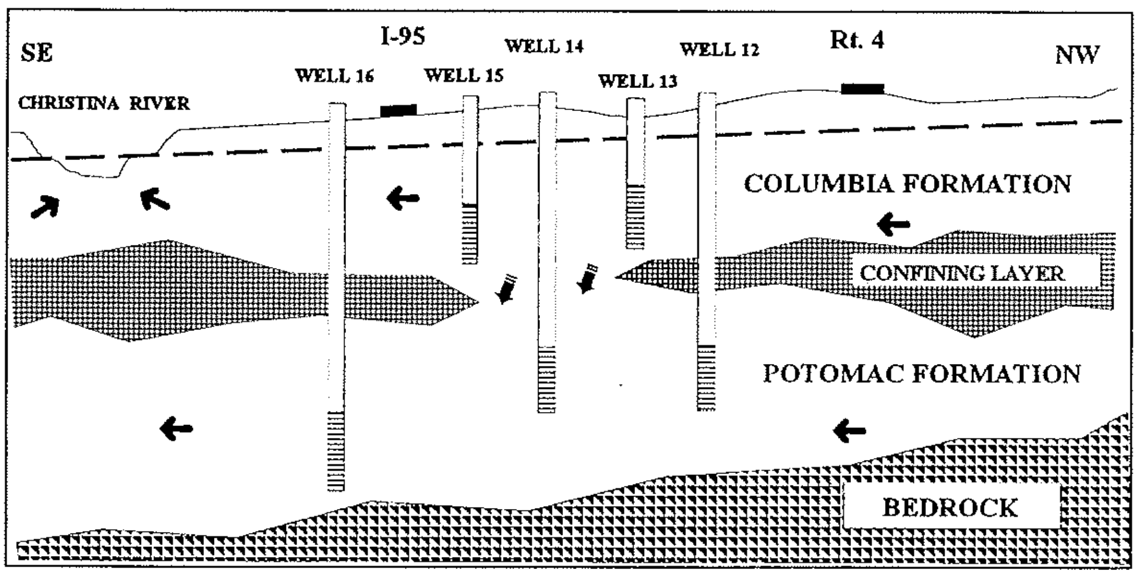
Appendix A Background Data Review/Compilation Summary
Appendix B Field Testing Program Summary
Appendix C South Wellfield Ground-Water Model Study
Appendix D South Wellfield Monitoring/Program Development Summary
Appendix E Well 16 Assessment Study
Appendix F Wellfield Automation Feasibility Study

2.0 SUMMARY OF KEY NEWARK SOUTH WELLFIELD CONSIDERATIONS

This section provides a very brief summary of the key points regarding geology and hydrogeology of the SWF, general water quality issues and trends, and other miscellaneous information regarding the SWF. Much of this information is discussed or presented in more detail throughout the rest of the report and in the appendices.

2.1 GENERAL SITE GEOLOGY/HYDROGEOLOGY

- The SWF is comprised of the Columbia Formation aquifer and the Potomac Formation aquifer (see schematic below - arrows indicate "non-pumping condition" ground-water flow directions). The Columbia Formation consists of coarse and medium sand and gravel, and ranges in thickness from 10 to greater than 60 feet in the SWF area. The underlying Potomac Formation consists of a varicolored silt and clay deposits with interbedded sand strata. The depth to bedrock in the SWF area is reported to be 90 to 170 feet.



- The Columbia aquifer is defined as the saturated portion of the Columbia Formation. This aquifer is considered to be unconfined throughout the SWF, as the ground-water table is typically within this formation.

- The Potomac aquifer is defined as the saturated portions of the Potomac Formation, predominantly the sand layers. In the southern and eastern portion of the SWF, the Potomac aquifer is separated from the Columbia aquifer by a confining layer of silt/clay, and is considered a confined aquifer in these areas. However, in other portions of the SWF, where the sands of the

Potomac Formation immediately underlie or subcrop beneath the sands of the Columbia Formation, the Potomac aquifer is considered unconfined/semi-confined.

- The general ground-water flow direction is from the northwest to the southeast in the SWF area toward the Christina River. Under non-pumping conditions, a ground-water divide is present north of the wellfield, with flow generally northeast toward White Clay Creek.
- Ground water can flow either upward or downward through the aquifer system based on the extent of pumping activities.
- Ground-water flow velocities in the Columbia aquifer are in the order of 100's of feet per year, whereas the velocities in the Potomac aquifer are much slower in the order of 10's of feet per year.
- The aquifer system in the Newark area provides up to 60% of the total baseflow in local streams and rivers.
- The average recharge rate in the vicinity of the SWF is 12 inches per year, or 560,000 gallons per day per square mile, which is approximately 25 to 30% of the average total precipitation.
- The safe yield of the SWF area is considered to be 2 to 3 million gallons per day.

2.2 WELLFIELD WATER QUALITY EVALUATION

- Elevated iron and manganese concentrations are common in the Coastal Plain aquifers of the mid-Atlantic area, especially in the Potomac aquifer of New Castle County and surrounding states. The cause of the naturally high concentrations is related to aquifer mineralogy and hydrogeochemistry.
- Elevated iron and manganese concentrations in the SWF during late 1989/early 1990's represent an aquifer-wide event, likely caused by a complex variety of natural (including climatic changes affecting precipitation/recharge rates, aquifer mineralogy, etc.) as well as man-induced (including overpumping during periods of reduced recharge, localized hazardous material releases, general urban land-uses, etc.) factors. The exact cause of the elevated metal concentrations remains unknown.
- Currently, the overall water quality in the Columbia aquifer is good, as Columbia aquifer wells have generally recovered from the early 1990's iron event much more quickly than Potomac aquifer wells, which remain impacted today.
- Various documented sources of ground-water contamination related to leaking underground storage tanks and spills of hazardous materials exist within the SWF, including those associated with the Lawn Doctor, Castle Mall Exxon, and Syntech sites.

- Low concentrations of volatile organic compounds, including benzene and tetrachloroethylene, have historically been detected in several SWF production wells.

- Given the uncertainty regarding the cause of the early 1990's high iron event, it is likely impossible to predict the factors which could lead to the reoccurrence of elevated concentrations in the SWF.

- Historically, iron has been more of a water quality problem than manganese with respect to complaints about the water supply.

2.3 KEY WELLFIELD FEATURES

- The SWF currently operates as a secondary (backup) water supply source for the City of Newark. It is pumped infrequently to supplement other water supply sources several times per year. Wells in the Columbia aquifer (4 wells) are presently pumped more frequently than wells in the Potomac aquifer (5 wells).

- The current approach to wellfield operation is effective and appropriate given the current operational requirements.

- The wellfield operated nearly continuously as a primary source of water supply for the City of Newark from the late 1960's through the end of 1992 when the White Clay Creek Water Treatment Plant came on line.

- Well 11 is pumped continuously to maintain pressure in the system and provide a consistent flow to the SWF treatment plant. Other wells are pumped infrequently, with the exception of Wells 16 and 19, which have not been pumped for water supply purposes since the early 1990's.

- The current DNREC wellfield allocation is 2.76 million gallons per day or 1915 gallons per minute.

- Recent operation of SWF wells show that actual pumping rates are below DNREC allocation limits.

- During long-periods of pumping activities, the wellfield can obtain recharge from the White Clay Creek drainage basin to the north.

- Iron concentrations decreased with time (sometimes significantly) in Wells 13, 15, and 16, and manganese concentrations decreased in Wells 13, 14, and 16 during pump test activities in November 1995, indicating localized short-term improvement in water quality associated with pumping.

- During September 1995, the SWF was pumped nearly continuously for a period of several weeks to provide additional water supply during drought, including Well 16 which was pumped to waste to supplement the surface water flow of the Christina River.

3.0 MONITORING PROGRAM RECOMMENDATIONS

A comprehensive monitoring program is recommended to collect and evaluate the primary data that are essential for effective wellfield management under any SWF operating scenario, including the current secondary water supply use or a future primary water supply use. The proposed monitoring program has 5 primary components: a location component, a monitoring parameter component, a frequency component, a procedure component, and a data evaluation and information management component. Recommendations for each of these components are presented in the following sections. The detailed technical basis for the development of these recommendations is included in **Appendix D (Monitoring Program/Pumping Schedule Development Summary).**

3.1 MONITORING LOCATIONS

It is recommended that at a minimum, all production wells (wells 11, 12, 13, 14, 15, 16, 17, and 19) and associated observation wells (wells 10 [see section 4.1.2 regarding the recommendation to modify this well to an observation well], OW-11, OW-14, OW-15, OW-16a, OW-17) be specified for monitoring. Observation wells CH-1A, CH-2A (Columbia aquifer wells), CH-1 and CH-2 (Potomac aquifer wells) should also be specified for monitoring. The benefit of the selection of these locations for monitoring is that they are equally distributed throughout the wellfield and are of a sufficient number to effectively monitor the Columbia and Potomac aquifers for the purposes of managing the SWF.

It is further recommended that all designated monitoring locations be surveyed, at minimum, for vertical control (i.e. elevation) to ensure that all data collected can be accurately compared in the future. The benefit of obtaining accurate vertical control for all of the monitoring locations is the elimination of one element of uncertainty regarding water level data that presently exists (note that current water level data assessment is based on estimated [+/- 5 feet] well elevation data at some wells), which will allow for a more accurate evaluation of water level conditions at the SWF. Estimated cost to complete a survey for the monitoring locations ranges from $3000 to $5000.

3.2 MONITORING PARAMETERS

It is recommended that all production wells be monitored for pumping rate, total pumpage, water level, and specific water quality parameters (field analytes - pH, conductivity, dissolved oxygen, temperature; laboratory analytes - total iron and manganese), and all designated observation wells be monitored for water level. The benefit of the selection of these parameters is that they include several items which are currently required to be monitored (such as water level, pumping rate, and total pumpage) as well as water quality parameters which will enable the City of Newark to effectively monitor the overall water quality of the SWF.

With regard to water level measurement, data collected from pumping wells will be useful for the long-term evaluation of well efficiency and determination of well rehabilitation requirements, whereas data collected from observation wells will be useful for the on-going evaluation of aquifer water levels in the Columbia and Potomac Formations.

The iron and manganese data are essential to the management of SWF pumping operations to minimize color, taste, or appearance problems for the water users. In addition, the measurement of additional field parameters (e.g. pH, conductivity, dissolved oxygen [DO], and temperature) may also be useful for indicating aquifer changes which can result in increased iron and manganese concentrations (for example, a decrease in pH coupled with a decrease in DO would indicate that the hydrgeochemistry of the aquifer is favorable for increased iron dissolution). Although these field parameters have been measured only sporadically in the past, it is expected that an expanded data base for these parameters will improve the usefulness of these relatively inexpensive data for evaluation of changing water quality in the aquifers.

The estimated costs associated with conducting a single monitoring event (as described above) are: 4 to 6 hours of field effort (City Water Department or intern staff or consultant/laboratory contractor staff) - $150 - $200; field parameter/water level measurement equipment rental - $50- $100; and laboratory cost (8 production well water samples for iron and manganese analysis) - $ 140; for a total estimated cost of $340 - $440 per event.

It is recommended that all water quality data, specifically volatile organic compound data, collected by the Delaware Department of Health and Social Services be incorporated into the proposed monitoring program. It should be noted that the Delaware Department of Health and Social Services (DDHS), Division of Public Health conducts quarterly and annual sampling of the wells in the SWF. Parameters monitored regularly by the DDHS include basic water quality parameters (pH, alkalinity, hardness, total dissolved solids) iron, manganese, and other inorganics (nitrate, chloride) and a suite of regulated and unregulated volatile organic compounds (VOCs). The VOCs are of special interest because several of these compounds have historically (and as recently as August 1995) been detected in several of the SWF wells, including Wells 10, 13, 14, 15, and 16, typically at concentrations below maximum contaminant levels (MCLs). Although not a focus of this study, organic compounds are a primary water quality concern, and as a result, the monitoring of these compounds is a very important component of wellfield management. Consequently, the benefit of incorporating the on-going DDHS activities into the monitoring program is that it provides additional data that are an integral part of the AMP.

3.3 MONITORING FREQUENCY

It is recommended that all production and observation wells be monitored monthly for the monitoring parameters specified in Section 3.2 (Monitoring Parameters). The benefit of monthly monitoring activities in the short-term is that it will ensure that a sufficient quantity of data is available to effectively support decisions regarding wellfield operation. The long term benefit is the development of a comprehensive data base that will be an important tool to further improve and refine the management of the wellfield in the future.

Monthly measurements are considered necessary given that the SWF can be subject to rapid changes in water quality (as was observed with the rapid increase in iron concentrations in June 1990, for example). Monthly monitoring should be conducted indefinitely as long as the wellfield remains in operation as a water supply source, regardless of the expected operating scenario (i.e. current, expanded, or continuous). It should be noted that no change in the frequency of the ongoing DDHS sampling activities (quarterly and annual sampling events) is recommended. However, City of Newark wellfield monitoring activities should be coordinated with DDHS sampling activities to minimize redundancy and limit additional sampling and analysis costs.

3.4 MONITORING PROCEDURES

The following general procedure is recommended to conduct the monthly monitoring event:

1. Visit each production well location and measure and record pumping rate (if pumping) and water level. Measure and record the water level in the associated observation well as appropriate. All water level measurements should be measured at the designated survey mark.

2. If the production well is pumping, a ground-water sample should be collected from the sample port and measured for field parameters (pH, DO, conductivity, temperature). A separate ground-water sample should be collected and submitted to the laboratory for total iron and manganese analysis. Water should be allowed to run from the sample port for a period of at least 5 minutes prior to the collection of any sample.

3. If the production well is not pumping, the well should be started and pumped for a period of no less than 24 hours prior to sampling activities as described in (2). This "well purging" activity will ensure that the ground-water samples collected are more representative of the actual aquifer conditions. **This is the preferred method of sample collection.**

   However, if a 24-hour purge period is not feasible, or if the data objective for collecting iron and manganese data is to determine the potential concentration of these analytes in the water system (as compared to in the aquifer) a well-purge duration of less than 24-hours (but greater than 1 hour) can also be implemented. However, iron and manganese concentrations measured using this approach could be substantially higher than actual aquifer concentrations. Consequently, iron and manganese concentrations collected using a shorter duration well purge event would represent a "worst-case" scenario for the SWF, and the data should be recorded and used with that uncertainty understood.

Once specific AMP recommendations are adopted by the City of Newark for the SWF, Tetra Tech will develop a detailed standard operating procedure (SOP) for monitoring activities as part of the final work product of this AMP.

3.5 DATA EVALUATION AND INFORMATION MANAGEMENT

It is recommended that all monitoring data be entered into an electronic spreadsheet/data base (Excel, Lotus, dBase, FoxPro, etc.) on a monthly basis, given a cursory review on a quarterly basis, and given a detailed review and evaluation on an annual basis by the City of Newark or its designate (e.g. Water Resources Agency, Delaware Geological Survey, consultant, etc.) to assess the overall status of the water level and water quality conditions of the SWF. The benefit of an electronic data base is that it allows for easy access to, and interpretation of, a large amount of information regarding the SWF, especially given that much of the historical data through November 1995 are now currently available in this electronic data base format as a result of this study. The benefit of the cursory quarterly and detailed annual review of the data is the ability to adjust the AMP (based on the collection of new data and identification of new trends or features) for optimal operation of the wellfield. It is anticipated that City of Newark Water Department staff can easily update the electronic data base on a monthly basis and provide the cursory quarterly data evaluation, as well as potentially conduct the annual evaluation. The estimated cost for a basic annual review and update to the AMP by an outside party ranges from $4000 to $6000.

4.0 PUMPING PROGRAM RECOMMENDATIONS

Three SWF operational scenarios were evaluated as part of the scope to develop optimum pumping program recommendations:

Scenario 1 The current operating scenario in which the SWF is only used infrequently as a secondary water source at current production rates;

Scenario 2 A future operating scenario in which the SWF continues to be used infrequently as a secondary water supply source but at improved/expanded production rates (i.e. higher than current production rates); and

Scenario 3 A future operating scenario in which the SWF is once again utilized continuously as a primary water source at the maximum allocated pumping rates.

Recommendations for pumping approaches for each of these scenarios are presented in the following sections. Specific recommendations regarding Well 16 are presented in Section 5.0 (Well 16 Recommendations). **The detailed technical basis for the development of these recommendations is included in Appendix C (South Wellfield Ground-Water Model Report) and Appendix D (Monitoring Program/Pumping Schedule Development Summary).**

It should be noted that no pumping program will be completely successful in limiting the potential for the reoccurrence of elevated iron concentrations in the SWF. Therefore, the uncertainty factor regarding future water quality, as related specifically to iron and manganese, should be considered carefully as part of the current operating scenario and any future operating scenario which includes expanded operations of the SWF. The cause of the iron problem in the early 1990's is not well understood, but appears to be related to aquifer-wide changes in hydrogeochemistry over a large area. Further, it is unlikely that another such high iron event could be predicted (or prevented) with any confidence in the future. Therefore, **it is possible that another high iron event could occur again at the SWF.**

Although uncertainty remains regarding the future water quality in the SWF with respect to iron and manganese, as well as other parameters of concern (e.g. VOCs), **the aquifer management pumping recommendations presented in this section are designed to improve the performance and overall effectiveness of the SWF, which are expected to result in the overall improvement in the quantity and quality of the water supply.** However, these procedures can only minimize the impact of elevated iron on the City of Newark water supply -- the only way to eliminate water quality uncertainty (with respect specifically to iron) under any type of SWF operation scenario is to eliminate or restrict use during periods of elevated iron or implement an iron treatment program.

4.1 CURRENT SWF OPERATIONS

The current SWF operations include two major components: 1) the continuous pumping of one well (historically and recently Well 11) to keep a minimum amount of water (approximately 100 to 120 gpm) moving through the South Wellfield treatment plant (chlorination and fluoridation) and maintain pressure in the water lines; and 2) the periodic, but infrequent, pumping from one or more additional wells to provide a secondary water supply to supplement the primary supply provided by the White Clay Creek water plant. The current operation production rate from the SWF is approximately 915 gpm, which is derived almost exclusively from wells 11, 13, 14, and 15, given that wells 10, 12, 16, and 19 are used very infrequently or not at all, and Well 17 is out of service.

The following recommendations address general well maintenance issues, the single-well continuous pumping element, and the various short-term and long-term pumping scenario elements applicable to the current use and operation of the SWF.

4.1.1 Well Inspection/Rehabilitation

No well rehabilitation activities are recommended under the current operating scenario. The current condition of the wells and existing production capability of the wellfield (approximately 915 gpm) appears to be suitable to meet the City of Newark's current needs for secondary water supply from the SWF, as this has been the capability for the last several years. Therefore, a comprehensive rehabilitation program would not provide any major added benefit for current operations. However, site-specific rehabilitation activities would be recommended if one of the major SWF production wells (such as Well 14 or 15) experienced operational problems (i.e. major reduction in well yield/specific capacity) attributable to well screen fouling/plugging, or additional production capacity was required for the SWF (see Section 4.2.1 - Expanded SWF Operations).

4.1.2 Well Abandonment/Repair/Retrofit

The following specific production well maintenance measures are recommended for the SWF under the current operating scenario:

1. **Well 10 -- This well should be removed from service as a production well and designated as a Potomac aquifer observation/monitoring well in the future.** Well 10 continues to have high iron concentrations (greater than 1 mg/l) and a relatively low yield (30 gpm during recent pumping activities), which is not optimum for continued operation. Abandonment as a production well would require the removal of riser pipe, pump, and other appurtenances from the well, and the installation of a protective locking well cap. Estimated cost for production well abandonment is $500 to $750.

2. **Wells 11, 13, 14, 15, and 19 -- These wells should be repaired or retrofitted to provide a water level measurement port to allow for accurate monitoring of pumping water levels.** All of these wells currently have inoperable or marginally operable air-line measurement devices (Wells 11, 13, 14, and 15) or no other means for water level measurement (Well 19). Repair or retrofit of these wells would require the modification of the wellhead assembly for a measurement port (the preferred alternative) or replacement/recalibration of air-line gauges, all of which would require that the well head be disassembled. Estimated cost for repair/retrofit is $250 to $1000 per well head if completed during other types of well rehabilitation activities which require pump removal or well head disassembly (see Section 4.2.1), or $1000 to $4000 per well head if not completed during other well rehabilitation activities.

4.1.3 Continual Pumping Requirements

It is recommended that a variety of wells, including Wells 14, 13, 11, and 15 (in decreasing order of preference), be used to replace Well 11 as the sole designated source to provide the necessary continuous minimum flow to the treatment plant. All wells should be used for some duration throughout the year. The selection of the most appropriate well for this task for any given time period should be based on a monthly evaluation of iron, manganese, and other water quality data provided by DDHS. The benefit of pumping multiple wells is that it will ensure that water of the highest quality will be incorporated into the City of Newark water supply. Using multiple wells throughout the year also provides an added benefit in that it promotes the cycling of water through different parts of the aquifer system, which may result in an overall improvement in the water quality of the aquifers, specifically the Potomac aquifer (Well 14).

The well matrix analysis and rationale supporting the selection of these wells for this task are provided in detail in Appendix D.

4.1.4 Various Pumping Scenario Recommendations

It is recommended that the optimum sequence for well operations during the one to three day, one month, and three month pumping scenarios be Well 13, 14, 11, 15, 12, 16, and 19. This performance sequence is a general guide only and should be reevaluated and adjusted prior to and during each well operation to account for the most recent iron, manganese, and other water quality data provided by DDHS. It should be noted that there is no pumping duration or additional water level restrictions (with the exception of those designated by the DNREC for the Potomac aquifer wells) specified with these pumping scenarios, as duration of pumping over the short-term does not affect the overall performance of the wellfield, as determined by the results of the ground-water model (see Appendices C and D). The benefit of this well sequence is that it identifies the wells which are likely to consistently provide ground water of the best quantity and quality based on a combination of factors including ease of operation, long-term iron and manganese concentrations, presence of VOCs, and pumping rate. The benefit of evaluating this sequence prior to each use using recent iron, manganese, and VOC data will ensure that the highest quality water is being extracted from the wellfield.

The results of the ground-water modeling and existing data evaluation indicate that short duration pumping of the wellfield at current maximum allocation rates, whether it be one day or three months, does not present any major concerns with respect to unacceptable expansion of well capture zones to impacted ground water at nearby sites of concern; overdraft of the aquifer (i.e. exceedence of safe yield); or detrimental aquifer drawdown affects. Consequently, the sequence provided is suitable for all pumping applications of less than 3 months in duration. However, the appropriateness of this sequence over the long-term is subject to change based on the evaluation of wellfield data in the future.

It is further recommended that this sequence be reevaluated and updated for applicability on a quarterly basis if the wellfield is used extensively, or on an annual basis if the wellfield is used only periodically, by the City of Newark or its designate. The benefit of the periodic reevaluation of the sequence is that it provides the ability to adjust the pumping scheme for optimal operation and performance of the wellfield. As stated previously for the monitoring data and evaluation recommendation, it is anticipated that City of Newark Water Department staff can conduct most of the cursory evaluation of the data on a periodic basis as well as potentially the annual evaluation, with some supplemental support from outside designates. Estimated cost for the periodic review and update of the AMP by an outside party ranges from $4000 to $6000.

The well matrix analysis and rationale supporting the development of this order are provided in Appendix D.

It is also recommended that all SWF wells, to the extent that water quality permits, be used more frequently than in the past as part of an attempt to cycle more water through the aquifer system, thereby potentially improving local water quality. The benefit to more frequent use of the wellfield is that cycling of the wellfield appears to be one of the factors which possibly has contributed to the improved water quality in the SWF since the early 1990's.

4.2 EXPANDED SWF OPERATIONS

The expanded SWF operation scenario would include one major component beyond that specified for current SWF operations: the increase in the reliable production capacity of the SWF. As stated in Section 4.1, the current reliable production rate of the SWF is approximately 915 gpm provided primarily by wells 11, 13, 14, and 15 -- this is only 48% of the DNREC allocated production rate (1915 gpm) for the SWF.

The recommendations presented in the following sections are designed to increase the reliable production capacity of the primary SWF wells (excluding **Well 16, recommendations for which are discussed separately in Section 5.0**) by nearly 35% (315 gpm), to an estimated capacity of 1,230 gpm (which is 64% of the DNREC allocation rate) under normal operating conditions, or by nearly 75% (685 gpm), to an estimated capacity of 1,600 gpm, under emergency drought conditions.

4.2.1 Well Inspection/Rehabilitation

It is recommended that all primary production wells (11, 13, 14, and 15) be inspected and rehabilitated to improve overall well efficiency and increase wellfield production potential. Rehabilitation of the wells could improve the yields of certain wells by 15 to 20% over current pump settings. For example, the yields at Well 11 (current production rate of 115 gpm vs. allocated production rate of 150 gpm), Well 13 (current 160 gpm rate vs. 180 gpm allocated rate), Well 14 (current 260 gpm rate vs. 325 gpm allocated rate), and Well 15 (current 380 gpm rate vs. 425 gpm allocated rate) could all probably be improved through well rehabilitation activities, thereby increasing the existing production capability of the SWF by approximately 165 gpm. The benefit of well rehabilitation in the short-term is that it will ensure maximum production capability from the SWF when needed, as well as reduce iron problems specifically related to well conditions. The long-term benefit includes the overall increase in the water supply capacity of the SWF.

Well inspection and rehabilitation typically involves the removal and retrofit of pumps; down-hole television inspection of the well casing and screen; and acid treatment combined with scouring and surging to address well encrustation. It should be noted that in the short-term, well rehabilitation would only be recommended for the most productive and frequently used wells at the SWF, as rehabilitation would not be necessary for other wells (such as Wells 12, 16, 19) used infrequently; however, all wells should be addressed eventually as part of the long-term wellfield management plan. Estimated cost for well inspection/rehabilitation (including oversight activities) ranges from $2,000 to $6,000 per well, based on overall pump and well condition.

4.2.2 Well Abandonment/Repair/Retrofit

The following specific production well maintenance/repair/retrofit measures are recommended for the SWF under the expanded operating scenario:

1. **It is recommended that Well 17 should be repaired (it reportedly had been pumping sand) and placed back into service as part of the SWF to increase wellfield production capability.** Well 17 has historically had a good yield (150 gpm allocated rate with total capacity up to 400 gpm), good water quality (iron and manganese concentrations of less than 0.3 mg/l and 0.05 mg/l, respectively), and has few, if any, capture zone impacts to consider, thereby making this well very attractive for reliable water supply. Repair of this well would require a down-hole television inspection of the well casing to investigate the extent of the problem prior to the determination of the corrective action. Estimated cost for repair of this production well cannot be determined until the specific problem is identified, however, it is expected to range from $1000 to $10,000.

   It should be noted that the recommendation to place Well 17 back into service is conditional because of the location of this well within the right-of-way of the proposed Old Baltimore Pike/Newtown Road, SR896 to SR72 connector road. According to the DELDOT Capital

Transportation Improvement Program (CTIP), Fiscal Years 1996 - 2001 report (DELDOT, 1995a), design on this roadway is slated for fiscal year 1998, with construction (if funded) planned for some period after the year 2001. However, neither the draft WILMAPCO FY 1997-1999 Transportation Improvement Program (TIP) project listing (WILMAPCO, 1996) nor the DELDOT CTIP, Fiscal Years 1997 - 2002 (DELDOT, 1995b) presently include this connector road, indicating that the project may have been placed on hold indefinitely or cancelled. Should the project ever proceed, the well would have to be abandoned and potentially replaced.

Consequently, the ultimate decision to return Well 17 to service should consider a cost/benefit or present worth analysis approach which incorporates: the cost of repairing and operating Well 17; the availability and cost to obtain water from other alternative sources; and the time to potential well abandonment (greater than 5 years from present). However, given the lengthy delay anticipated until the start of construction (i.e. greater than 5 years, with a possibility that it may never be constructed), it is likely that the cost/benefit of returning Well 17 to service is very feasible and viable at this time.

2. **It is recommended that all well pumps be inspected and repaired/retrofitted to ensure that the pump capacity exceeds (by at least 20%) the DNREC allocation limits for each well. Further, it is also recommended that larger sized pumps be considered for Well 13 (300 gpm) and Well 17 (400 gpm) for expanded production capacity during drought emergency conditions.** The benefit of having pump capacity that exceeds the DNREC allocation limit for any given well is the ability to ensure that the wells can produce at the allocation limit during periods of low water level, well specific capacity reduction, or other operational problems, all of which can contribute to an increase in the pressure head, which in turn will reduce pumping rates. Historically, the City of Newark has installed lower capacity pumps in these wells to prevent the overdraw of the aquifer and to simplify the operation of the wellfield; however, higher pump capacity for each well will provide more flexibility with the overall production capacity of the SWF. The estimated cost of retrofitting well pumps ranges from \$500 to \$3000 per pump.

   With regard to increased pump capacity for Well 13 (300 gpm) and Well 17 (400 gpm), these wells have historically demonstrated well yield capacity (based on the review of original pump test data) above their DNREC allocation rates of 180 gpm and 150 gpm, respectively. Although these higher rates are not believed to be sustainable for long-term operation of these wells, they could operate safely at higher capacities for a period of several days to several weeks (1 to 3 weeks) during emergency drought conditions where allocation rates are temporarily suspended (as occurred in September 1995). The benefit of higher capacity pumps in these wells is that an estimated 370 gpm of additional yield could be derived from these wells in an emergency situation. The estimated cost of replacing the pumps for these wells is \$2000 to \$3000 per pump.

   It should be noted that no other primary SWF well (including wells 11, 14, and 15) appears to have this additional emergency capacity based on a review of historical pump test data, as the current allocation rates for these wells are near their maximum capacity.

4.2.3 Continual Pumping Requirements

It is recommended that Well 17 (once returned to service) be incorporated into the sequence of wells proposed to replace Well 11 as the designated source to provide the necessary continuous minimum flow to the treatment plant. With Well 17 operational, the preferred operation sequence for this continuous pumping task is Well 17, 14, 13, 11, and 15. However, as specified previously, the selection of the most appropriate well for this task should be based on a monthly evaluation of iron, manganese, and other water quality data provided by DDHS.

The benefit of using Well 17 as one of the primary multiple wells to provide the continuous flow for the treatment plant is that it has historically provided water with consistently high quality (e.g. low iron). Although all of the primary wells are proposed to be used periodically to provide the continuous flow, Well 17 would provide probably the best quality and optimum quantity of water for this purpose.

4.2.4 Various Pumping Scenario Recommendations

It is recommended that Well 17 (once returned to service) be incorporated into the sequence of wells proposed for the one to three day, one month, and three month pumping scenarios. With Well 17 operational, the optimum sequence for operations is Well 13, 14, 17, 11, 15, 12, 16, and 19. This performance sequence is a general guide only and should be reevaluated and adjusted prior to and during each well operation to account for the most recent, iron, manganese, and other water quality data provided by DDHS.

Based on the matrix analysis presented in Appendix D, Well 17 is only listed third in the optimum pumping sequence because of its remote location. This remote location makes the operation of this well more difficult than some of the other wells in the SWF. However, because of its historic good water quality and lack of capture zone impacts, Well 17 can be an extremely reliable production well, in terms of quality and quantity, for the SWF.

4.3 CONTINUOUS WELLFIELD OPERATIONS

Continuous SWF operations would involve a change in the overall status of the SWF from a secondary water supply source to a primary water supply source for the City of Newark as part of a plan to reduce dependence on water provided by other purveyors. This would require that several, or potentially all, of the production wells in the SWF are returned to some type of continuous operation. The SWF is currently allocated by permit from the Delaware Department of Natural Resources and Environmental Control (DNREC) for up to 1915 gpm, or 2.76 million gallons per day (MGD), which is considered to be the "safe yield" for the wellfield during the average water year (see Appendix D for a detailed discussion of the "safe yield" of the SWF). Once again it should be noted that there is long-term uncertainty regarding water quality that should be fully considered as part of any plan to expand operations at the SWF. A treatment program remains the only way to eliminate the water quality uncertainty issue under the continuous wellfield operation scenario.

The following recommendations for pumping approaches for continuous operations are based on several considerations, including ease of operation, well capacity, historical water quality, and capture zone analysis (see Appendix C and D). The concept of safe yield for the SWF was also taken into consideration during the development of the pumping recommendations, and **is discussed in detail in Appendix D.**

It is recommended that any continuous wellfield operations be maintained within the allocated 2.76 MGD pumping rate, which is determined to be the "safe yield" of the SWF in an average water year. However, during long-term periods of water shortages, as defined by the Water Conditions Index (WCI) for Northern New Castle County, wellfield operations should be reduced to specified rates to ensure conservation of the water resources in the basin. The benefit of operating the wellfield within the safe yield in the long term will ensure that the SWF aquifer system is not overdrafted and adequate ground-water discharge rates to local streams and rivers are maintained. An added benefit of working within the current allocation rates is there are no additional permitting requirements to bring the SWF back to full production potential.

The proposed wellfield production rates under the continuous operating scenario are as follows:

WCI Value*	Estimated Corresponding SWF Safe Yield	Pumping Rate	% Reduction
>5.0	2.76 MGD	1915	0
4.5 - 5.0	2.48 MGD	1725	10
4.0 - 4.5	2.20 MGD	1530	20
3.5 - 4.0	1.93 MGD	1340	30
3.0 - 3.5	1.65 MGD	1145	40
2.5 - 3.0	1.38 MGD	960	50

* WCI Values: Wet (>10); Normal (10.0 - 5.0); Potential Shortage (5.0 - 3.0); Water Shortage (3.0 - 0.0)

Using this approach for a continuous pumping scenario, the average SWF pumping rate for a given month should not exceed the safe yield number associated with a given WCI value. For comparison purposes, the monthly WCI value has been 5.0 or less only 19 times from the period January 1981 through November 1995, or approximately 10.6% of the reporting period. Therefore, it appears that under the continuous pumping scenario, reduction of the SWF pumping rates would only be required on a periodic basis.

For example, the most recent time period where reduced pumping would have been required was during 1995, where a potential shortage (WCI value between 5.0 and 3.0) was recorded in February (4.89), June (3.59), July (3.68), and September (3.63), and a water shortage (WCI value less than 3.0) was recorded in August (2.79). Therefore, if the SWF had been operating in a continuous mode (i.e. being operated as a primary water supply source) during 1995, a reduction in pumping rates would have been recommended to be consistent with the "safe yield" of the aquifer system. A 10% reduction of the pumping rates below the allocated limit would have been recommended during March 1995 (to address February 1995 WCI value), whereas a 30% reduction would have been recommended during July, August, and October 1995 (to address June, July, and September 1995 WCI values), and a 50% reduction would have been recommended during September 1995 (to address the August 1995 WCI value).

Although it is important that the appropriate safe yield be maintained under a long-term continuous pumping scenario (i.e. periods greater than 3 to 6 months) to minimize stress on the aquifer system, it is probably not as important to maintain safe yield under short-term continuous pumping scenarios (less than 3 months duration, for example), even during periods of drought (such as the case in late summer/early fall 1995). The results of the ground-water model indicate that continuous short-term pumping scenarios do not extensively stress the aquifer system, as long as the aquifer system has the opportunity to recover between high capacity pumping periods.

It is recommended that the optimum sequence for any long-term continuous wellfield operations for specific wells be Well 17, 13, 14, 11, 15, 12, 19, and 16. As with all other pumping scenarios, this performance sequence is a general guide only and should be reevaluated and adjusted during operations to account for the most recent iron, manganese, and other water quality data provided by DDHS. The benefit of this general sequence is that it takes into account capture zone elements for each well, which for the highest ranked wells, will likely result in better water quality as the long-term pumping of these wells are expected to minimize the potential impacts from known ground-water problem areas in the SWF area.

5.0 WELL 16 RECOMMENDATIONS

Well 16 was specifically evaluated in terms of future use given its favorable production potential but high iron concentration. Future uses considered for Well 16 include those uses under the current SWF operation scenario (secondary water supply); an expanded SWF operation scenario (secondary water supply with increased use); and a continuous SWF operation scenario (primary water supply use). Additional discussion regarding the iron problem at Well 16 and recommendations for all three wellfield operation scenarios are presented in the following sections. The detailed technical basis for the development of these recommendations is included in Appendix E (Well 16 Assessment Study).

5.1 WELL 16 BACKGROUND

Well 16, which is screened in the Potomac aquifer, was formerly the most highly productive production well in the SWF, with a given allocation of 475 gpm (or a capacity to provide over .680 MGD), and a yield of over 600 gpm. This well pumped nearly continuously from July 1977 (when it was placed into service) until July 1990, at which time it was essentially removed from service because of unacceptable high iron concentrations (2 to 6 mg/l). Since that time it has not been used for City of Newark water supply, although during the drought period of early Fall 1995, this well was pumped to a nearby surface water feature to supplement surface water flow in the Christina River.

The current iron problem associated with the Potomac aquifer in the SWF is a function of two primary elements - the mineralogy of the aquifer material and the hydrogeochemistry of the aquifer water. The mineralogy of the aquifer material is the fundamental source of the iron (siderite, pyrite, and other iron oxyhydroxide compounds), whereas the aquifer hydrogeochemistry is what actually controls the release of dissolved iron to the ground water. The cause of the current iron problem appears to be a combination of a natural condition and specific aquifer-wide changes in hydrogeochemistry that resulted in the exceptionally high iron concentrations during 1989-1991.

Elevated iron concentrations are a common occurrence in the Potomac aquifers in New Castle County (Martin and Denver, 1982) and in other nearby states (Langmuir, 1969; Pyne, 1995) because of the natural combination of mineralogy and geochemistry which promotes the dissolution of iron in certain geochemical zones within the aquifer. Historically before the 1989 - 1991 time period, iron concentrations at the SWF were consistently higher in the Potomac aquifer wells (especially well 19 which was never used extensively because of high iron concentrations) as compared to Columbia aquifer wells. Specifically, water quality data collected from Well #16 during the late 1960's through the mid-1980's reveal that iron was often detected at concentrations above the 0.3 mg/l Secondary Maximum Contaminant Levels (SMCL), although usually only in a range of .3 to .8 mg/l (which is much less than the 1 to 12 mg/l iron concentrations detected after December 1989). Therefore, elevated levels of iron are not an unexpected feature in the Potomac aquifer. However, although iron concentrations in the range of 1 to 10 mg/l are common in the Potomac aquifer in other parts of New Castle County, concentrations in this range were not historically common at the SWF prior to 1989 - 1991.

The cause of the aquifer-wide changes in hydrogeochemistry which triggered the high iron concentrations in both the Columbia and Potomac aquifers is not well understood. It is probably related to a complex combination of factors, with both large and small scale components. On the large scale, changes in climate, which affected the quantity/rate and geochemistry of recharge water to the entire aquifer system, is probably a principal cause of the aquifer-wide changes. On the smaller scale, factors such as SWF pumping rates and pumping levels all probably contributed somewhat to the problem, but it is uncertain to what extent any specific small-scale factor contributed to the overall iron problem.

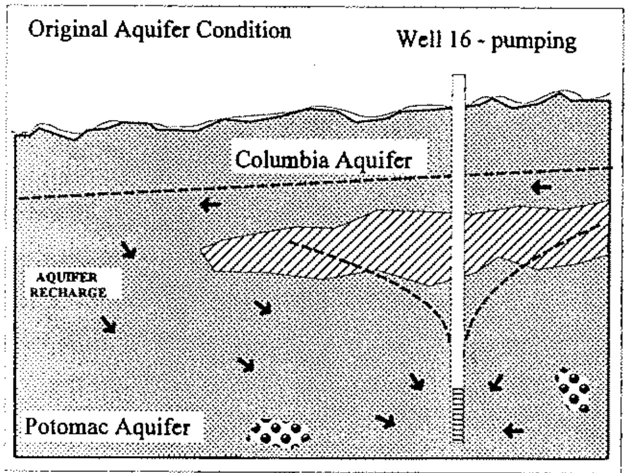
Regardless of what precipitated the iron problem in 1989, an elevated iron problem remains in the Potomac aquifer of the SWF. The primary reason that the iron remains a problem in the Potomac aquifer is that the hydrogeochemical conditions in the aquifer remain favorable for iron dissolution. This is in sharp contrast to the Columbia aquifer at the SWF, which has largely recovered from the high iron problem. An illustration of the historical and current conditions of the SWF aquifer system near Well 16 are presented on the following page.

It is believed that the Columbia aquifer has recovered from the iron problem because of major changes in the hydrogeochemistry within the aquifer, which is directly related to the nature of recharge and ground water flow through the aquifer. Given that the Columbia aquifer receives direct and relatively rapid recharge from precipitation (i.e. the aquifer responds within 30 to 40 days of a major precipitation event), provides baseflow to the Christina River and White Clay Creek, and has been pumped more extensively than the Potomac aquifer since 1989, ground-water moves through this aquifer system relatively quickly (as compared to the Potomac aquifer), at rates of 100's of feet per year. As a result of this "flushing of water" through the aquifer, conditions are no longer suitable for the extensive dissolution of iron in this aquifer, and iron is no longer a problem.

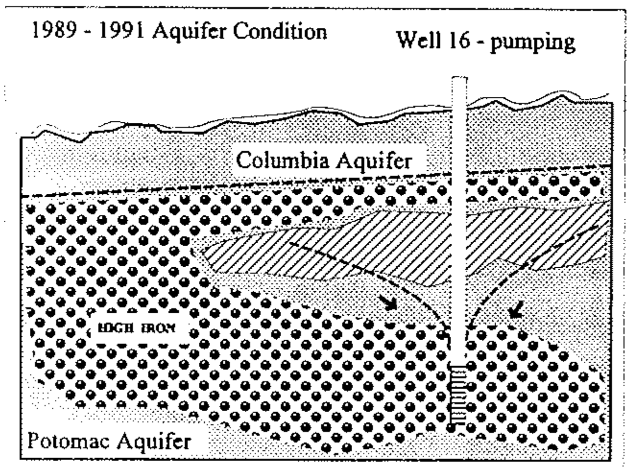
The movement of water through the Potomac aquifer is much different than the Columbia aquifer. Under non-pumping, natural conditions, the Potomac aquifer receives recharge from the overlying Columbia aquifer, either by leakage through the confining bed (where present) or by direct recharge where the confining bed is absent. The natural ground-water flow direction in this aquifer is "down-dip," or generally toward the Atlantic Ocean, with no major surface water body discharge points. Ground-water movement in this aquifer is very slow, typically on the order of only 10's of feet per year. However, during pumping conditions, ground-water movement can increase considerably.

The slow ground-water movement in the Potomac aquifer is one of the primary reasons that this aquifer continues to have high iron concentrations, as the hydrogeochemistry of the aquifer is not changing very quickly. **Consequently, it appears that iron concentrations in the Potomac aquifer (specifically as related to Well 16) can only be reduced in the short-term (i.e. months or years vs. decades) by inducing changes in aquifer geochemistry.**

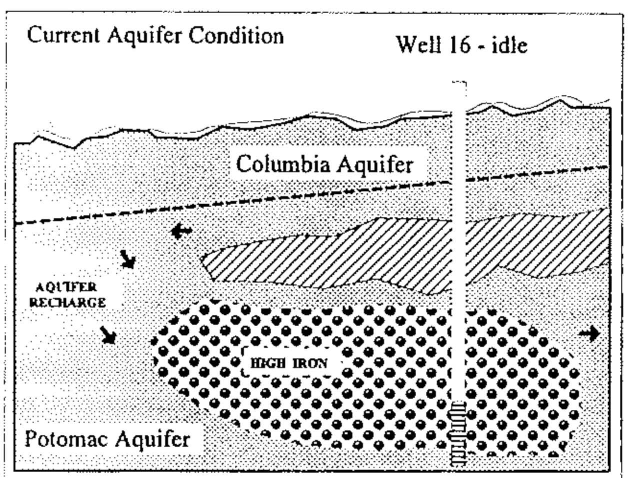
There are two potential options available to induce changes in aquifer geochemistry with respect to Well 16: Aquifer Storage Recovery (ASR) and Managed Pumping. A detailed assessment of these aquifer control options, as well as an iron treatment plant option (which is an alternative option for addressing the iron problem) are presented in Appendix E.



Original Aquifer Condition: Both the Columbia and Potomac aquifers are used for water supply in the SWF. Iron concentrations are very low in the Columbia aquifer, with occasional higher iron concentrations (.3 to .8 mg/l) in the Potomac aquifer. Pumping in the Potomac aquifer induces more recharge and ground-water flow from the Columbia aquifer into the Potomac aquifer, especially in areas where the confining layer is absent.



1989 - 1991 Aquifer Condition: Both the Columbia and Potomac aquifers are used for water supply in the SWF. Initially, changes in the Columbia aquifer hydrogeochemistry result in elevated concentrations of iron in the Columbia aquifer. Ultimately, iron concentrations in the Potomac aquifer also increase as a result of hydrogeochemical changes caused by the induced recharge and ground-water flow from the Columbia aquifer.



Current Aquifer Condition: The Columbia aquifer is the primary SWF water supply source; Well 16 is idle. Iron concentrations have decreased considerably in the Columbia aquifer because of favorable hydrogeochemical conditions, likely the result of the natural movement of recharge and ground-water through this aquifer (flushing) and possibly pumping activities. On the contrary, iron concentrations remain high in the Potomac aquifer because of hydrogeochemical conditions, and there is little movement of recharge and ground water through this aquifer given slow natural flow velocities and lack of pumping. Iron concentrations are expected to naturally diminish over time as recharge water from the Columbia aquifer water mixes with and moves through the Potomac aquifer, thereby changing the hydrogeochemistry. However, this natural process will be an extremely slow (10's to 100's of years).

5.2 CURRENT SWF OPERATIONS

It is recommended that Well 16 be pumped continuously as part of an attempt to improve the water quality (with respect to iron and manganese) in the Potomac aquifer in the SWF. More frequent pumping of other Potomac aquifer wells (including wells 12 and 14) is also recommended as part of the overall plan to address the Potomac aquifer (see Section 4.2.1). The benefit of an extended period of pumping for Well 16 is that it will generally increase the amount of water flowing through, as well as recharge to, the Potomac aquifer in this area. It is this "cycling of water" through the aquifer system which holds the best potential for reducing the iron concentrations in this aquifer in the short-term.

Initially, it is recommended that Well 16 be pumped at a rate of 400 gpm for a period of 6 weeks. The actual pump rate and duration of pumping will be determined after negotiation with DNREC regarding water use and discharge, as DNREC expressed some initial concern regarding this approach. DNREC indicated that such an approach may be considered if it was conducted for a brief period of time during a period of low ground water use (i.e. winter/spring). Consequently, the final approach to managed pumping of Well 16 will be determined in the future.

If the managed pumping approach is accepted, it will be implemented and reevaluated after a test period to determine if an improvement in water quality is being observed or sustained. If iron concentrations have improved to acceptable levels in this well, this well should be pumped continuously (at a rate of at least 100 to 200 gpm) to maintain some flow through this aquifer system. However, if iron concentrations are not sustained at an acceptable level or have not improved, a decision whether to continue with, or to cease pumping should be made based on the water quality trends (if any) shown by the monitoring data.

The estimated cost for this managed pumping approach would include the negotiation with DNREC (4 to 6 hours of technical effort - $500), collection of weekly iron and manganese samples (8 samples - $140), 4 to 8 hours of field effort and data evaluation ($150 - $500), and the cost of operating and maintaining Well 16 during this time period ($800 - $1000), for a total estimated cost of $1,600 to $2,200.

5.3 EXPANDED SWF OPERATIONS

It is recommended that a limited application aquifer storage recovery (ASR) approach be considered to enhance the short-term periodic pumping utility of Well 16, should the managed pumping approach be unsuccessful. However, the actual implementation of a ASR system at Well 16 should be based on a detailed cost/benefit assessment of this ASR approach versus other water supply alternatives (such as conjunctive use with other water purveyors) given the potentially high cost of ASR implementation. The benefit of the ASR approach is that it would allow for the return of Well 16 to production status at the DNREC allocation rate (475 gpm) under a short-term pumping (2 to 3 weeks), periodic use (3 to 4 times per year) scenario.

Three ASR approaches are feasible for Well 16: ASR1 (which utilizes Well 14 as the aquifer recharge source); ASR2 (which utilizes SWF Columbia aquifer wells as the aquifer recharge source); and ASR3 (which utilizes surface water sources [City of Newark, United Water, or Artesian] as the aquifer recharge source). Each have separate facilities renovation, operation and maintenance, and resulting cost considerations, all of which affect their ultimate feasibility as the most appropriate ASR approach.

At present, approach ASR1 or ASR2 could be implemented without major extensive facilities renovation if water quality remains good (with respect to iron) in the SWF, but additional study, design, and testing would be required prior to final implementation of this technology. Facilities renovation would include Well 16 pump replacement/retrofit (including wellhead modifications) and well rehabilitation; new SWF valve fittings (to enable water to be conveyed to Well 16); installation of a wellhead filtration device, flow and level indicators, etc. In addition to facilities renovation, ASR implementation would also require additional hydrogeologic characterization (the installation of 1 to 2 additional wells, source water characterization, etc.), cycle testing and monitoring, and the development of an implementation and operations plan. pH pretreatment facilities (to raise the pH of the recharge water to minimize further iron dissolution and mobilization in the aquifer) may also be required based on the results of the hydrogeologic characterization and cycle testing.

It should be noted that the ASR1 and ASR2 applications are highly susceptible to water quality changes (specifically iron) in the recharge water. However, the implementation of approach ASR3 (surface water sources) eliminates this uncertainty, but would require additional facilities renovation (such as major pipeline work for connection to Well 16) as well as potential pre-treatment requirements (as discussed previously), thereby increasing the cost and difficulty of this operation. The potential capital cost for ASR implementation ranges from $400,000 to greater than $800,000 (depending on the approach selected [ASR1, ASR2, or ASR3] and the pre-treatment and operational requirements), with operation and maintenance costs ranging from $1,000 to $5,000 per month of operation depending on monitoring, backflushing, and pre-treatment requirements.

See Appendix E for a detailed description and analysis of ASR approaches.

5.4 CONTINUOUS SWF OPERATIONS

It is recommended that an iron treatment plant be considered for any plan for the long-term continuous operation of Well 16. Given the uncertainty regarding the cause of the iron problem in the SWF, as well as the uncertainty as to whether or not the iron problem could worsen again in the future, treatment of the SWF water prior to use is the most feasible and reliable method (as compared to managed pumping method [which has a high degree of uncertainty] or aquifer storage recovery method [which is not conducive to continuous operation because of the cycling (i.e. recharge and discharge periods) requirements]) to ensure consistently good water quality on a continuous basis.

However, an iron treatment plant would not be cost-effective to address Well 16 exclusively, nor would it likely be cost-effective for any scenario less than full continuous pumping of the SWF. Rather it would likely only be viable for the entire SWF, as it would allow all of the other Potomac and Columbia aquifer wells to be utilized at their maximum "safe-yield" production rates, thereby optimizing the use of the water resources in the SWF.

The estimated capital cost for an iron treatment plant ranges from $.7M to $1.5M per million gallons per day (MGD) treated, or $1.9 M to $3.3 M for the maximum current allocated flow rate for the SWF (2.76 MGD). Operations and maintenance costs would range from $100 to $150 per million gallons treated.

6.0 WELLFIELD AUTOMATION RECOMMENDATIONS

Automation of the SWF was evaluated by first performing an inventory of existing wellfield instrumentation, then identifying the equipment that would be required to permit automation of various functions. A cost-benefit analysis of four automation alternative scenarios and two options was then conducted. Recommendations for both current and expanded wellfield operations follow, based upon information contained in Appendix F (Wellfield Automation Feasibility Study).

6.1 CURRENT SWF OPERATIONS

No automation of the wellfield is recommended under the current operating status, as the cost of automation outweighs the benefits given the infrequent operation of the SWF. The implementation of the recommendations presented in Section 4.1 (Pumping Program Recommendations - Current Wellfield Operations) are sufficient to effectively operate the wellfield under the current operating scenario of infrequent pumping activities.

6.2 EXPANDED SWF OPERATIONS

It is recommended that automation of some, or all, of the primary production wells (specifically Wells 17, 14, 15, 11, and 13 in order of priority) for remote monitoring and pump control be implemented as part of any plan to maximize the water production potential of the SWF. The benefit of automated monitoring and remote pump control is that it allows for more effective operation of the wellfield from the perspective of both day to day operation (including pump operation (on/off), water level, flow, and pressure monitoring) and long-term operation and management (automated data collection and reporting). The operation of the SWF would be more efficient with the automation of all of the primary production wells, however, Wells 17 and 14 would benefit the most with automation given their respective location problems (i.e. the remote location of Well 17 and the traffic hazard location of Well 14), followed by Wells 15 (longer drive for vehicle access), 11, and 13 (convenience).

The primary components of the automation plan include: the use of a remote telemetry unit (RTU) and digital control panel to permit the remote measurement and transmission of water level, flow rate, discharge line pressure, and power, as well as remote control of pump operation (on/off). In general, all data collected at the RTU would be sent to the a centrally located master telemetry unit (MTU), which together, with the selected computer support systems, comprise the Supervisory Control and Data Acquisition (SCADA) system (**see Appendix F for additional technical discussion regarding the automation system components**).

It should be noted that the remote monitoring of water quality parameters is not included in the automation plan as this instrumentation and operation is cost-prohibitive and adds little value to the system. The estimated cost for implementation of the selected automation plan ranges from $12,000 to $15,000 per well, or a total of $ 60,000 to $ 75,000 for the primary production wells.

6.2 CONTINUOUS SWF OPERATIONS

It is recommended that automation of the entire wellfield be implemented as part of any plan to operate the SWF continuously. The benefit of automating the entire wellfield under a continuous pumping scenario is that it allows for the most effective operation of the wellfield from the perspective of both day to day operation and long-term operation and management.

The automation components under the continuous operating scenario are the same as those recommended under the expanded operating scenario, with the exception that the automation plan would also include a remote leak detection option for water and chlorine releases at the chlorination plant. These additional automation systems provide additional critical operational information related to the treatment of the raw water.

The estimated cost for implementation of automation to the entire SWF is approximately $96,000 to $120,000.

7.0 AQUIFER MANAGEMENT PLAN SUMMARY

A summary of all of the recommendations proposed as part of this AMP are presented on Table 1. In addition, specific answers to the questions posed in the original RFP (City of Newark, 1995) follow:

1. **What wellfield management procedures should Newark implement in an attempt to limit the potential for reoccurrence of elevated iron concentrations in the water of the South Wellfield?**

   The cause of the elevated iron concentrations in the SWF is not well understood, but appears to be related to aquifer-wide changes in hydrogeochemistry over an extensive area. These changes likely came about as a result of a complex combination of several natural and possibly man-made factors, including large-scale elements such as aquifer mineralogy, climatic factors (i.e. daily, weekly, monthly, or yearly changes in recharge rates and aquifer levels) and ground-water recharge quality changes, as well as small scale elements such as changes in pumping rates and aquifer water levels. The SWF high iron event of the late 1980's/early 1990's appears to be a random and singular event; however, given the general lack of understanding regarding the exact cause of the event, it is considered unlikely that another such high iron event could be predicted with any confidence in the future. It is possible, however, that another high iron event could occur in the SWF.

   Given the complex nature of the aquifer system at the SWF and the large uncertainty regarding the exact cause of the iron problem, it is also considered unlikely that any specific wellfield management procedures would be successful in limiting the potential for the reoccurrence of elevated iron concentrations in the SWF. Consequently, the only wellfield management procedures that can be implemented presently to limit the impact of an aquifer-wide event of elevated iron concentrations on the City of Newark water supply are either: eliminate or restrict the use of water from the SWF during periods of elevated iron concentrations; or implement an iron treatment program for the SWF.

   Although it is unlikely that such a high iron event can be predicted or prevented with managed pumping of the SWF, a high iron event can potentially be mitigated with specific pumping activities. Pumping (or cycling) of the wellfield appears to be one of the factors which possibly has contributed to the improved water quality in the SWF since the early 1990's. Wells which have been pumped more frequently (such as Wells 11, 13, and 14) seem to have recovered more rapidly from the iron event compared to those pumped less frequently (such as Wells 10, 12, 15, and 16). Therefore, continued pumping operations during high iron events is a wellfield management procedure that is recommended to mitigate these types of events.

TABLE 1
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
A. CURRENT WELLFIELD OPERATIONS		
GOAL: To increase operational efficiency and collect necessary aquifer management data.		
A1. All production wells (wells 11, 12, 13, 14, 15, 16, 17, and 19) and associated observations wells (wells 10 [see Recommendation A7], OW-11, 0W-14, OW-15, OW-16A, OW-17, CH-1A, CH-2A, CH-1, and CH-2) should be specified for monitoring.	N/A	N/A
A2. All designated monitoring locations should be surveyed for vertical control (i.e., elevation) to ensure that all data collected can be accurately compared in the future.	$3000 - $5000	$3000 - $5000
A3. All production wells should be monitored monthly for pumping rate, total pumpage, water level, and specific water quality parameters (field analytes - pH, conductivity, dissolved oxygen, temperature; laboratory analytes - total iron and manganese), and all designated observation wells should be monitored for water level.	$340 - 440 per event	$4080 - $5280/year
A4. All water quality data, especially volatile organic compound data, collected by the Delaware Department of Health & Social Services should be incorporated into the proposed monitoring program.	$1000 - $2000	$1000 - $2000
A5. Standard operating procedures should be followed to conduct the monthly monitoring events to ensure comparability of the data.	N/A	N/A

TABLE 1 (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

	RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
A6.	All monitoring data should be entered into an electronic spreadsheet/database (Excel, Lotus, dBase, FoxPro, etc.) on a monthly basis, and given a cursory review on a quarterly basis and a detailed review and evaluation on an annual basis by the City of Newark or its designate (e.g., Water Resources Agency, Delaware Geological Survey, consultant, etc.) to assess the overall status of the water level and water quality conditions of the SWF.	\$4000 - \$6000/year	\$4000 - \$6000/year
A7.	Well 10 should be removed from service as a production well and designated as a Potomac aquifer observation/monitoring well in the future.	\$500 - \$750	\$500 - \$700
A8.	Wells 11, 13, 14, 15, and 19 should be repaired or retrofitted to provide a water level measurement port to allow for accurate monitoring of pumping water levels.	\$250 - \$4000/well	\$1250 - \$15,000
A9.	A variety of wells, including Wells 14, 13, 11, and 15 (in decreasing order of preference) should be in use in place of Well 11 to provide the necessary continuous flow to the treatment plant. The selection of the most appropriate well for this task should be based on a monthly evaluation of iron, manganese, and other water quality data provided by DDHS.	N/A	N/A
A10.	The optimum sequence for well operations during the one- to three-day, one-month, and three-month pumping scenarios should be Well 13, 14, 11, 15, 12, 16, and 19. This performance sequence is a general guide only and should be reevaluated and adjusted prior to and during each well operation to account for the most recent iron, manganese, and other water quality data provided by DDHS.	N/A	N/A
A11.	All SWF wells, to the extent that water quality permits, should be used more frequently than in the past as part of an attempt to cycle more water through the aquifer system, thereby potentially improving local water quality.	N/A	N/A

TABLE 1 (continued)

SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
A12. The operation sequence should be reevaluated and updated for applicability on a quarterly basis if the wellfield is used extensively, or on an annual basis if the wellfield is used only periodically by the City of Newark or its designate.	Cost included as part of Recommendation A6	
A13. Well 16 should be pumped continuously for a period of 6 weeks as part of an attempt to improve the water quality (with respect to iron and manganese) in the Potomac aquifer in this portion of the SWF. If water quality improves to acceptable levels during the extended pump test, then this well should be pumped continuously at a rate of 100 to 200 gpm to maintain flow through this aquifer system. More frequent pumping of other Potomac wells (including Wells 12 and 14) should also be implemented, whenever possible to promote the cycling of water through the Potomac aquifer.	\$1600 - \$2200	\$1600 - \$2200
A14. No automation of the wellfield is recommended under the current operation scenario, as the cost of automation outweighs the benefits given the infrequent operation of the SWF.	N/A	N/A
CURRENT WELLFIELD OPERATIONS - ESTIMATED COST	Capital Cost Annual O&M Cost	\$7,350 - \$25,000 \$8,080 - \$11,280/yr

TABLE 1 (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
B. EXPANDED WELLFIELD OPERATIONS		
GOAL: To increase reliable production capacity of the SWF from 915 gpm (current) to 1230 gpm (normal capacity) or 1600 gpm (emergency operating conditions, exclusive of Wells 12, 16, and 19) or to 1630 gpm (normal operating conditions) and 2000 gpm (emergency operating conditions), inclusive of Well 16.		
B1. All recommendations presented for the current wellfield operations (A1-A14) should be implemented.	N/A	\$7350 - \$25,000 \$8000 - \$11,280/yr (O&M)
B2. All primary production wells (11, 13, 14, and 15) should be inspected and rehabilitated to improve overall well efficiency by 15 to 20% and to increase wellfield production potential.	\$2000 - \$6000/well	\$8000 - \$24,000
B3. Well 17 should be repaired, rehabilitated, and placed back into service as part of the SWF.	\$1000 - \$10,000	\$1000 - \$10,000
B4. All primary production well pumps should be repaired/retrofitted to ensure that the pump capacity exceeds (by at least 20%) the DNREC allocation limits for each well.	\$500 - \$3000/pump	\$2000 - \$12,000
B5. Larger size pumps should be considered for Well 13 (300 gpm) and Well 17 (400 gpm) for expanded production capacity during drought emergency conditions.	\$2000 - \$3000/pump	\$4000 - \$6000

TABLE 1 (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
B6. Well 17 should be incorporated into the well sequence (Wells 17, 14, 13, 11, and 15—in decreasing order of preference) to provide the necessary continuous flow to the treatment plant, and incorporated into the well sequence (Wells 13, 14, 17, 11, 15, 12, 16, and 19—in decreasing order of preference) for one- to three-day, one-month, and three-month pumping scenarios.	N/A	N/A
B7. A limited application aquifer storage recovery (ASR) approach should be considered to enhance the short-term periodic pumping utility of Well 16. However, the actual implementation of the ASR system should be based on a detailed cost/benefit assessment of the ASR approach versus other water supply alternatives (such as conjunctive use with other water purveyors).	N/A	$300,000 - $800,000 (capital cost) $8000 - $80,000/yr (O&M)
B8. Some, or all, of the primary production wells (Wells 17, 14, 15, 11, and 13—in decreasing order of preference) should be automated for remote monitoring and pump control (on/off) to improve operation efficiency and data collection efforts.	$12,000 - $15,000/well	$60,000 - $75,000
EXPANDED WELLFIELD OPERATIONS ESTIMATED COST	Capital Cost (excluding Well 16 ASR)	$82,350 - $152,000
	Capital Cost (including Well 16 ASR)	$382,350 - $952,000
	Annual O&M Cost (excluding Well 16 ASR)	$8080 - $11,280/yr
	Annual O&M Cost (including Well 16 ASR)	$16,000 - $91,000/yr

TABLE 1 (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN
RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
C. CONTINUOUS WELLFIELD OPERATIONS		
GOAL: To operate the SWF on a continuous basis to obtain the highest quantity of water at the highest quality.		
C1. All recommendations presented for current and expanded wellfield operations (A1-A14 and B1- B8 [excluding B7 - ASR at Well 16]) should be implemented.	N/A	\$82,350 - \$152,000 \$8080 - \$11,280/yr (O&M)
C2. Any expanded wellfield operations should be maintained within the allocated 2.76 MGD pumping rate, which is determined to be the approximate safe yield of the SWF in an average water year. However, during periods of water shortage, as defined by the Water Conditions Index (WCI) for Northern New Castle County, wellfield operations should be reduced to specified rates to ensure conservation of water resources.	N/A	N/A
C3. The optimum sequence for any long-term continuous operations should be Wells 17, 13, 14, 11, 15, 12, 19, and 16. As with all other pumping scenarios, this sequence should be reevaluated and adjusted during operations to account for the most recent iron, manganese, and other water quality data provided by DDHS.	N/A	N/A
C4. An iron treatment plant should be considered as part of any plan for the continuous operation of the SWF.	N/A	\$1.9M to \$3.3M (capital cost) \$100,000 - \$150,000 per year (O&M)

TABLE 1 (continued)
SUMMARY OF NEWARK SOUTH WELLFIELD AQUIFER MANAGEMENT PLAN RECOMMENDATIONS

RECOMMENDATIONS	ESTIMATED UNIT COST	ESTIMATED TOTAL COST
C5. Automation of all of the wellfield for remote monitoring and pump control (Wells 12, 16, and 19 only given that other wells are proposed for automation under expanded operations) should be implemented as part of any plan to maximize the water production potential of the SWF.	$12,000 - $15,000/well	$36,000 - $45,000
CONTINUOUS WELLFIELD OPERATIONS ESTIMATED COST	Capital Cost (All A, B, and C recommendations except Well 16 ASR)	$2.018M - $3.495M
	Annual O&M Cost	$108,080 - $161,280/yr

2. **When additional supply is needed for one to three days, what is the optimal sequence for turning on the wells?**

   The optimum sequence for well operations during the one to three day pumping scenario is as follows: Well 13, 14, 17 (if returned to service), 11, 15, 12, 16 and 19. This performance sequence is a general guide only, and should be reevaluated prior to each well operation to account for the most recent iron and manganese data. For example, if the most recent iron data indicate concentrations of 0.1 mg/l, 1.0 mg/l, .25 mg/l, 1.0 mg/l, and total VOC concentrations of 0.003 mg/l, 0.004 mg/l, <0.001mg/l, and 0.002 mg/l for wells 13, 14, 17, and 11, respectively, then the optimum operation sequence would be wells 17, 13, 14, and 11. It should be noted that there is no pumping duration specified with this pumping scenario, as duration of pumping over the short term (i.e. one to three days) does not affect the overall performance of the wellfield.

   The optimum sequence should be reevaluated for applicability on a quarterly basis if the wellfield is used extensively, or on an annual basis is used only periodically.

3. **At what drawdown level should the Newark turn off a particular well? Can the well be throttled back to reduce drawdown or should the well be turned off to facilitate recovery of the aquifer?**

   Drawdown levels in the Potomac aquifer production wells should not exceed those required by the allocation permit for Wells 12 (120 feet below land surface [ft. bls]), 14 (106 ft. bls), 16 (129 ft. bls), and 19 (117 ft. bls). These drawdown levels will ensure that the water level surface in the well will not drop below the top of the well screen for these Potomac aquifer well locations.

   No other drawdown levels are proposed as part of the AMP. Drawdown control is not considered necessary during most pumping scenarios to manage water levels in either the Columbia or Potomac aquifers under average climatic conditions. Even during full operation, the withdrawal from the wellfield is considered to be within the range of the safe yield for these aquifers during normal water years. However, the collection of aquifer water level data from area observation wells as part of the proposed monitoring program will provide more information in the future regarding whether or not drawdown levels will need to be considered as part of the wellfield management procedures.

   Reduction in total SWF pumping rates should be considered, however, during periods of potential water shortages, as determined by the Delaware Geological Survey (DGS) Water Conditions Index (WCI) for Northern New Castle County. The reduction of pumping rates during these periods will ensure that the aquifers are not extensively "dewatered," the safe yield is not exceeded, and ground-water discharge to streams is maintained. It should be noted that long-term drawdowns in the aquifers was one of the factors that was previously suspected to contribute to the iron problem. During periods when the WCI is below 5 for more than one month (the start of "potential shortage" conditions), the total pumping rates from each aquifer should be reduced based on the safe yield determinations discussed in Appendix D (Safe Yield Pumping Considerations). However, the actual reductions, if any, will be based on City water supply requirements and the status of any City or State drought requirements.

4. **If every drop of water is needed for one month, how will the start-up sequence and pumping duration of each well change?**

   The optimum sequence for well operations during the one month pumping scenario is the same as the one- to three-day pumping scenario: Well 13, 14, 17 (if returned to service), 11, 15, 12, 16, and 19. Once again, this performance sequence is a general guide only, and should be reevaluated prior to each well operation to account for the most recent water quality data. There is also no pumping duration specified with this pumping scenario, as duration of pumping during this period (one month is still considered short-term) does not affect the overall performance of the wellfield.

   Pre- and post- pumping operation wellfield monitoring data (which are collected monthly) should be compared to ensure optimum wellfield operation and water quality control. As with the one- to three-day pumping scenario, the optimum sequence should be reevaluated for applicability on a quarterly basis if the wellfield is used extensively, or on an annual basis is used only periodically.

5. **If every drop of water is needed for three months, how will the start-up sequence and pumping duration for each well change?**

   The start-up sequence and pumping duration for the three month pumping operation is the same as that specified for the one month pumping operation. However, the appropriateness of each well used during this pumping period should be reevaluated each month based on the new water quality data collected. If water quality complaints are received between monthly sampling events, additional water quality sampling should be conducted to determine the source of the problem.

6. **If the wells are needed continuously, what procedures should be followed on a continuous basis to limit the resulting reduction in potentiometric levels in each aquifer?**

   There are limited data currently available regarding the range of potentiometric levels in the Columbia and Potomac aquifers at the SWF. Historically, water level data have only been collected for the pumping wells, which can not be directly correlated with the actual potentiometric levels in the aquifers because of well losses. Consequently, there are currently no historical basis or guidelines that can be applied to establish minimum potentiometric levels that should be maintained for the SWF aquifers, with the exception of the allocation permit pumping level requirements for Potomac aquifer wells. However, this information will become very important to manage pumping in the wellfield should the SWF expand in operation.

   The monthly water level monitoring proposed for the SWF observation wells will provide the information necessary to evaluate the range of potentiometric levels in the Columbia and Potomac aquifers, and determine the minimum potentiometric levels that are most appropriate for the SWF. At a minimum, it is anticipated that if the wellfield is operated within the range of the safe yield (as discussed in Appendix D), potentiometric levels in the aquifers should be consistent with overall climatic conditions.

7. If the wells are not needed for one to three months, how should the wells be exercised/cycled in any particular order; run for any particular length of time; operated how often?

It is recommended that the wells be operated as frequently as possible to keep water cycling through the aquifer system. At a minimum, the operation of Wells 17 (if returned to service), 13, 14, and 11 should be alternated under the currently operating scenario to provide the continuous flow to the treatment plant. In addition, other wells should be used as frequently as possible (water quality conditions permitting) to keep aquifer conditions current. Further, Well 16 should also be pumped continuously for a period of 6 weeks as part of an attempt to improve the water quality in the Potomac aquifer in this area of the wellfield.

The results of the field testing indicate that iron and manganese concentrations can initially be high in wells that have been idle, but after 2 to 3 days of pumping water quality can improve considerably. Therefore, all wells that have been idle for a period of time should be pumped for a period of 2 to 3 days prior to any anticipated use, if possible, to ensure the best water quality in the water supply system.

8.0 REFERENCES

The following references have been reviewed or cited in the development of this SWF Aquifer Management Plan:

Andres, A.S., 1994, Causes of High Iron Concentrations in Newark's South Well Field: Unpublished letter report.

Boggess, D.H., and Adams, J.K., 1963, Water-table, surface-drainage, and engineering soils map of the Newark area, Delaware: U.S. Geological Survey Hydrologic Investigations, Atlas HA-64, 1:24,000.

Borden, R.C., Gomez, C.A., and Becker, M.T., 1995, Geochemical Indicators of Intrinsic Bioremediation: Ground Water, vol. 30, no. 2.

Chapelle, F.H., 1992, Ground-Water Microbiology and Geochemistry: John Wiley and Sons, Inc., New York.

Chapelle, F.H., and Lovely, D.R., 1992, Competitive Exclusion of Sulfate Reduction by FE(III)-Reducing Bacteria: A Mechanism for Producing Discrete Zones of High-Iron Ground Water: Ground Water, v. 30, no. 1.

Cheng, A.H.D., and Andres, A.S., 1994, Groundwater Modeling for Well Head Protection under Hydrological and Geological Uncertainties: University of Delaware Water Resources Center.

Conklin, H., 1946, Utilization of groundwater storage in stream system development: Transactions of the American Society of Civil Engineers, v.111, p. 275-305.

Delaware Department of Natural Resources and Environmental Control, 1995b, Facility Evaluation Report for the Syntech Site: Unpublished report.

Delaware Department of Natural Resources and Environmental Control, 1994b, Newark South Well Field Sample Procedure Summary; letter correspondence from Paul Will to Gerald Kauffman, Water Resources Agency for New Castle County; November 2, 1994.

Delaware Department of Natural Resources and Environmental Control, 1995a, Newark South Well Field Sampling Results; letter correspondence from Paul Will to Gerald Kauffman, Water Resources Agency for New Castle County; January 9, 1995.

Delaware Department of Natural Resources and Environmental Control Water Supply Branch, 1979, Public Water Systems in Delaware; Document No. 40-08/79/03/3.

Delaware Department of Natural Resources and Environmental Control Water Supply Branch, 1994a, Water Use Reports for the City of Newark South Well Field in 1993; January 28, 1994.

Delaware Department of Natural Resources and Environmental Control Water Supply Branch, 1995b, Water Use Reports for the City of Newark South Well Field in 1994; January 23, 1995.

Delaware Department of Transportation, 1995a, DELDOT Capital Transportation Improvement Program, Fiscal Years 1996 - 2001; unpublished report.

Delaware Department of Transportation, 1995b, Draft DELDOT Capital Transportation Improvement Program, Fiscal Years 1997 - 2002; unpublished report - 12/14/95.

Delaware Geological Survey, 1993a, Proposal for City of Newark Ground-Water Quality Investigation; letter correspondence from John Talley to Carl Luft, City of Newark; March 29, 1993.

Delaware Geological Survey, 1993b, Sample Results for PW-15 and PW-16; letter correspondence from A. Scott Andres to Ronald Gardner, City of Newark; October 4, 1993.

Delaware Geological Survey, 1993c, Part I Pilot Environmental Release and Aquifer Monitoring Project; letter correspondance from John Talley to Bernard Dworsky, Water Resources Agency for New Castle County; October 27, 1993.

Delaware Geological Survey, 1993d, City of Newark Production Wells - South Wellfield Pump Rate Data; DOS Text File WRAUSE1.LST, November 5, 1993.

Delaware Geological Survey, 1993e, Part I Pilot Environmental Release and Aquifer Monitoring Project, Pump Test Results; letter correspondance from John Talley to Bernard Dworsky, Water Resources Agency for New Castle County; November 17, 1993

Delaware Health and Social Services, 1994a, September 16, 1994 Volatile Organic Chemical Results for Miscellaneous Newark Wells; letter correspondance from Laura Gannon to Joe Dombrowski Newark Water Department; November 9, 1994.

Delaware Health and Social Services, 1994b, September 16, 1994 Volatile Organic Chemical Results for Miscellaneous Newark Wells; letter correspondance from Laura Gannon to Jerry Kauffman, Water Resources Agency for New Castle County; November 23, 1994.

Delaware Health and Social Services, 1995a, Newark South Well Field Sample Results, May 1995; letter correspondance from Donna Stulir to Tom Fitz, Tetra Tech; August 14, 1995.

Delaware Health and Social Services, 1995b, Newark South Well Field Sample Results, Third Quarter 1995; letter correspondance from Barbara Ashby to Tom Fitz, Tetra Tech; September 21, 1995.

Delaware Health and Social Services, 1996, Routine Chemical Analyses Data for Newark Surface Water Plant (5/24/95 - sample date), United Water Stanton and Churchmans Plant (10/19/95 - sample date), facsimile received 2/27/96 and various telephone conversations.

Delaware State Board of Health, 1989, State of Delaware Regulations Governing Public Drinking Water Systems, Title 16, Section 122 (3) (c) of Delaware Code.

Domenico, P.A. and Schwartz, F.W., 1990, Physical and Chemical Hydrogeology: John Wiley & Sons, New York, New York.

Driscoll, F.G, 1986, Groundwater and Wells: Johnson Division, St. Paul, Minnesota.

Duffield Associates, Inc. and CH2M Hill, 1994a, Newark South Well Field Evaluation; unpublished report to the City of Newark, June 30, 1994.

Duffield Associates, Inc., 1994, Newark South Well Field Technical Roundtable Group Comment Responses; letter correspondance from Glenn Elliot to Bernard Dworsky, Water Resources Agency for New Castle County; September 16, 1994.

Duffield Associates, Inc. and CH2M Hill, 1994b, Discussions Regarding Origin of Elevated Iron and Manganese Concentrations From Columbia and Potomac Aquifer Production Wells in the City of Newark's South Wellfield; memorandum from Mark Lucas to Carl Luft, City of Newark; November 3, 1994.

Freeze, R.A. and Cherry, J.A., 1979, Groundwater: Prentice-Hall, Inc., Englewood Cliffs, New Jersey

Johnston, R.H., 1973, Hydrology of the Columbia (Pleistocene) deposits of Delaware: An appraisal of a regional water-table aquifer: Delaware Geological Survey, Bulletin No. 14, 78 p.

Jordan, R. R., and Woodruff, K.D., 1982, A Numerical Indicator of Water Conditions for Northern Delaware: Delaware Geological Survey Open File Report No. 18, May 1982.

Langmuir, D. 1969, Geochemistry of Iron in a Coastal-Plain Ground Water of the Camden, New Jersey, Area: U.S. Geological Survey, Professional Paper 650-C.

Maidment, D.R. (editor), 1993, Handbook of Hydrology: McGraw-Hill, Inc., New York, New York.

Martin, M., 1984, Simulated ground-water flow in the Potomac Aquifers, New Castle County, Delaware: U.S. Geological Survey Water-Resources Investigations Report 84-4007.

Martin, M.M., and Denver, J.M., 1982, Hydrologic data for the Potomac formation in New Castle county, Delaware: U.S. Geological Survey, Water-Resources Investigations, Open-File Report 81-916, 148 p.

Mather, J.R., 1978, The Climatic Water Budget in Environmental Analysis: Lexington Books/D.C. Heath and Company, Lexington, Massachusetts.

McCurdy, W.H, University of Delaware, Department of Chemistry and Biochemistry, 1994, Improper Deductions from Electrode Potential Measurement of Water Well Samples; Memorandum from Wallace H. McCurdy, Jr. to Joseph Dombrowski, City of Newark; October 7, 1994.

McMahon, P.B., Don Vroblesky, Paul Bradley, Francis Chapelle and Cheryl Gullett, Evidence for Enhanced Mineral Dissolution in Organic Acid-Rich Shallow Ground Water: Ground Water Vol. 33, No. 2, March-April 1995.

Mineralogy Incorporated, 1994, Core Analysis Results from Selected Core Intervals from the CH2M Hill, Newark South Well Field Water Quality Study; letter correspondence from Timothy Murphy to Robert Varrin, Duffield Associates, Inc.; April 21, 1994.

Newark Water System Advisory Committee (NWSAC), 1991, City of Newark Water System Analysis Report: unpublished report, September 1991.

City of Newark, 1995a, South Wellfield Management Plan Request for Proposal: unpublished report, March 1995.

City of Newark, 1995b, Council Meeting Minutes; May 22, 1995.

Nyer, E.K., 1985, Groundwater Treatment Technology: Van Nostrand Reinhold Company, New York, New York

Petty, S., Miller, W.D., and Lanan, B.A., 1983, Potential for ground-water recharge in the coastal plain of northern New Castle County, Delaware: Delaware Geological Survey, Open File Report, No. 28, Sheet 1: Newark-Wilmington Area, Scale 1:24,000.

Pyne, D.G., 1995, Groundwater Recharge and Wells - A Guide to Aquifer Storage Recovery: Lewis Publishers/CRC Press, Boca Raton, Florida.

Steel, E.W., and McGhee, T.J., 1979, Water Supply and Sewerage; McGraw Hill, New York, New York.

Sundstrom, R.W., and Pickett, T.E., 1971, The availability of ground water in New Castle County, Delaware: University of Delaware Water Resources Center, 156 p.

Tetra Tech, Inc., 1995, Technical Proposal -- Aquifer Management Plan for the City of Newark South Well Field, Newark, Delaware, April 18, 1995.

United States Geological Survey, 1953, Photorevised 1985, Engineering Soils and Water-Table Map: Newark East Quadrangle, Scale 1:24,000.

Wang, B., 1994, Groundwater Modeling for Wellhead Protection in Newark, Delaware: (MS Thesis), University of Delaware.

Water Resources Agency for New Castle County, 1993, EPA GIS Groundwater Modeling Pilot Project; letter correspondence from Gerald Kauffman to Mike Paquette, Vigyan, Inc.; October 1, 1993.

Water Resources Agency for New Castle County, 1994a, Newark South Well Field Evaluation; letter correspondence from Bernard L. Dworsky to Dr. Robert D. Varrin, P.E., P.G., Duffield Associates, Inc.; August 31, 1994.

Water Resources Agency for New Castle County, 1994b, September 27, 1994 Technical Roundtable Group Agenda; letter correspondence from Bernard L. Dworsky to Technical Roundtable Group, Newark South Wellfield Evaluation; September 2, 1994.

Water Resources Agency for New Castle County, 1994c, Technical Roundtable Summary regarding Newark South Well Field Evaluation; letter correspondence from Bernard L. Dworsky to Carl F. Luft, Newark City Manager; October 5, 1994.

Water Resources Agency for New Castle County, 1993, Water resource protection areas for City of Newark, City of Wilmington, New Castle County, Delaware: Scale 1:24,000.

Wilmington Metropolitan Area Planning Council (WILMAPCO), 1996, Draft WILMAPCO FY 1997-1999 Transportation Improvement Program (TIP) project listing; unpublished report , February 21, 1996.

Woodruff, K.D., 1970, General ground-water quality in fresh-water aquifers of Delaware: Delaware Geological Survey, Report of Investigations, no. 15, 22 p.

Woodruff, K.D., 1978, Geohydrology of the Newark area, Delaware: Delaware Geological Survey, Hydrologic Map Series, No. 2, scale 1:24,000, 2 sheets.

Woodruff, K.D., and Thompson, A.M., 1972, Geology of the Newark Area, Delaware: Delaware Geological Survey, Geologic Map No. 3, 1:24,000.

Woodruff, K.D., Miller, J.C., Jordan, R.R., Spoljaric, N., Pickett, T.E., 1972, Geology and Ground water, University of Delaware, Newark, Delaware: Delaware Geological Survey, Report of Investigations No. 18, 40 p.

The following well logs on file at the Delaware Geological Survey were also reviewed as part of the development of this AMP:

Db32-16[j]	Db22-53	Db22-36	Db22-33	Db21-20	Db21-17
Db21-18	Db21-15	Db11-36	Db11-28[b]	Db11-31	Db11-32
Db11-33	Db11-49[e]	Db11-27[d]	Db12-28	Db11-23	Db12-27[c]
Db12-32	Db12-20	Db12-31	Db12-22	Cb51-23	Cb52-13
Db12-21	Db21-35	Db21-16	Db22-41	Db22-42[g]	Db23-25
Db31-23	Db31-24	Db31-28	Db31-22	Db31-51[h]	Db31-57
Db31-43[i]	Db21-40	Db21-29	Db21-22	Db11-25	Db11-24
Db11-51	Db11-58	Da15-19	Da15-17	Ca55-74	Ca55-80
Ca55-72	Ca55-53	Ca55-119	Db21-40	Db22-40	Db22-49[k]
Db12-19	Db12-18	Db12-30	Db12-33	Cb52-12	Cb52-17
Cb51-40	Cb51-44	Ca55-80	Cb51-25	Cb51-60	Cb51-39
Da14-41	Da15-40	Db11-58	Db11-55	Db11-03	Db12-34
Db12-33	Db12-47	Db13-01	Ca55-105	Ca55-106	Ca55-115
Cb51-12	Cb51-24	Cb51-41	Cb51-42	Cb51-43	Cb51-45
Cb51-53	Cb51-58	Da15-22	Da15-29	Da15-34	Da15-36
Da15-48	Da25-07	Db11-23	Db12-08	Db12-21	Db12-45
Db21-19	Db21-21	Db21-26	Db21-27	Db21-28	Db11-48[f]
9010622[a]					

[a] - PW-10
[b] - PW-11
[c] - PW-12
[d] - PW-13
[e] - PW-14
[f] - PW-15
[g] - PW-16
[h] - PW-17
[i] - PW-18
[j] - PW-19
[k] - OW-16A

Appendix A
Background Data Review Summary

APPENDIX A

Background Data Review/Compilation Summary

BACKGROUND REVIEW/DATA COMPILATION SUMMARY

One of the objectives of the SWF AMP entailed a background review phase, which included a detailed compilation and review of data pertaining to the SWF. These data include water quality data, water levels, pumping rates, precipitation, streamflow data, and local geology/ hydrology. As part of the background data collection and evaluation phase, Tetra Tech implemented a geographic information system (GIS) to organize pertinent data into a form that allowed for meaningful review, management, and display. The software utilized was MapInfo, a low-cost PC-based desktop mapping system compatible with leading spreadsheets and databases. The GIS was then updated as additional data were generated during field activities conducted as part of this project.

A map illustrating pumping wells and observation points included in the GIS is presented as Figure A.1. A table describing and categorizing the wells is presented in Table A.1. Summary plots illustrating key water quality parameters, pumping rates (where appropriate), water levels, and precipitation are included as Attachment 1 of this appendix. Additional summary plots that detail water levels, pumping rates (when appropriate), iron concentration, and manganese concentration from August 11 to November 17, 1995 are included as Attachment 2 of this Appendix. That time period corresponds to field activities performed as part of this project, including a system-wide aquifer test conducted from November 13 to November 17, 1995.

Specific aspects of the various data components are discussed below.

A. WATER QUALITY

A printout of the water quality database compiled for this project is included as Attachment 3 of this Appendix. It is sorted by well, date, and parameter. This database presentation is included for ease of interpretation of the parameter data. A second printout of the water quality database compiled for this project is included as Attachment 4 of this Appendix. This database is sorted by well, parameter, and date.

The initial basis of the water quality database was tabular, hard-copy data found in the report "Newark South Well Field Evaluation" (Duffield/CH2M Hill, 1994) and other water quality data from City of Newark files. These data describe water quality results obtained at the SWF production wells from 1966 through April 1994, and at several observation wells monitored in 1993 and 1994 (CH-1, CH-1A, CH-2, CH-2A, OW-15, OW-16A, OW-16B). The water quality parameters of interest reported include iron and manganese concentrations, pH, TDS, and alkalinity. Sampling

Table A.1 - Newark South Wellfield Well Description

Well	Aquifer	Description
PW-8	Columbia	Former Newark North Wellfield production well
PW-10	Potomac	SWF production well
PW-11	Columbia	SWF production well
PW-12	Potomac	SWF production well
PW-13	Columbia	SWF production well
PW-14	Potomac	SWF production well
PW-15	Columbia	SWF production well
PW-16	Potomac	SWF production well
PW-17	Columbia	SWF production well
PW-19	Potomac	SWF production well
OW-11	Columbia	Monitor well located approximately 16 ft. from PW-11
OW-14	Potomac	Monitor well located approximately 29 ft. from PW-14
OW-15	Columbia	Monitor well located approximately 74 ft. from PW-15
OW-16A	Potomac	Monitor well located approximately 12 ft. from PW-16
OW-16B	Potomac	Monitor well located approximately 62 ft. from PW-16
CH-1/1A	Potomac/Columbia	Monitor wells installed during Duffield/CH2M Hill investigation
CH-2/2A	Potomac/Columbia	Monitor wells installed during Duffield/CH2M Hill investigation
SYN-6D	Columbia	Monitor well located at the Syntex facility
WIP-2	Columbia	Monitor well located at the proposed Woodland Industrial Park
NLW-10	Potomac	Monitor well located at the University of Delaware landfill
NLW-11	Columbia	Monitor well located at the University of Delaware landfill
DTP-2	Columbia	Monitor well located at Delaware Technology Park
DTP-4	Columbia	Monitor well located at Delaware Technology Park

performed during 1993 and 1994 as part of that study also included analyses for dissolved oxygen (DO) and Eh.

The data from that report were manually entered into the GIS, and underwent a 100% QA/QC check to ensure accuracy and completeness. Water quality data for select wells compiled by Tetra Tech were added (DTP-2, DTP-4, NLW-10, NLW-11, WIP-2). The database was periodically updated during the field program of this investigation, as new data were obtained. The field program for this investigation (see Appendix B for details) included water quality sampling at SWF pumping wells and observation wells, plus other observation wells (CH-1, CH-1A, CH-2, CH-2A, OW-11, OW-15, OW-16A, OW-16B, DTP-2, DTP-4, NLW-10, NLW-11, WIP-2)

In addition to the summary plots of key water quality parameters, plots were made of iron and manganese concentrations versus the following field measured data: pH, dissolved oxygen, and Eh and are shown in Attachment 5. These plots were made to indicate what, if any, correlation exists between the observed iron and manganese concentrations and other water quality parameters. These plots can be used to visually determine relationships between parameters. In addition, correlation coefficients were calculated as follows: iron vs. Eh ($r = -0.26973$), iron vs. DO ($r = -0.27214$), iron vs. pH ($r = 0.322171$), manganese vs. Eh ($r = -0.15189$), manganese vs. DO ($r = -0.25156$), and manganese vs. pH ($r = 0.113493$).

B. WATER LEVELS/PUMPING DATA

A printout of the water level and pumping database compiled for this project is included as Attachment 6 of this Appendix. It is sorted by well and by date. Basic well construction data are also presented in this attachment. Water levels were calculated from depth-to-water measurements by Tetra Tech based on measuring-point elevations estimated by Tetra Tech. Measuring point elevations for the production and observation wells were obtained/estimated from well construction logs, geologic cross-sections, and nearby reference elevations for some of the observation wells. These measuring point elevations, and associated uncertainty regarding the accuracy of these elevations, are included in the Attachment.

Initial water levels and pumping data at the production wells of the SWF were obtained from the Delaware Geological Survey. These data consisted of usage values, pumping rates, and pumping level measurements made monthly at each production well in the SWF. The period of time covered was from the start of well production (variable for each well) through 1992. The usage values represent the total amount of water (gallons) pumped at each particular well for the entire month. The pump rate is calculated as the average pump rate over the entire month, based on usage and number of days in a month. The pumping level measurement is a single value for the well representing the depth to water level taken at some point during the month of record. Note that pumping level measurements represent water in the well when pumping and not in the aquifer (the drawdown in the well can be substantially higher than actual drawdown in the aquifer due to well losses). Also, pumping levels in wells, measured with air lines, are generally only accurate within approximately 5 feet or more.

The same types of data for each production well of the SWF were obtained from the City of Newark covering the time period January 1993 to October 1995. These data were in the form of monthly water use reports and reported total pumping (gallons), pump rate, and pumping levels for each well for the month of record. Note that during the period August to November, 1995 SWF production wells were pumping with varying degrees of frequency, and well PW-16 was at times pumping to waste (not included in the monthly usage totals).

Additional water levels from other sites in the vicinity of the SWF, obtained from a FOIA request from the DNREC (see Appendix B), were added to the database. These wells monitor the Columbia Formation, and water levels at these locations improve the overall regional knowledge of water levels. Finally, water levels at observation wells collected as part of the field testing for this investigation (August - November 1995) are included in this database. These data significantly enhance the overall water level database in several ways. First, water levels were monitored at many observation wells where water levels were not previously available (CH-1, CH-1A, CH-2, CH-2A, OW-11, OW-14, OW-15, OW-16A, OW-16B, DTP-2, DTP-4, NLW-10, NLW-11, WIP-2, SYN-6). These water levels represent aquifer water levels, since they are not subject to well losses caused by pumping. Secondly, water levels at these wells were measured during an aquifer-wide pump test conducted in November 1995. These data allow drawdowns in the aquifer that result from pumping to be observed and analyzed.

As described previously, most pumping rates in the database are monthly usage values, with average rates calculated. The date pertains to the date of the report, and covers the previous month's pumpage. For example, a total of 5,619,000 gallons was pumped at production well PW-14 in the month of June 1994, which is reported as July 1, 1994 in the database.. The average pump rate would be 5,619,000 gal divided by number of minutes in June (30 days x 24 hours/day x 60 minutes/hour) or 130 gallons per minute (GPM). Additional pumping rates in this database, between August and November 1995, are actual rate measurement taken on specific days. For example, on October 18, 1995, PW-14 was measured to be pumping at 290 GPM.

It is important to consider the following points when evaluating the water level and pumping rate database:

(1) Measuring point elevations, from which water elevations are calculated, have been estimated and not surveyed for most wells (i.e., there is uncertainty regarding the accuracy of the measuring point elevations).

(2) Water level measurements at pumping wells that are pumping are substantially impacted by well losses and do not reflect water levels in the aquifer adjacent to the well, and are also, in general, only accurate to within 5 feet.

(3) Pumping rates calculated from monthly values do not indicate the actual days when pumping occurred.

(4) When pumping rates measured on specific days are reported, they do not indicate how long the well was pumped before or after the measurement was taken.

(5) During the period August to November, 1995, when water levels were measured at many observation wells, SWF production wells were pumping with varying degrees of frequency, and well PW-16 was at times pumping to waste (not included in the monthly usage totals)

The groundwater modeling activities conducted as part of this investigation, which simulates aquifer water levels, utilized measured water levels at non-pumping wells. In addition, the groundwater modeling utilized a water level contour map for 1958 ("pre-pumping") conditions, as drawn by Boggess and Adams (1963). Those water level contours were digitized into the GIS, and are presented as Figure A.2. The modeling activities are explained in more detail in Appendix C.

C. PRECIPITATION

Rainfall data for the Newark area was obtained from the National Oceanographic and Atmospheric Administration (NOAA). Monthly precipitation totals at a gaging station located at the University of Delaware in Newark were obtained from NOAA's electronic bulletin board system. The data covers the time period from 1968 through 1994. Precipitation by month are plotted on the graphs in Attachment 1 of this appendix.

D. STREAM DISCHARGE DATA

Stream discharge data was obtained for two gaging stations in the vicinity of the SWF. The stream gages were located on the Christina River near Coochs Bridge, and on White Clay Creek near Newark. The data consisted of daily, monthly and yearly stream flow data, in cfs, for the period 1992 through 1994 at these two locations. In addition, stream flow measurements were also made by Tetra Tech at several smaller streams in the vicinity of the SWF in October 1995. These locations included Cool Run, a minor stream adjacent to Diamond State Park, and another minor stream adjacent to the Iron Hill apartments. A summary of these data is included in Attachment 7. These data were considered in the development of the conceptual groundwater flow model and subsequent numerical groundwater modeling of the SWF (see Appendix C).

E. GEOLOGY/HYDROGEOLOGY

A significant portion of the data review under Task 1 of the Aquifer Management Plan involved an examination of available information relating to the hydrogeology of the Newark area and the wellfield in particular. Initial work involved reviewing the report for the South Wellfield by Duffield

Associates/CH2M Hill (1994). A complete list of references used during the hydrogeologic review of the SWF site is presented in Section 8 (References) of this report. These include reports detailing general hydrological properties of both the Columbia and Potomac aquifers, geologic characteristics of both formations, water system analysis reports, and maps showing thickness and extent of the Columbia formation, bedrock elevations, and water table elevation contours. In addition, a number of geologic cross-sections included in the Duffield and CH2M/Hill reports, well logs provided by the City, and cross-sections prepared by Tetra Tech, were used to help further delineate areas of interest pertaining to formation thicknesses and elevations and the extent, if any, of a confining layer between the two aquifers.

Much of the hydrogeologic data reviewed during this task was compiled for inclusion into the SWF GIS. This included digitizing geologic maps showing Columbia formation thickness (see Figure A.3), bedrock elevations (see Figure A.4), and a surficial geology map (See Figure A.5). In addition, elevations and thicknesses for the Potomac formation were calculated where available from cross-sections and well logs. Available pump test results are summarized in Table A.2.

In addition to review of sitewide reports on hydrogeology, discussions were held with A. Scott Andres of the Delaware Geological Survey. These included discussions on the conceptual model of groundwater flow in the vicinity of the SWF, the connection of surface water bodies, such as the Christina River, White Clay Creek, and other smaller streams, to the aquifer and areas where the Columbia and Potomac may not be present and surface streams are receiving baseflow through the bedrock. These issues were important in accurately describing the conceptual model of groundwater flow in the SWF during Task 2 of the Aquifer Management Plan.

Table A.2. Summary of Historic Pump Test Results

City Of Newark Pumping Test Results

	Pumping Well Number	Date, Duration Of Test, and Pumping Rate	Observation Wells and Distance From Pumping Well (ft)	Analysis By	Method Of Anaysis	Transmissivity (gdp/ft)	Coefficient Of Storage
PW-13	Db11-27	7-62 24 hours 300 gpm	Db11-27 ... Db12-35 415	WCR	C and J, Theis	85,000 (average)	0.030 (average)
PW-11	Db11-28	7-62 48 hours 385 gpm	Db11-29 12.7	WCR	C and J, Theis	60,000 (average)	0.035 (average)
PW-12	Db12-27	7-62 24 hours 125 gpm	Db12-35 366	WCR	C and J, Theis	95,000 (average)	0.045 (average)
PW-17	Db31-51	5-14-71 401 gpm	Db31-51a 140	KDW	Theis	16,600	0.001
PW-19	Db32-16	12-76 24 hours 94 gpm	Db32-16 ...	KDW	C and J	2,200	—
PW-18	Db31-43	12-76 24 hours 109 gpm	Db31-43 ...	KDW	C and J	2,900	—

NOTES:
WCR = W. C. Rassmussen
KDW = K. D. Woodruff
gpm = gallons per minute
gpd/ft = gallons per day per foot
C and J = Cooper and Jacob semi-log

F. GIS IMPLEMENTATION

The use of a geographic information system was implemented during Task 1 of the Aquifer Management Plan to facilitate better data management and interpretation. Tetra Tech received from the Water Resources Agency of New Castle County a series of Arc/Info data files from the "EPA GIS - Groundwater Modeling Pilot Project". These data files consisted of Arc/Info coverage which covered greater New Castle County and more specifically, the area of the South Wellfield. The Arc/Info coverage included major and minor roads, railroads, major and minor water bodies, land parcels, street and place names, land use, zoning areas, and production well locations of the SWF. These Arc/Info coverage were converted to MapInfo files using ArcLink, a commercially available translation software. MapInfo is the PC-based software used as the basis for the SWF GIS.

Upon conversion, each Arc/Info coverage became a separate MapInfo map and table file in the GIS. These maps were checked for accuracy and completeness of the conversion process from Arc/Info to MapInfo. During this checking, it was discovered that the locations of the production wells of the SWF in the original Arc/Info files received from the WRA did not exactly match the latitude and longitude values obtained by the Delaware Geological Survey Global Positioning System survey of October 1993. These values are listed in Table A.3. The production well locations were corrected in the MapInfo GIS of the SWF and are shown on Figure A.1 along with other base map information for the greater Newark area.

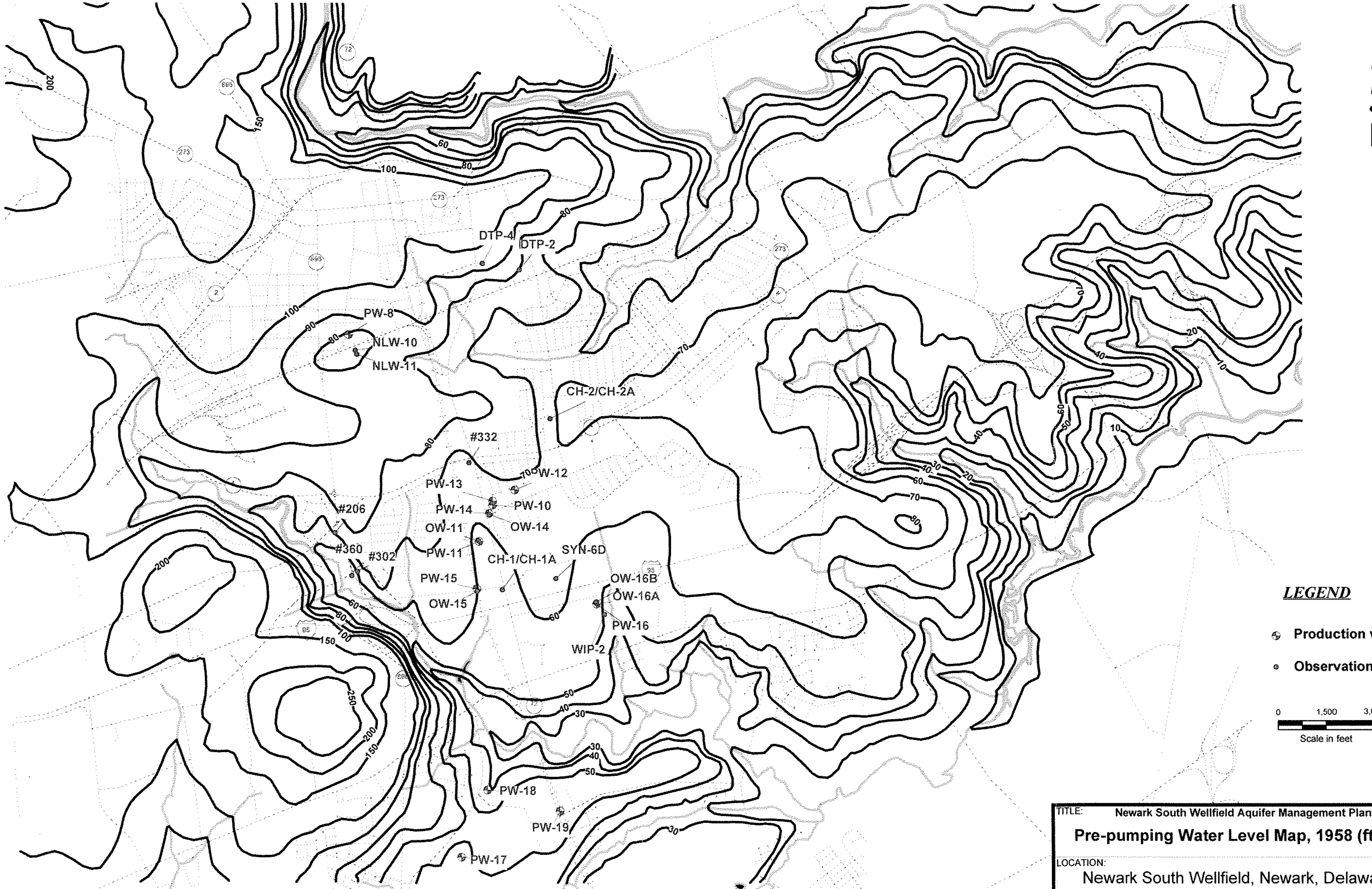
In addition to the production wells, the SWF GIS contains the locations of all observation wells in the vicinity of the wellfield. Observation wells CH-1/1A and CH-2/2A were placed in the GIS by estimating their position based on site maps found in the Duffield Associates report "Newark South Well Field Evaluation". The other observation wells monitored during the field testing program of the Aquifer Management Plan were located based on field reconnaissance. Finally, several creeks which were not included in the Arc/Info coverage received from the WRA were added to the SWF GIS. These creeks were located in the vicinity of the wellfield and were digitized electronically from USGS quad maps for the Newark area. The addition of these water bodies was necessary for a better understanding of the overall flow regime and hydrologic budget in the vicinity of the wellfield. These were included in subsequent groundwater modeling of the SWF site.

LIST OF ATTACHMENTS

1. Historical Hydrologic Data Plots - 1968 - 1995
2. Recent Hydrologic Data Plots - August 1995 - November 1995
3. Tabular Historical Water Quality Data - Well, Date, Individual Parameter Summary
4. Tabular Historical Water Quality Data - Well, Date, All Parameter Summary
5. Water Quality Correlation Plots
6. Tabular Water Level Data - 1968 - 1995
7. Streamflow Data

Table A.3. Latitude and longitude values obtained by the Delaware Geological Survey Global Positioning System survey of October 1993.

DGS ID	WELL NAME	LATITUDE	LONGITUDE
9010622	PW-10	393926.56	754403.60
Db11-28	PW-11	393915.18	754409.20
Db12-27	PW-12	393931.31	754354.71
Db11-27	PW-13	393927.82	754403.64
Db11-49	PW-14	393923.91	754405.02
Db11-48	PW-15	393900.33	754410.04
Db22-42	PW-16	393855.79	754322.03
Db31-51	PW-17	393737.42	754416.53
Db32-16	PW-19	393751.72	754336.82



LEGEND

- Production well
- Observation well

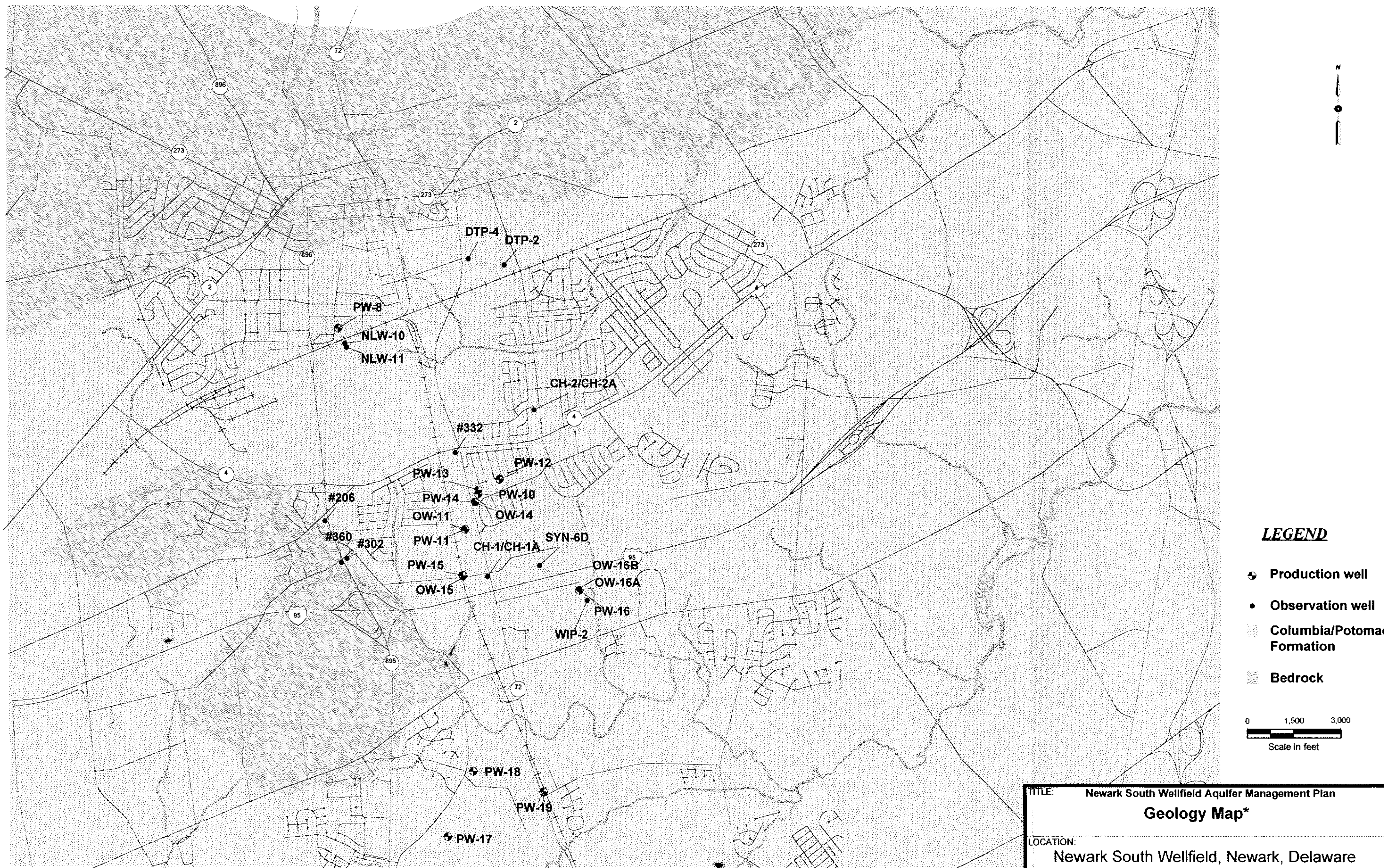
0 1,500 3,000
Scale in feet

Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

* Source: Boggess and Adams, 1963

TITLE: Newark South Wellfield Aquifer Management Plan	
Pre-pumping Water Level Map, 1958 (ft,MSL)*	
LOCATION: Newark South Wellfield, Newark, Delaware	
TETRA TECH, INC.	CHECKED: JJB DRAFTED: STG FILE: FIGA2.WOR DATE: 29-Dec-1995
FIGURE:	A.2

p:\data-projects\newark\sitegis\report\figa2.wor



Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

* Source: Woodruff and Thompson, 1972

TITLE: Newark South Wellfield Aquifer Management Plan		
Geology Map*		
LOCATION: Newark South Wellfield, Newark, Delaware		
TETRA TECH, INC.	CHECKED: JJB DRAFTED: STG FILE: FIGA3.WOR DATE: 29-Dec-1995	FIGURE: A.3

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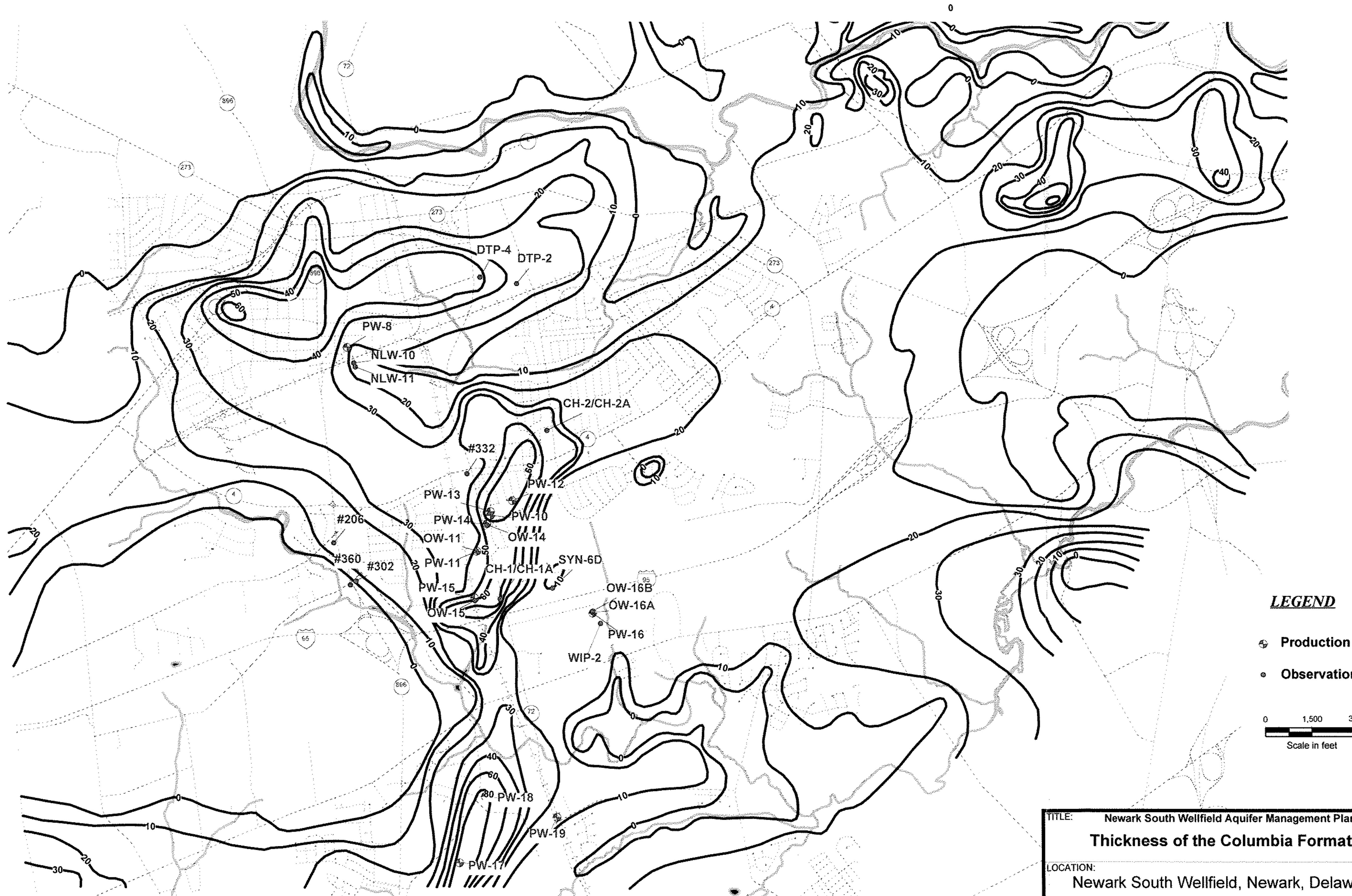

Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

* Source: Woodruff and Thompson, 1972

p:\data-projects\newark\sitegis\report\figa4.wor

TITLE: Newark South Wellfield Aquifer Management Plan			
Thickness of the Columbia Formation (ft)*			
LOCATION: Newark South Wellfield, Newark, Delaware			
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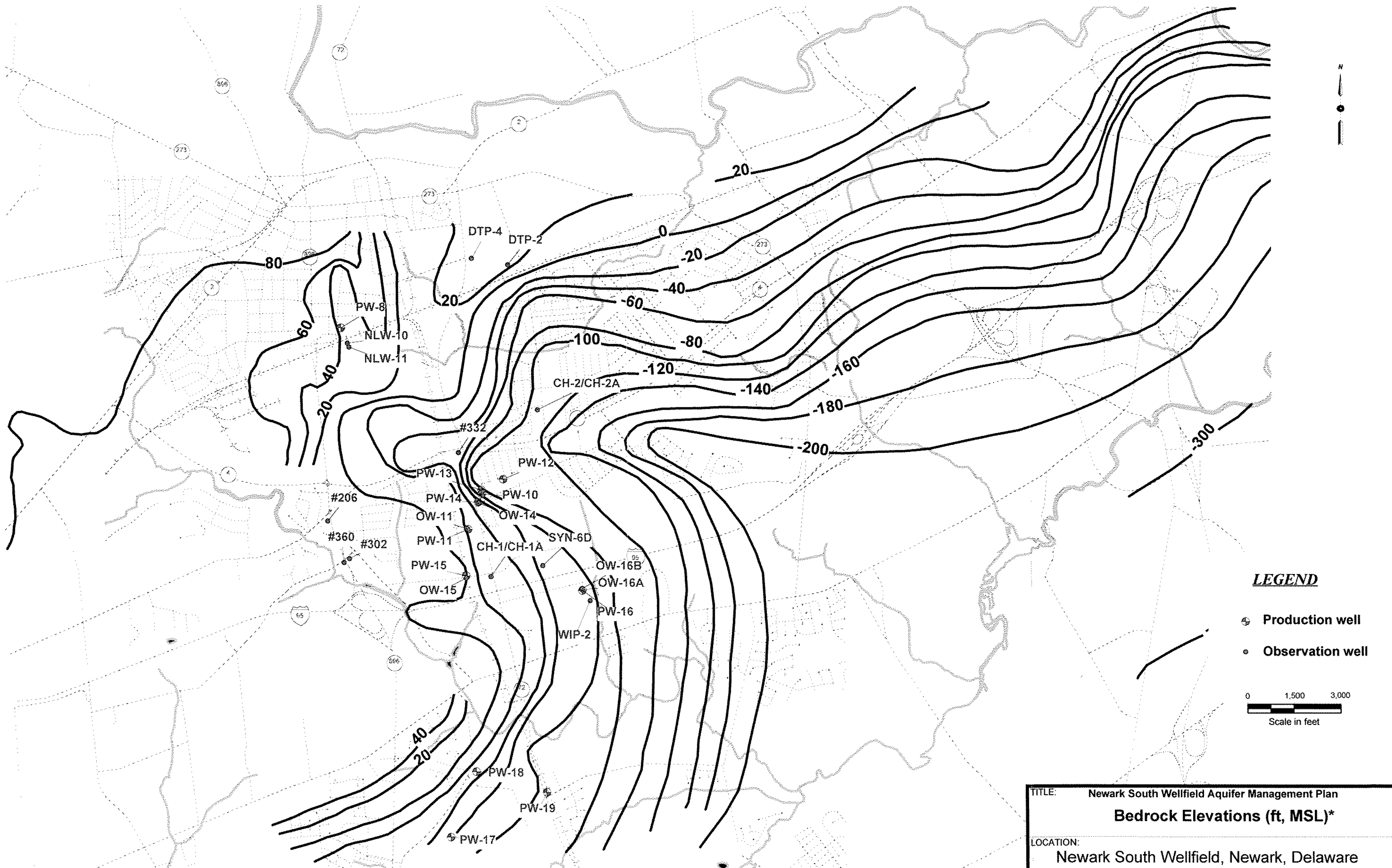
	DRAFTED: STG		A.4
	FILE: FIGA4.WOR		
	DATE: 29-Dec-1995		



p:\data-projects\newark\sitegis\report\figa5.wor

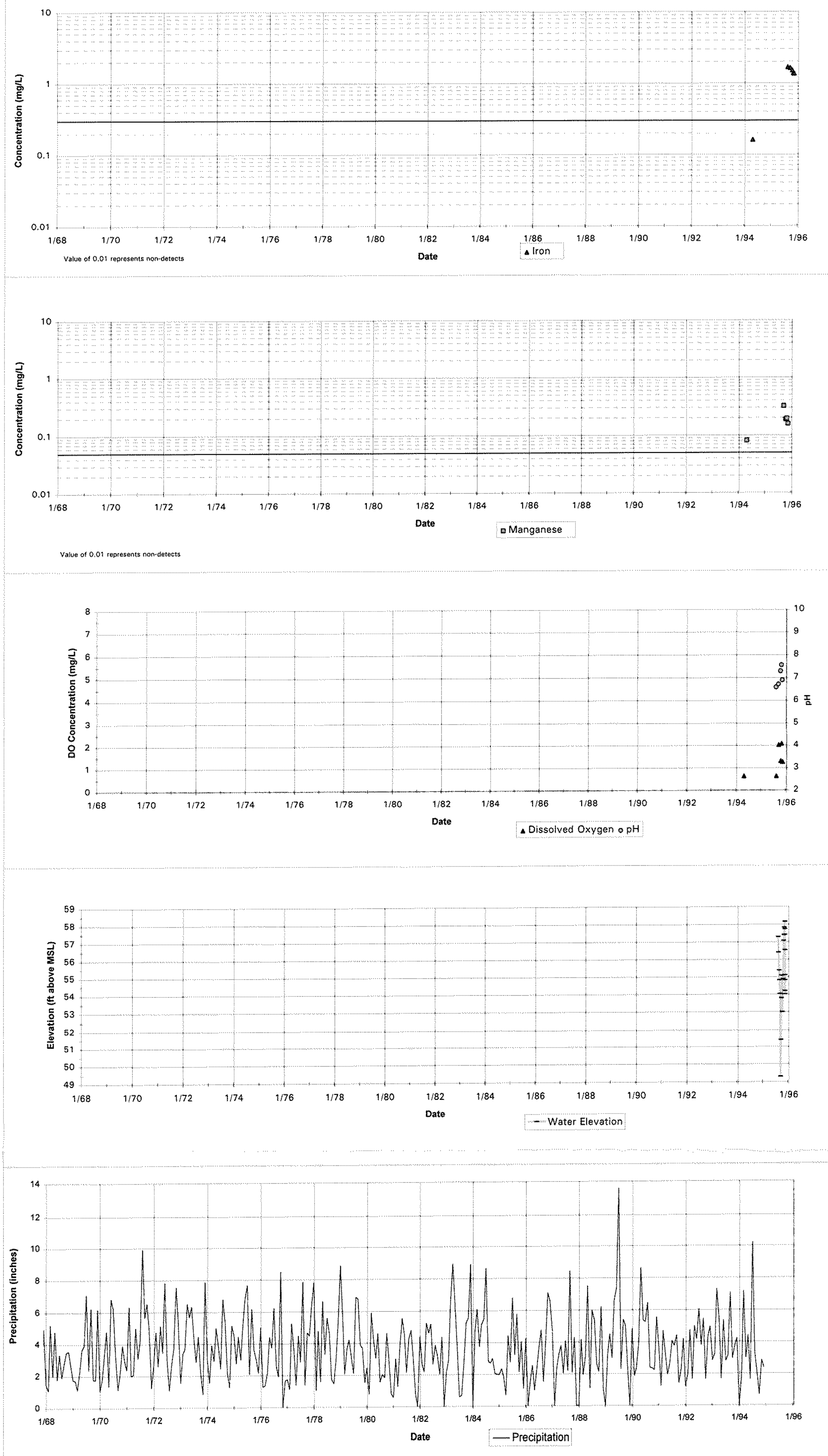
Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

* Source: Woodruff, 1977

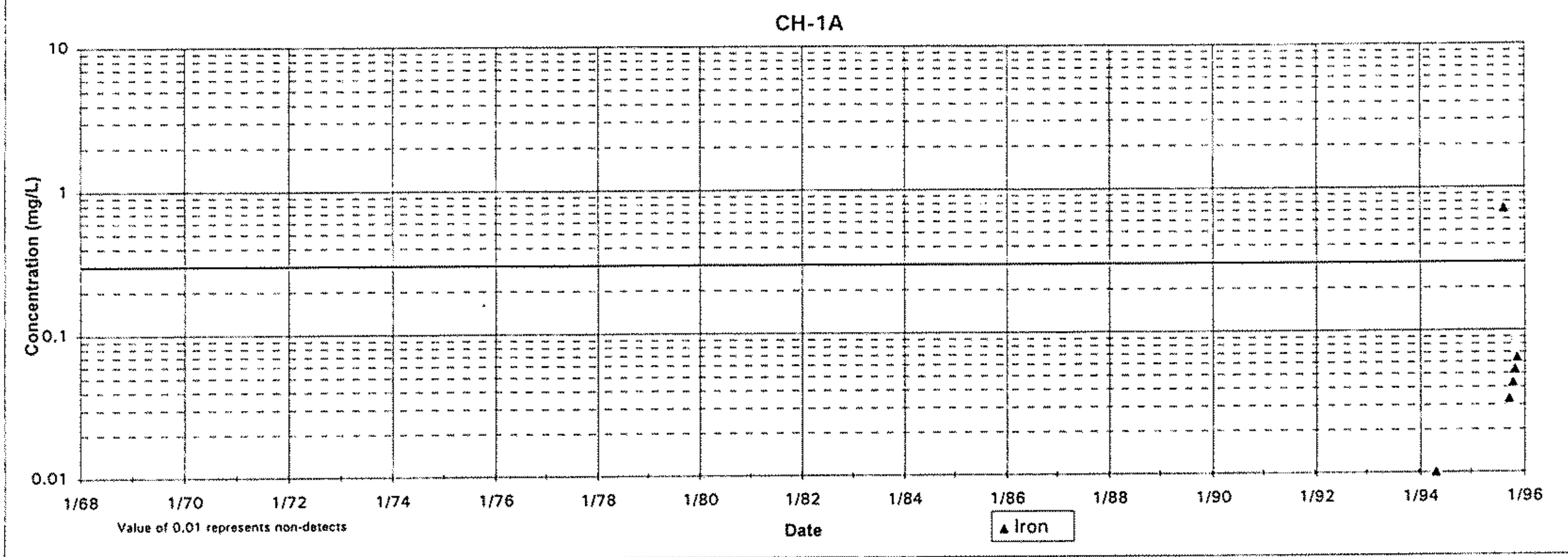
TITLE: Newark South Wellfield Aquifer Management Plan			
Bedrock Elevations (ft, MSL)*			
LOCATION: Newark South Wellfield, Newark, Delaware			
TETRA TECH, INC.	CHECKED:	JJB	FIGURE:
	DRAFTED:	STG	A.5
	FILE:	FIGA5.WOR	
	DATE:	29-Dec-1995	

ATTACHMENT 1
Historical Hydrologic Data Plots - 1968 - 1995

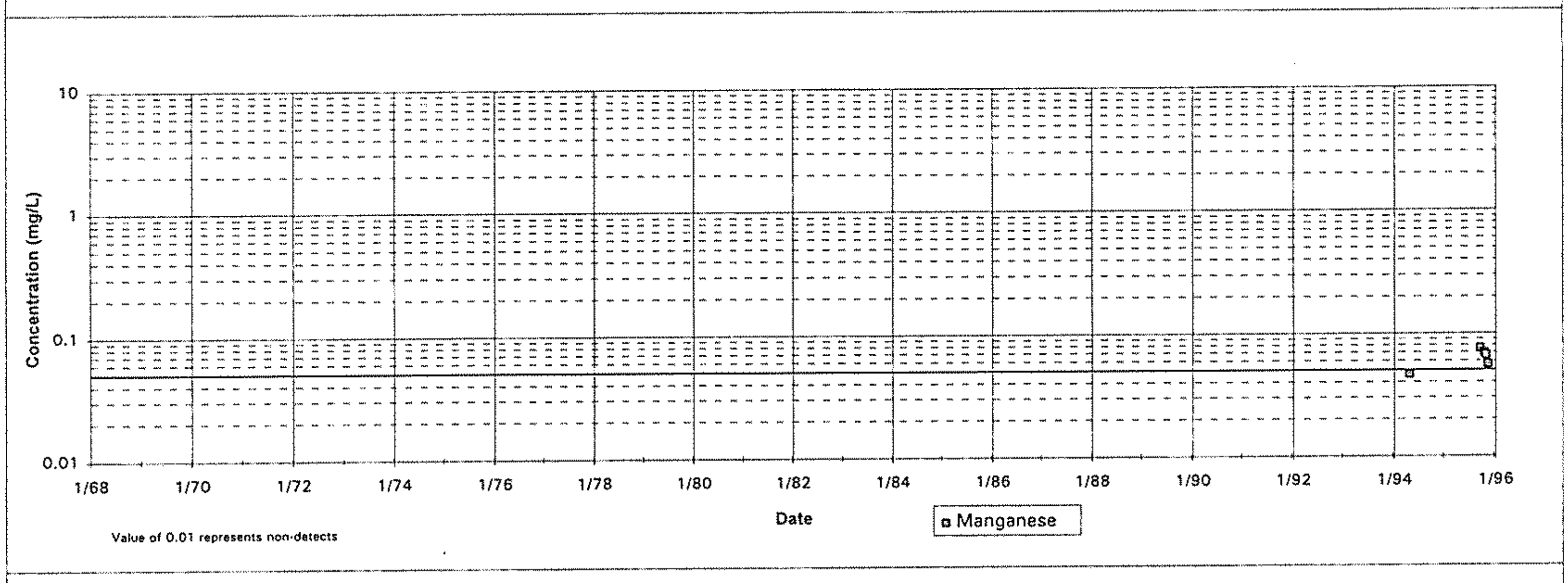
CH-1


Concentration (mg/L)
Date
Iron
Value of 0.01 represents non-detects
Concentration (mg/L)
Date
Manganese
Value of 0.01 represents non-detects
DO Concentration (mg/L)
pH
Date
Dissolved Oxygen
pH
Elevation (ft above MSL)
Date
Water Elevation
Precipitation (inches)
Date
Precipitation

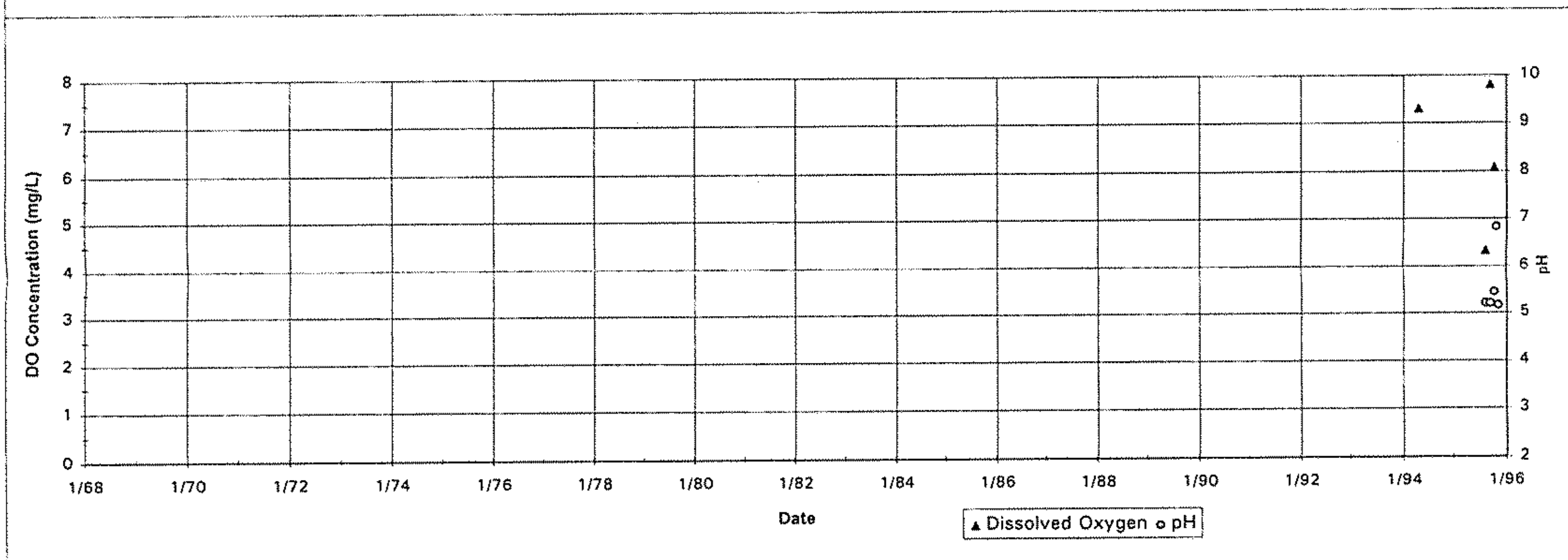
CH-1A



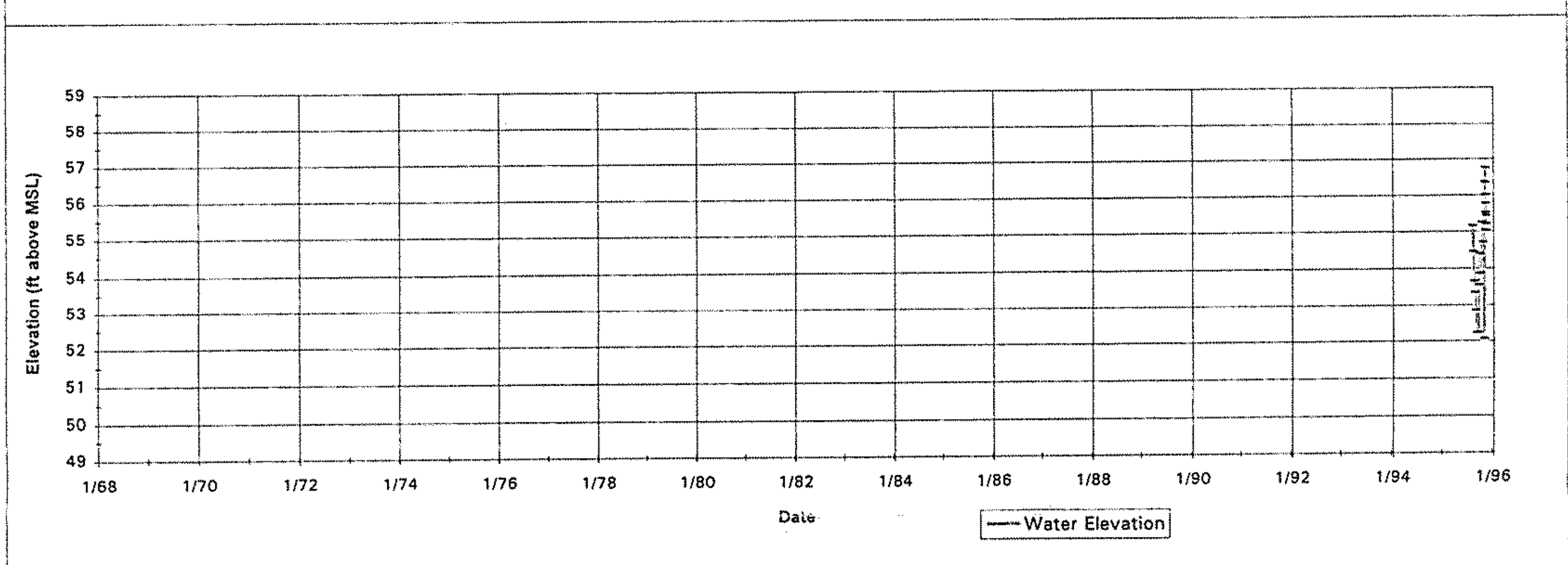
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Value of 0.01 represents non-detects
Iron



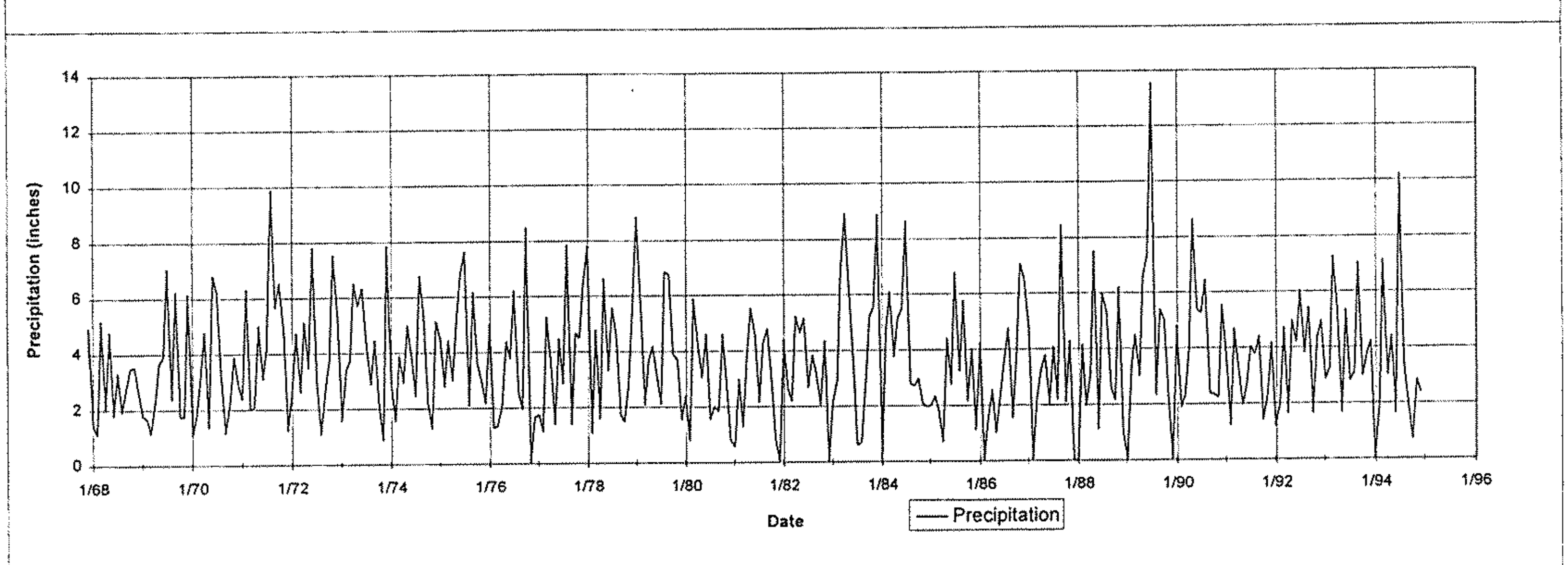
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Value of 0.01 represents non-detects
Manganese



DO Concentration (mg/L)
0 1 2 3 4 5 6 7 8
pH
2 3 4 5 6 7 8 9 10
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Dissolved Oxygen
pH

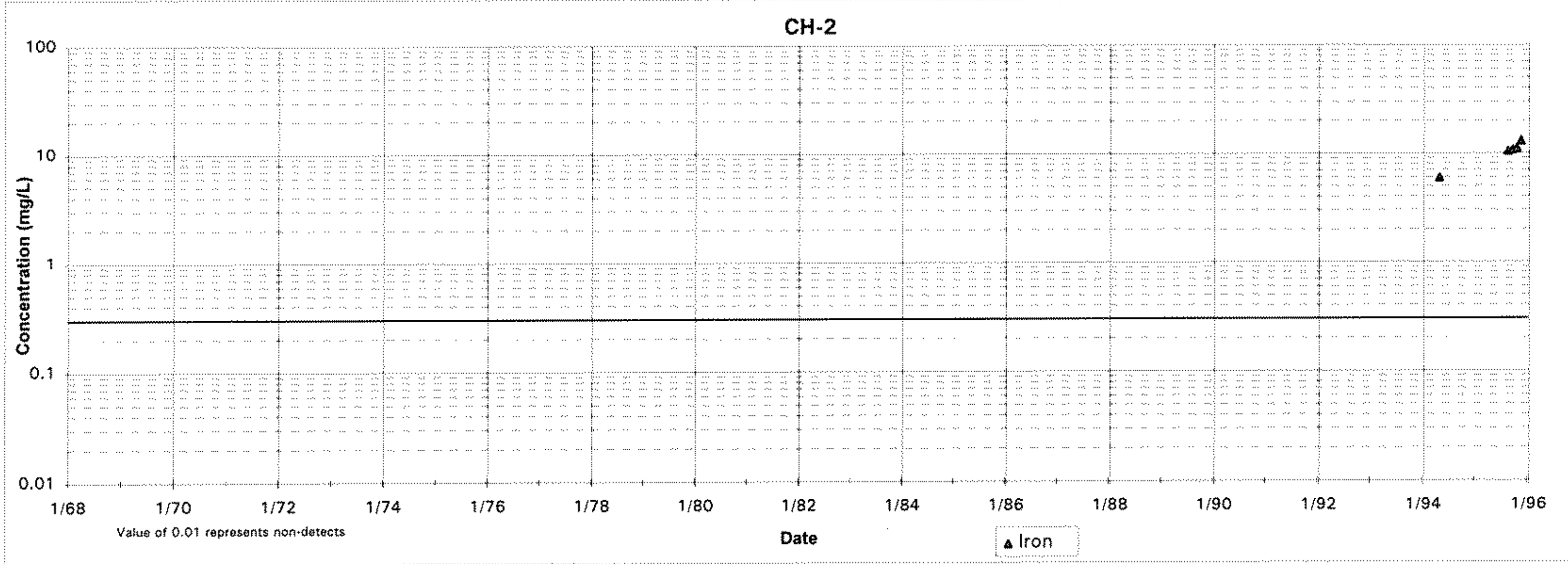


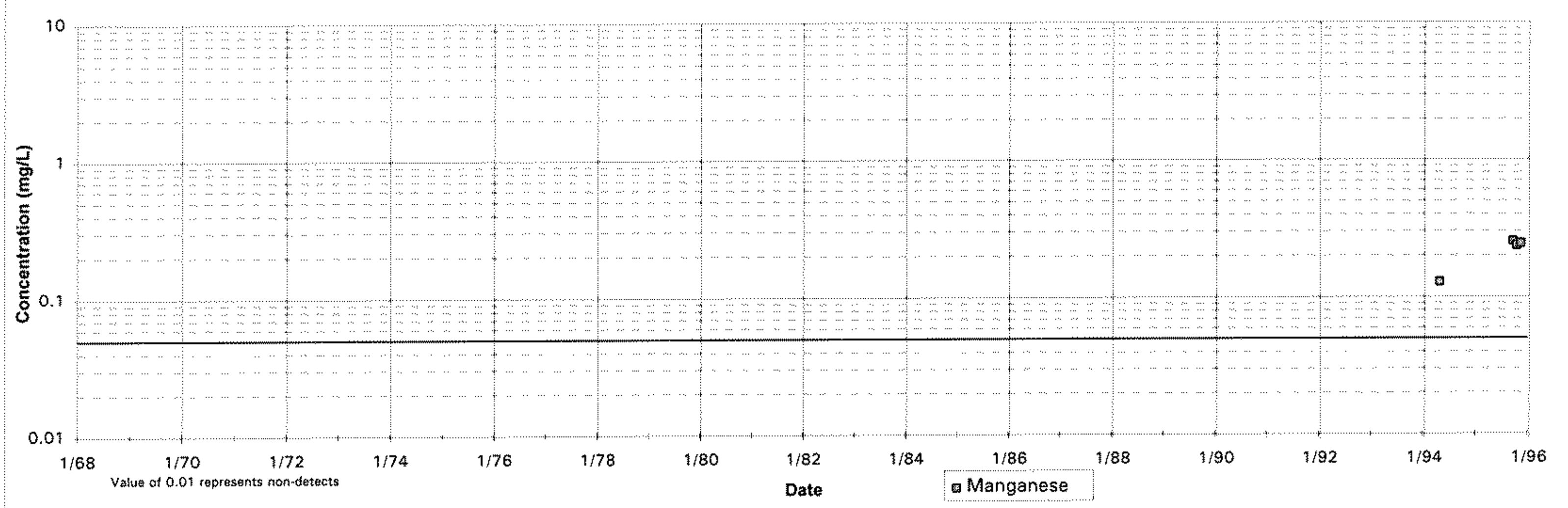
Elevation (ft above MSL)
49 50 51 52 53 54 55 56 57 58 59
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Water Elevation

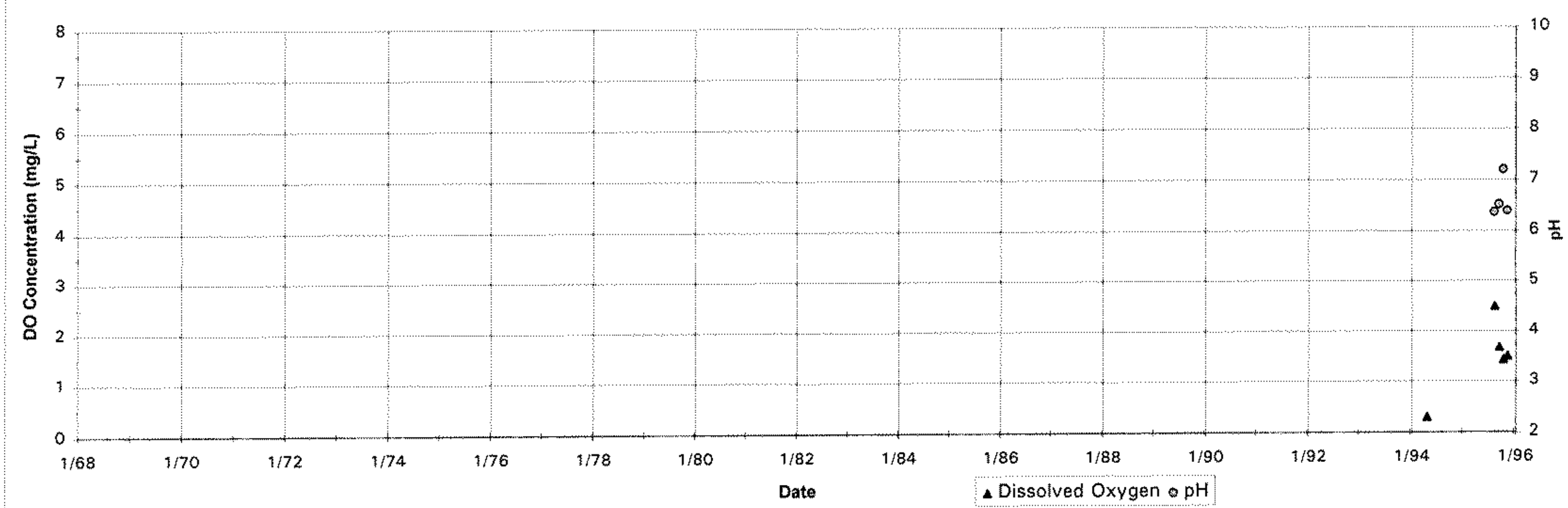


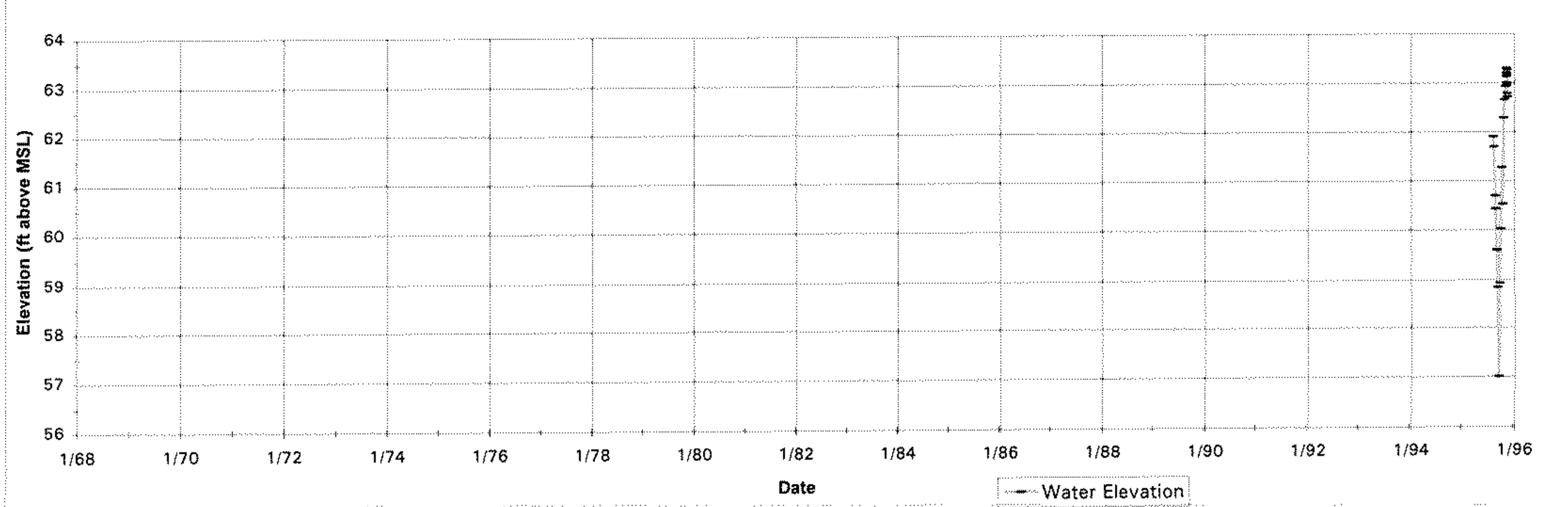
Precipitation (inches)
0 2 4 6 8 10 12 14
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Precipitation

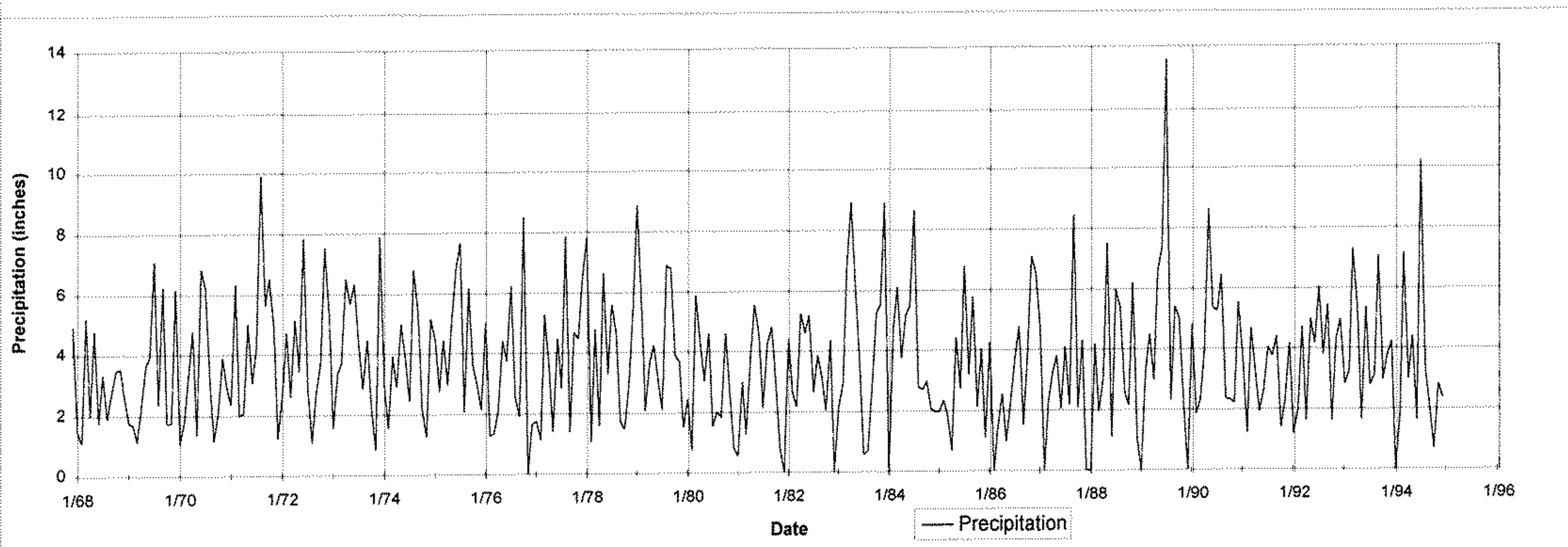
CH-2


CH-2
100
10
1
0.1
0.01
Concentration (mg/L)
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Value of 0.01 represents non-detects
Date
Iron

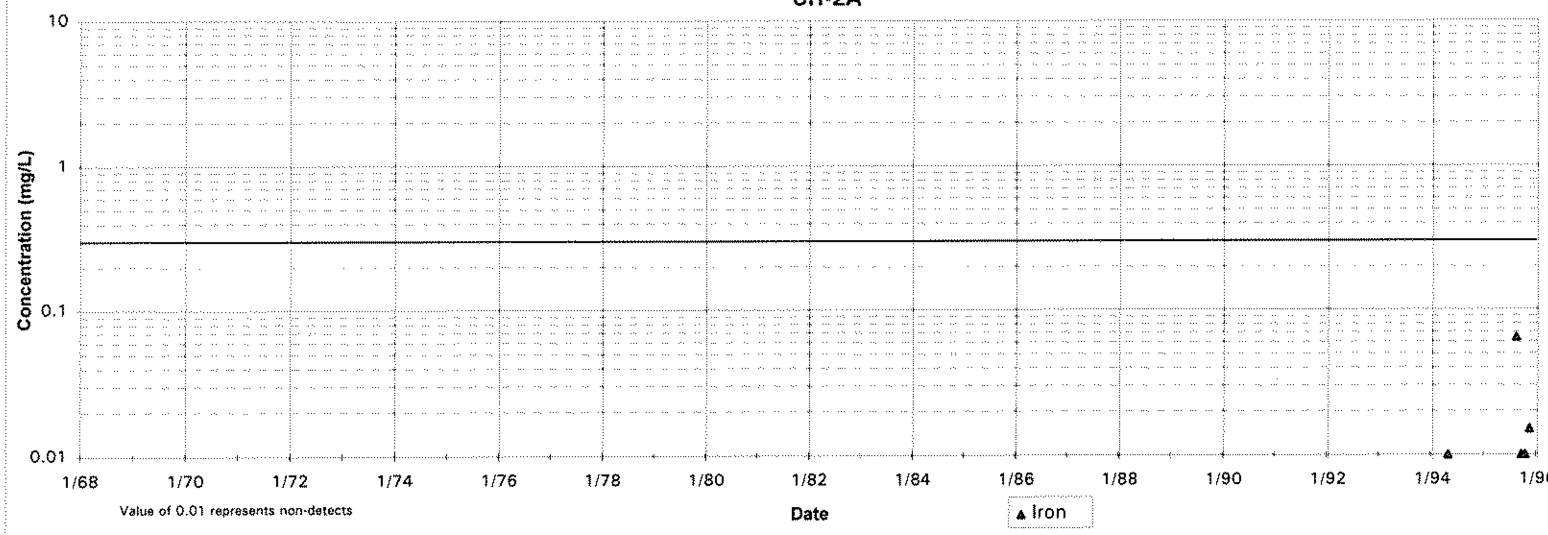

10
1
0.1
0.01
Concentration (mg/L)
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Value of 0.01 represents non-detects
Date
Manganese


DO Concentration (mg/L)
pH
Date
Dissolved Oxygen
pH

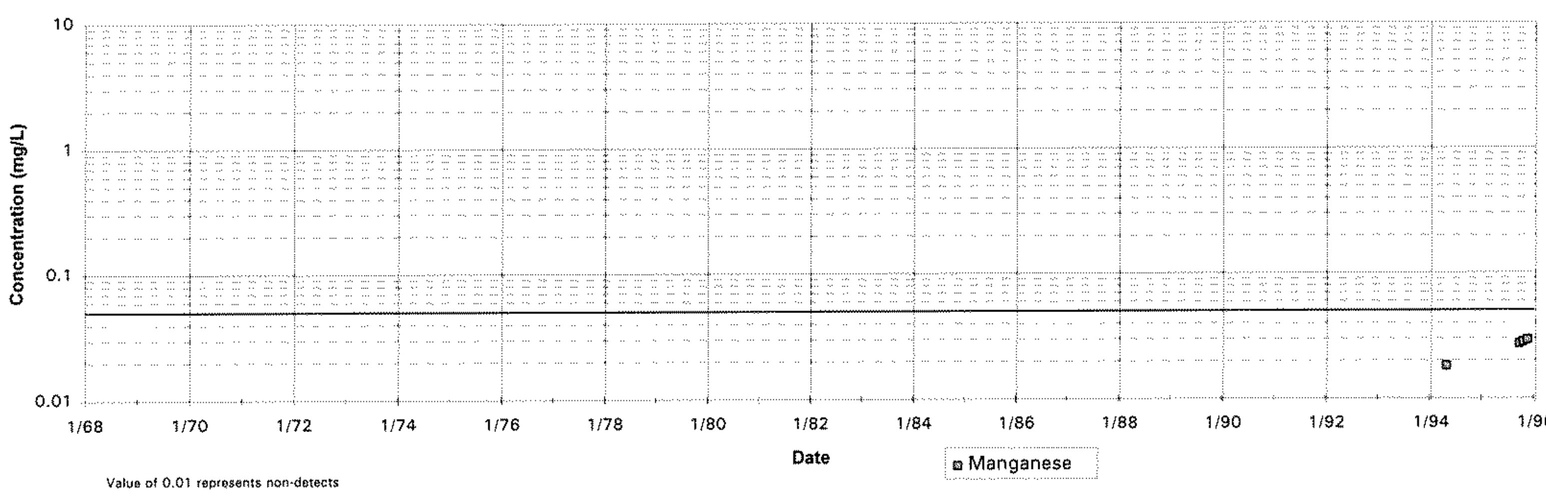

Elevation (ft above MSL)
Date
Water Elevation


Precipitation (inches)
Date
Precipitation

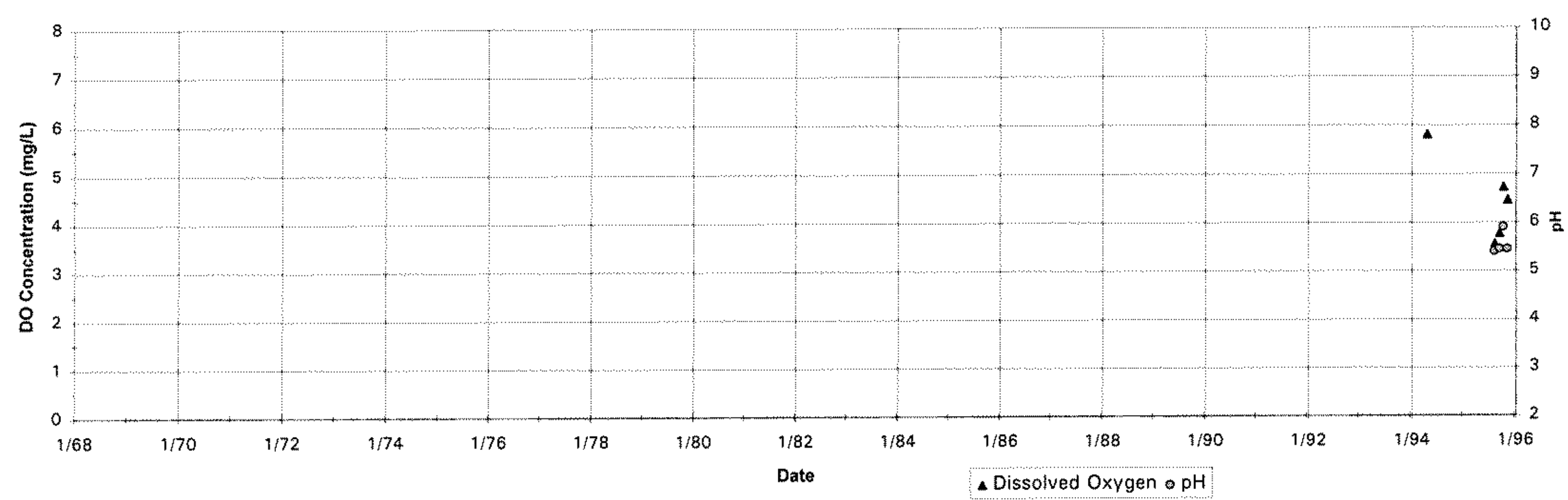
CH-2A



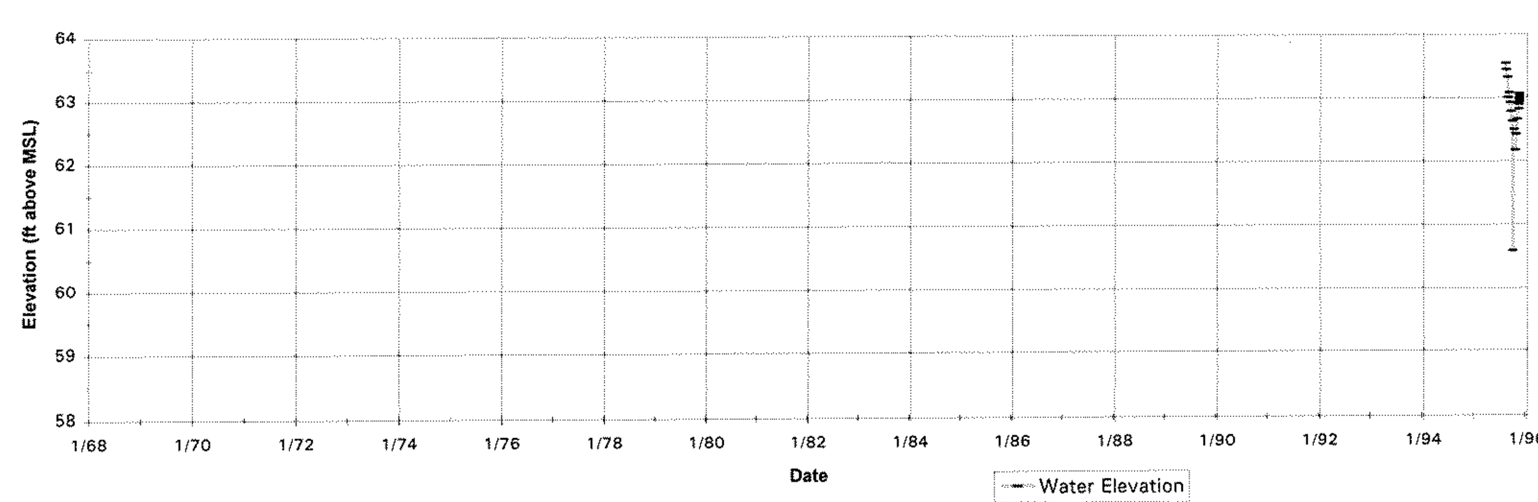
Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Value of 0.01 represents non-detects
Iron



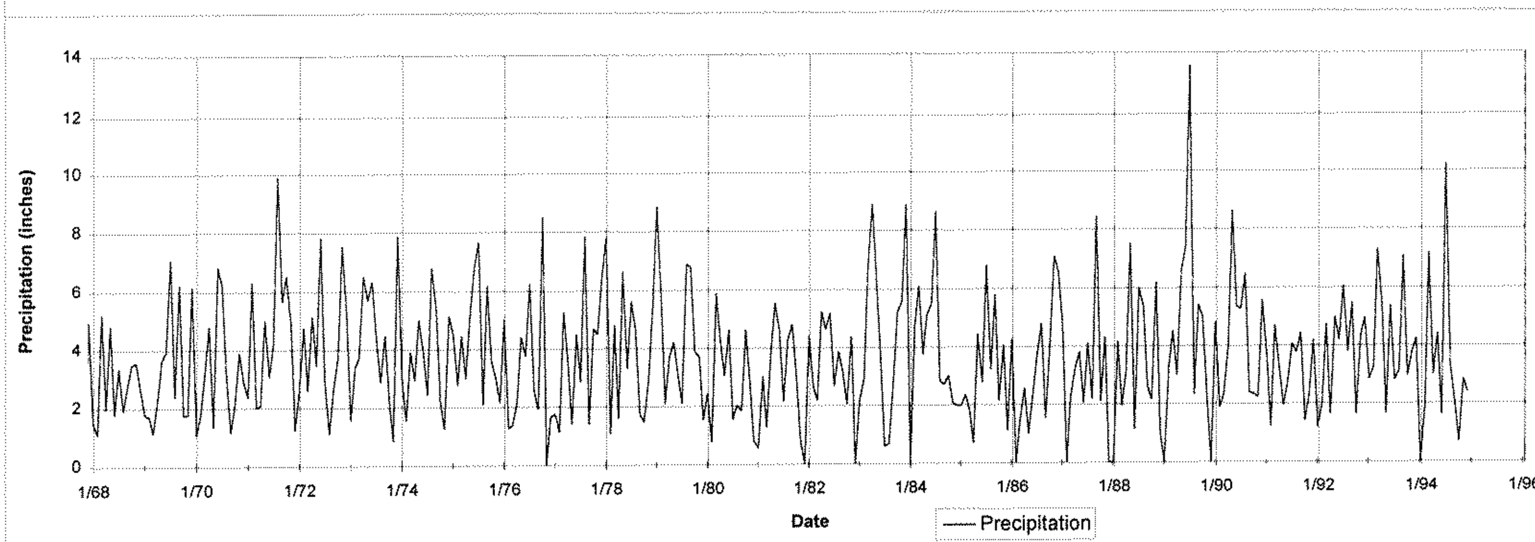
Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Manganese
Value of 0.01 represents non-detects



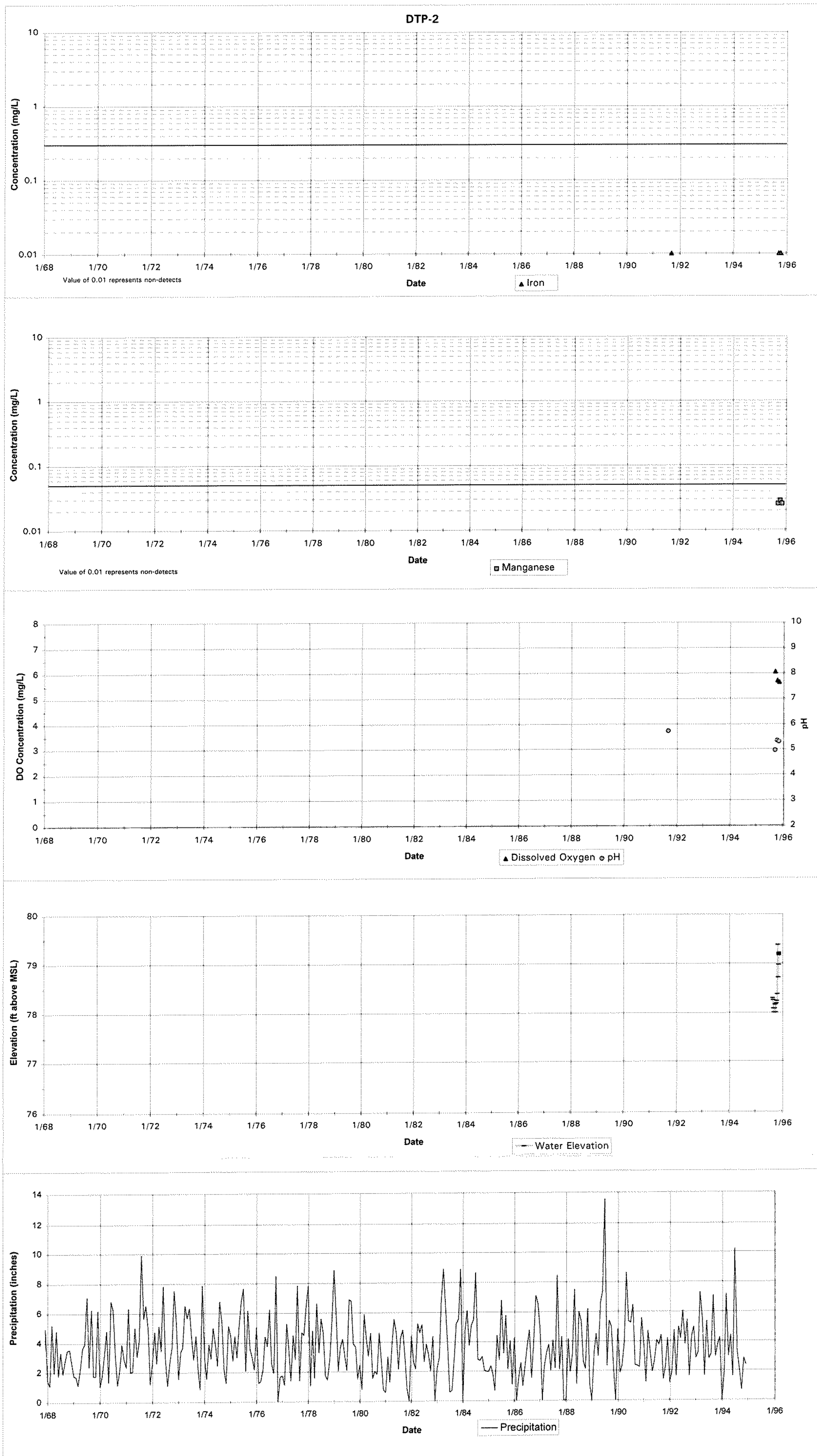
DO Concentration (mg/L)
8
7
6
5
4
3
2
1
0
pH
10
9
8
7
6
5
4
3
2
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Dissolved Oxygen
pH



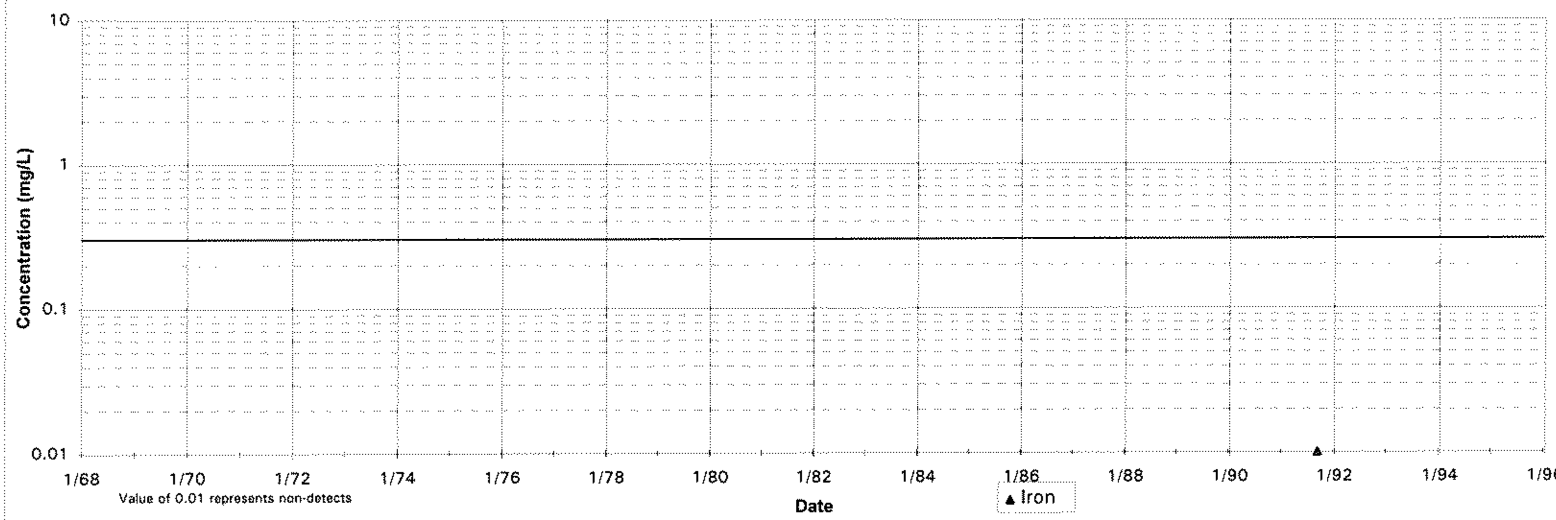
Elevation (ft above MSL)
64
63
62
61
60
59
58
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Water Elevation

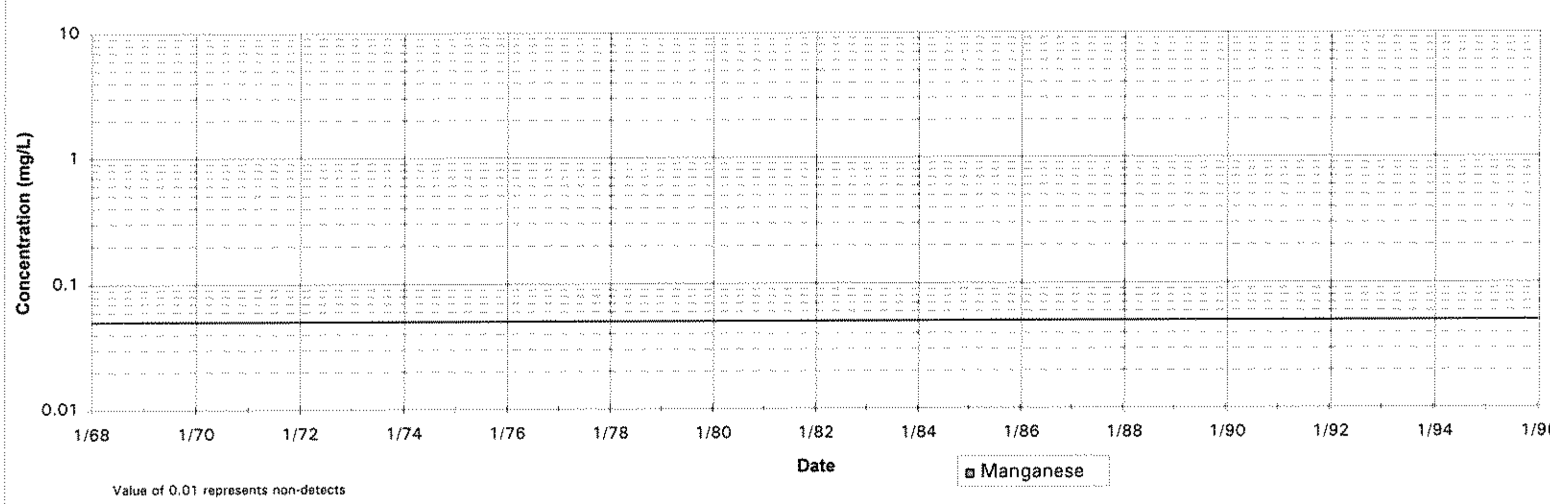


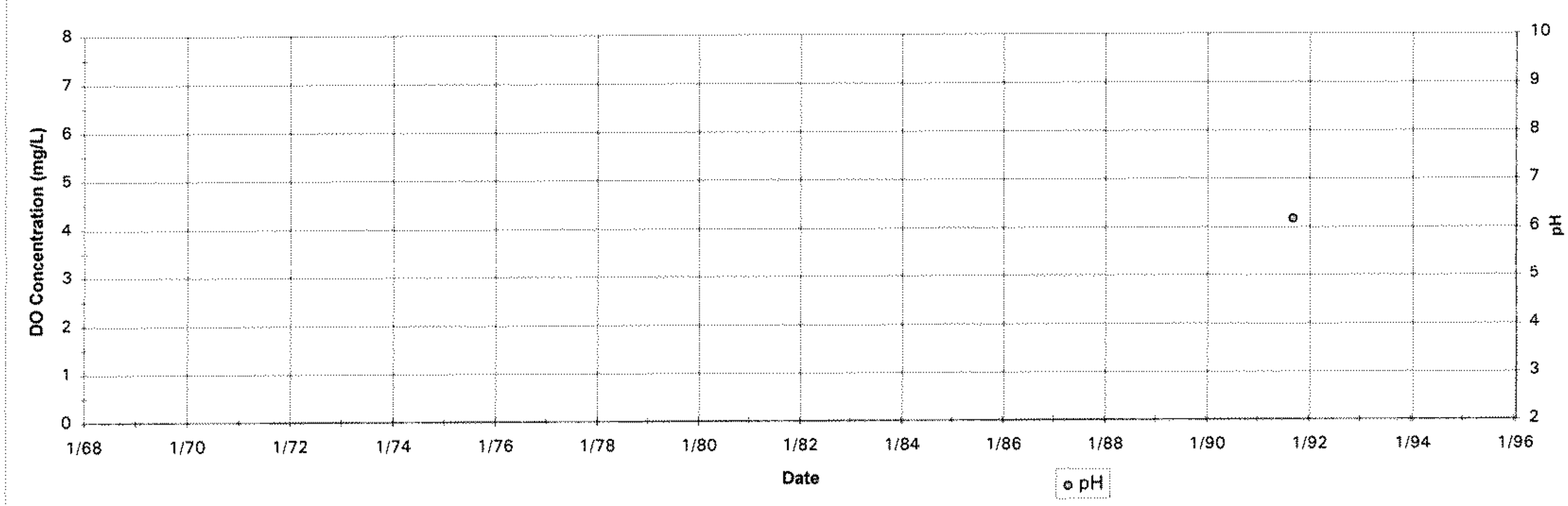
Precipitation (inches)
14
12
10
8
6
4
2
0
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Precipitation

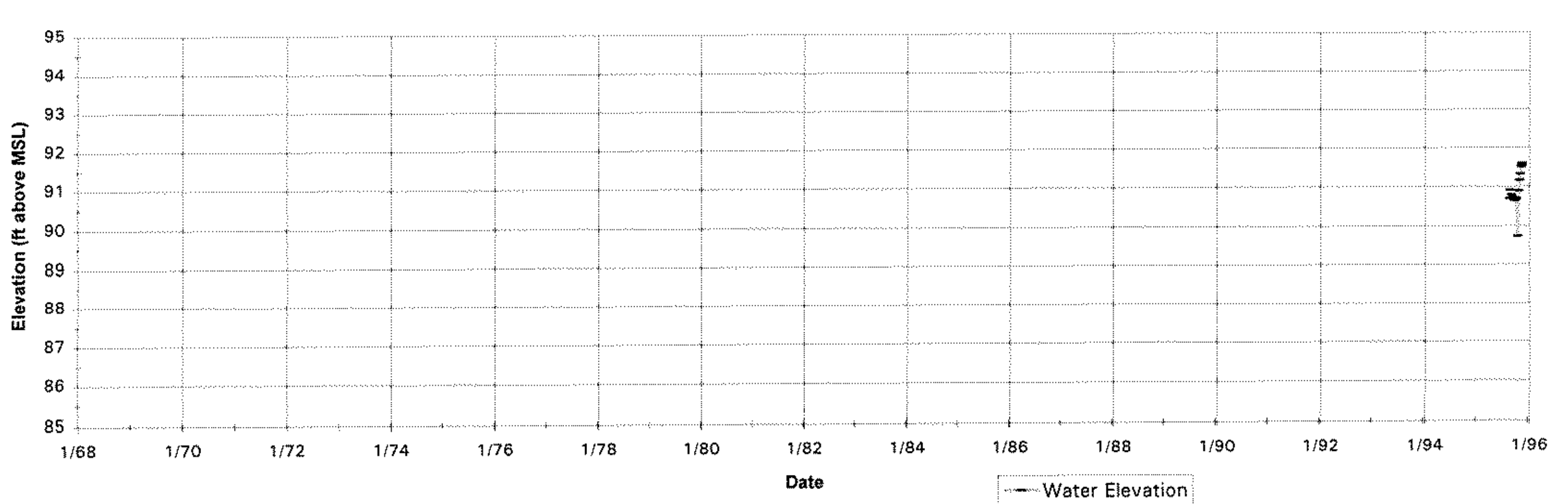

DTP-2
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Value of 0.01 represents non-detects
Date
Iron
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Value of 0.01 represents non-detects
Manganese
DO Concentration (mg/L)
8 7 6 5 4 3 2 1 0
pH
10 9 8 7 6 5 4 3 2
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Dissolved Oxygen pH
Elevation (ft above MSL)
80 79 78 77 76
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Water Elevation
Precipitation (inches)
14 12 10 8 6 4 2 0
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Precipitation

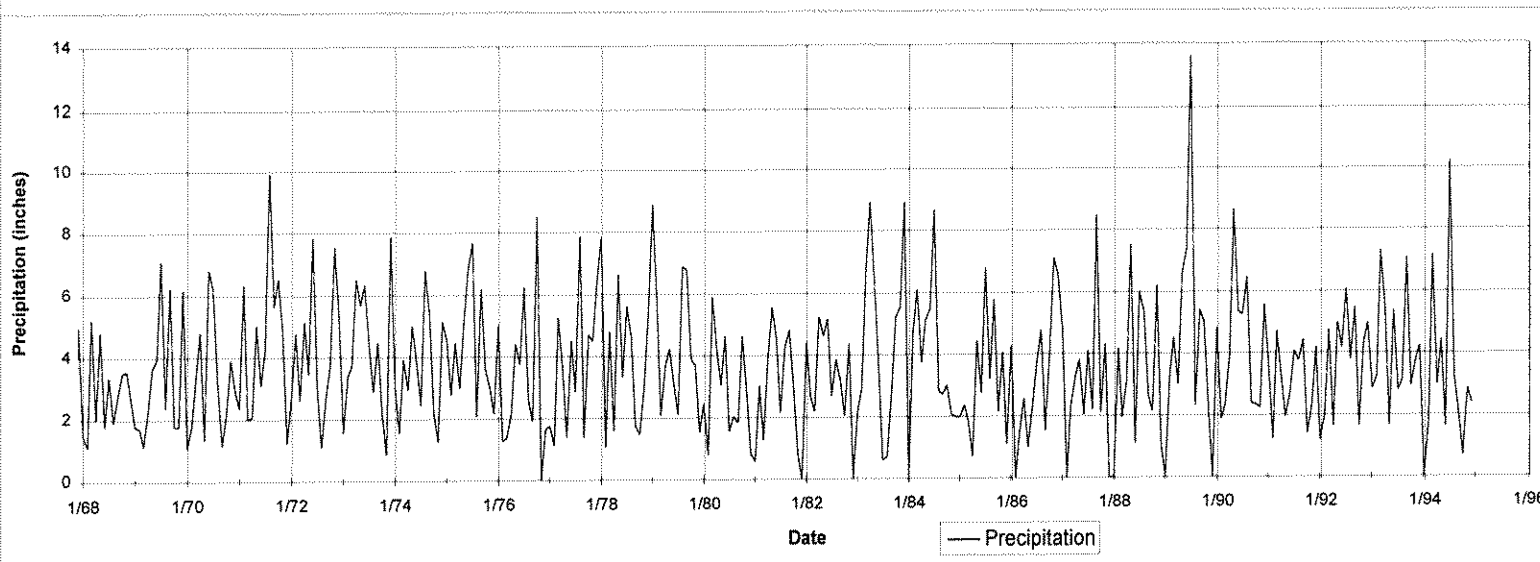
DTP-4

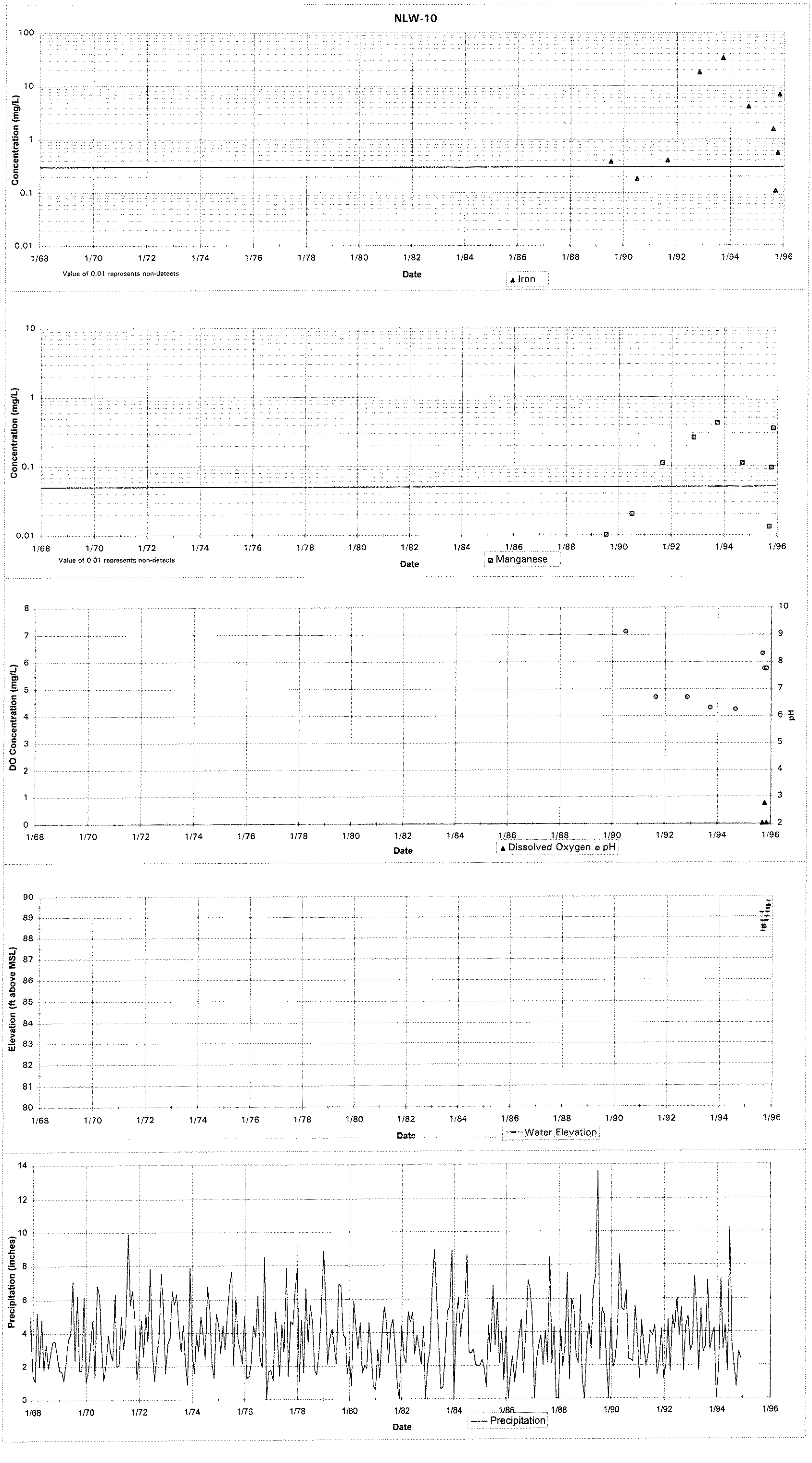

Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Value of 0.01 represents non-detects
Date
Iron

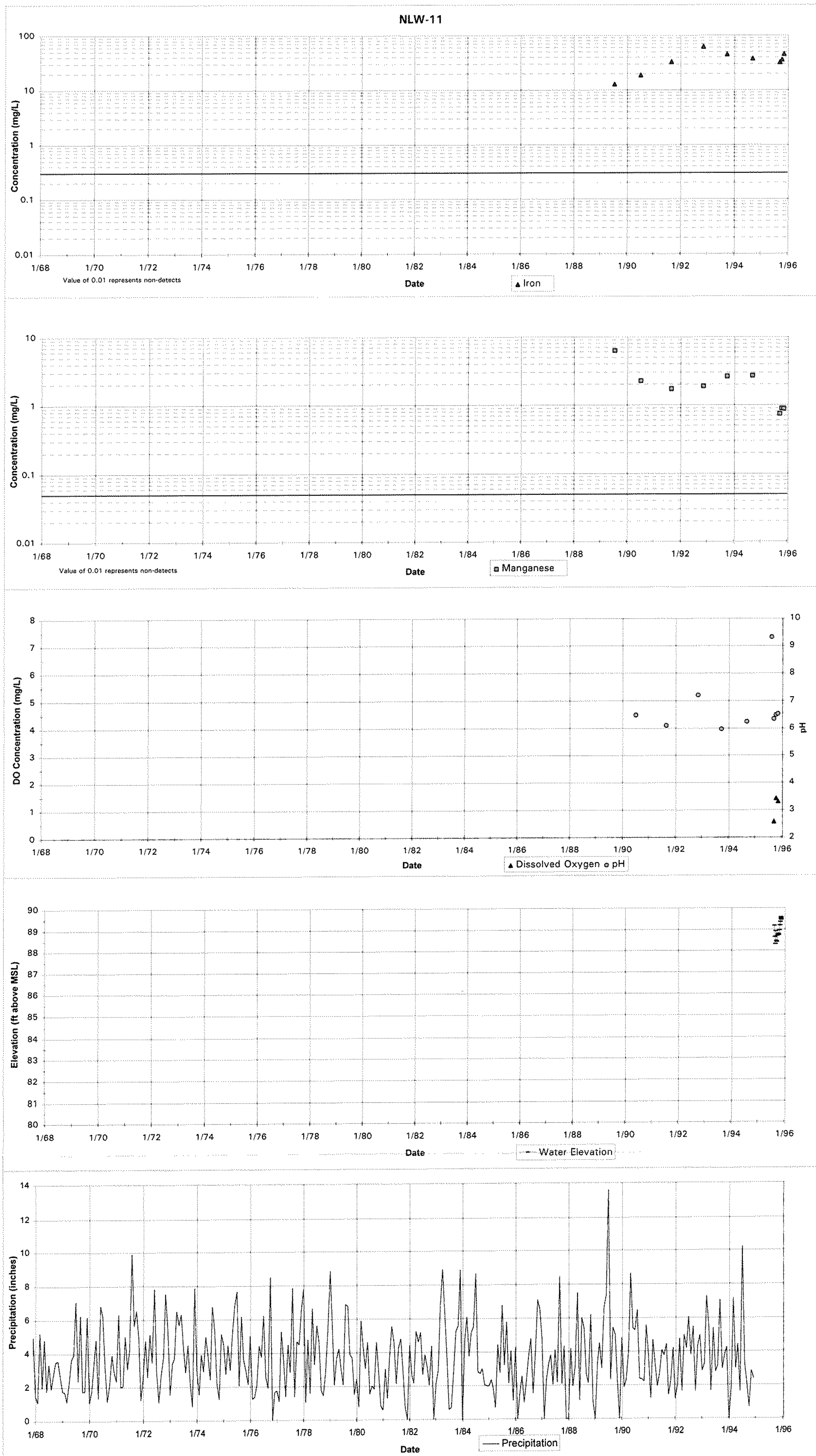

Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Manganese
Value of 0.01 represents non-detects


DO Concentration (mg/L)
8
7
6
5
4
3
2
1
0
pH
10
9
8
7
6
5
4
3
2
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
pH

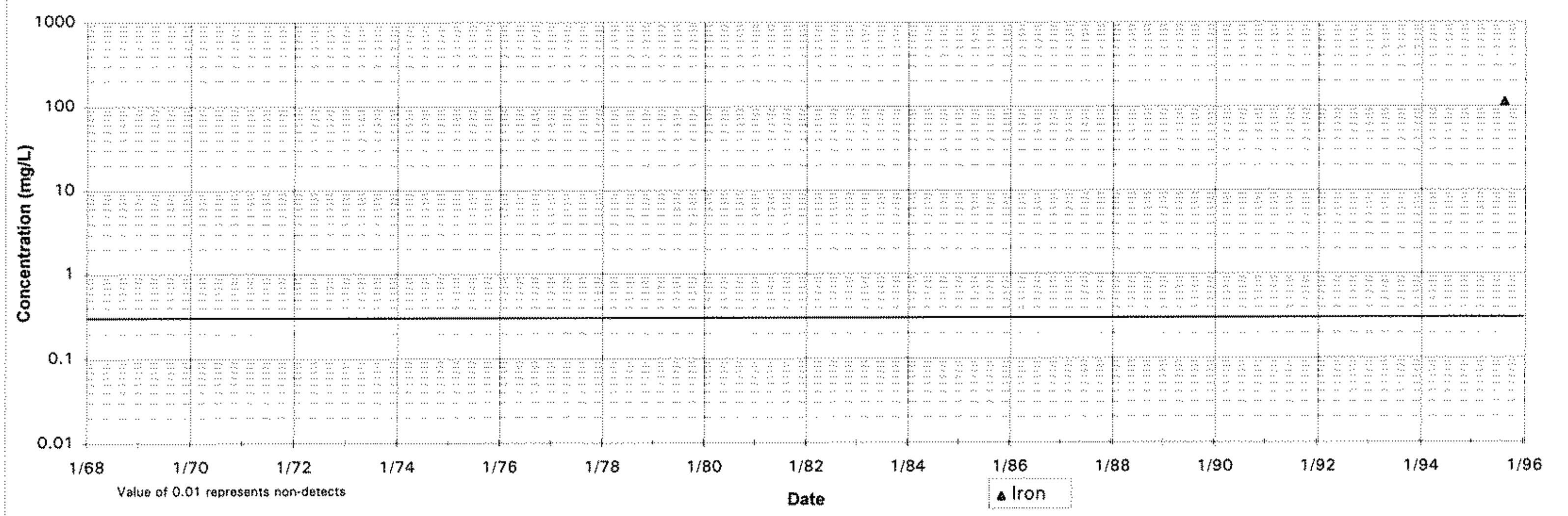

Elevation (ft above MSL)
95
94
93
92
91
90
89
88
87
86
85
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Water Elevation


Precipitation (inches)
14
12
10
8
6
4
2
0
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Precipitation

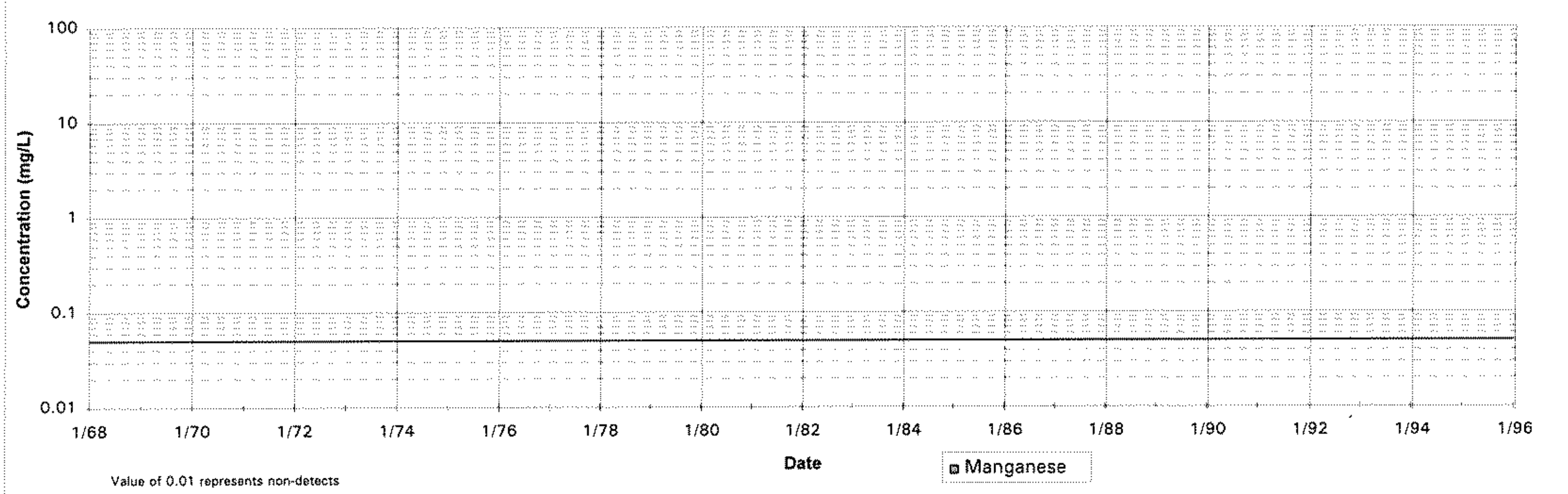

NLW-10
Concentration (mg/L)
Date
Value of 0.01 represents non-detects
Iron
Concentration (mg/L)
Date
Value of 0.01 represents non-detects
Manganese
DO Concentration (mg/L)
pH
Date
Dissolved Oxygen
pH
Elevation (ft above MSL)
Date
Water Elevation
Precipitation (inches)
Date
Precipitation


NLW-11
Concentration (mg/L)
Value of 0.01 represents non-detects
Date
Iron
Concentration (mg/L)
Value of 0.01 represents non-detects
Date
Manganese
DO Concentration (mg/L)
pH
Date
Dissolved Oxygen
pH
Elevation (ft above MSL)
Date
Water Elevation
Precipitation (inches)
Date
Precipitation

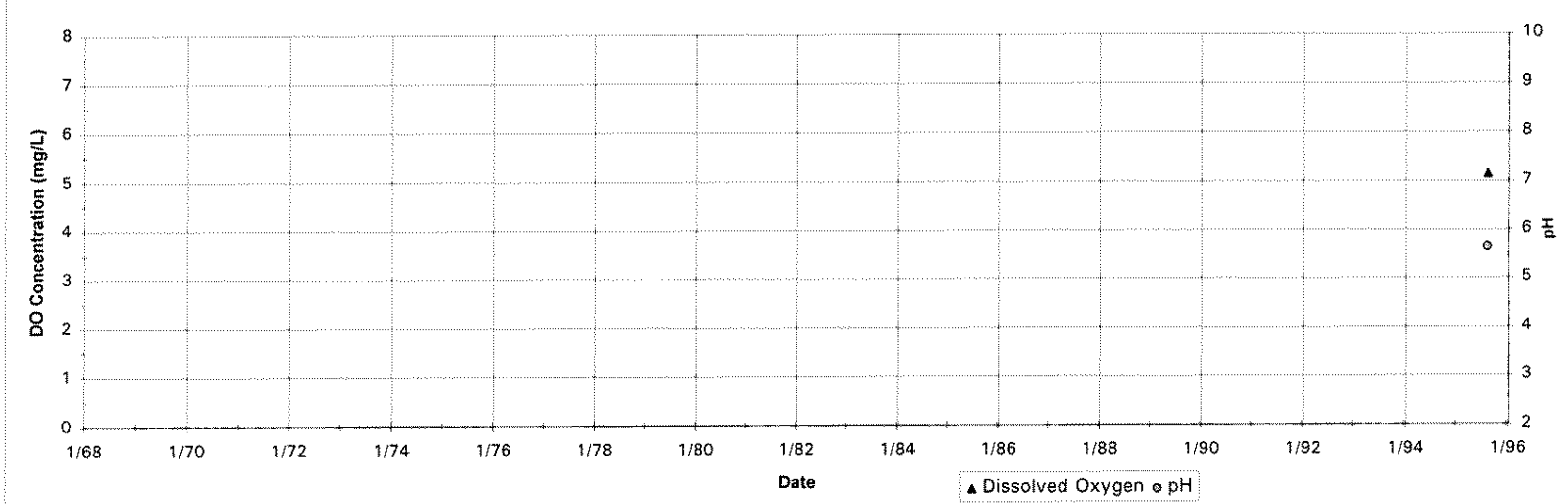
OW-11



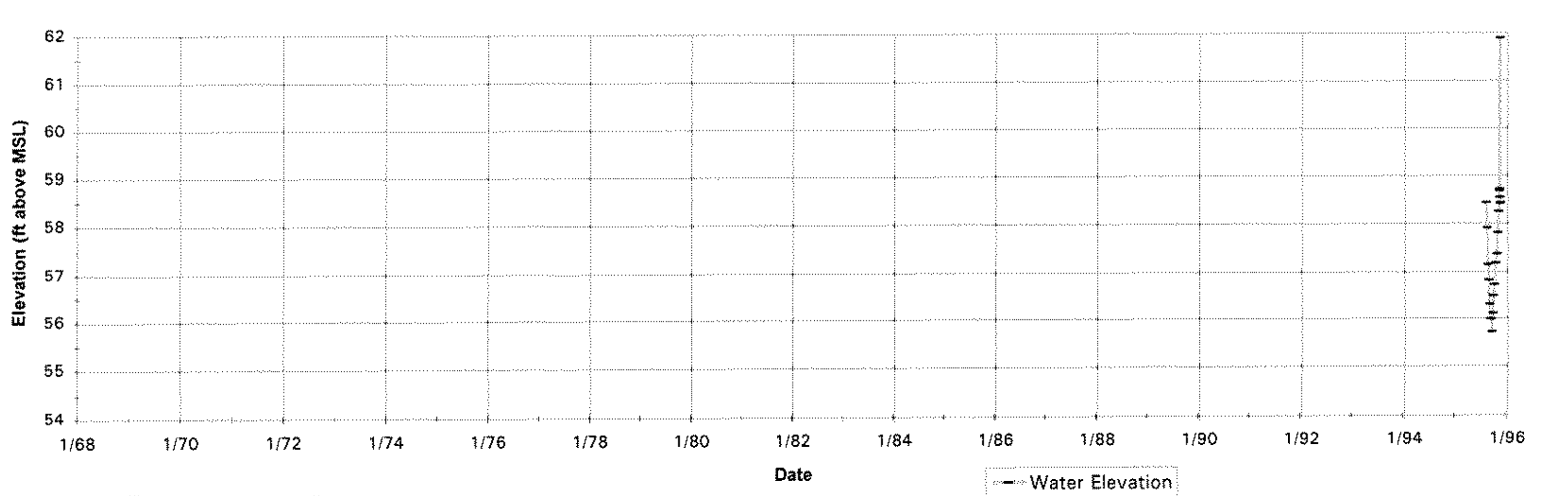
Concentration (mg/L)
1000
100
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Value of 0.01 represents non-detects
Iron



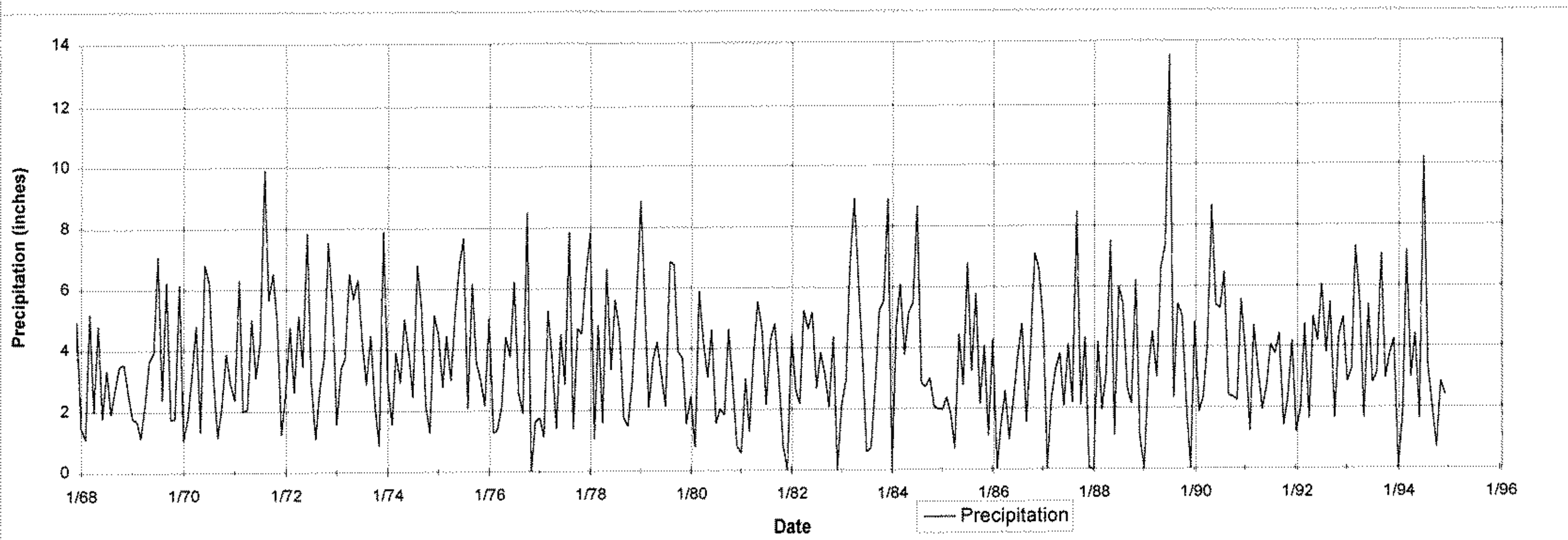
Concentration (mg/L)
100
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Value of 0.01 represents non-detects
Manganese



DO Concentration (mg/L)
pH
Date
Dissolved Oxygen
pH

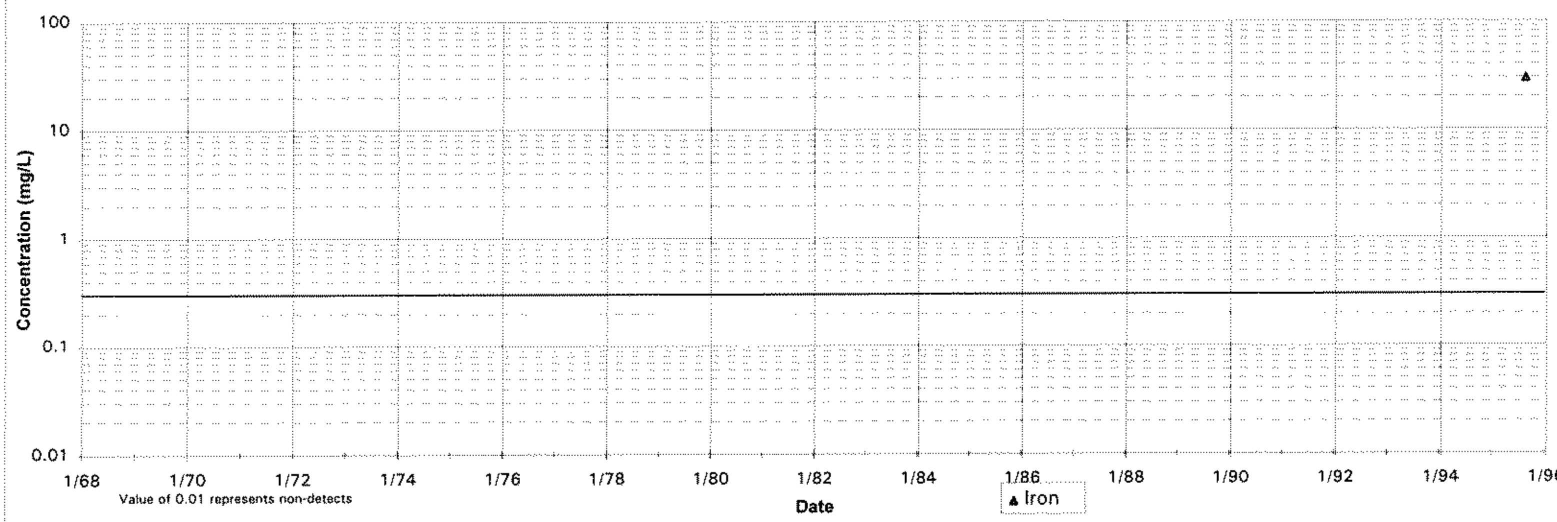


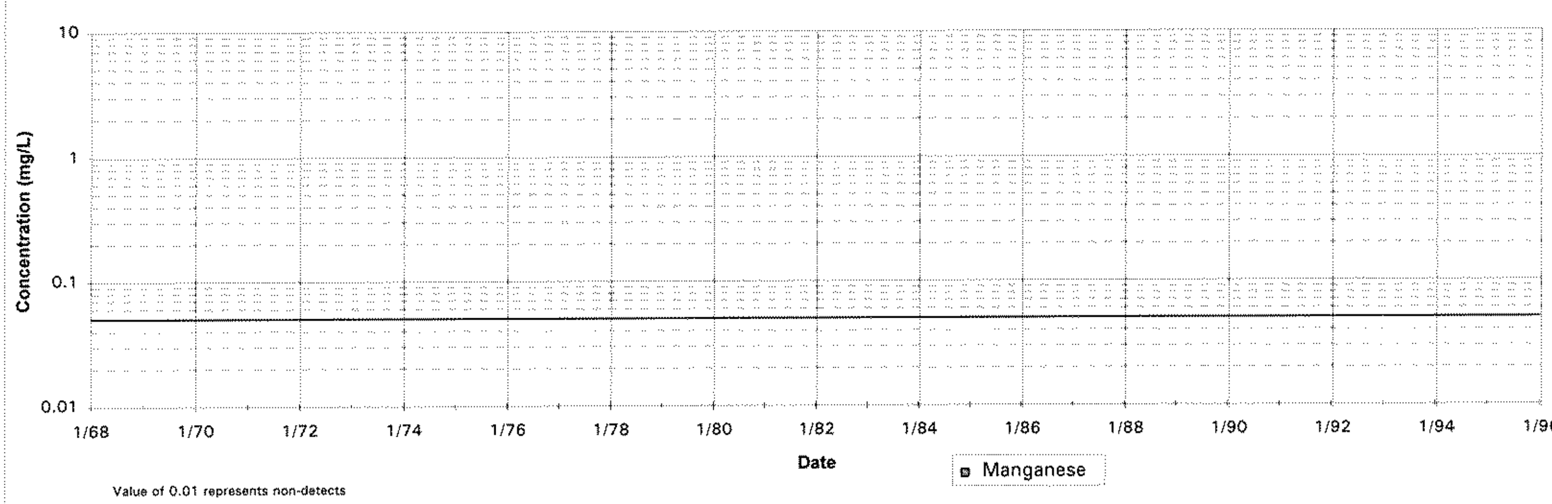
Elevation (ft above MSL)
Date
Water Elevation

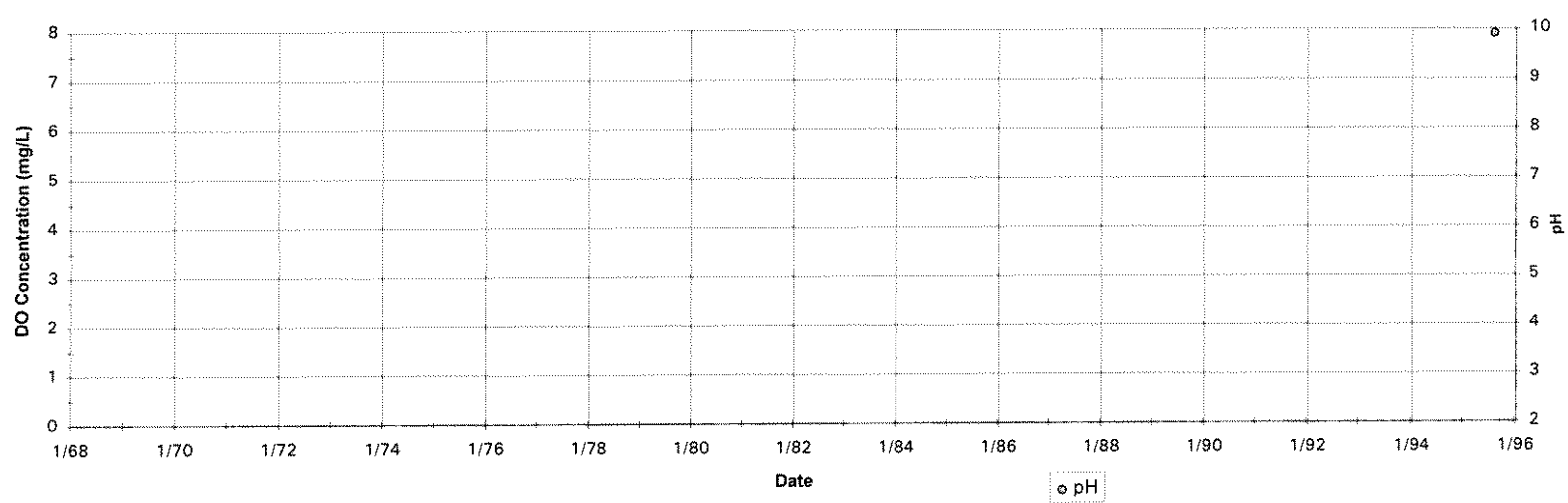


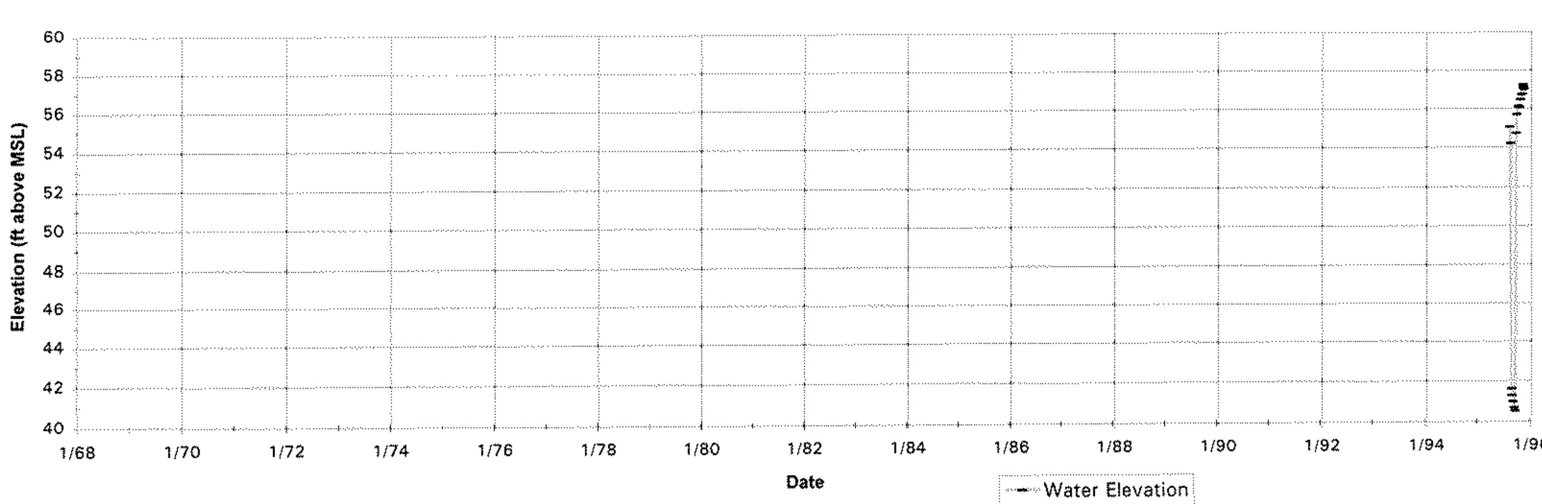
Precipitation (inches)
Date
Precipitation

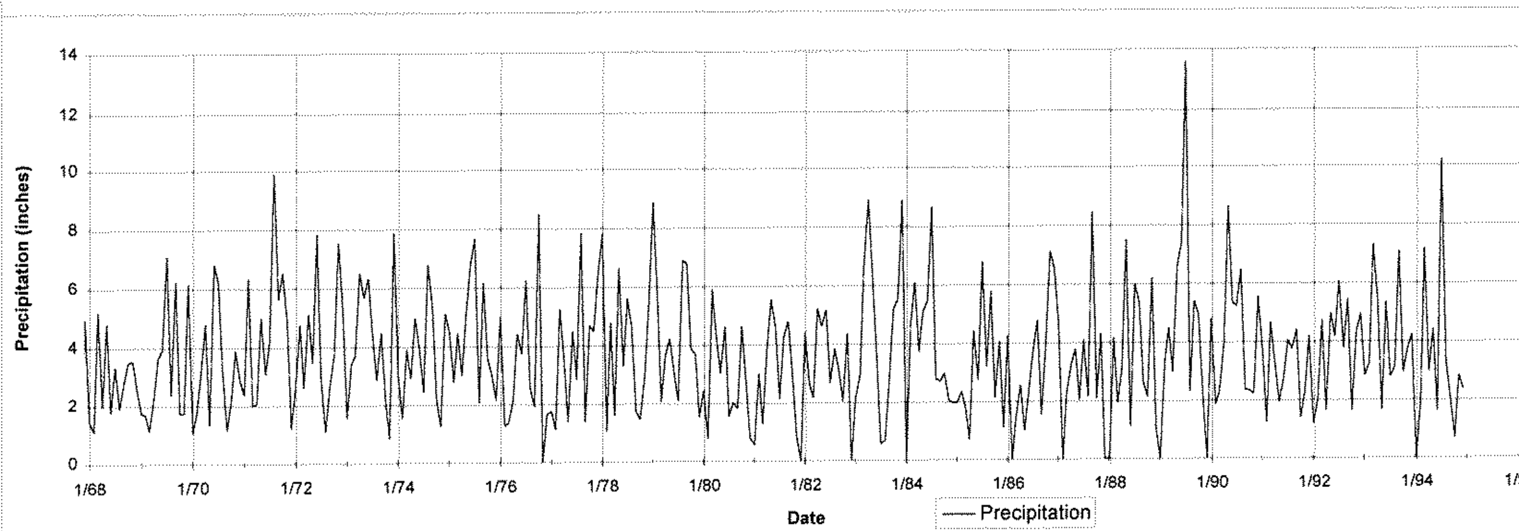
OW-14


Concentration (mg/L)
100
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Value of 0.01 represents non-detects
Iron

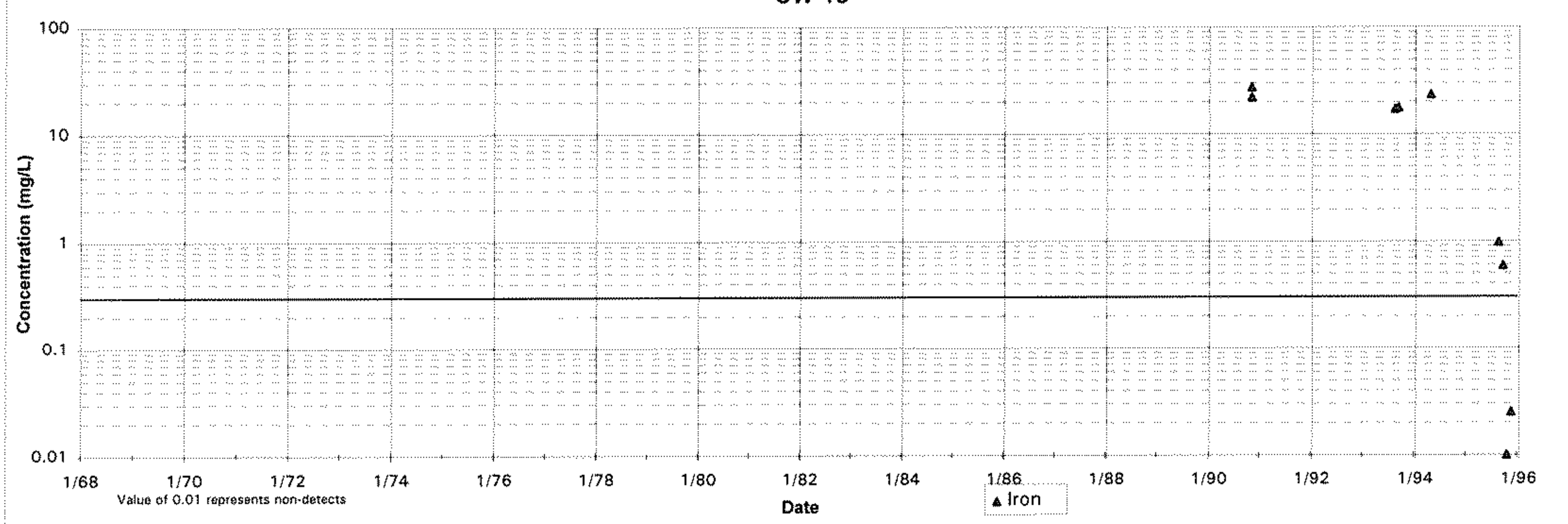

Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Manganese
Value of 0.01 represents non-detects

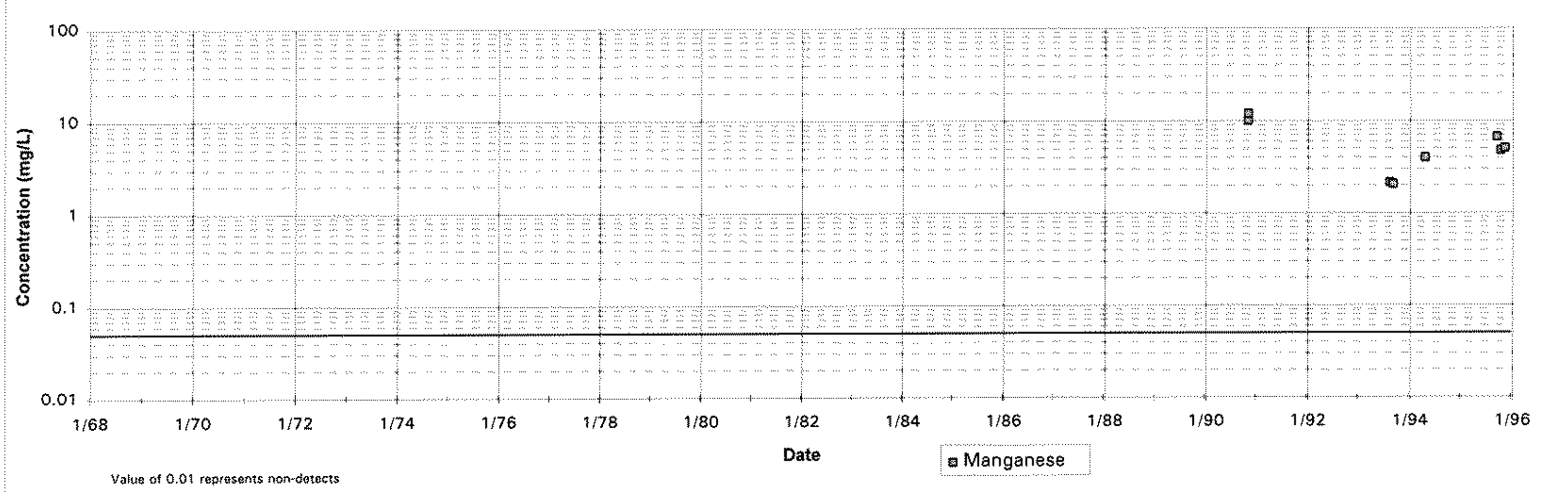

DO Concentration (mg/L)
0 1 2 3 4 5 6 7 8
pH
2 3 4 5 6 7 8 9 10
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
pH

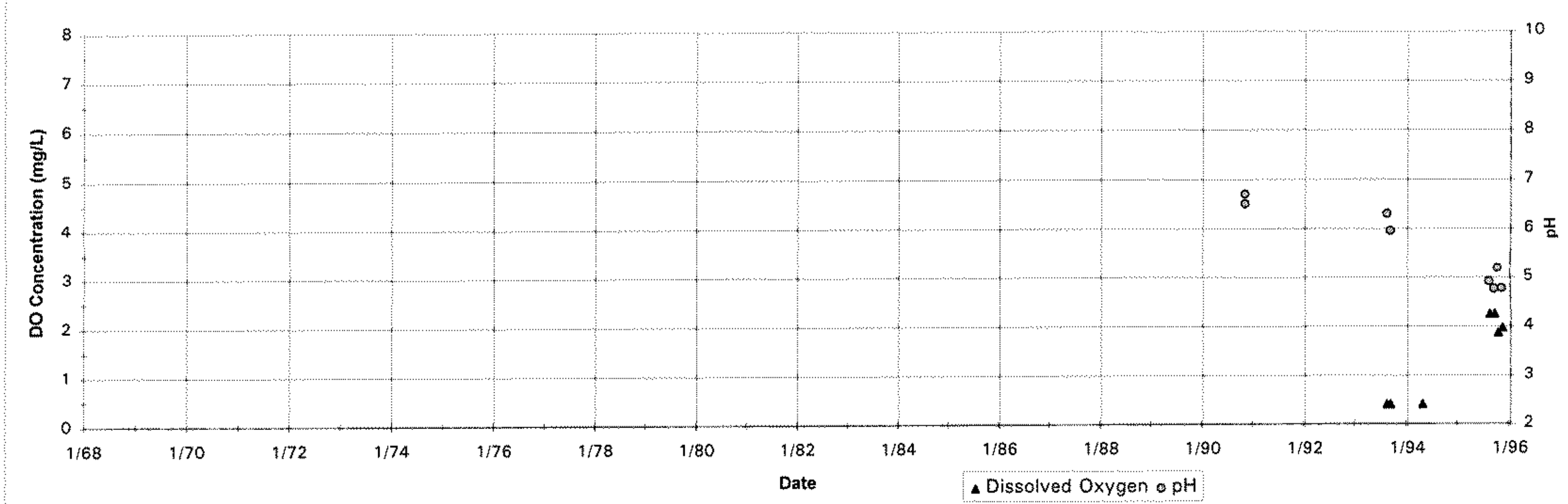

Elevation (ft above MSL)
40 42 44 46 48 50 52 54 56 58 60
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Water Elevation

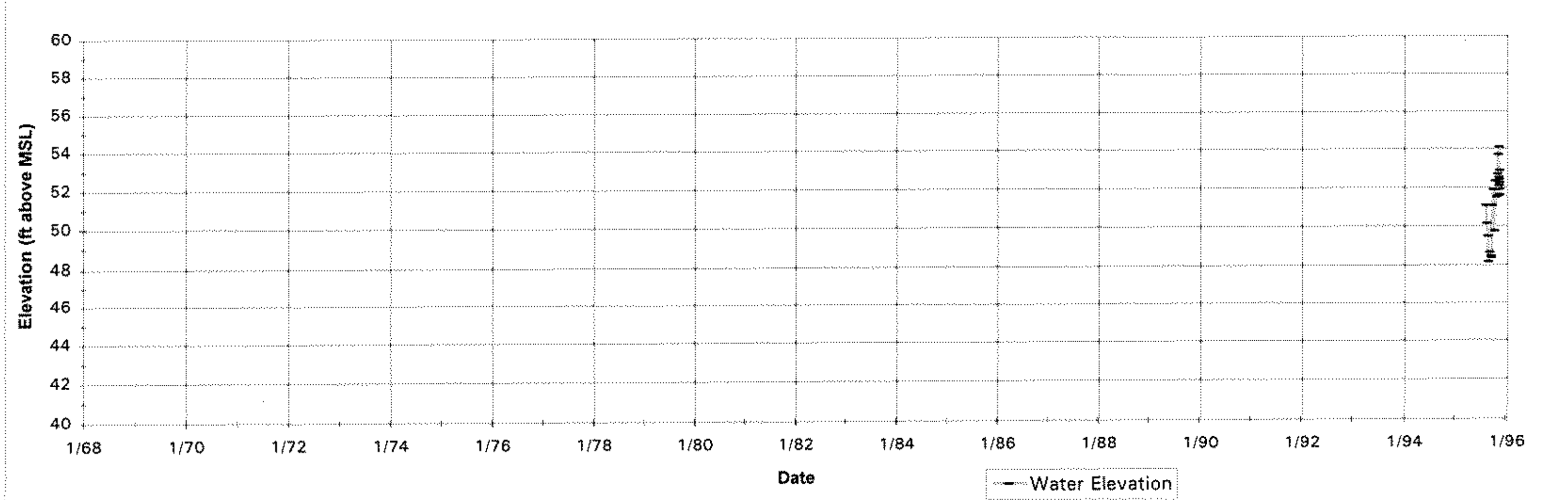

Precipitation (inches)
0 2 4 6 8 10 12 14
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Precipitation

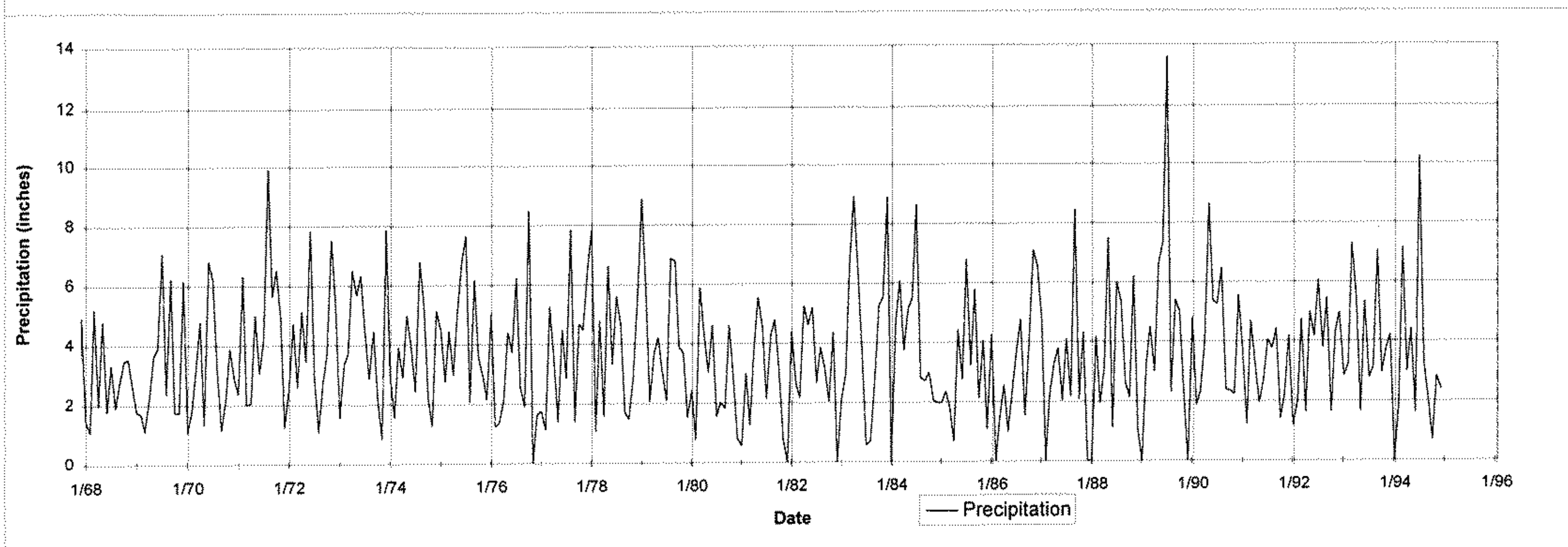
OW-15


Concentration (mg/L)
100
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Value of 0.01 represents non-detects
Date
Iron

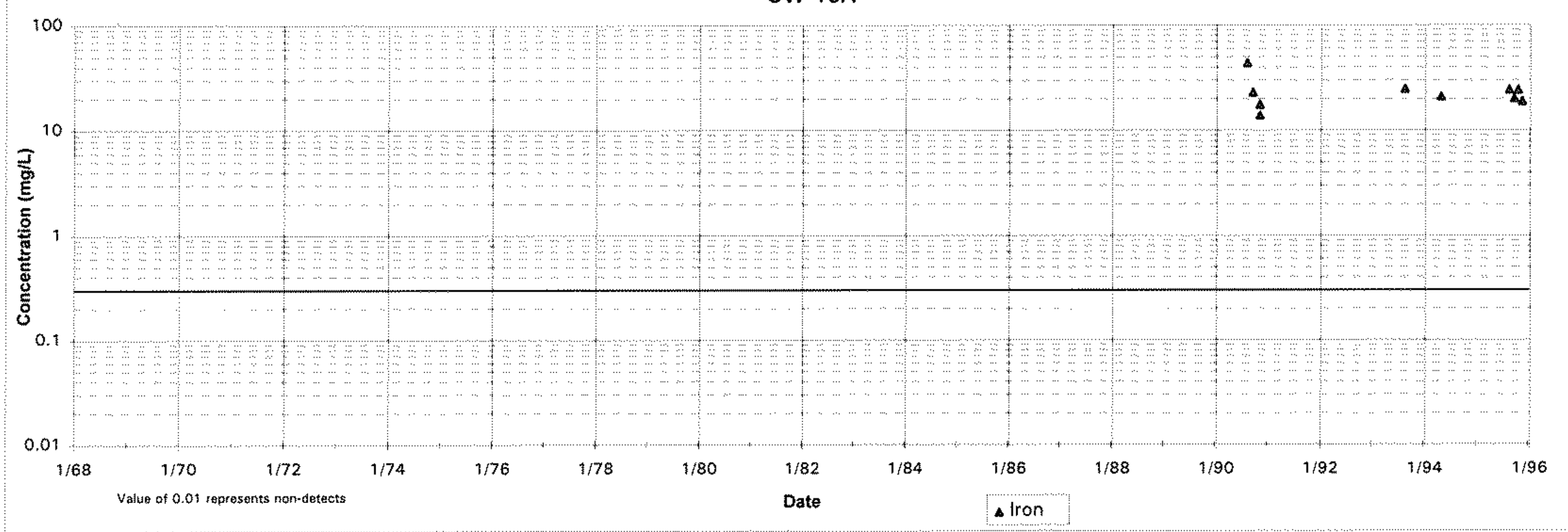

Concentration (mg/L)
100
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Manganese
Value of 0.01 represents non-detects

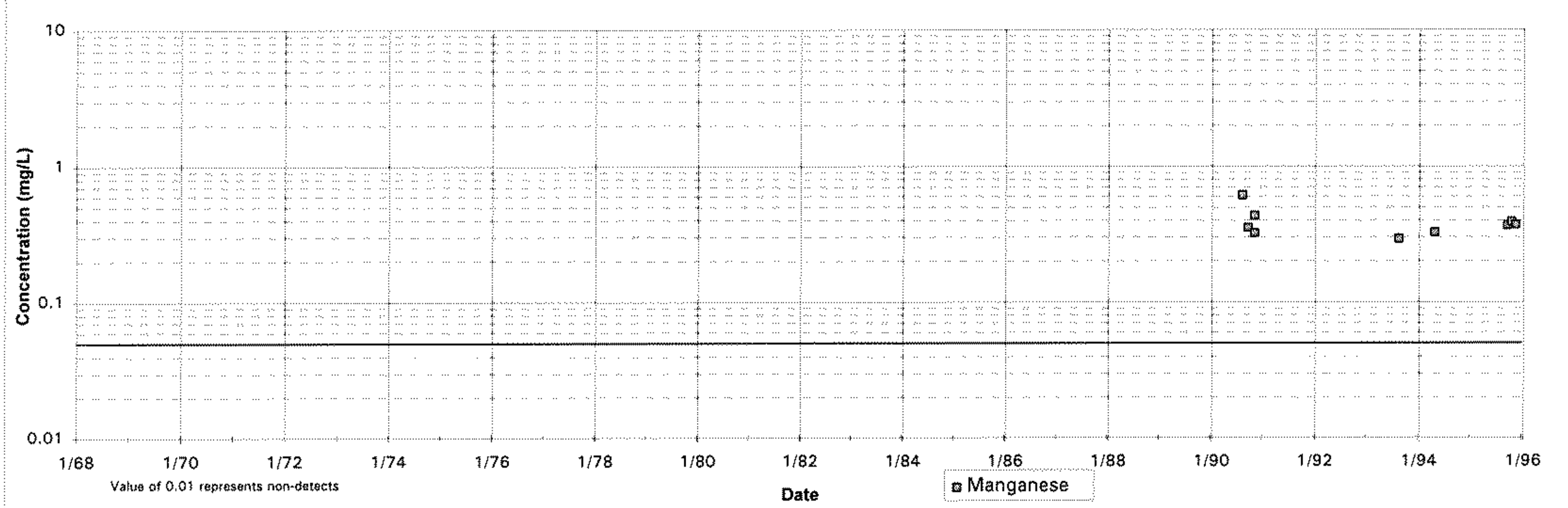

DO Concentration (mg/L)
8
7
6
5
4
3
2
1
0
pH
10
9
8
7
6
5
4
3
2
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Dissolved Oxygen
pH

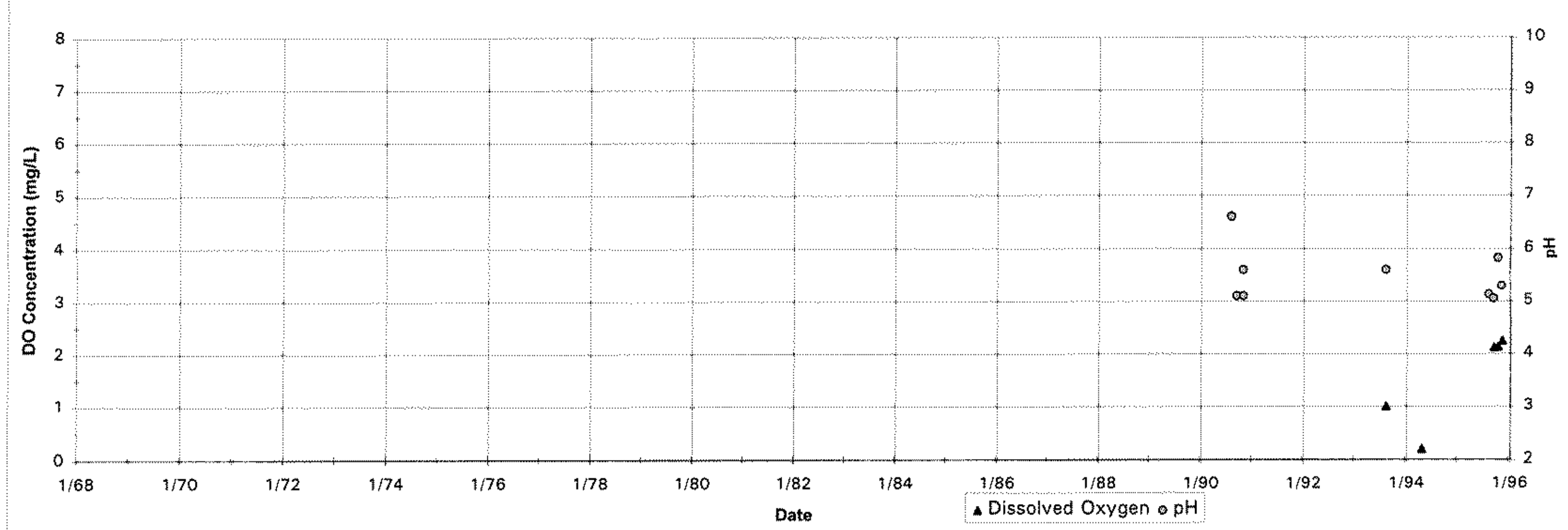

Elevation (ft above MSL)
60
58
56
54
52
50
48
46
44
42
40
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Water Elevation

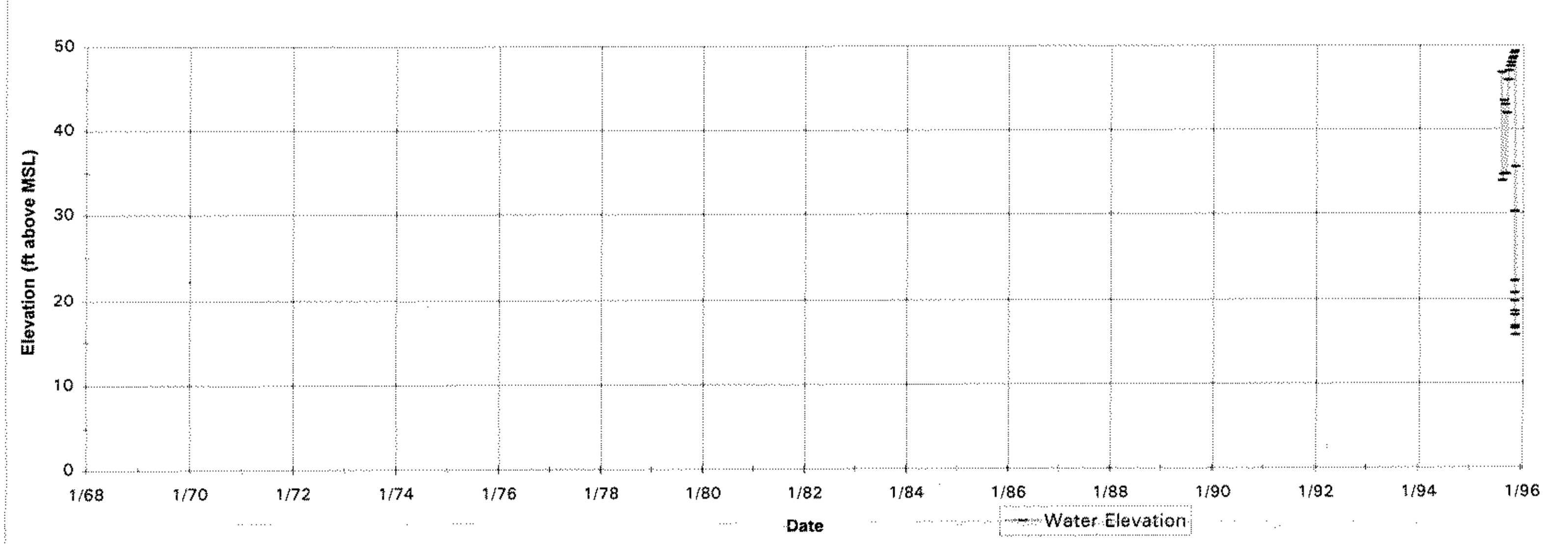

Precipitation (inches)
14
12
10
8
6
4
2
0
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Precipitation

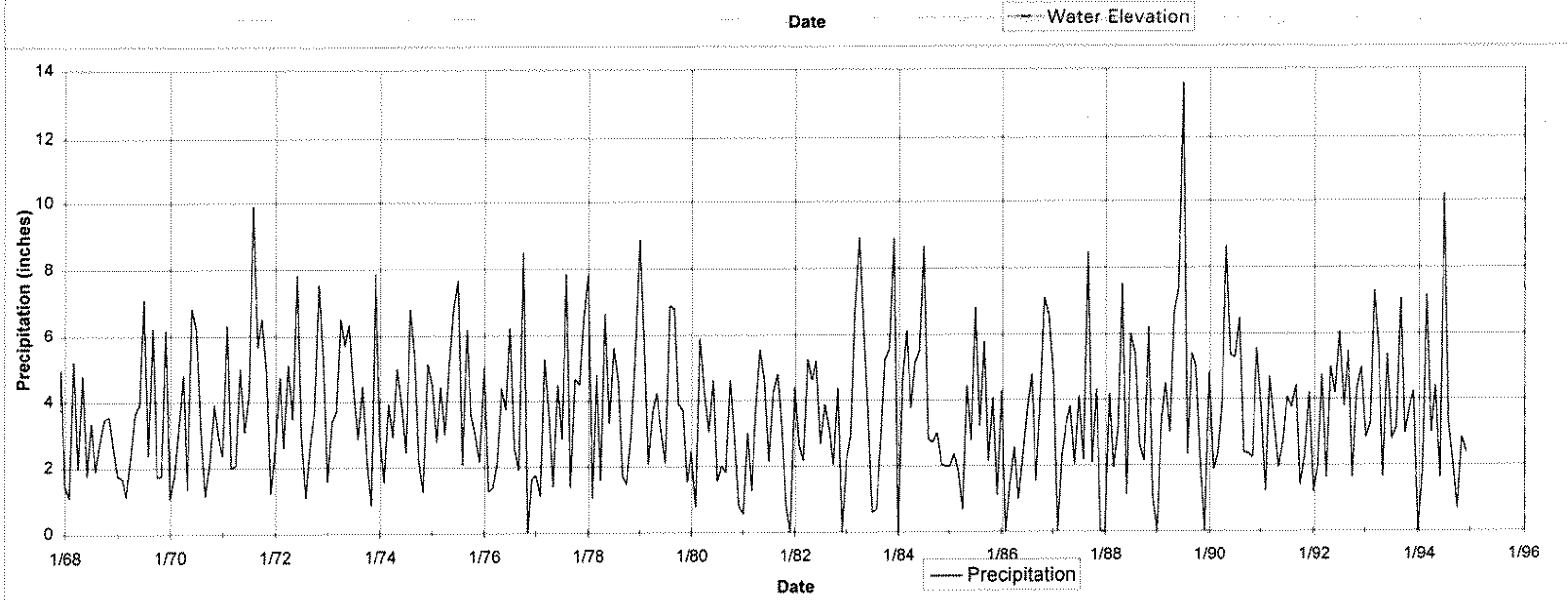
OW-16A


Concentration (mg/L)
100
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Value of 0.01 represents non-detects
Iron

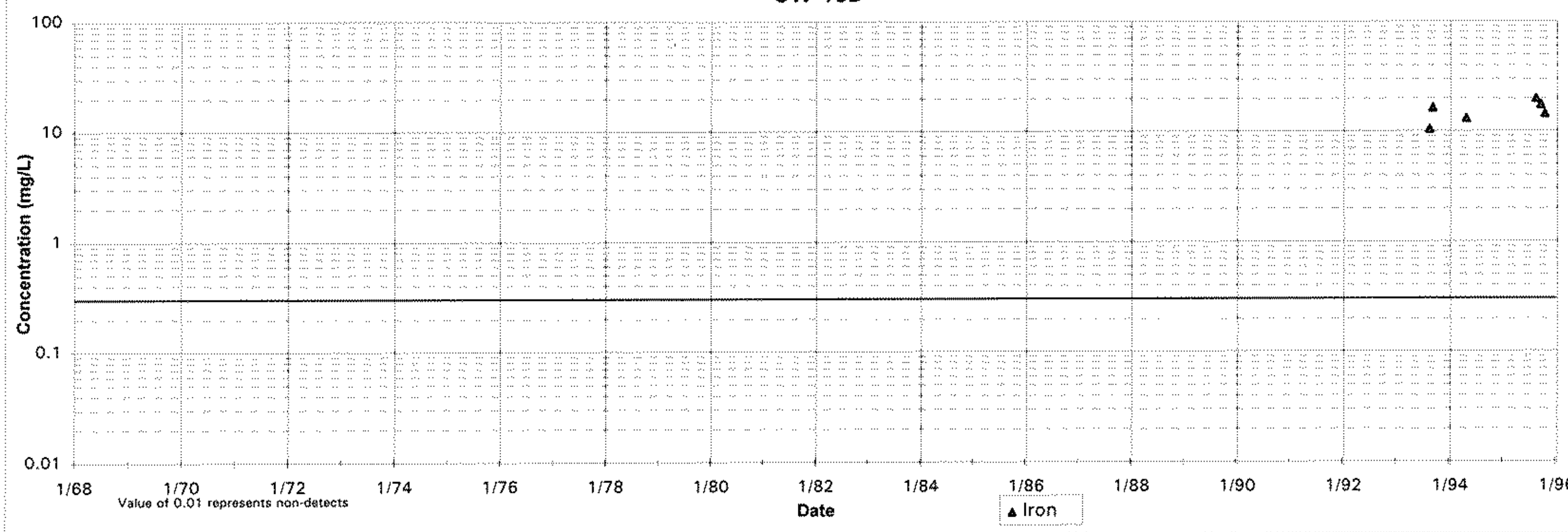

Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Value of 0.01 represents non-detects
Manganese


DO Concentration (mg/L)
0 1 2 3 4 5 6 7 8
pH
2 3 4 5 6 7 8 9 10
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Dissolved Oxygen
pH

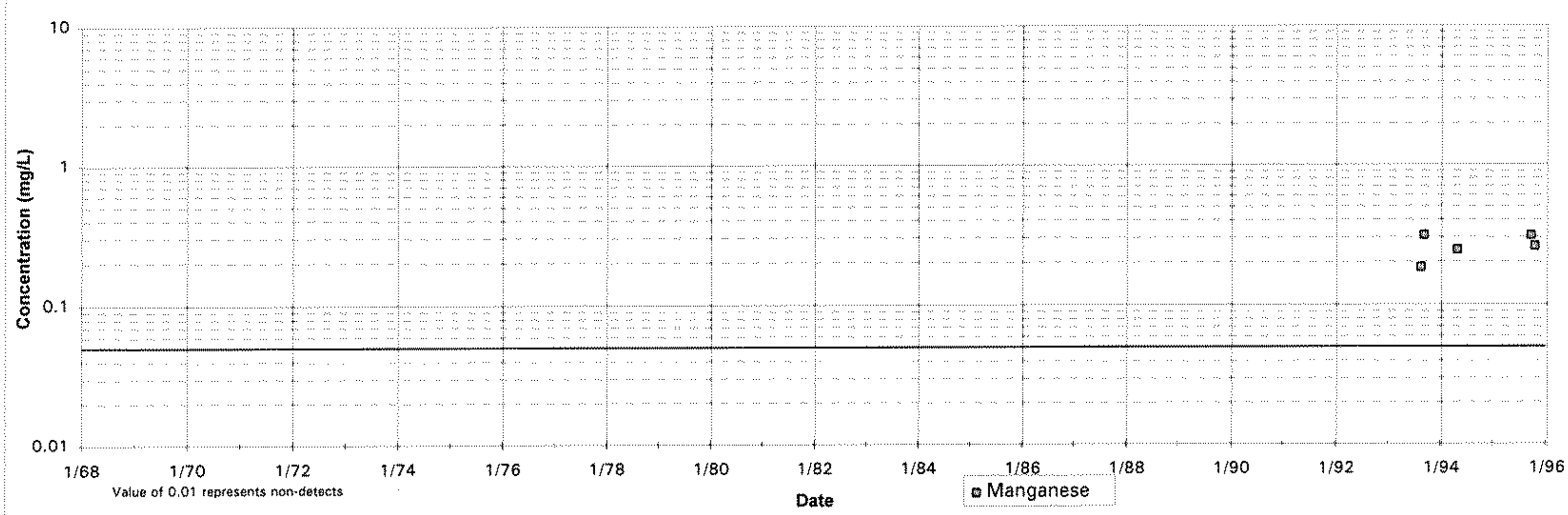

Elevation (ft above MSL)
0 10 20 30 40 50
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Water Elevation


Precipitation (inches)
0 2 4 6 8 10 12 14
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Precipitation

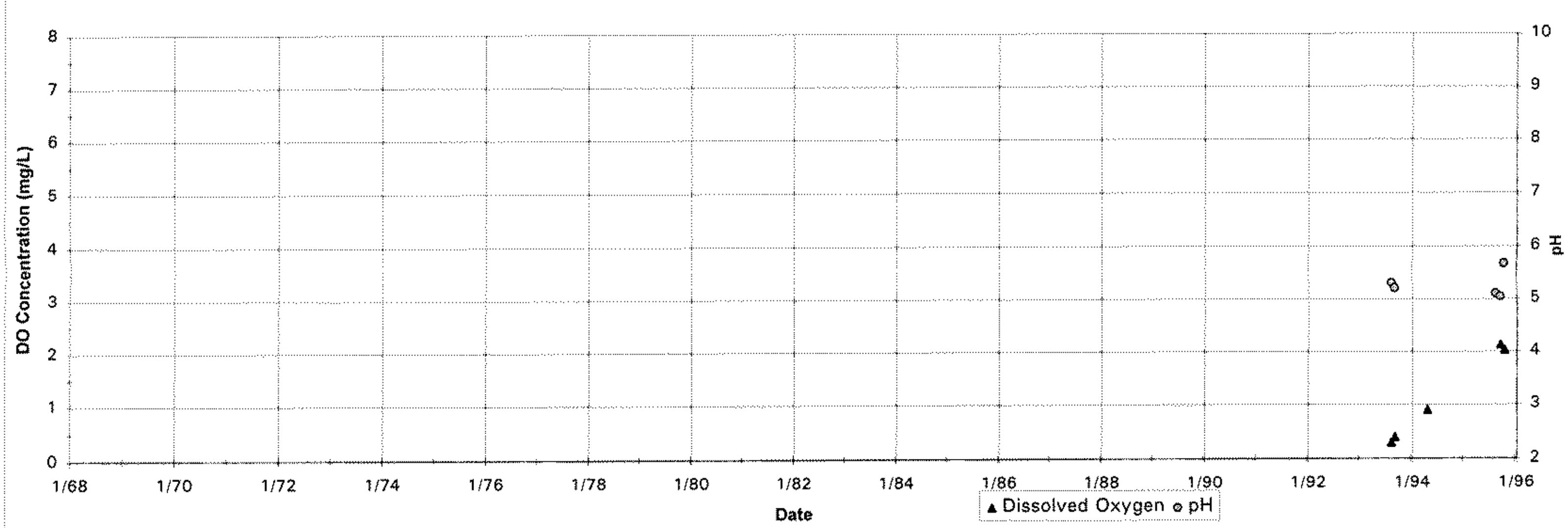
OW-16B



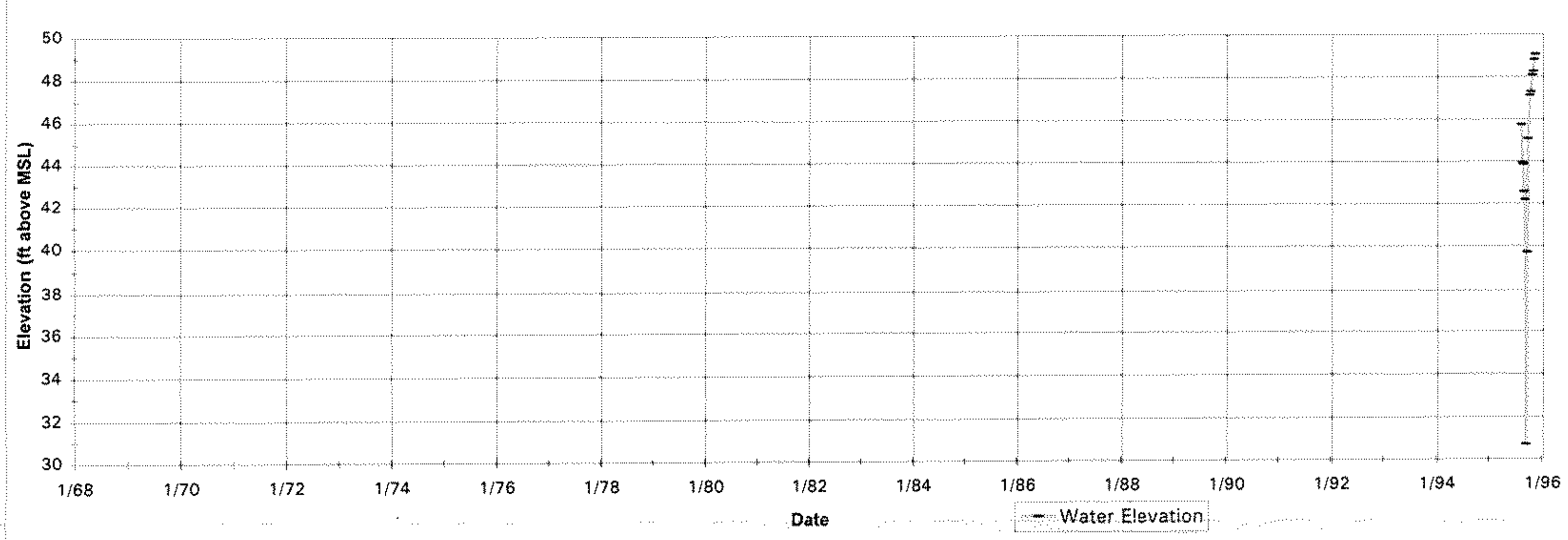
Concentration (mg/L)
100
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Value of 0.01 represents non-detects
Date
Iron



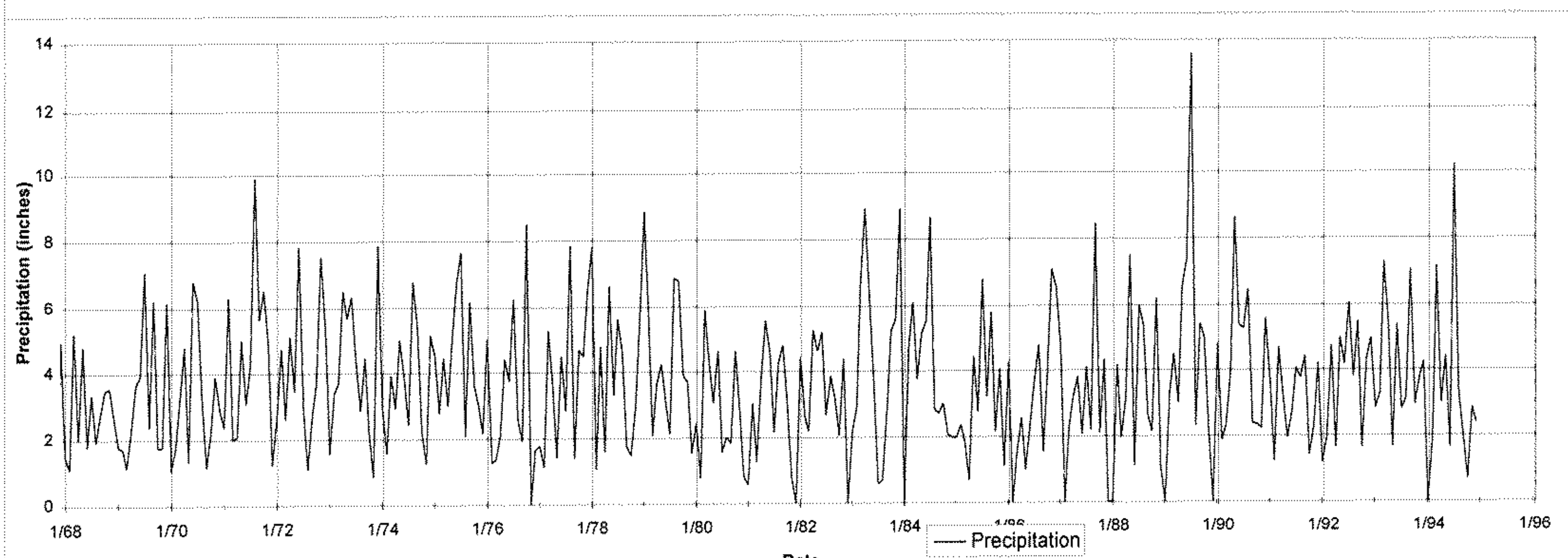
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Value of 0.01 represents non-detects
Date
Manganese



DO Concentration (mg/L)
0 1 2 3 4 5 6 7 8
pH
2 3 4 5 6 7 8 9 10
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Dissolved Oxygen
pH

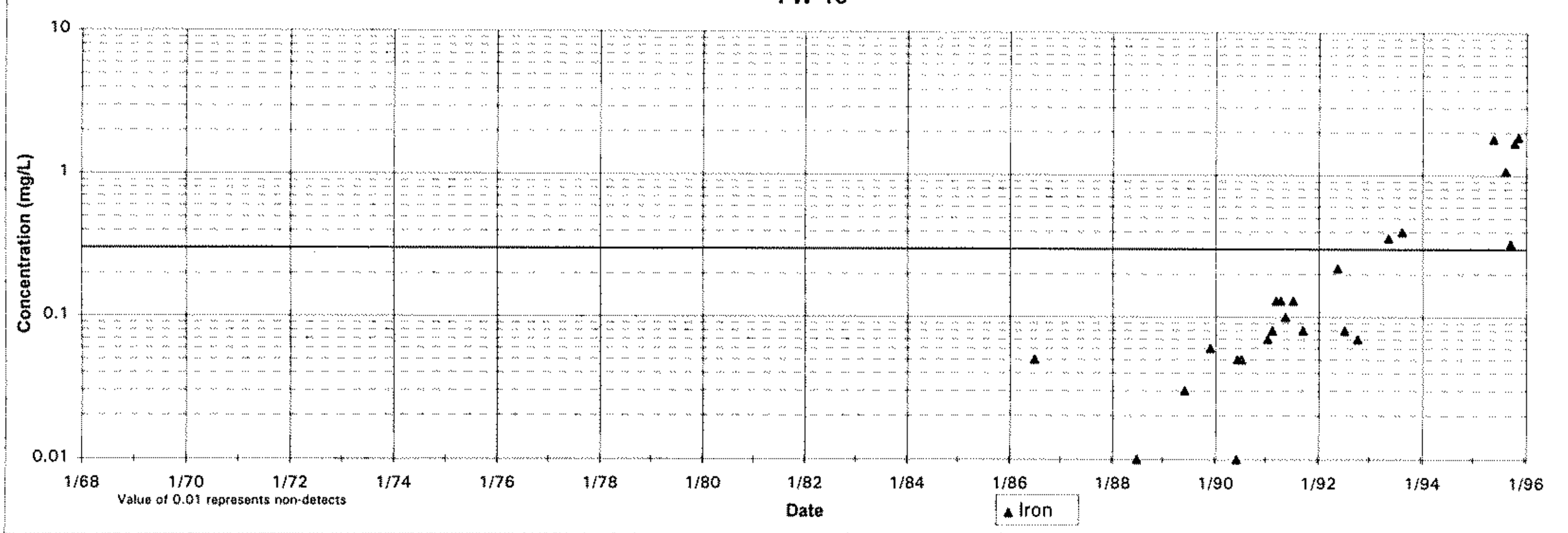


Elevation (ft above MSL)
30 32 34 36 38 40 42 44 46 48 50
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Water Elevation

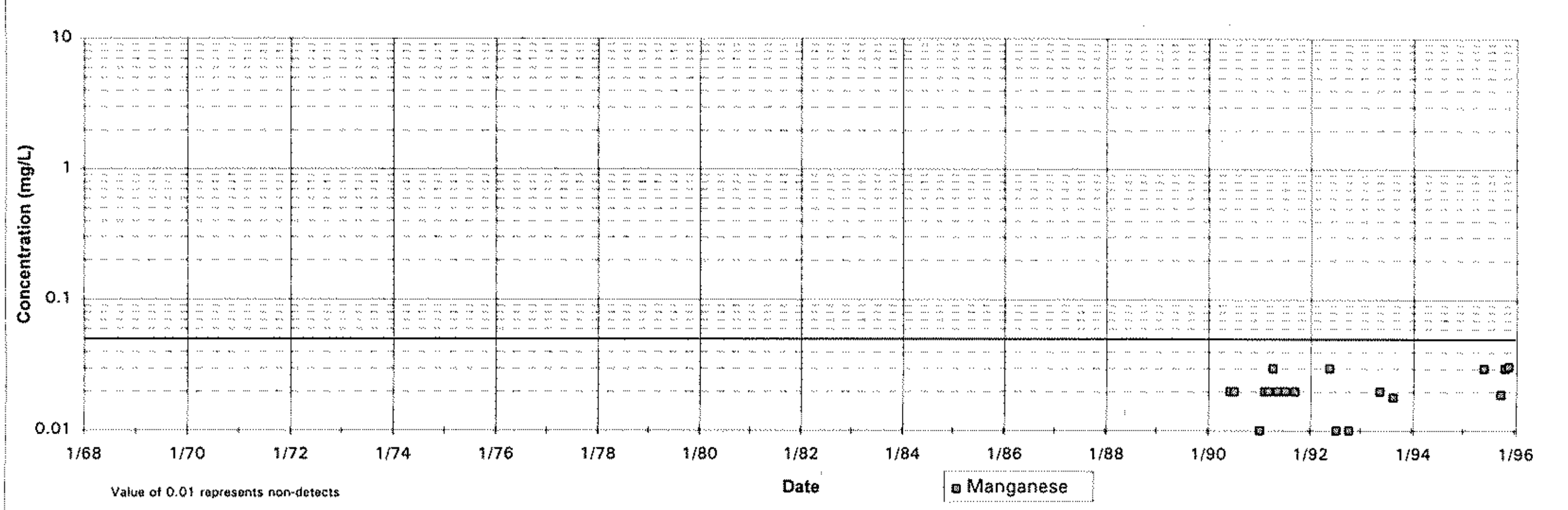


Precipitation (inches)
0 2 4 6 8 10 12 14
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/88 1/90 1/92 1/94 1/96
Date
Precipitation

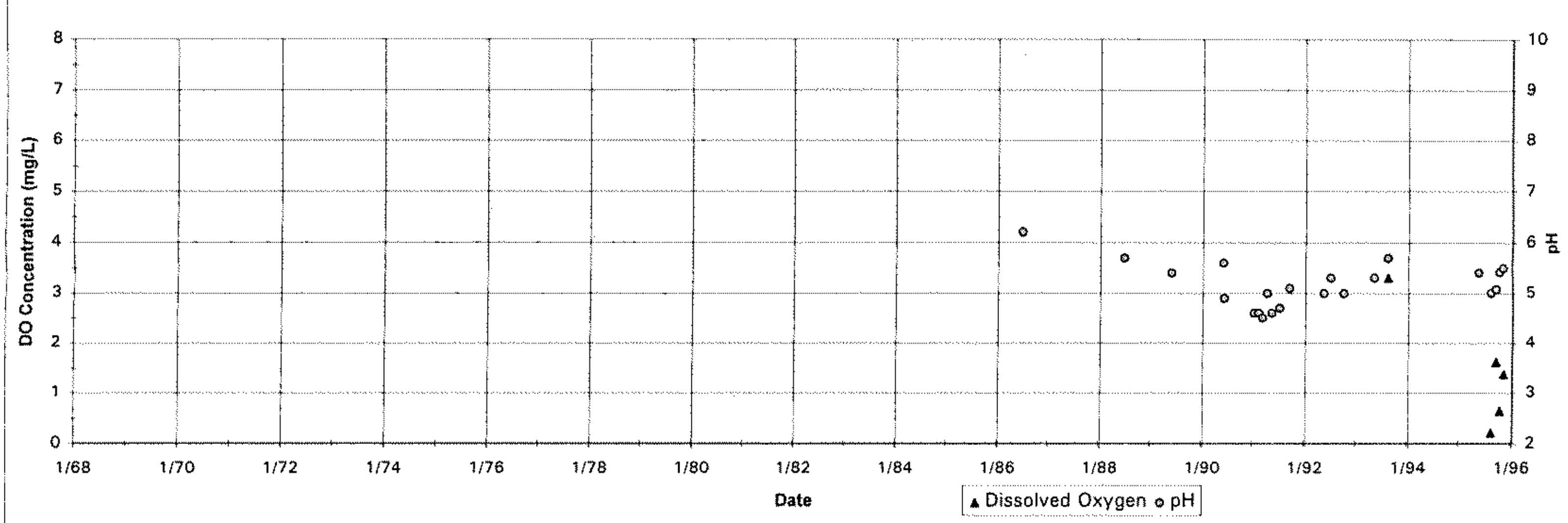
PW-10



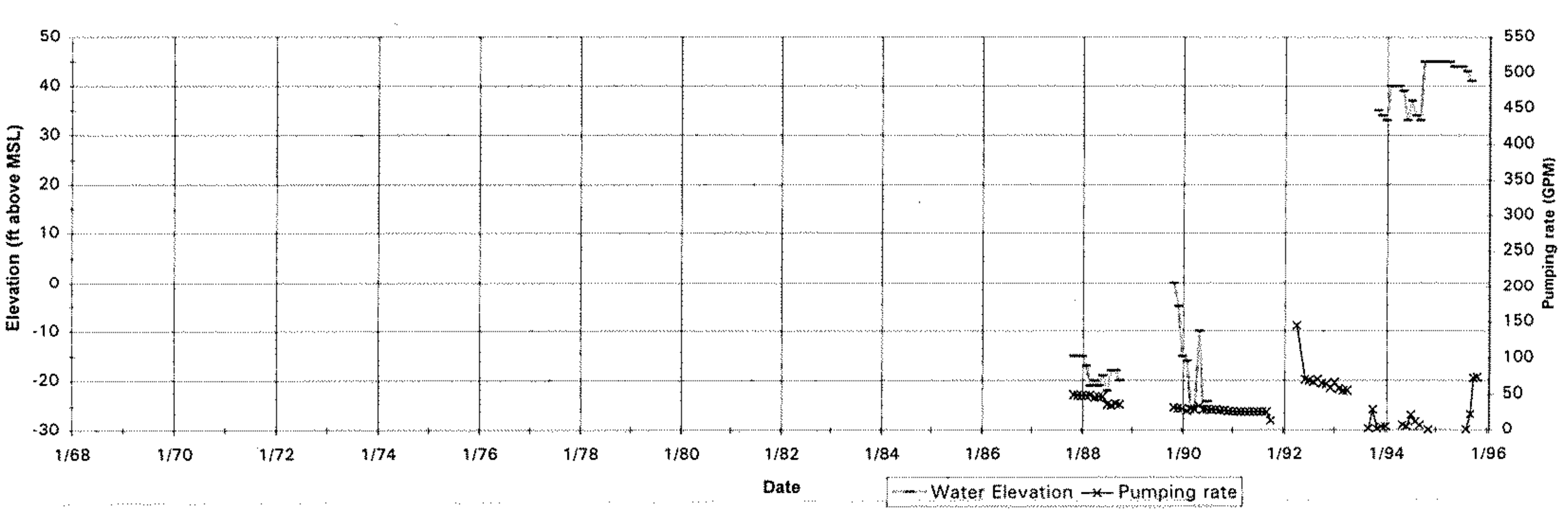
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Value of 0.01 represents non-detects
Date
Iron



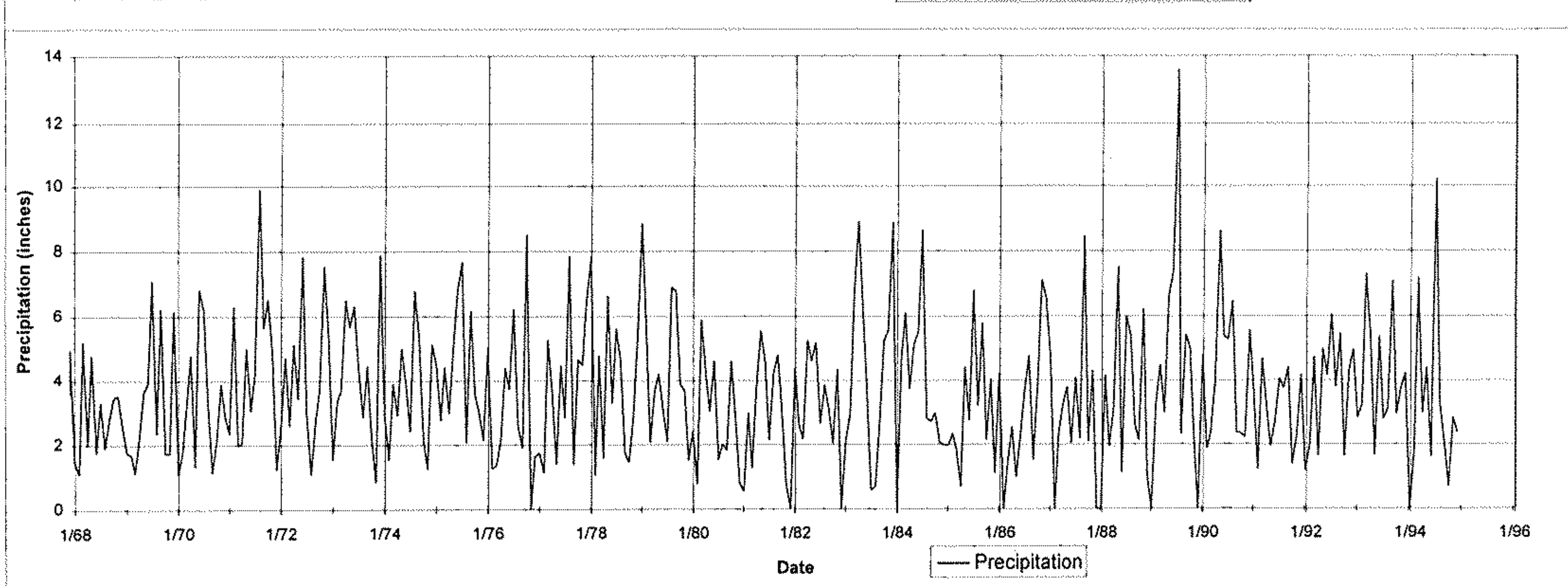
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Value of 0.01 represents non-detects
Date
Manganese



DO Concentration (mg/L)
pH
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Dissolved Oxygen
pH

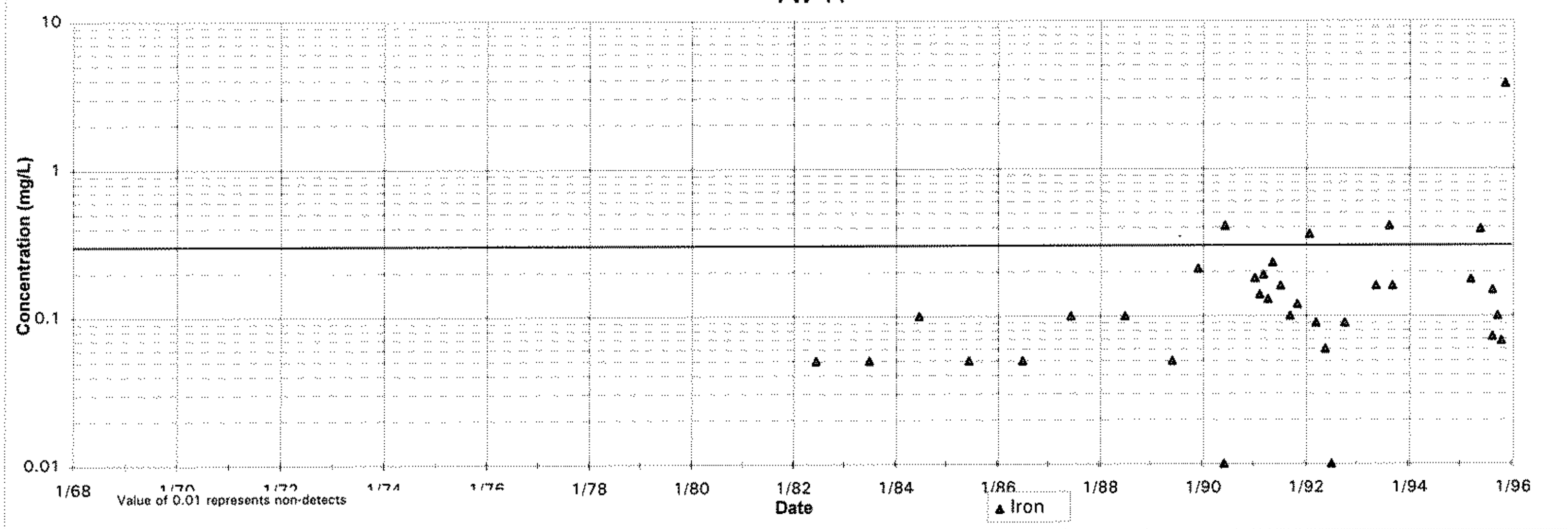


Elevation (ft above MSL)
Pumping rate (GPM)
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Water Elevation
Pumping rate

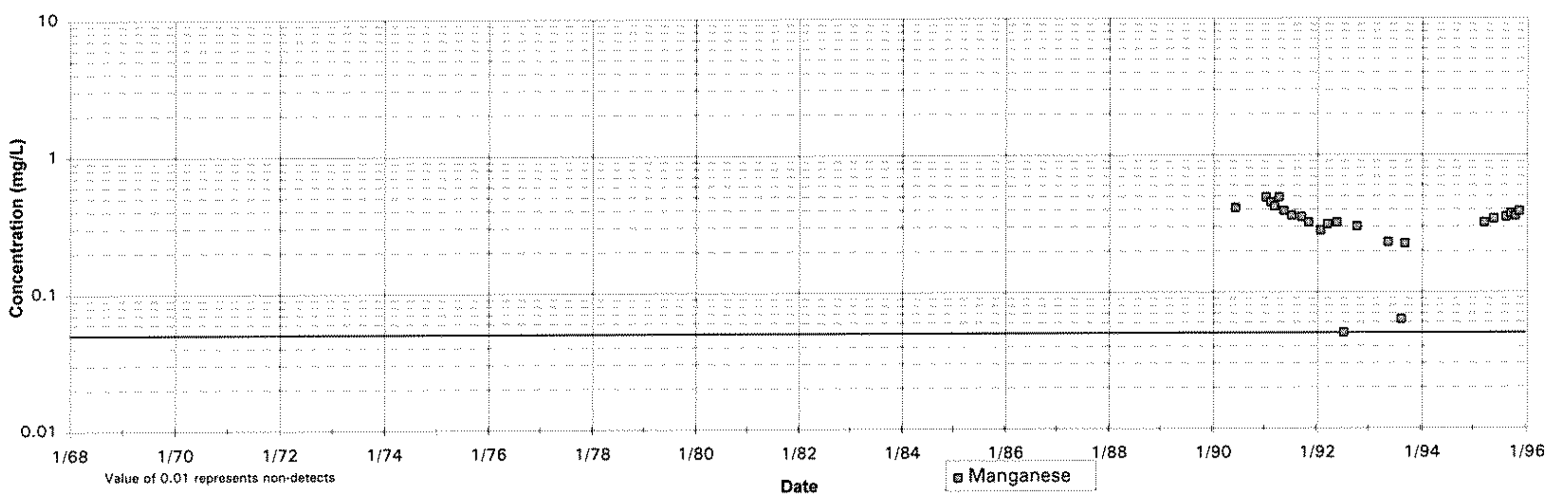


Precipitation (inches)
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Precipitation

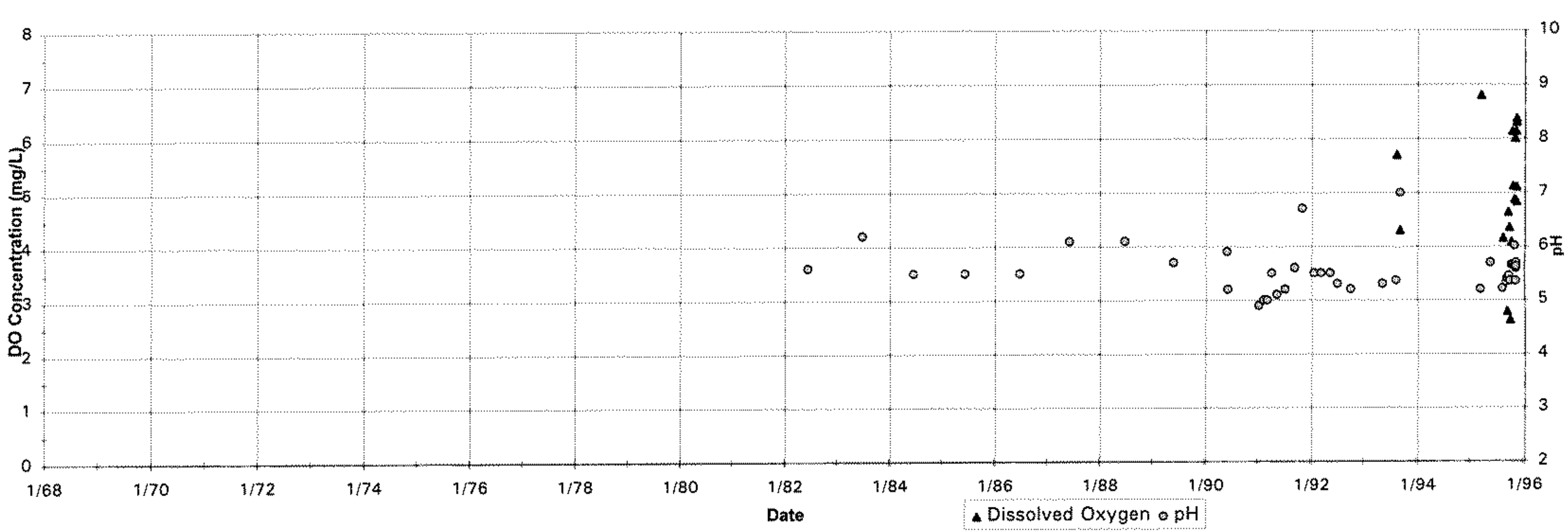
PW-11



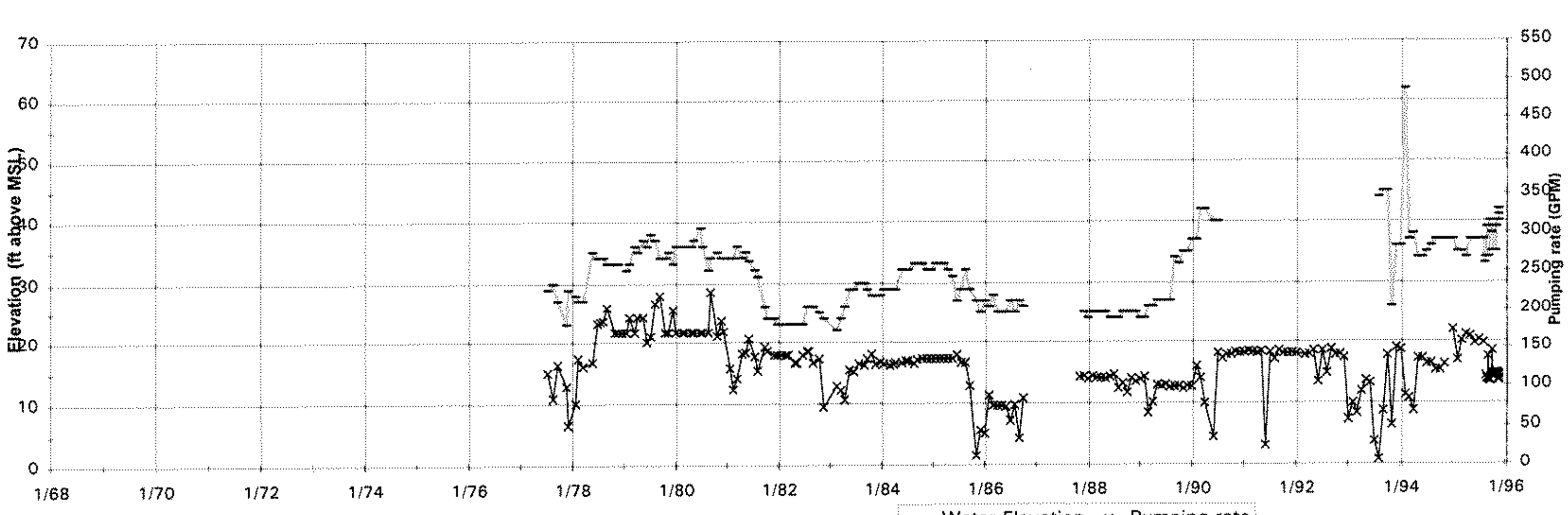
Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Value of 0.01 represents non-detects
Date
Iron



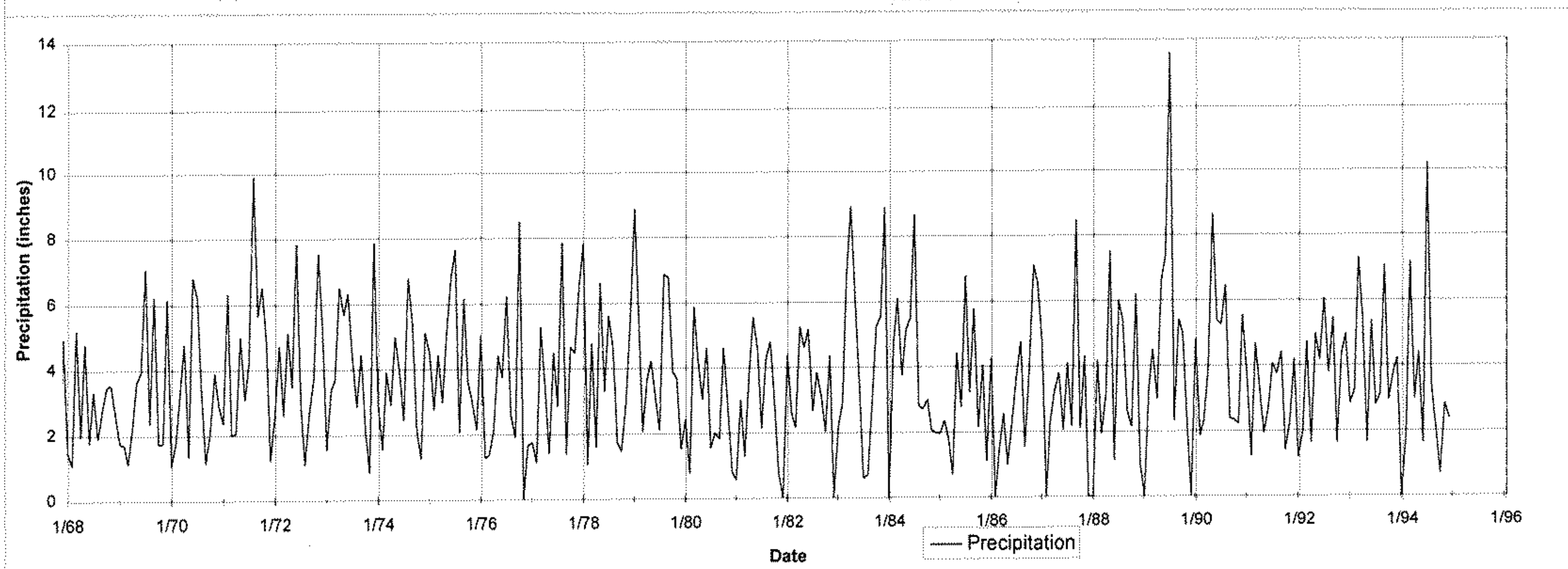
Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Value of 0.01 represents non-detects
Date
Manganese



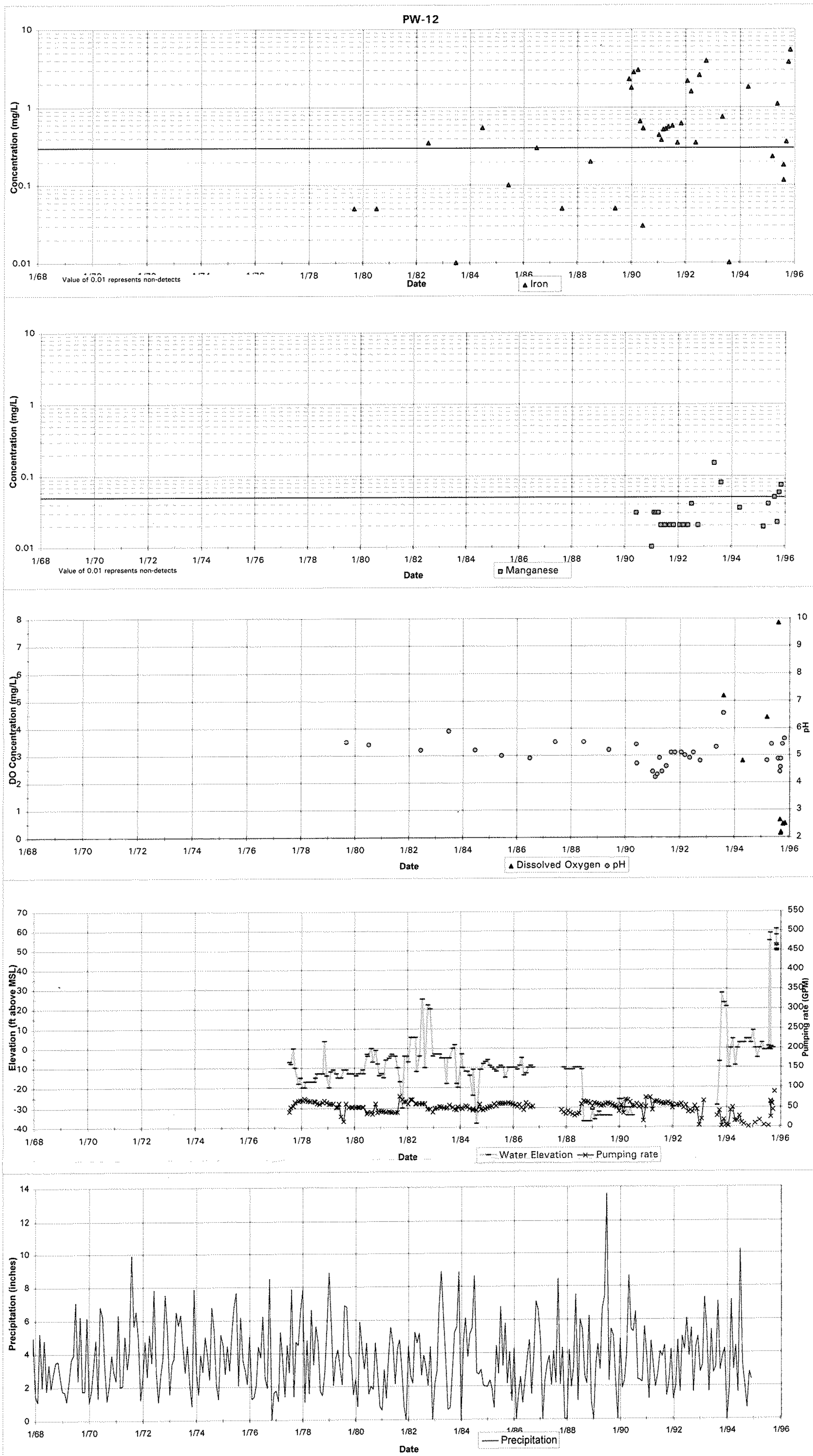
DO Concentration (mg/L)
pH
8
7
6
5
4
3
2
1
0
10
9
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Dissolved Oxygen
pH



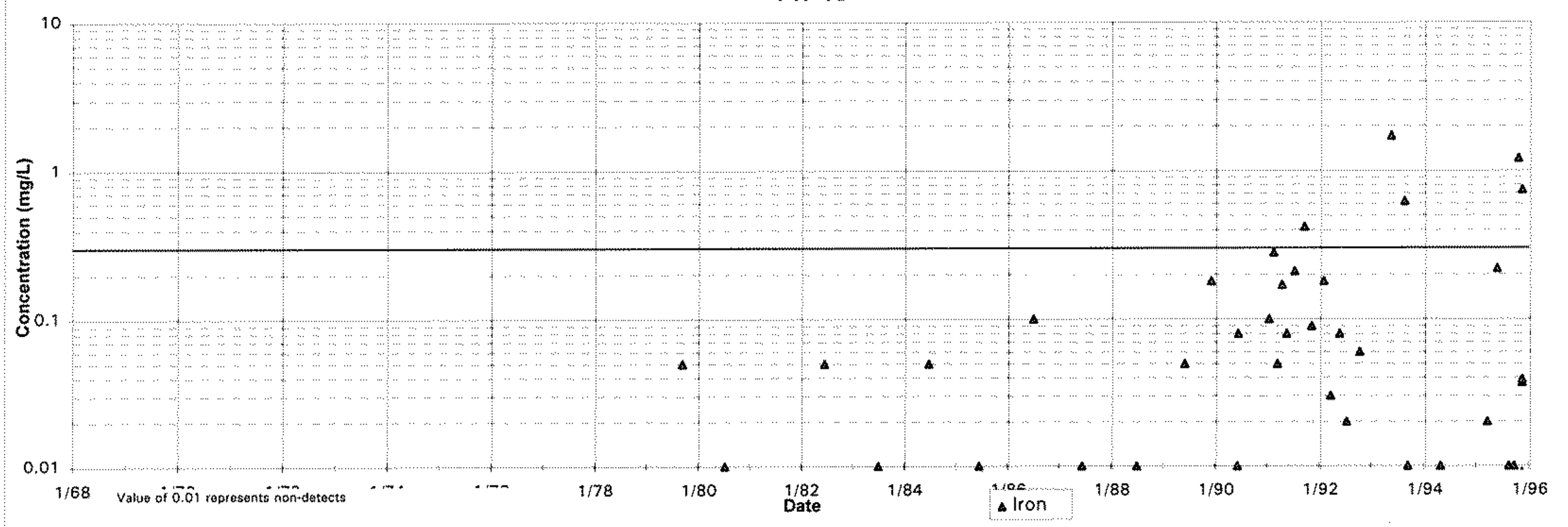
Elevation (ft above MSL)
Pumping rate (GPM)
70
60
50
40
30
20
10
0
550
500
450
400
350
300
250
200
150
100
50
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Water Elevation
Pumping rate



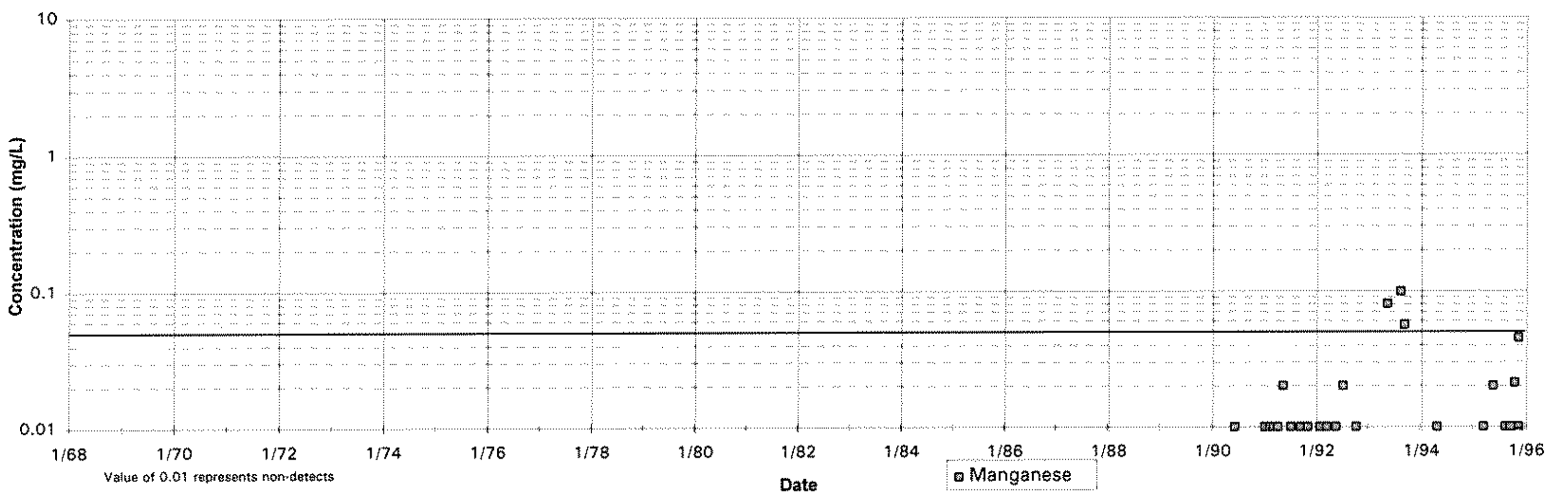
Precipitation (inches)
14
12
10
8
6
4
2
0
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Precipitation


PW-12
Concentration (mg/L)
Value of 0.01 represents non-detects
Date
Iron
Manganese
DO Concentration (mg/L)
pH
Dissolved Oxygen
Elevation (ft above MSL)
Pumping rate (GPM)
Water Elevation
Pumping rate
Precipitation (inches)
Precipitation

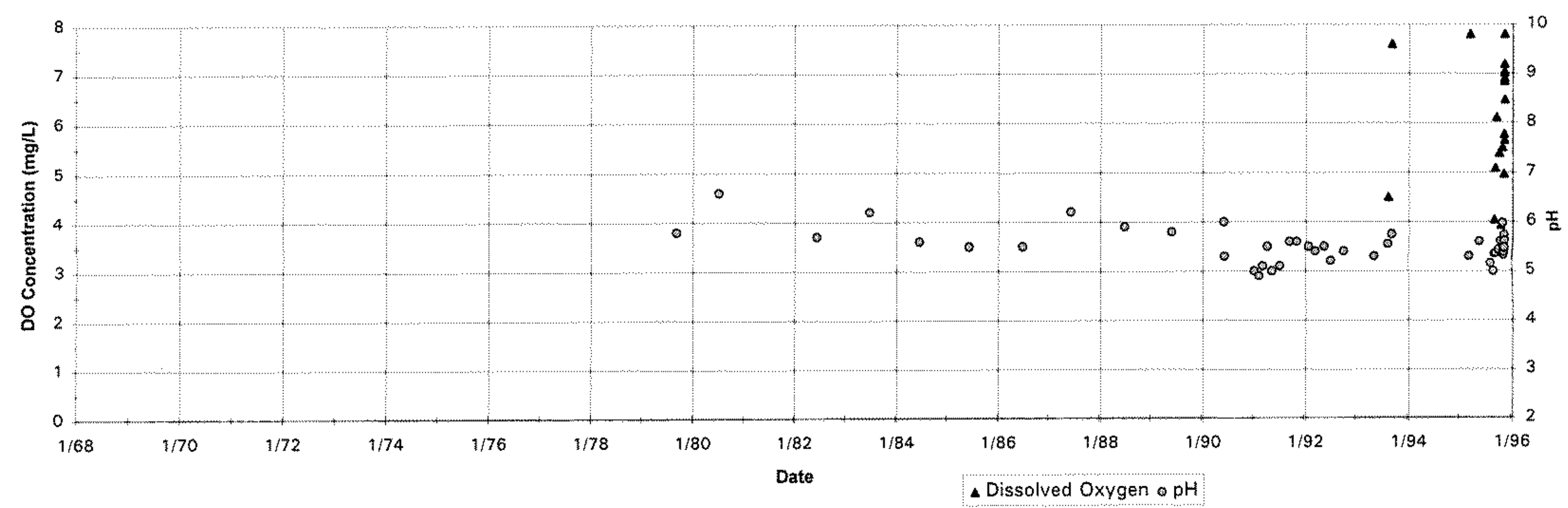
PW-13



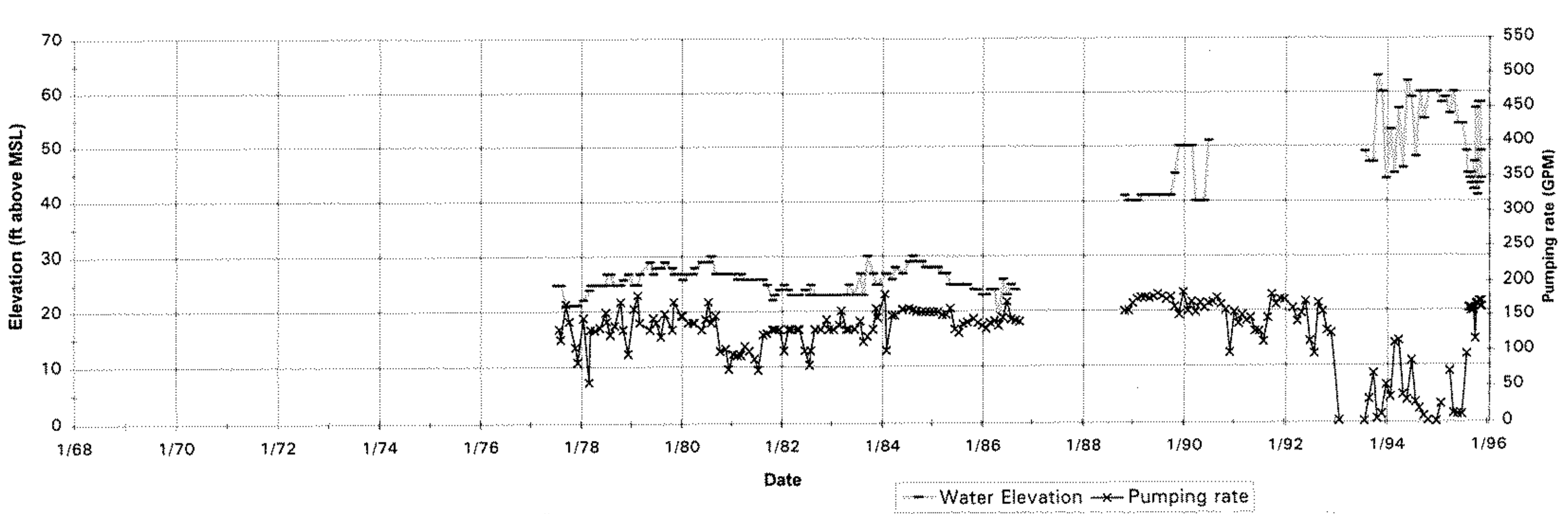
Concentration (mg/L)
Date
Value of 0.01 represents non-detects
Iron



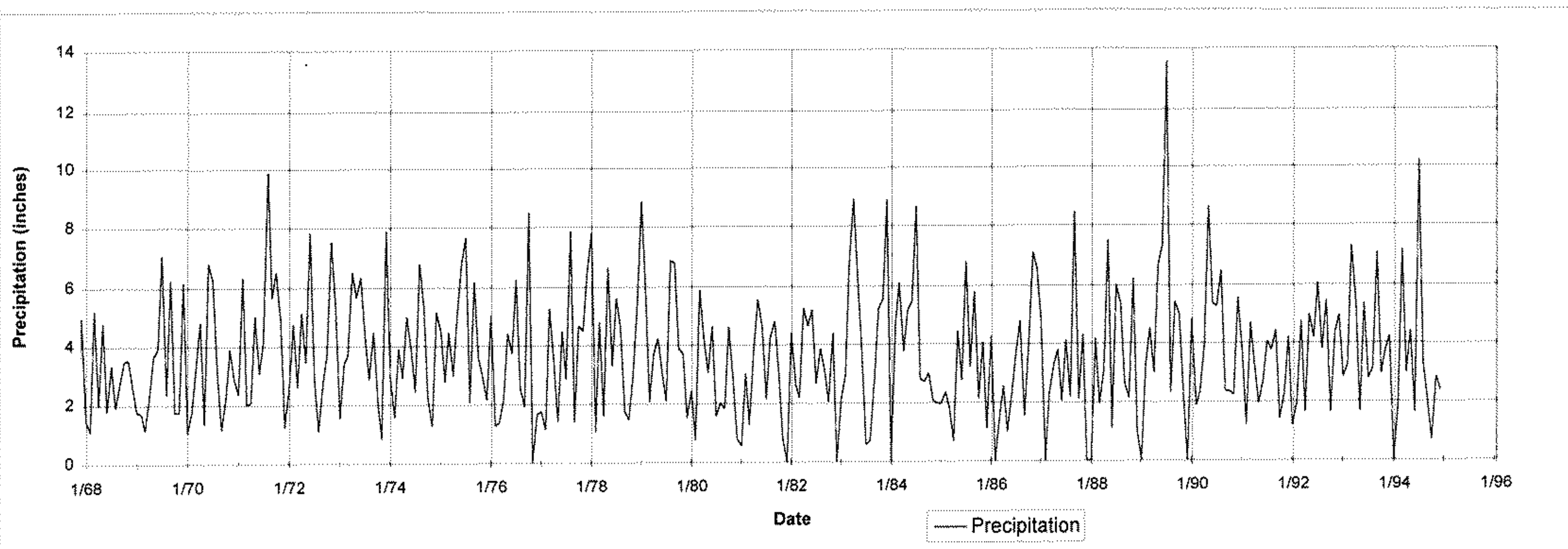
Concentration (mg/L)
Date
Value of 0.01 represents non-detects
Manganese



DO Concentration (mg/L)
pH
Date
Dissolved Oxygen
pH

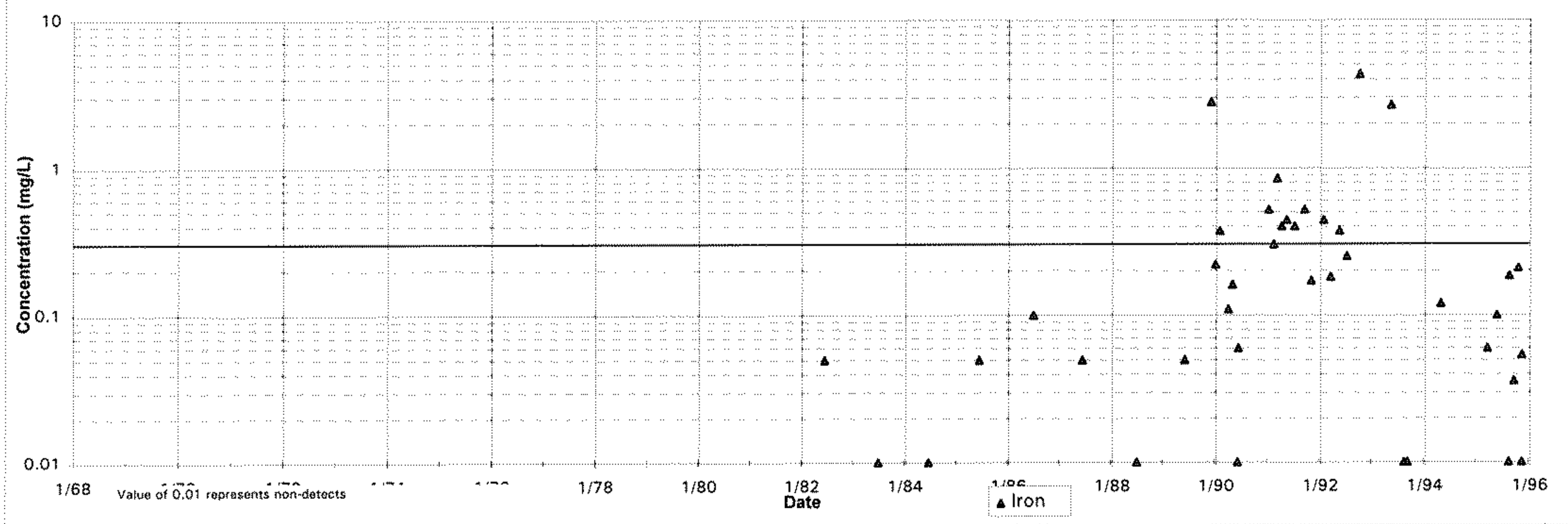


Elevation (ft above MSL)
Pumping rate (GPM)
Date
Water Elevation
Pumping rate

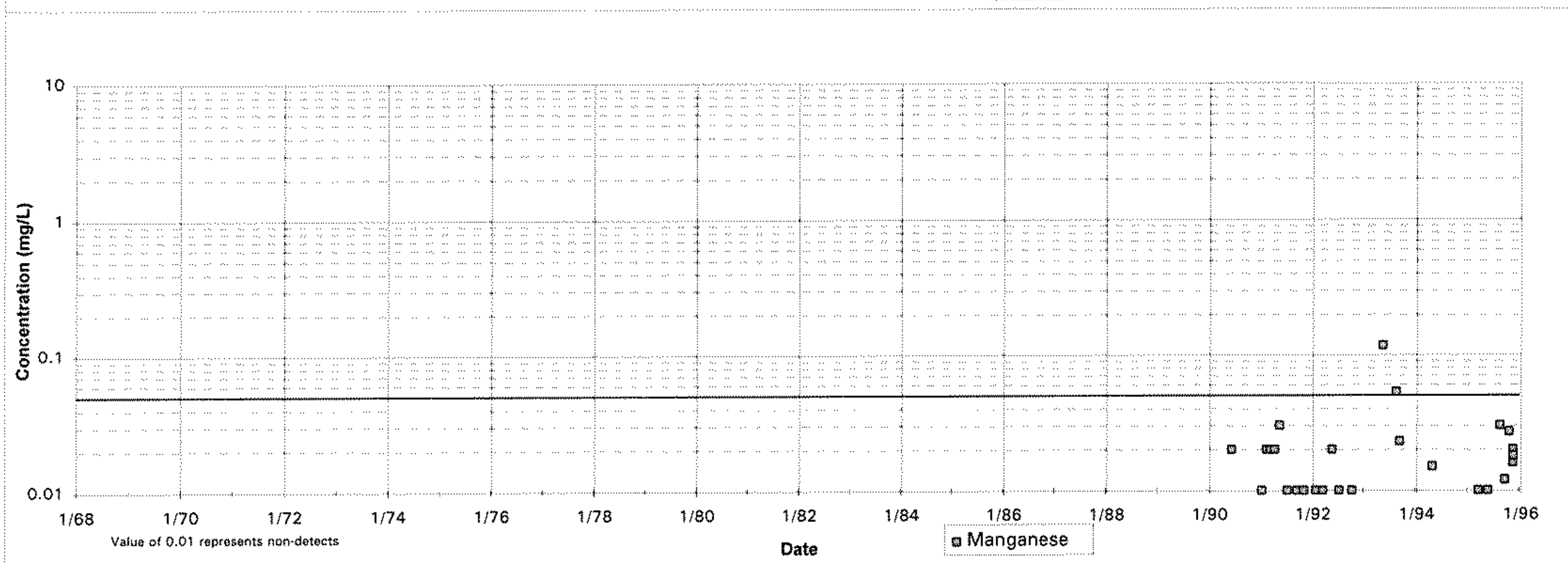


Precipitation (inches)
Date
Precipitation

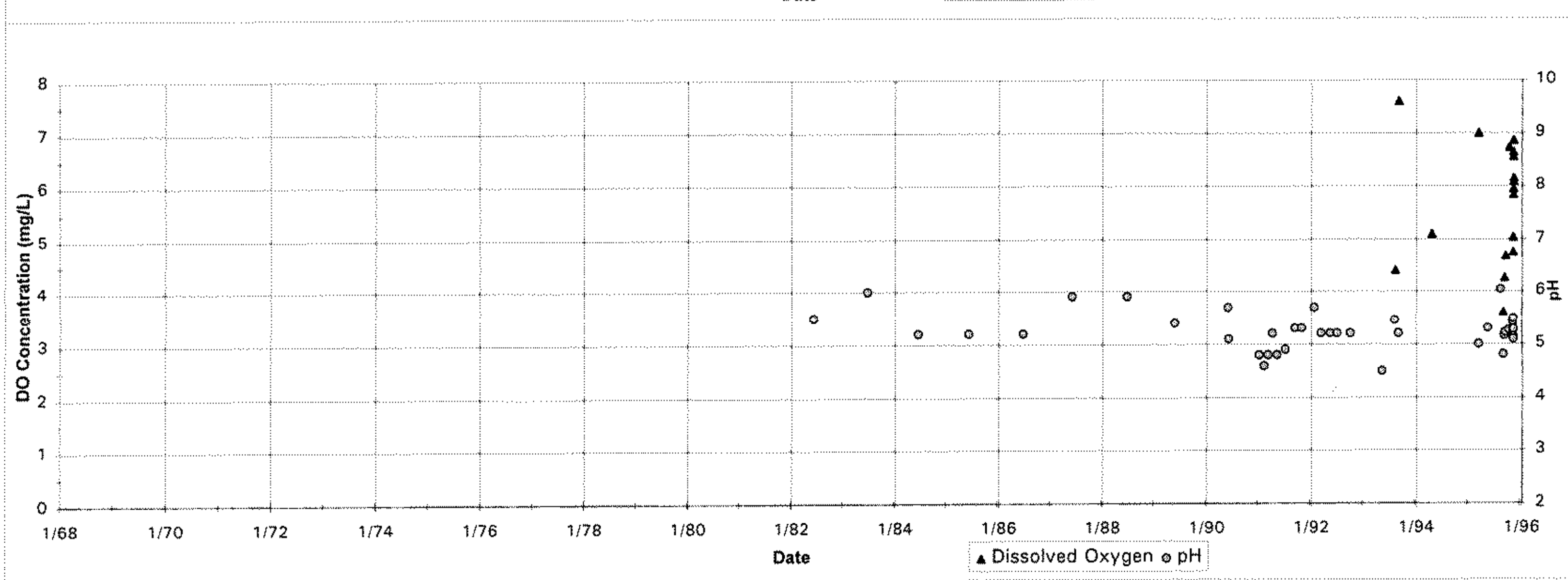
PW-14



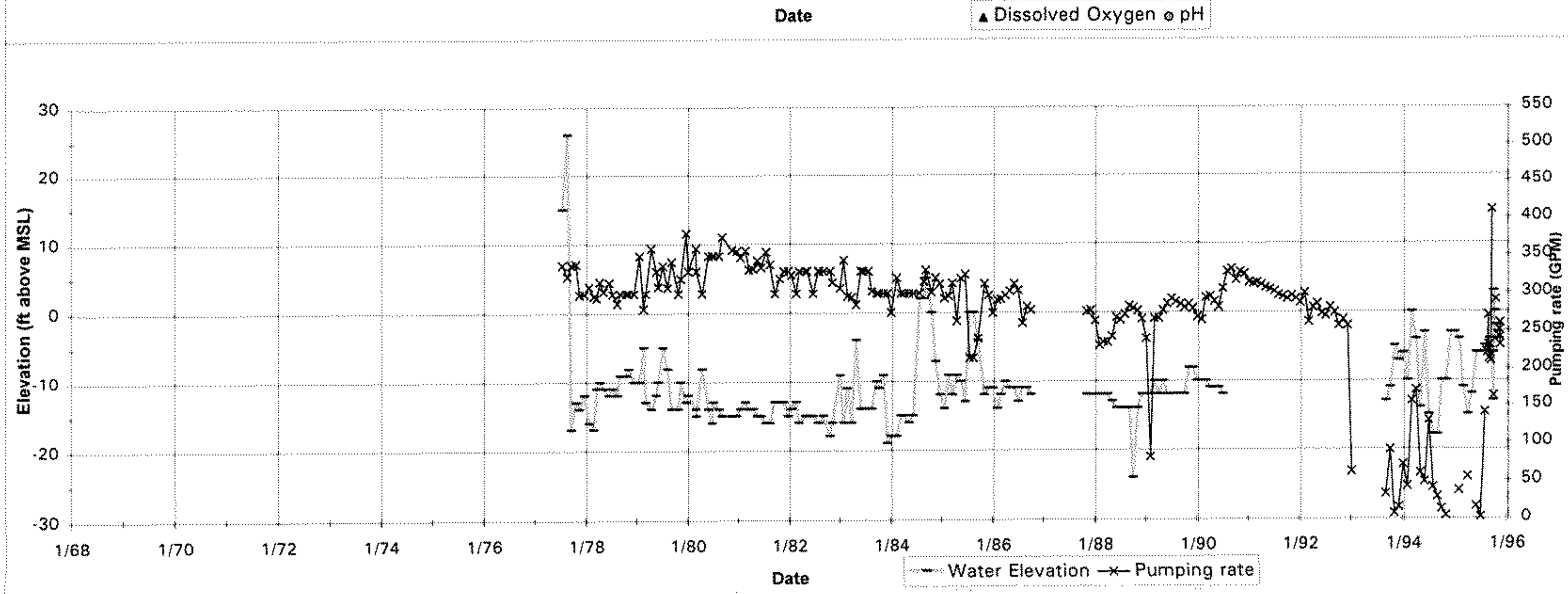
Concentration (mg/L)
10
1
0.1
0.01
1/68
1/78
1/80
1/82
1/84
1/88
1/90
1/92
1/94
1/96
Date
Value of 0.01 represents non-detects
Iron



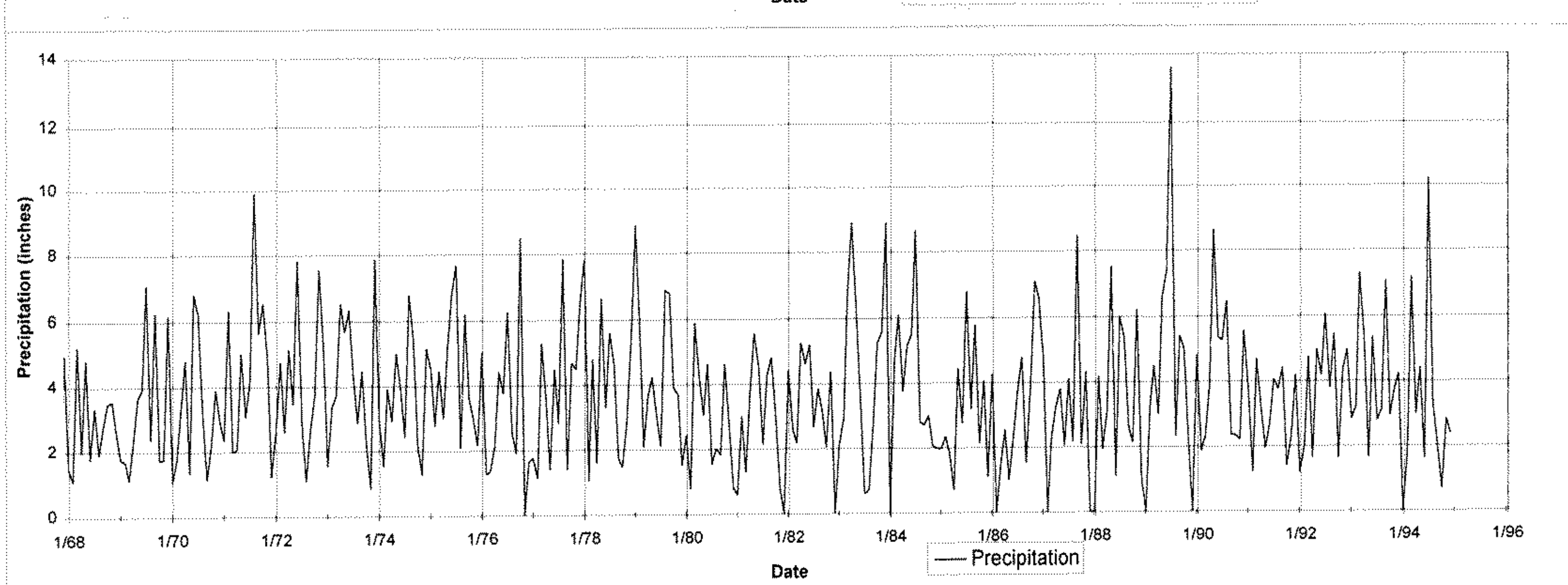
Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Value of 0.01 represents non-detects
Manganese



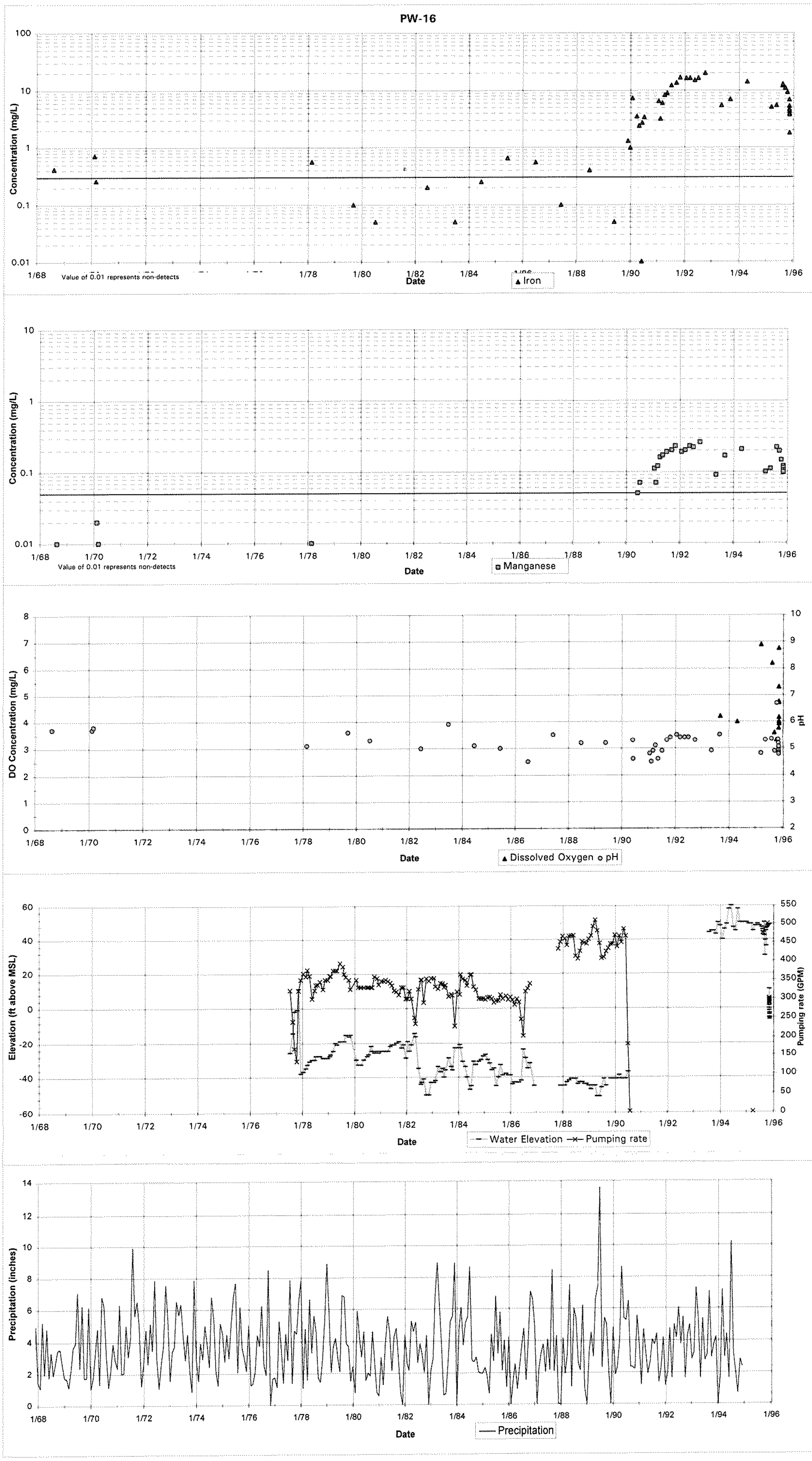
DO Concentration (mg/L)
pH
8
7
6
5
4
3
2
1
0
10
9
8
7
6
5
4
3
2
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Dissolved Oxygen
pH



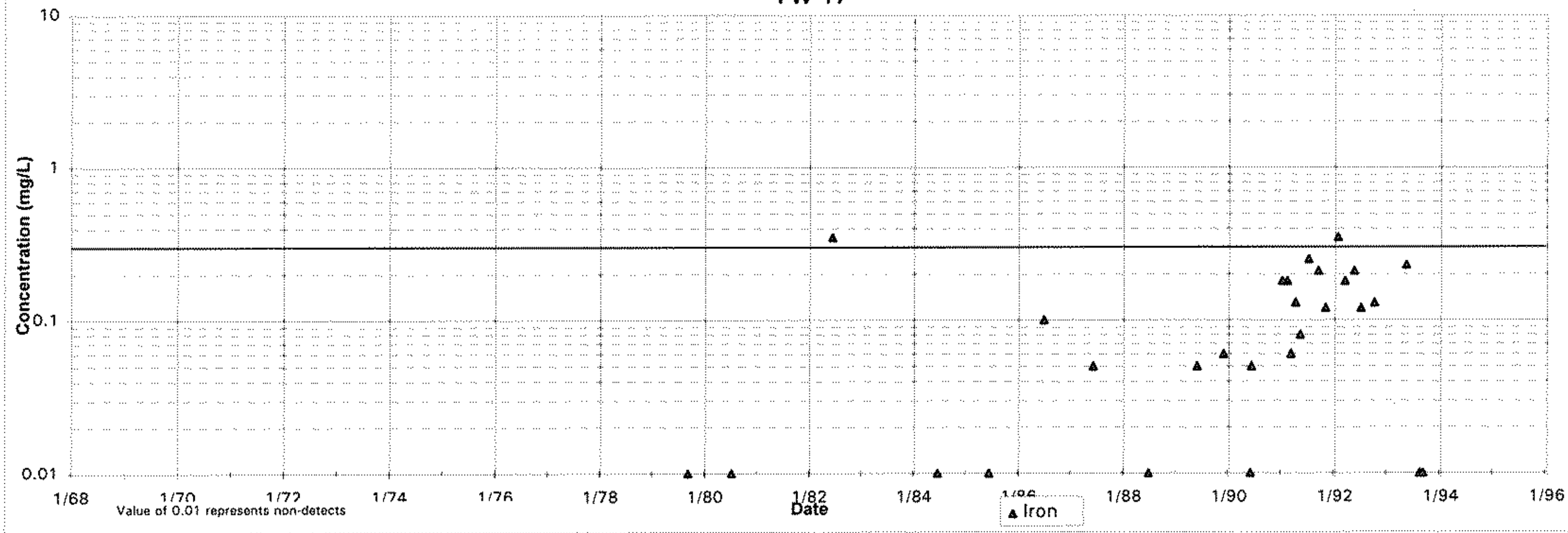
Elevation (ft above MSL)
Pumping rate (GPM)
30
20
10
0
-10
-20
-30
550
500
450
400
350
300
250
200
150
100
50
0
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Water Elevation
Pumping rate



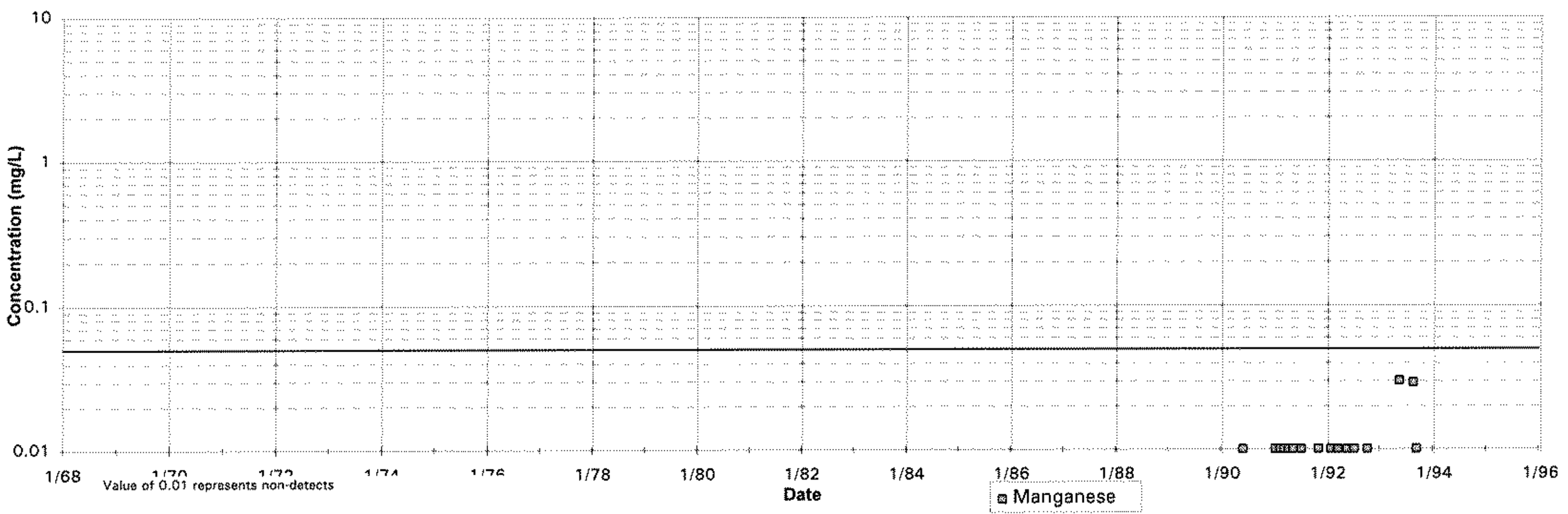
Precipitation (inches)
14
12
10
8
6
4
2
0
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Precipitation


PW-16
Concentration (mg/L)
Value of 0.01 represents non-detects
Date
Iron
Concentration (mg/L)
Value of 0.01 represents non-detects
Date
Manganese
DO Concentration (mg/L)
pH
Date
Dissolved Oxygen
pH
Elevation (ft above MSL)
Pumping rate (GPM)
Date
Water Elevation
Pumping rate
Precipitation (inches)
Date
Precipitation

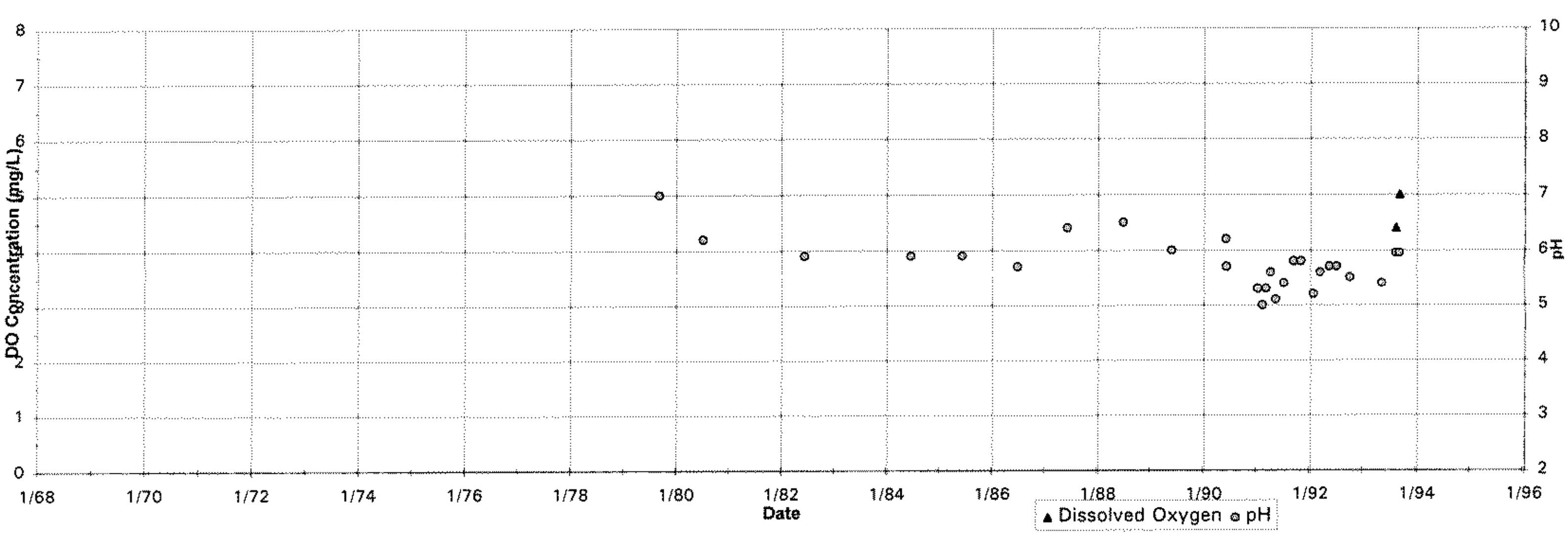
PW-17



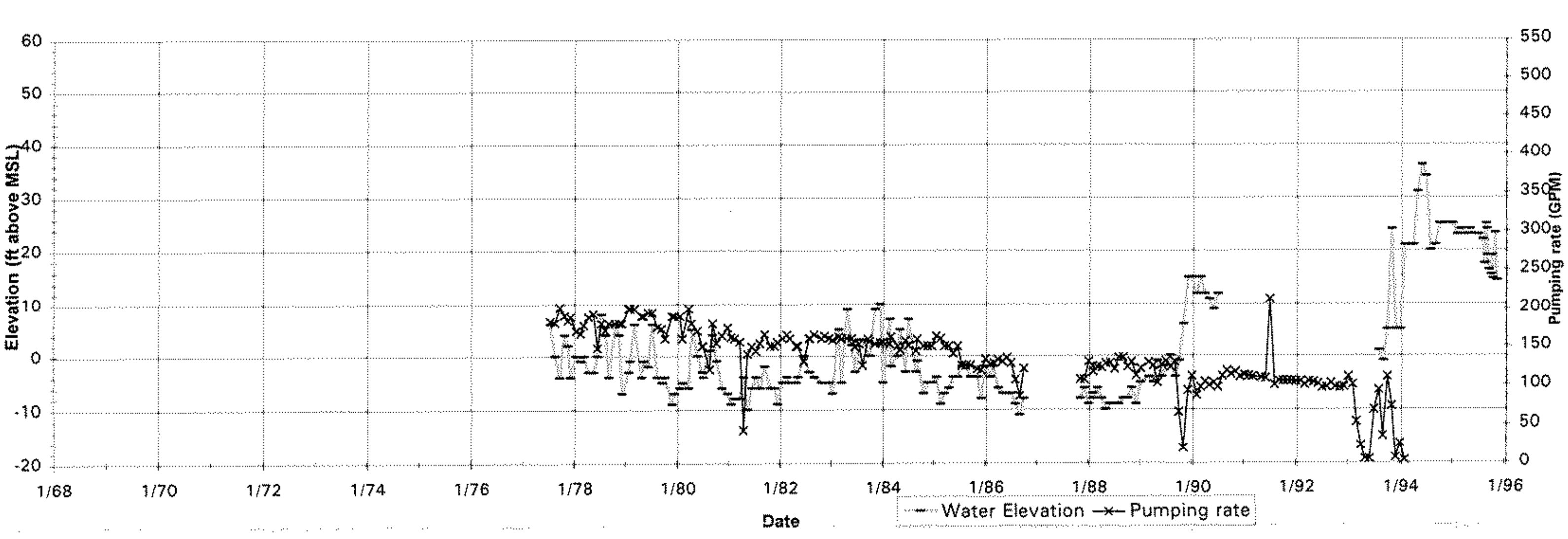
Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Value of 0.01 represents non-detects
Date
Iron



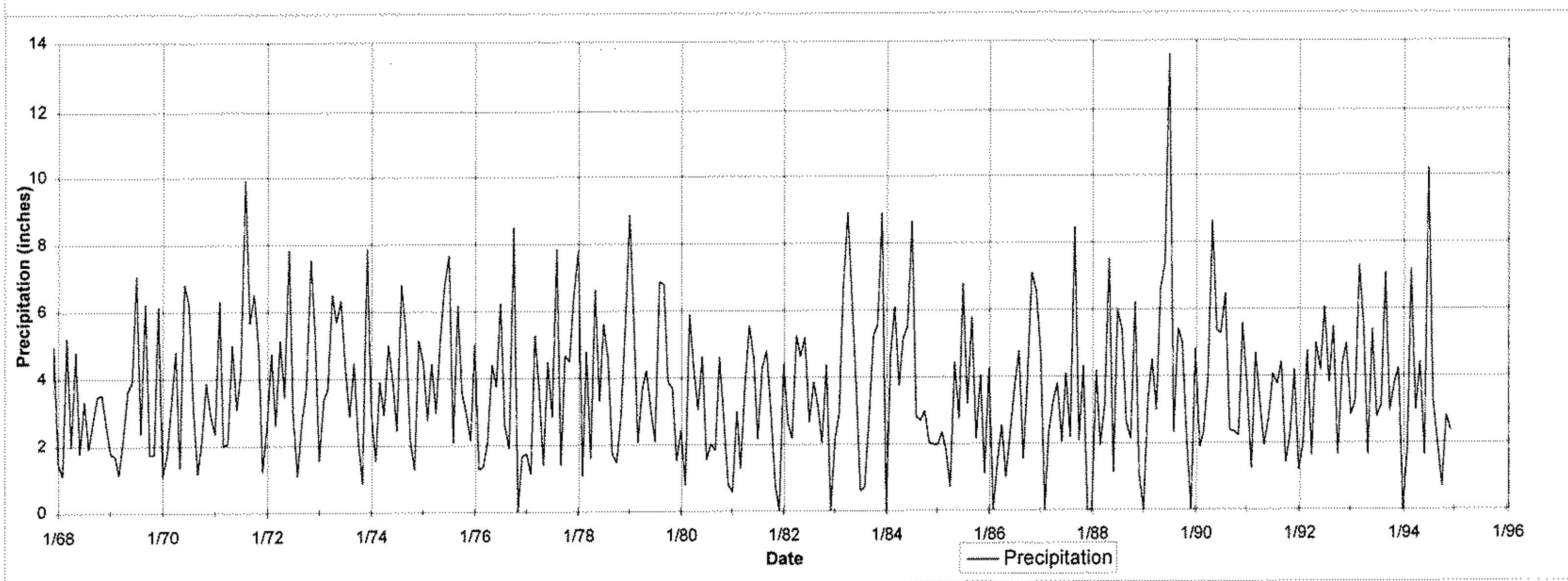
Concentration (mg/L)
10
1
0.1
0.01
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Value of 0.01 represents non-detects
Date
Manganese



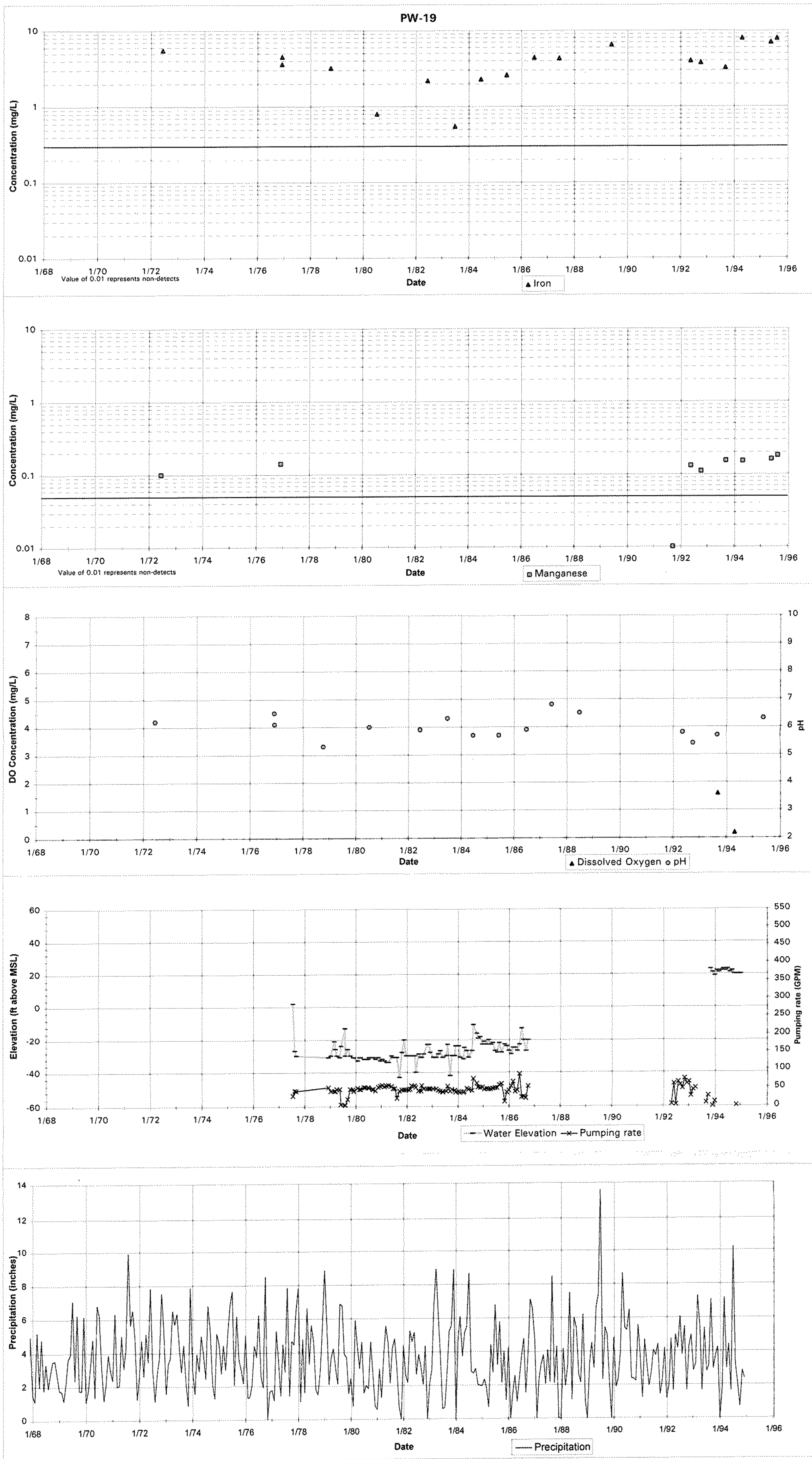
DO Concentration (mg/L)
8
7
6
5
4
3
2
1
0
pH
10
9
8
7
6
5
4
3
2
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Dissolved Oxygen
pH



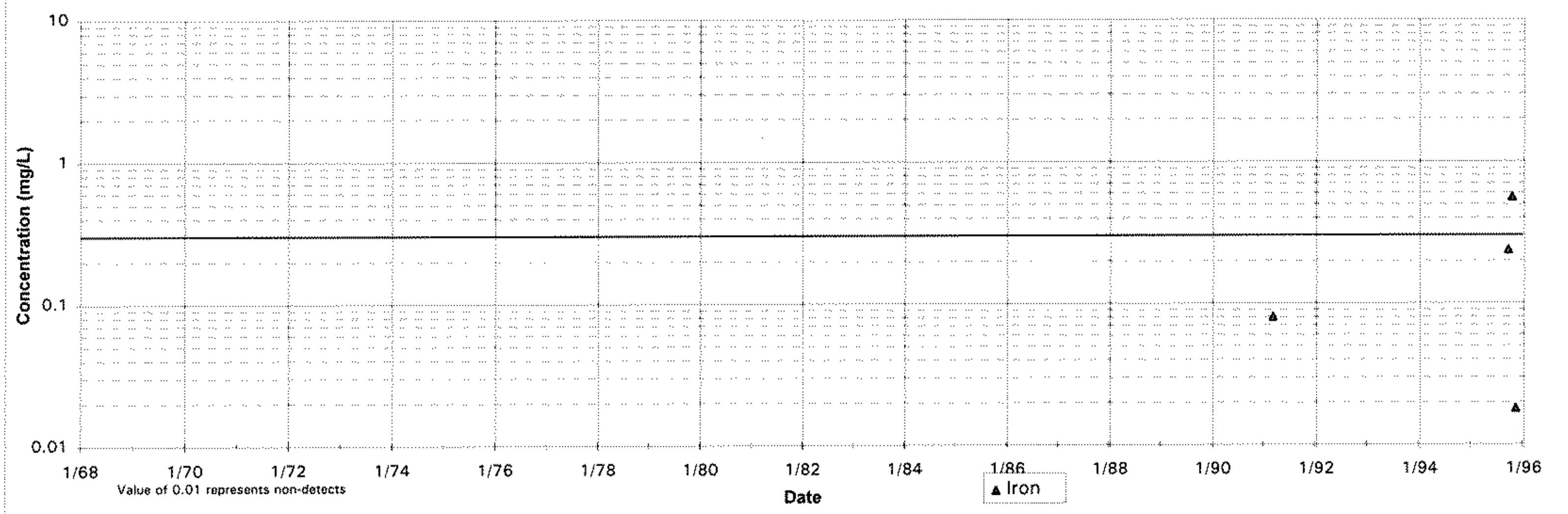
Elevation (ft above MSL)
60
50
40
30
20
10
0
-10
-20
Pumping rate (GPM)
550
500
450
400
350
300
250
200
150
100
50
0
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Water Elevation
Pumping rate



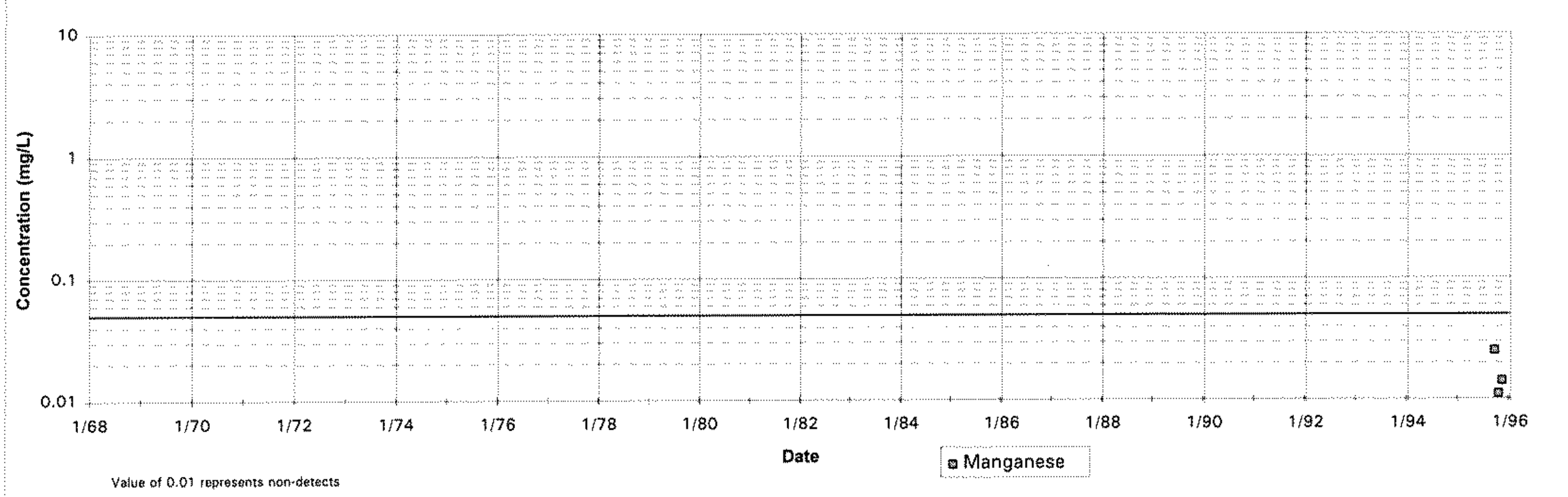
Precipitation (inches)
14
12
10
8
6
4
2
0
1/68
1/70
1/72
1/74
1/76
1/78
1/80
1/82
1/84
1/86
1/88
1/90
1/92
1/94
1/96
Date
Precipitation


PW-19
Concentration (mg/L)
Date
Value of 0.01 represents non-detects
Iron
Concentration (mg/L)
Date
Value of 0.01 represents non-detects
Manganese
DO Concentration (mg/L)
pH
Date
Dissolved Oxygen
pH
Elevation (ft above MSL)
Pumping rate (GPM)
Date
Water Elevation
Pumping rate
Precipitation (inches)
Date
Precipitation

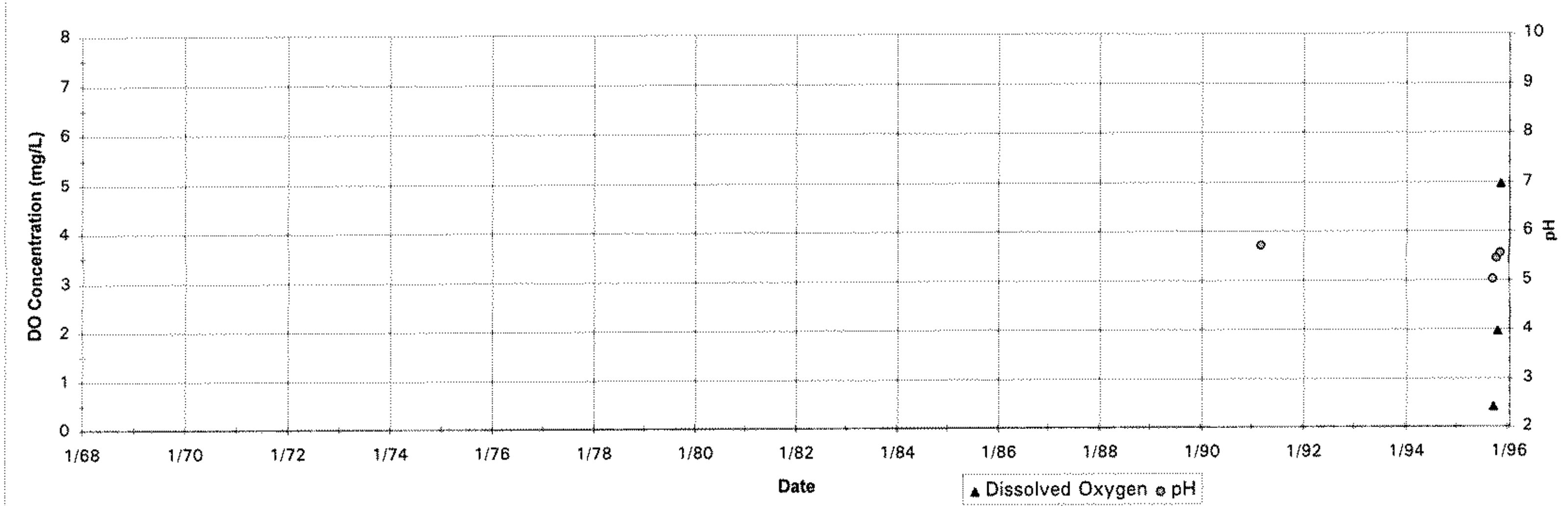
WIP-2



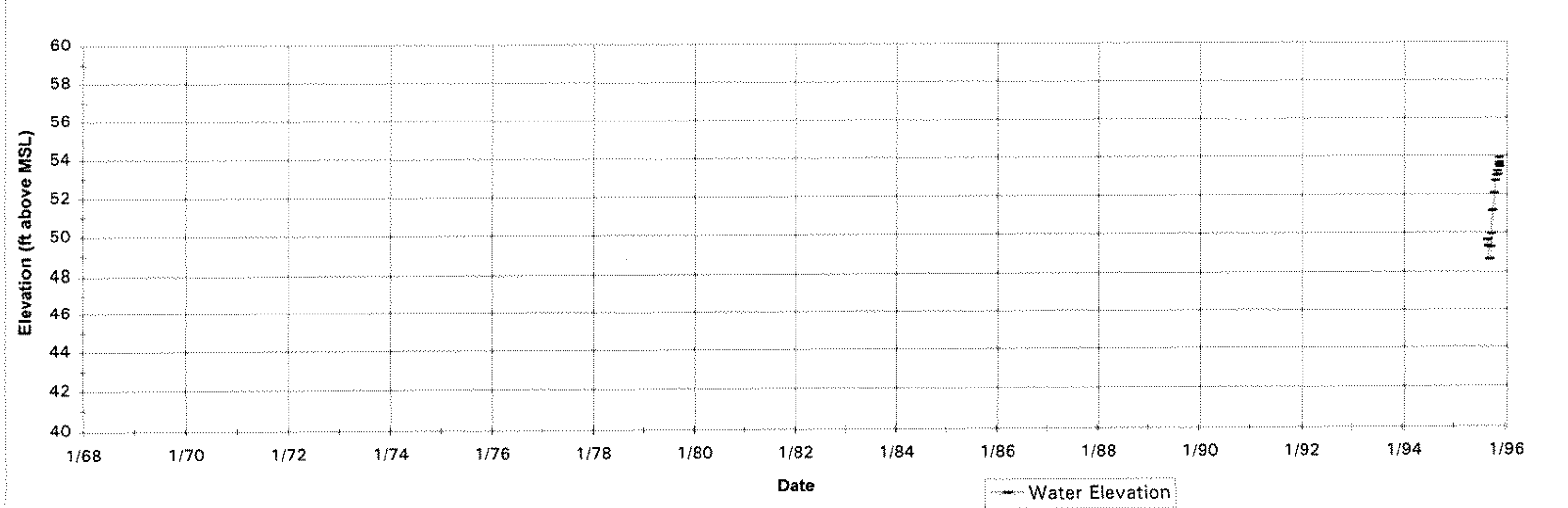
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Value of 0.01 represents non-detects
Iron



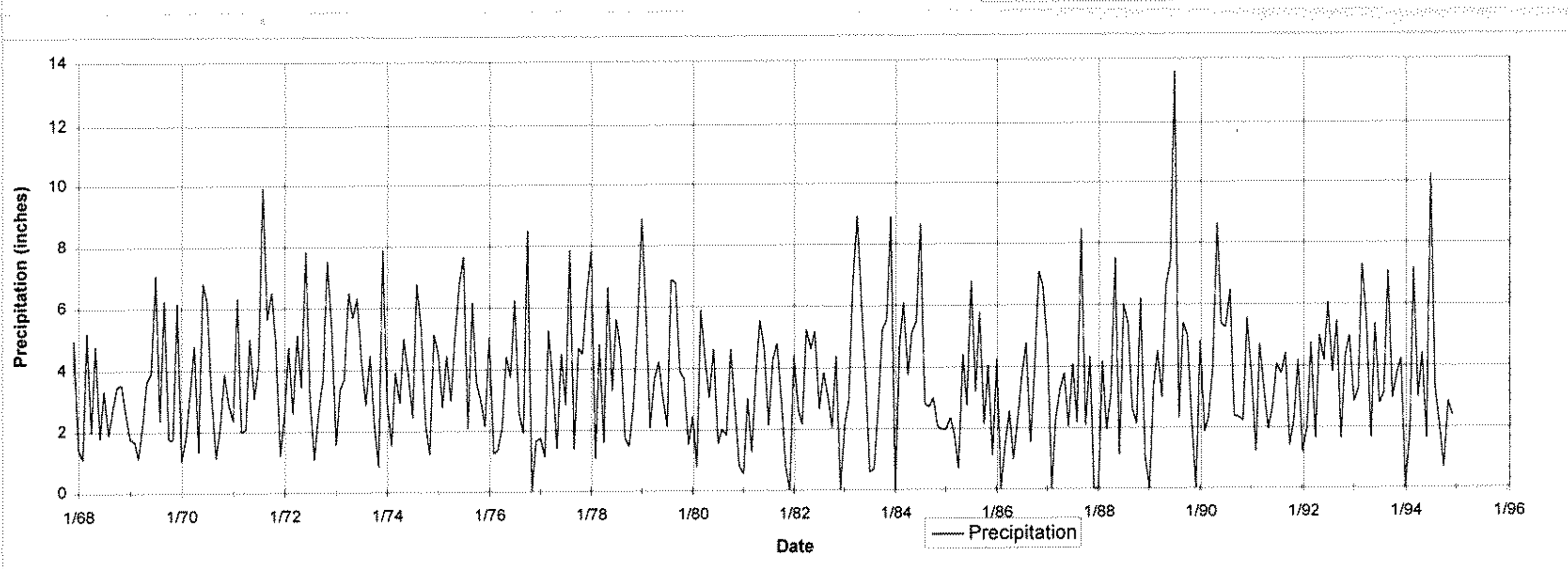
Concentration (mg/L)
10
1
0.1
0.01
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Value of 0.01 represents non-detects
Manganese



DO Concentration (mg/L)
8 7 6 5 4 3 2 1 0
pH
10 9 8 7 6 5 4 3 2
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Dissolved Oxygen
pH

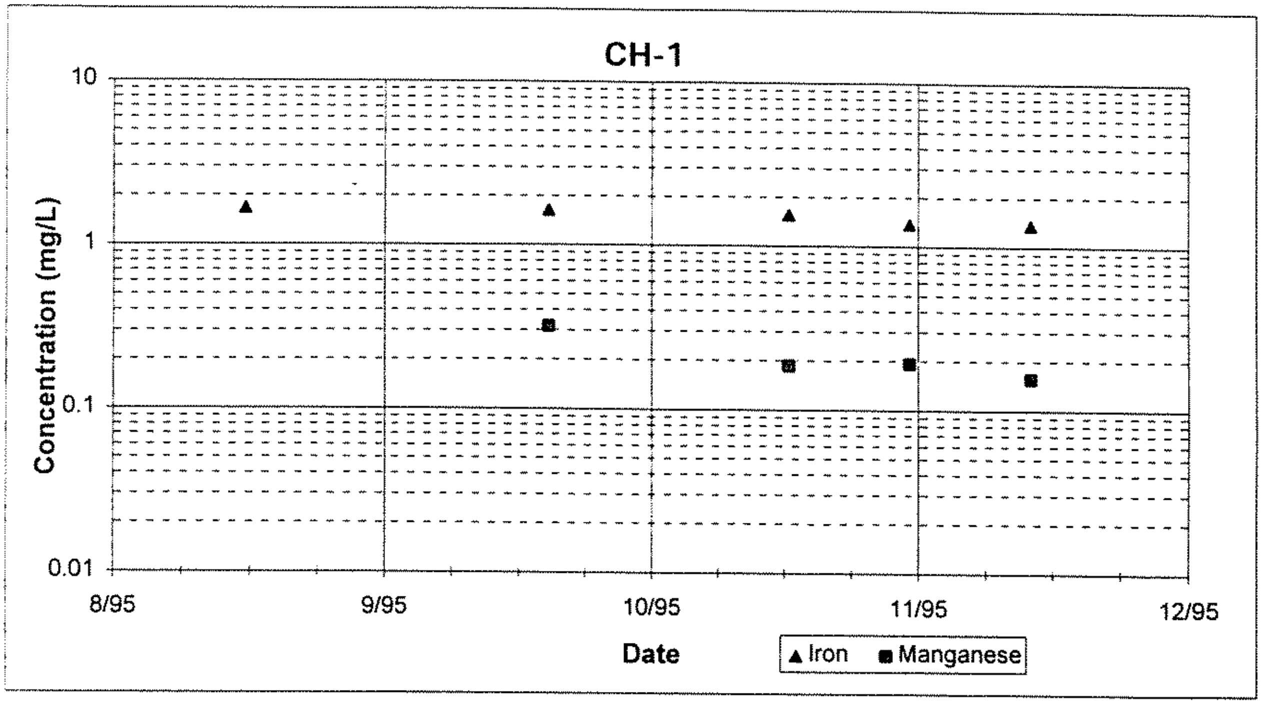


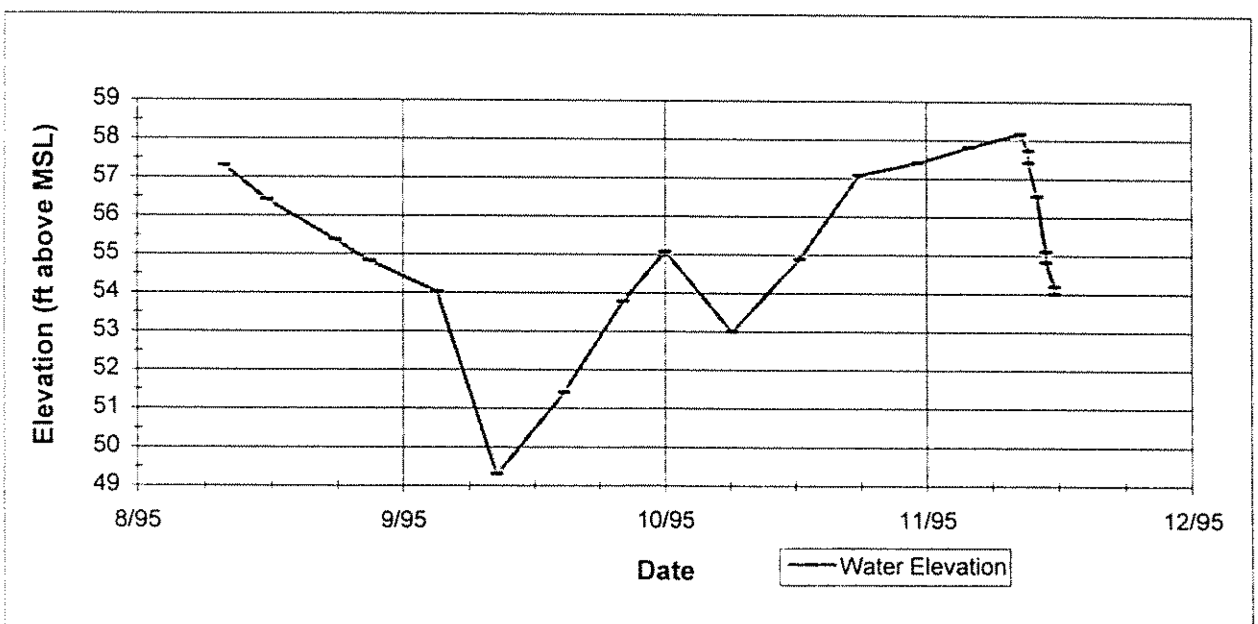
Elevation (ft above MSL)
60 58 56 54 52 50 48 46 44 42 40
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Water Elevation



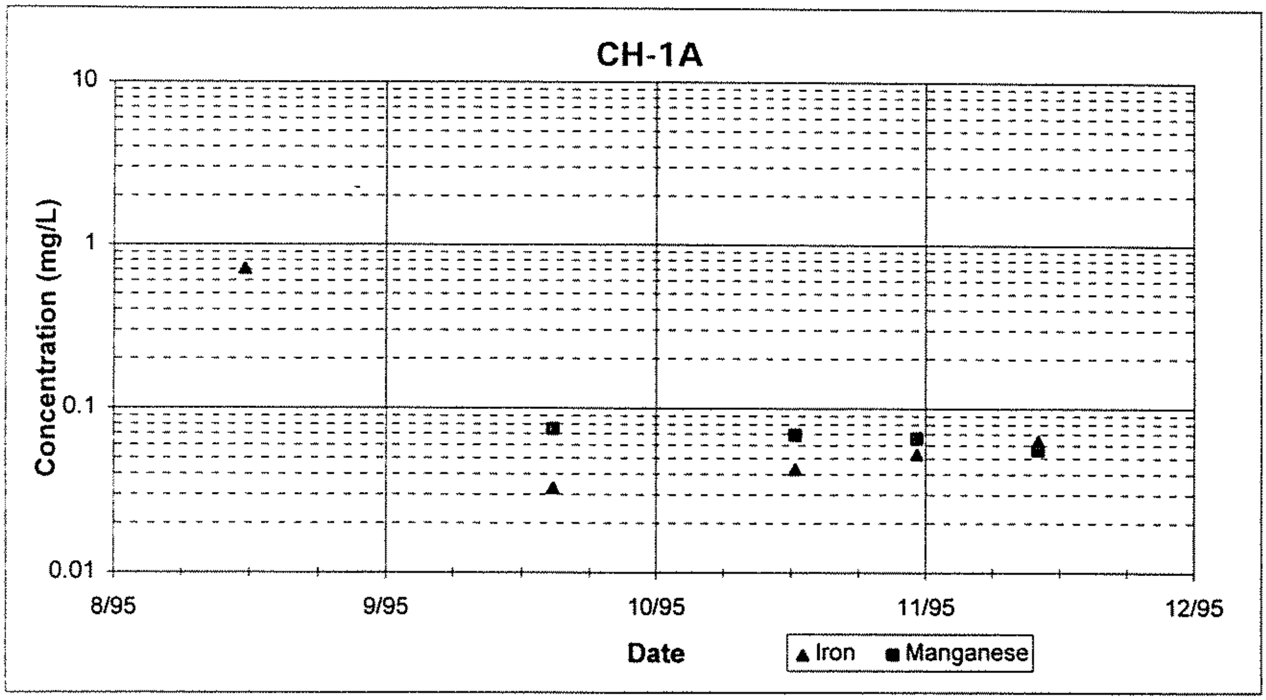
Precipitation (inches)
14 12 10 8 6 4 2 0
1/68 1/70 1/72 1/74 1/76 1/78 1/80 1/82 1/84 1/86 1/88 1/90 1/92 1/94 1/96
Date
Precipitation

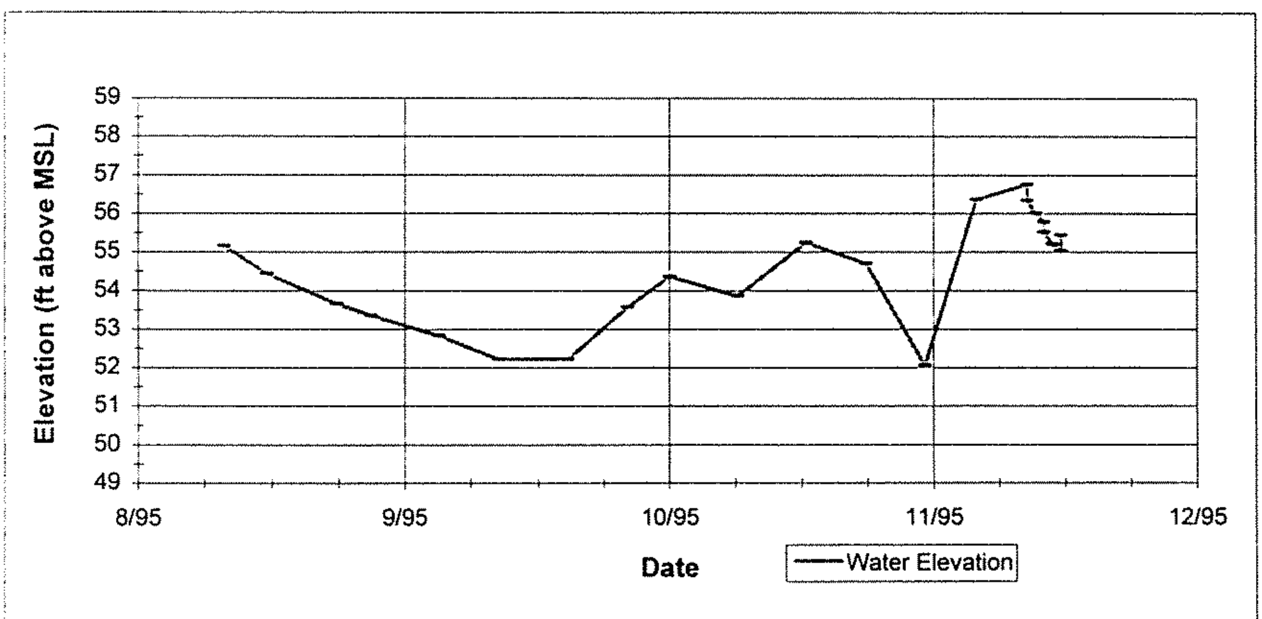
ATTACHMENT 2
Recent Hydrologic Data Plots - August 1995 - November 1995



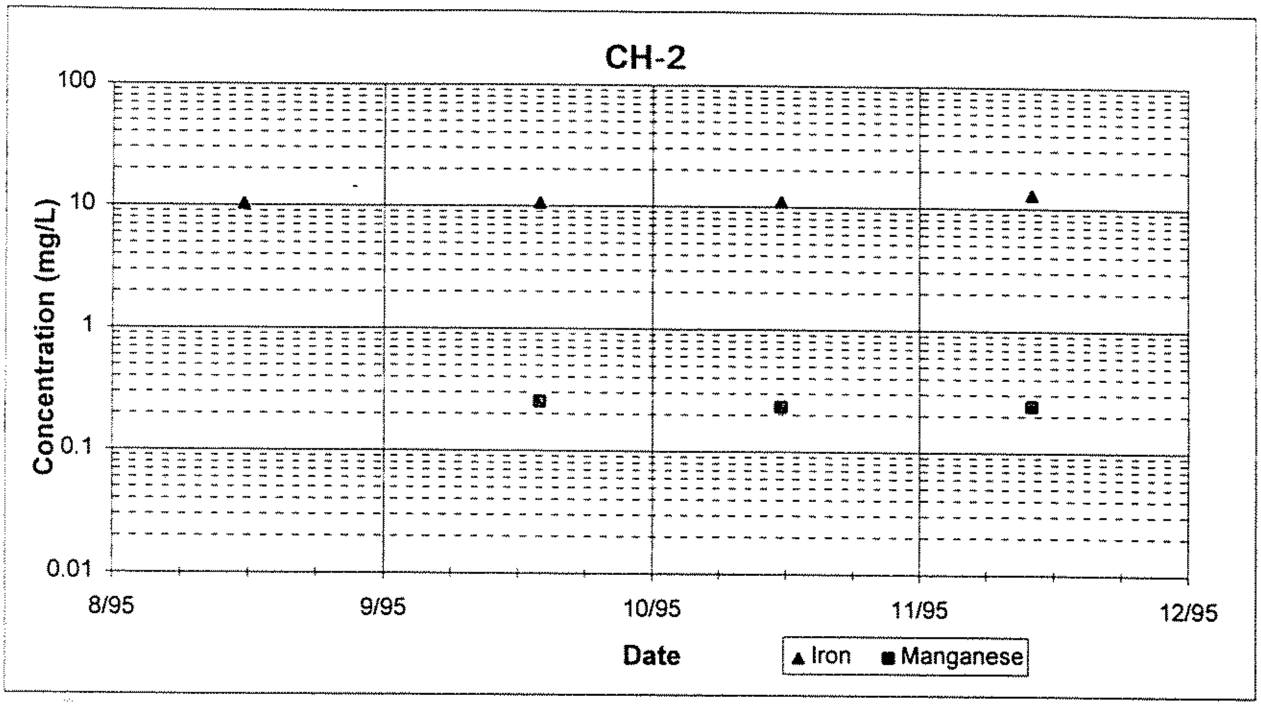


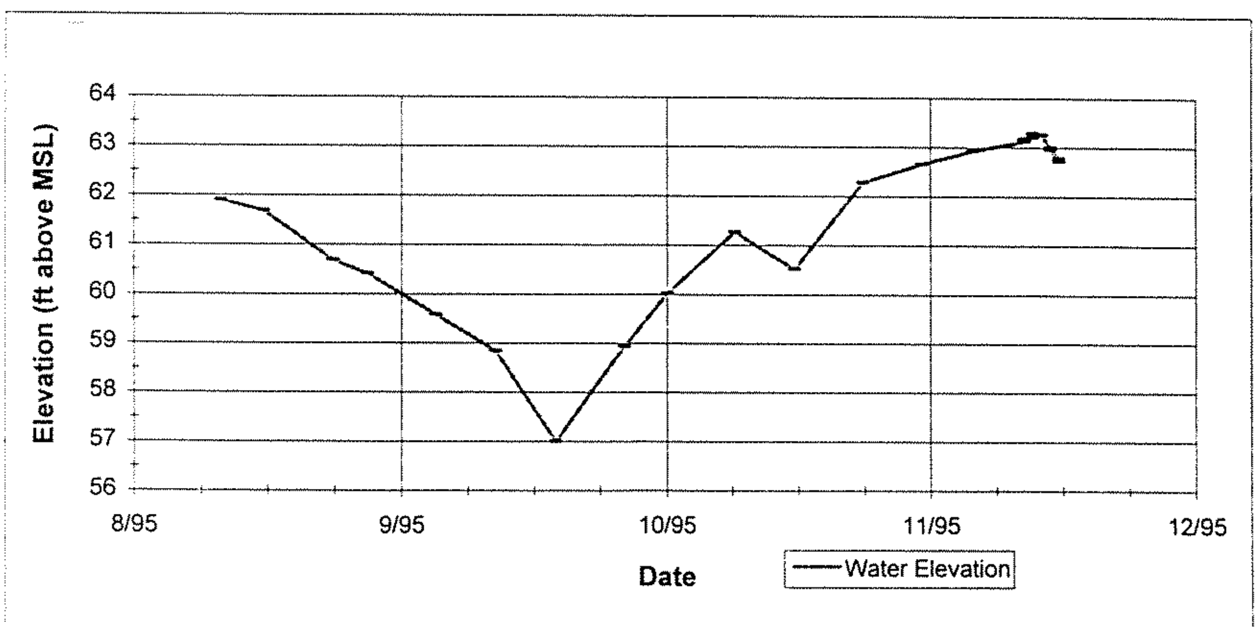
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



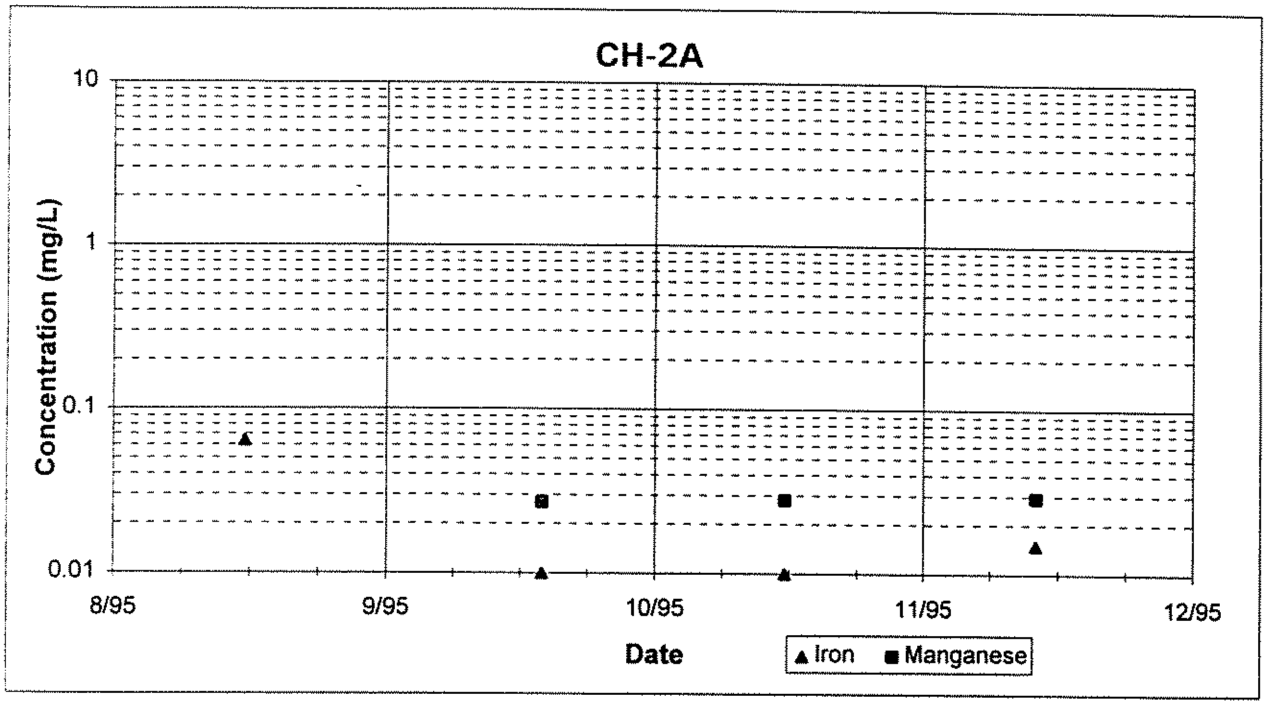


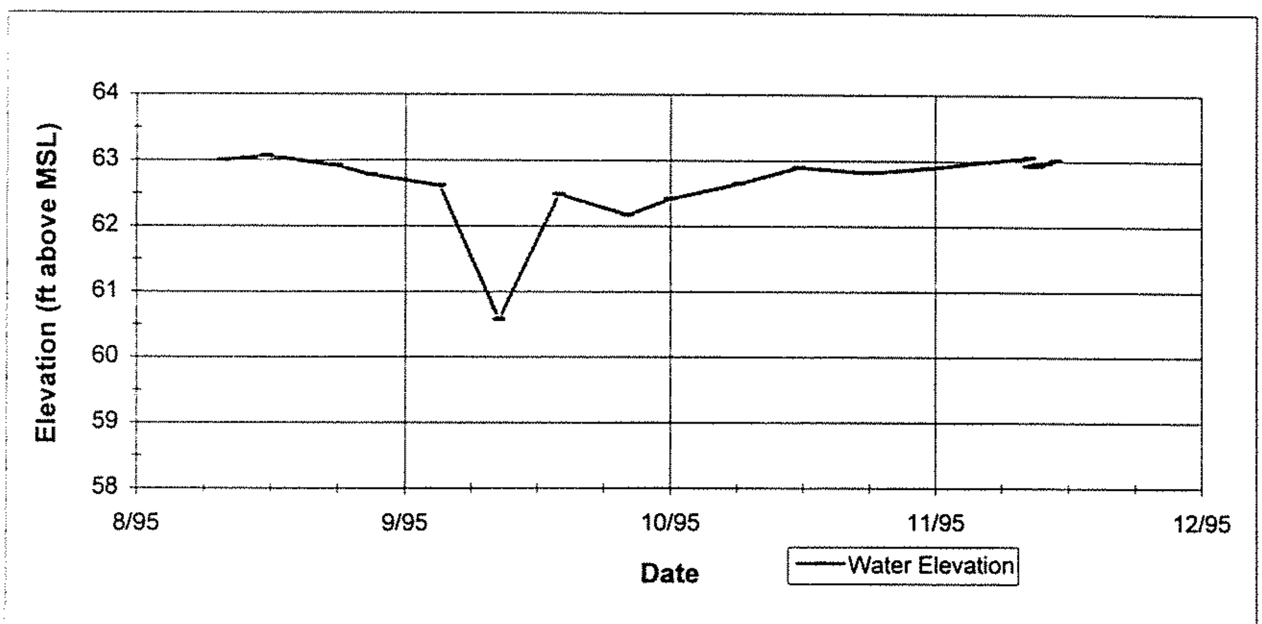
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



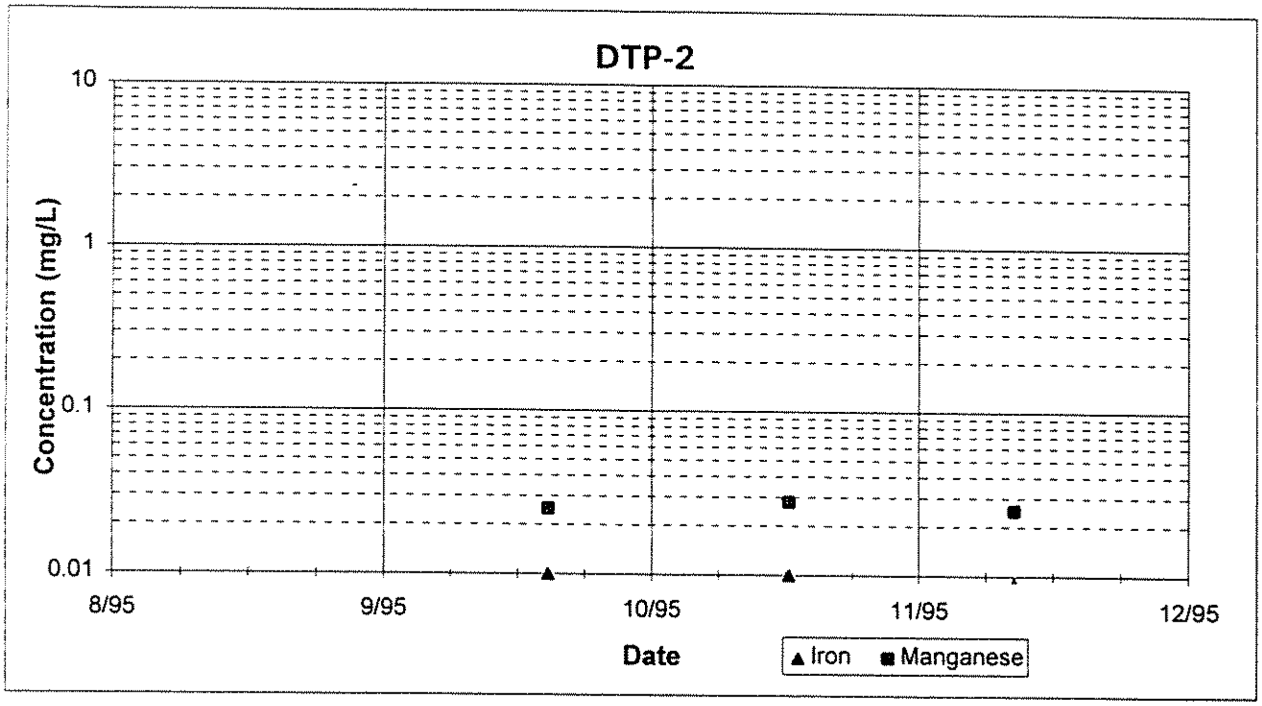


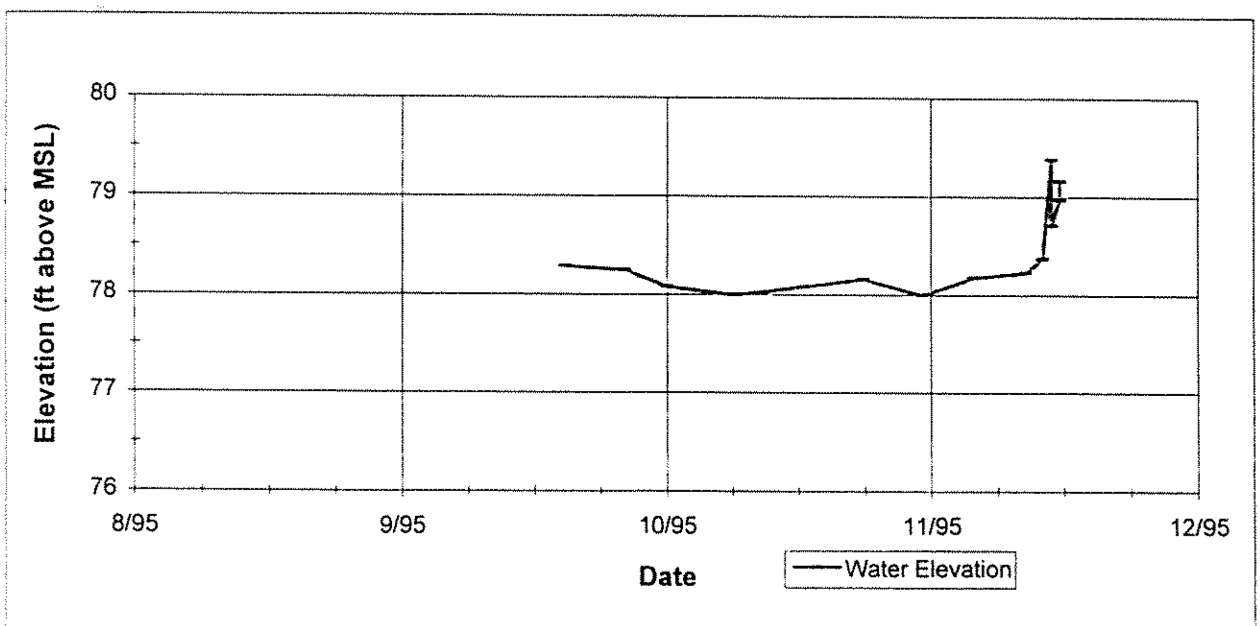
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



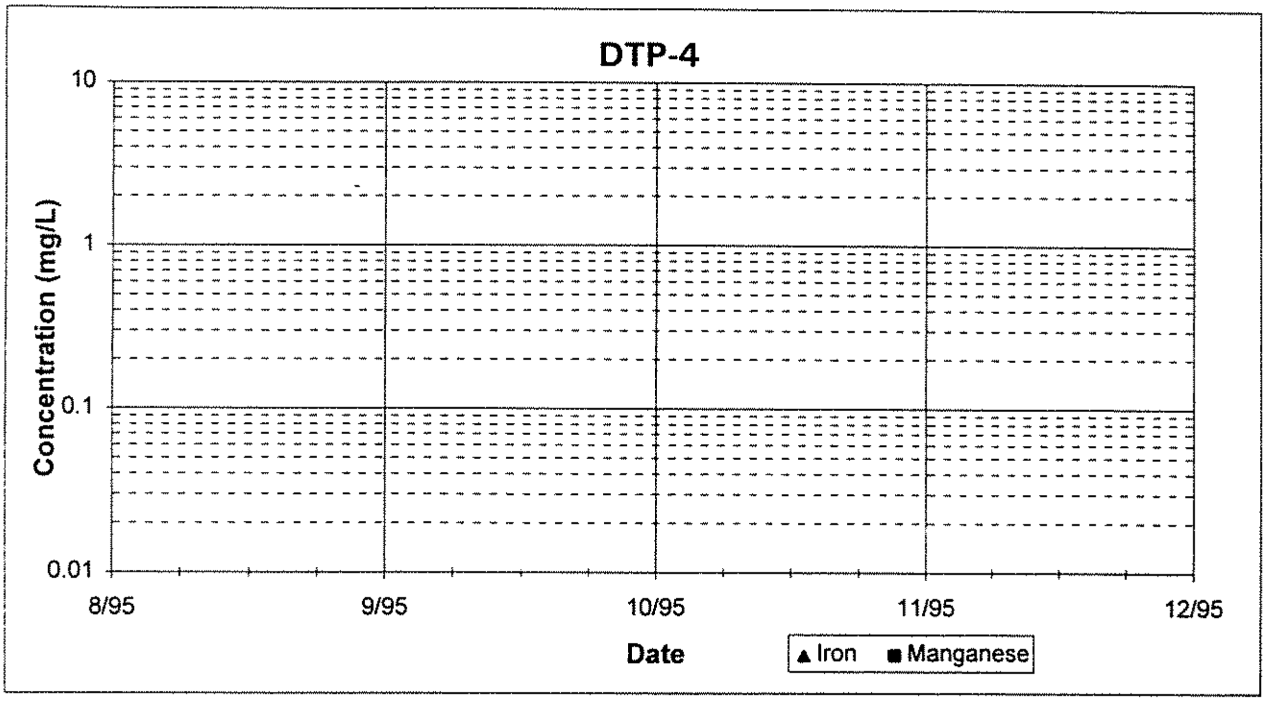


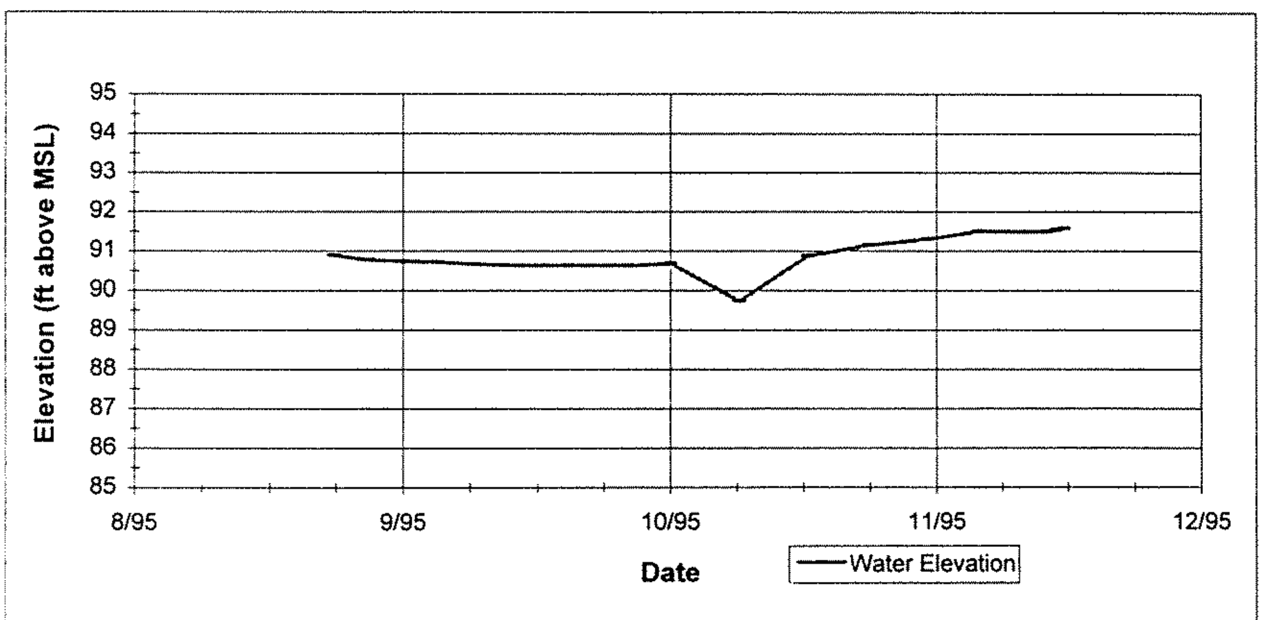
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



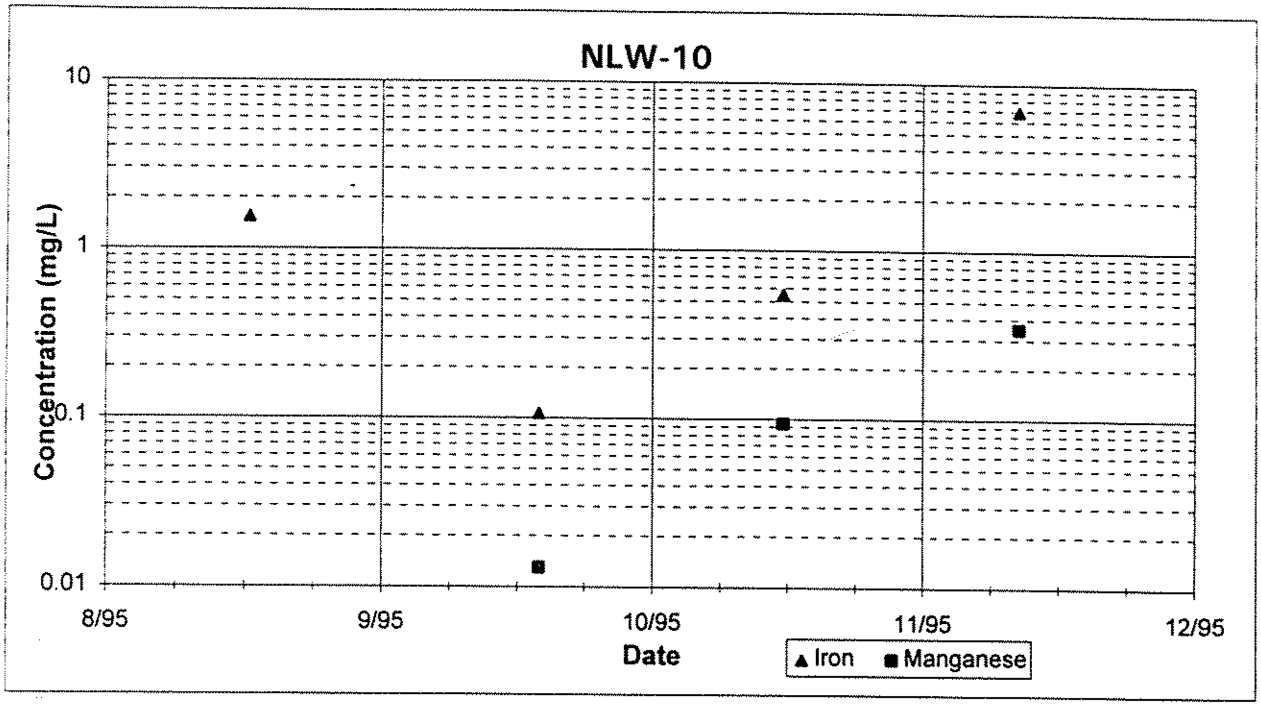


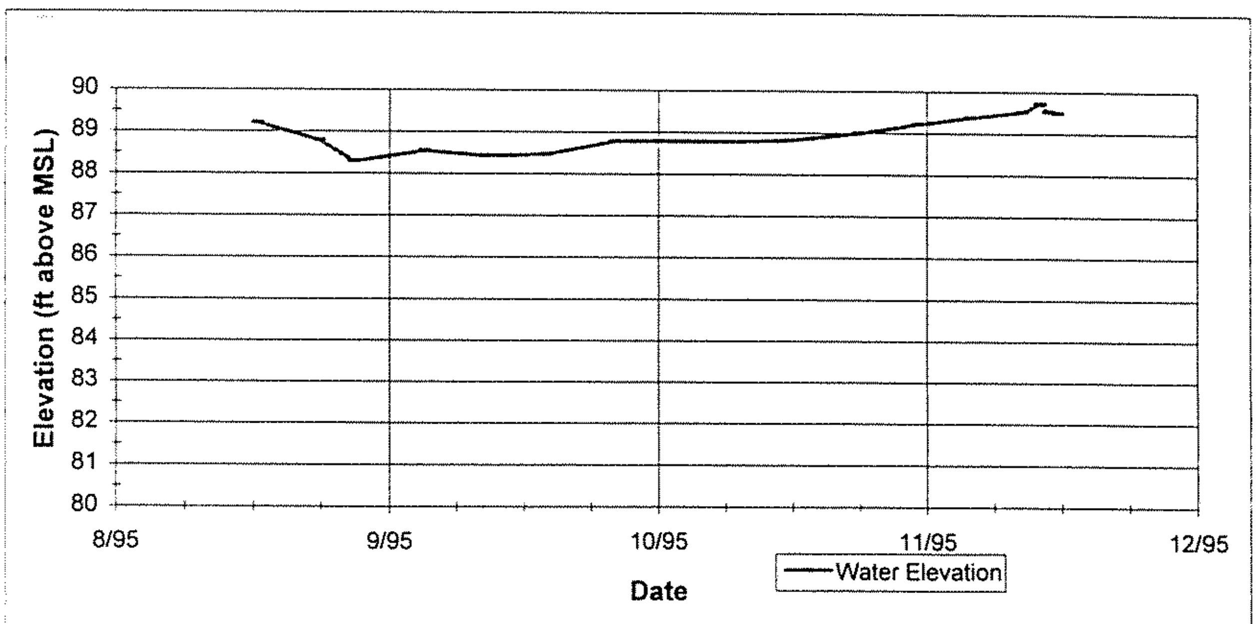
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



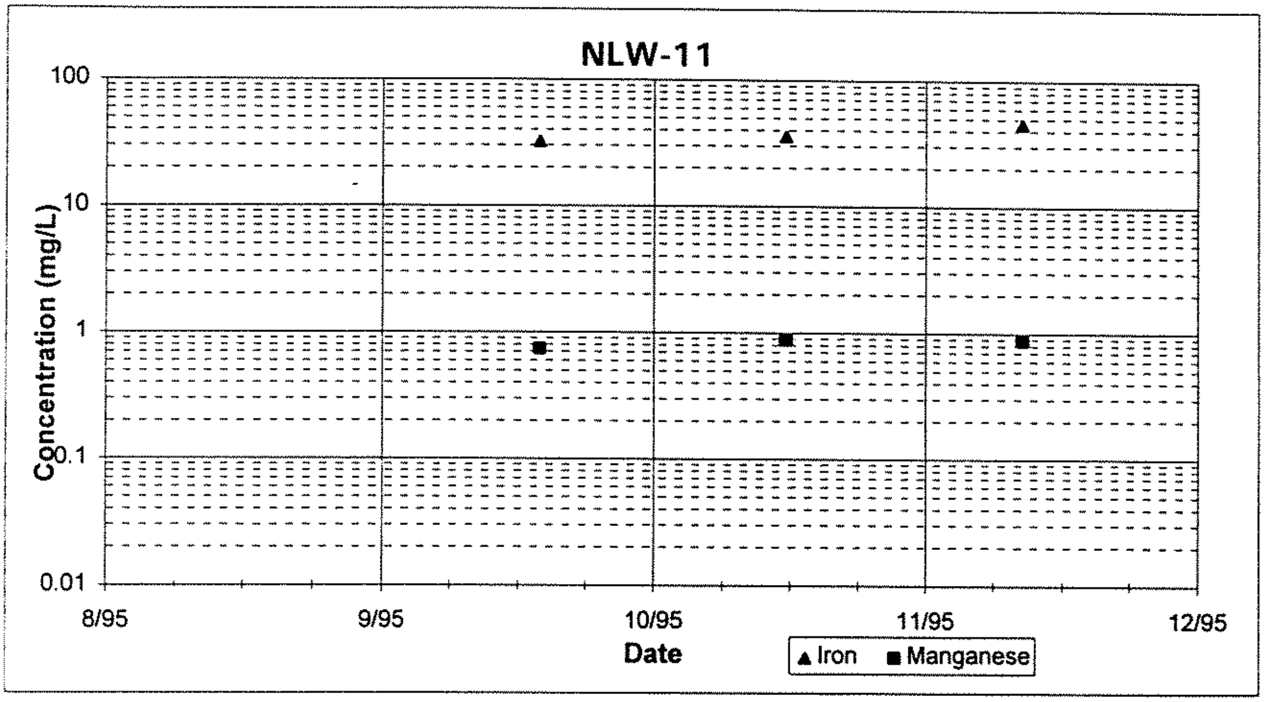


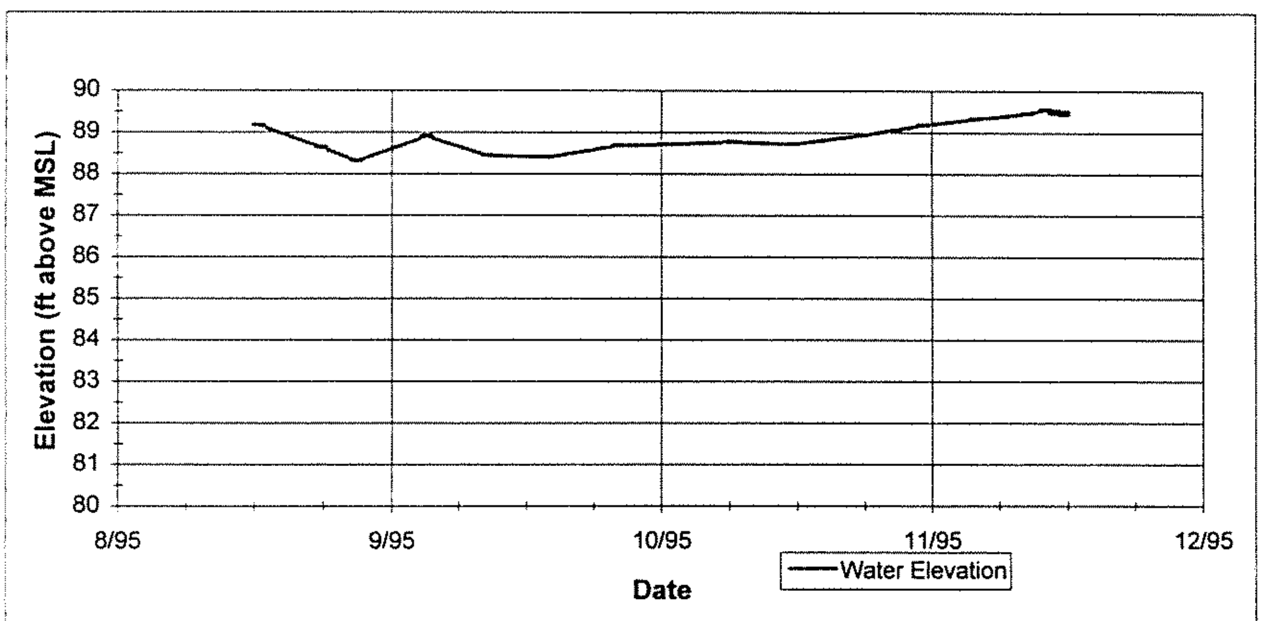
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



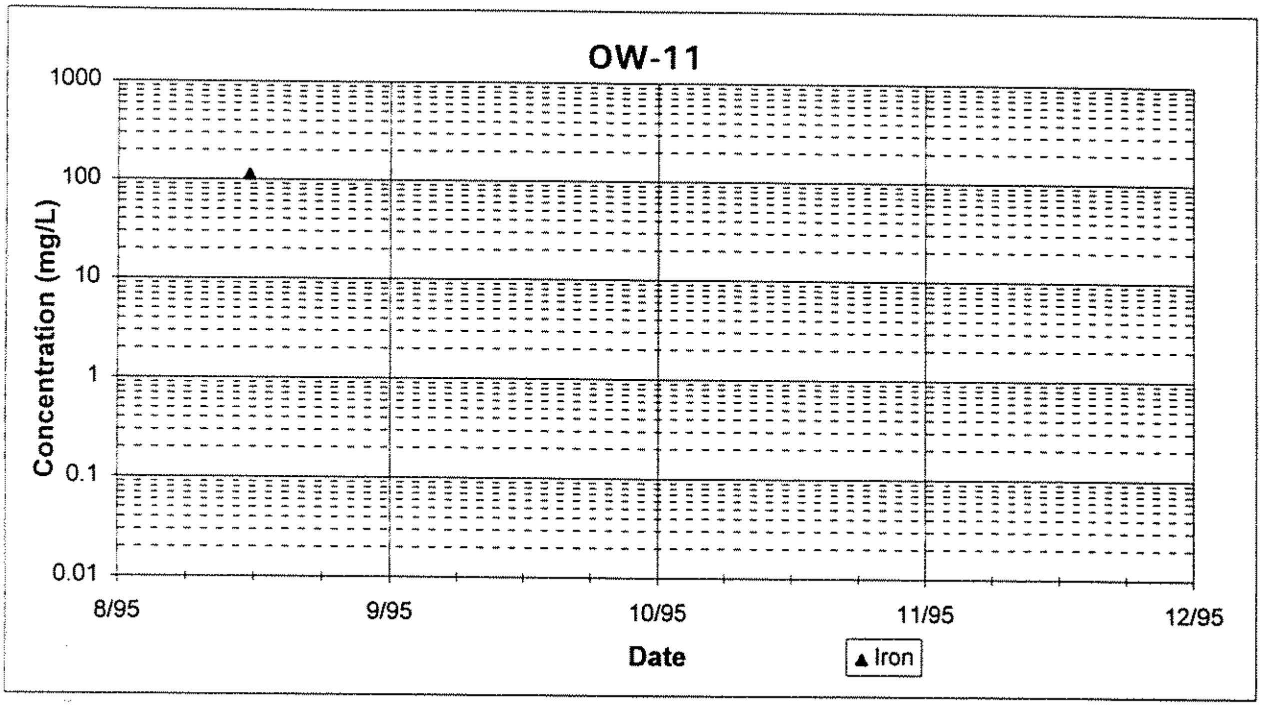


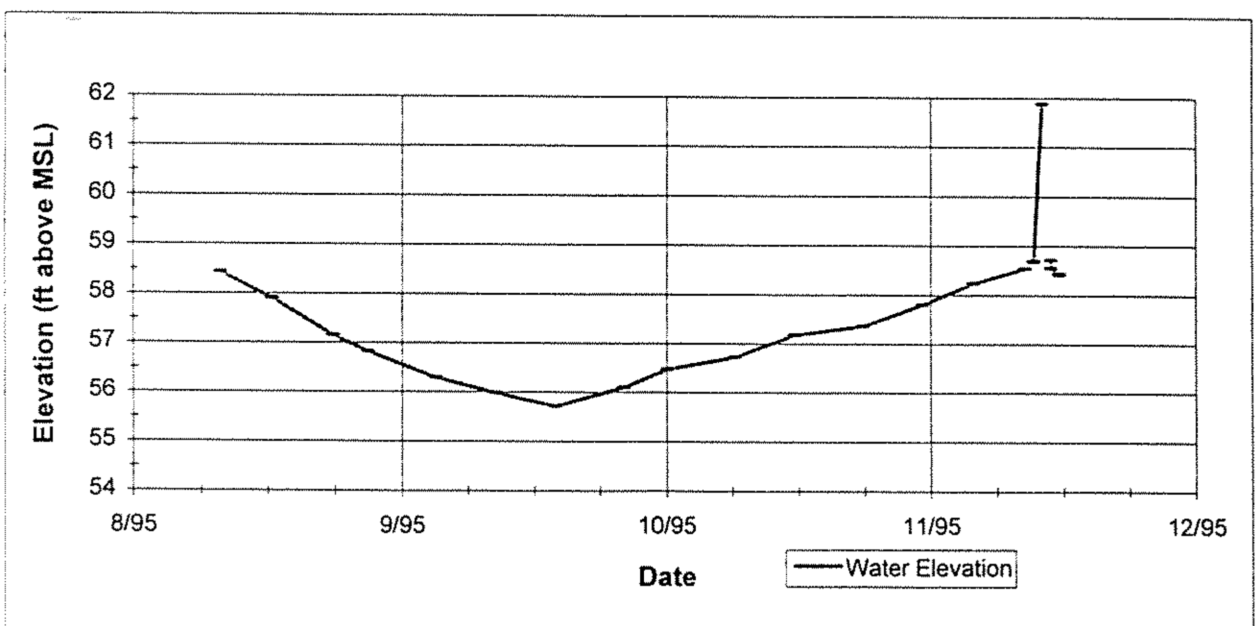
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



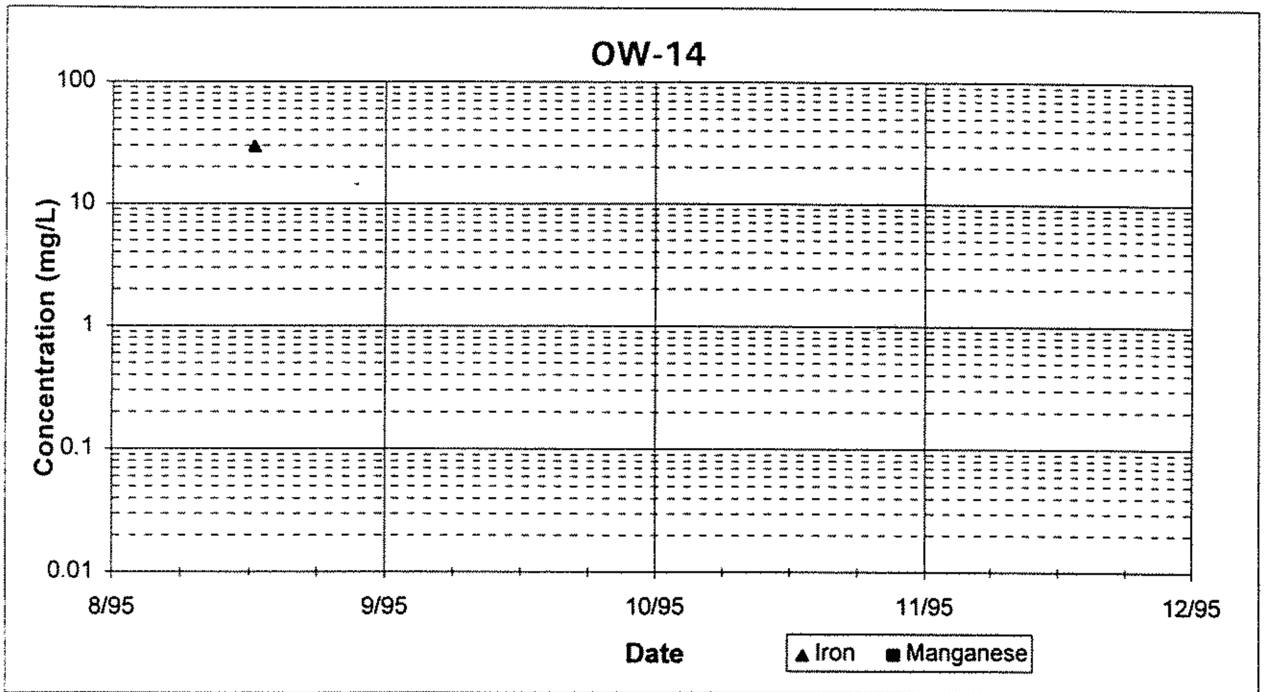


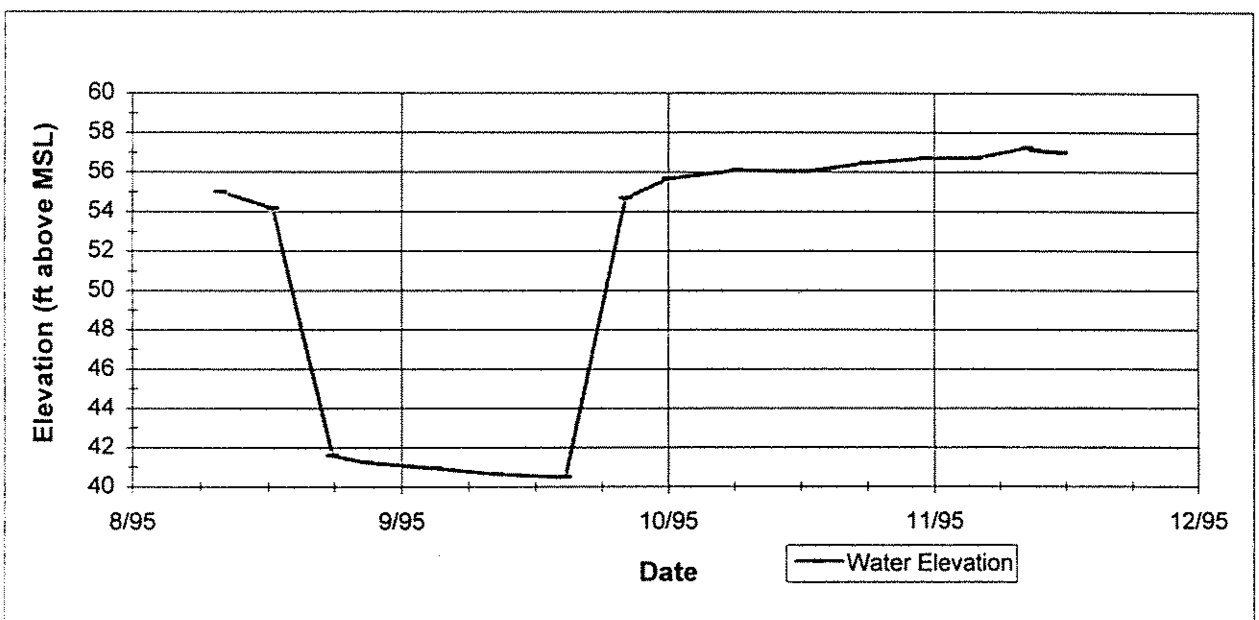
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



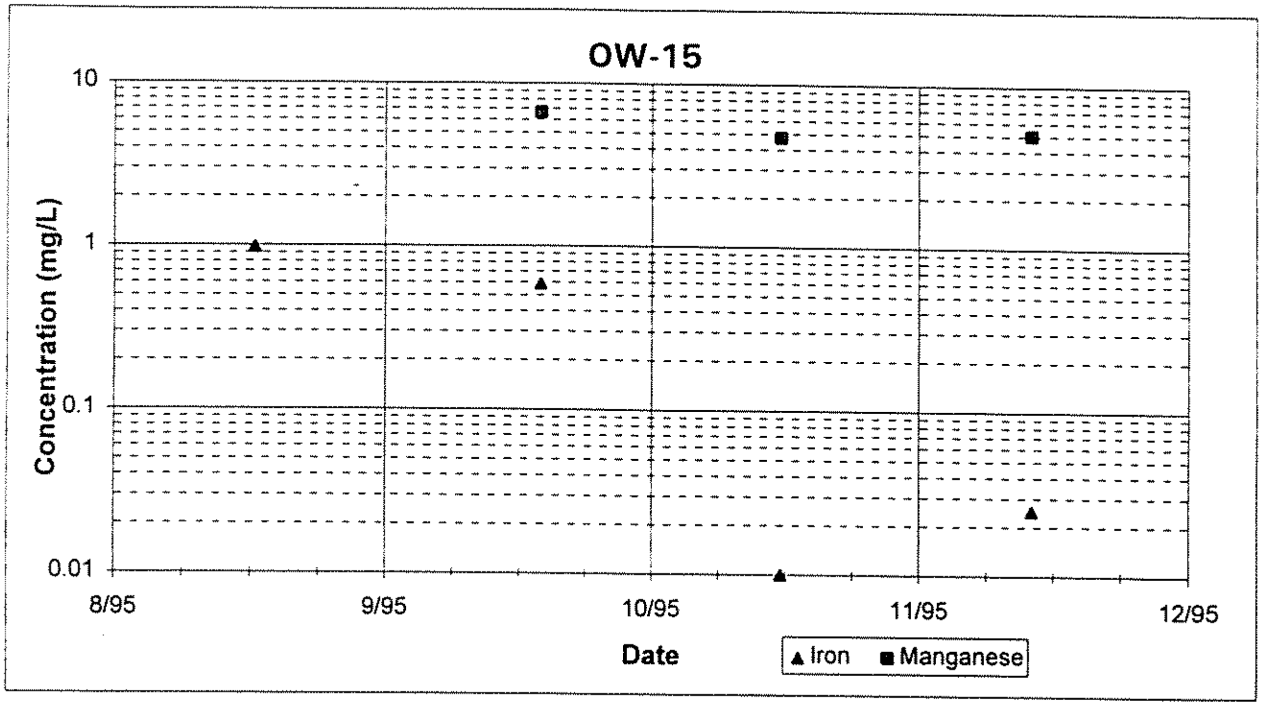


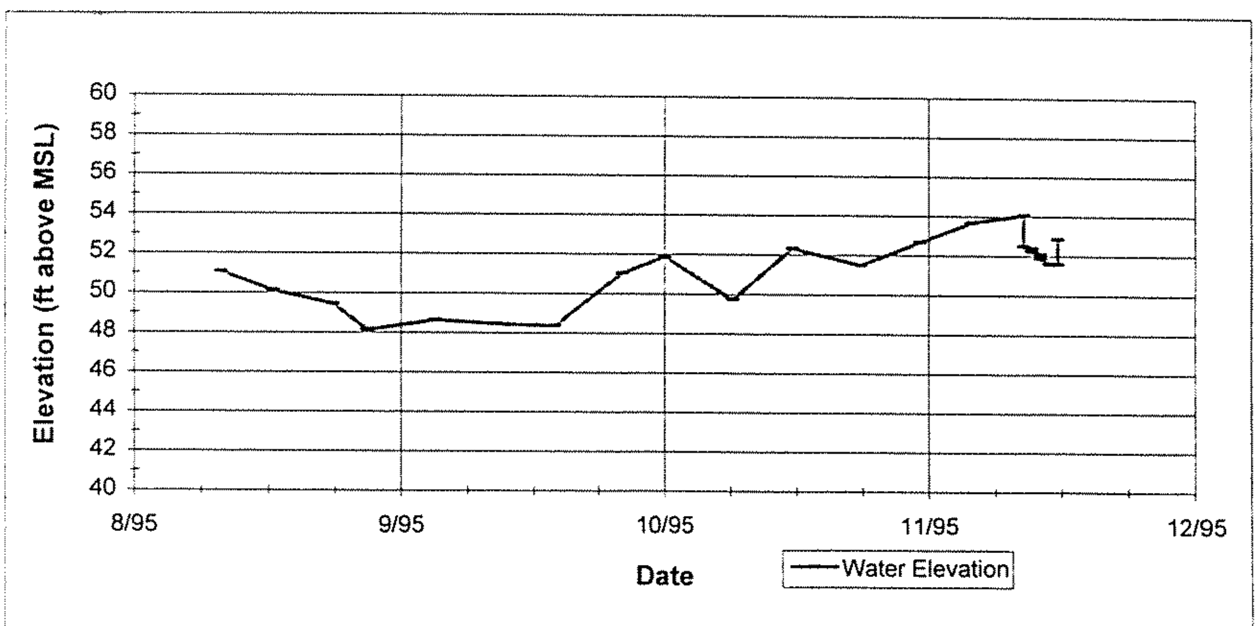
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



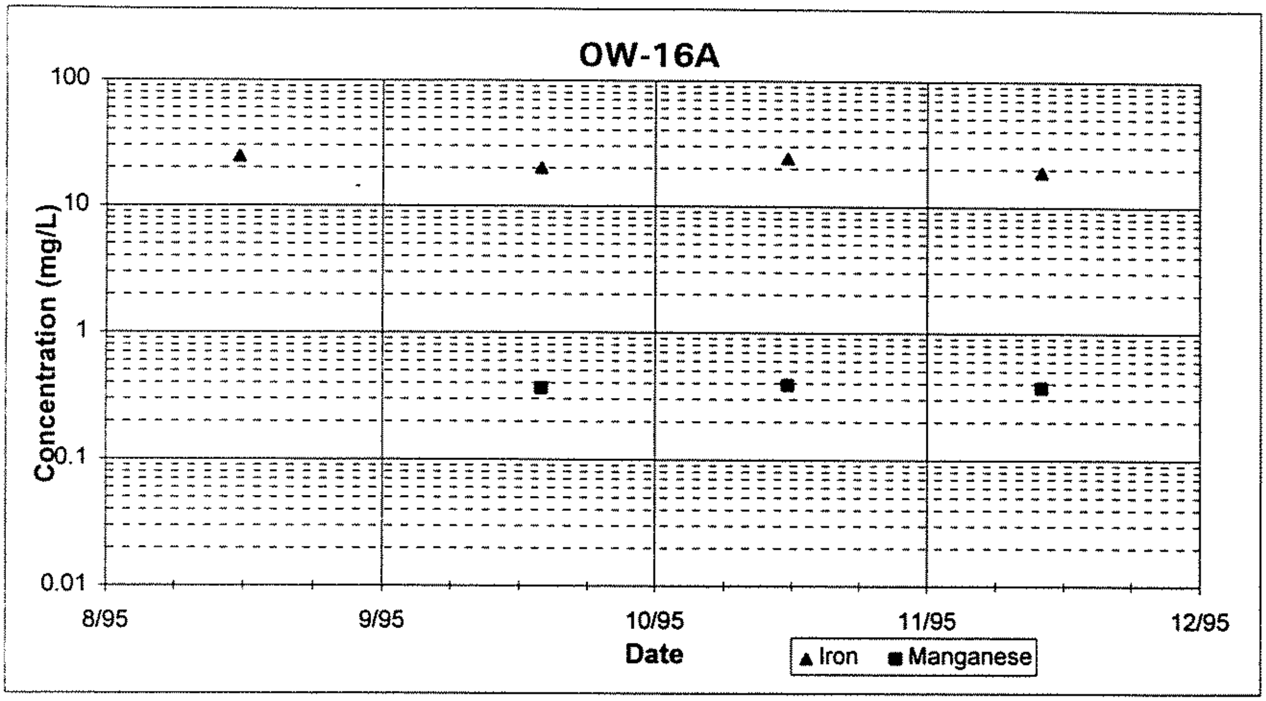


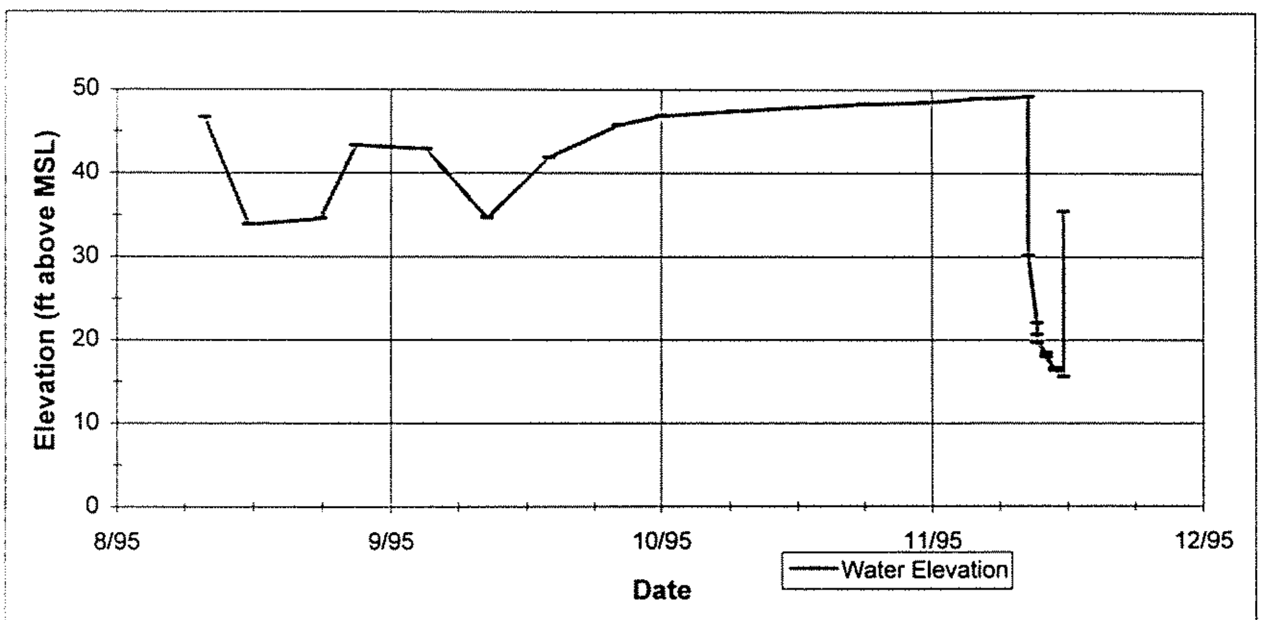
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



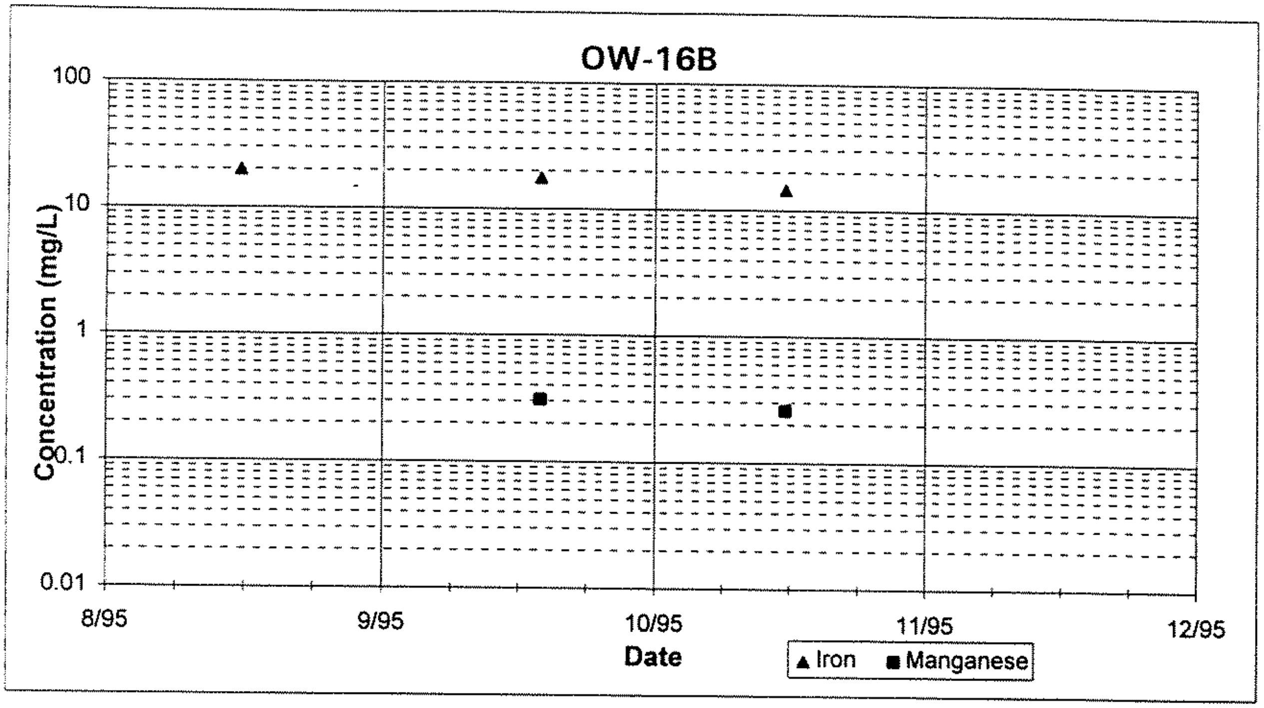


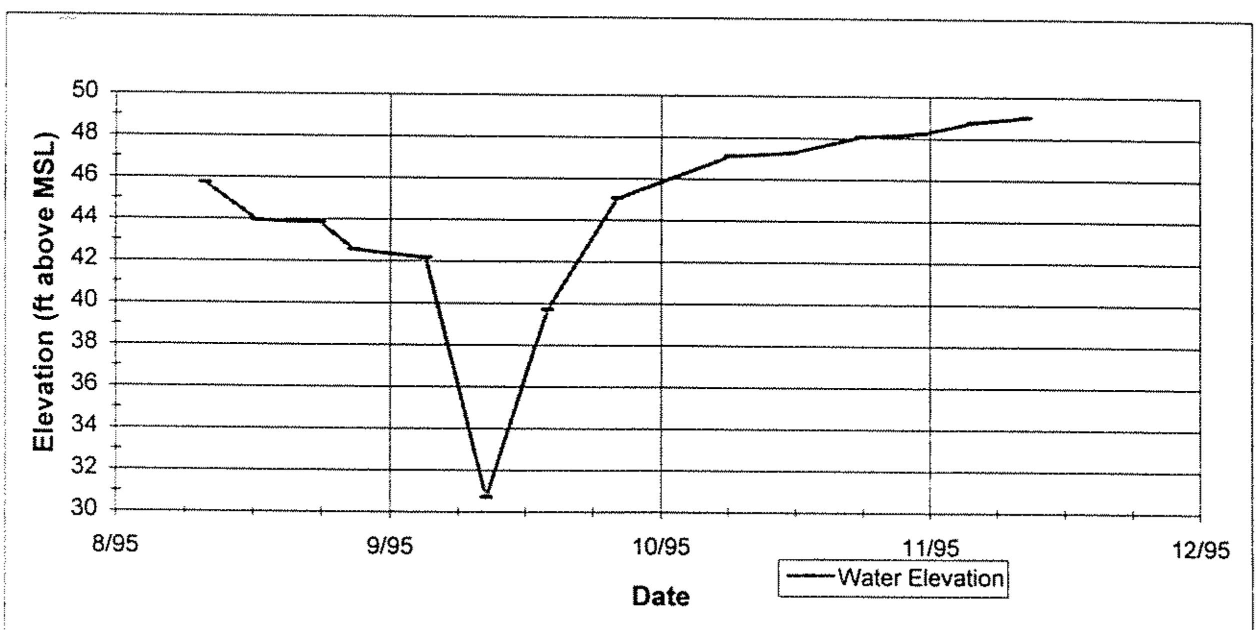
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



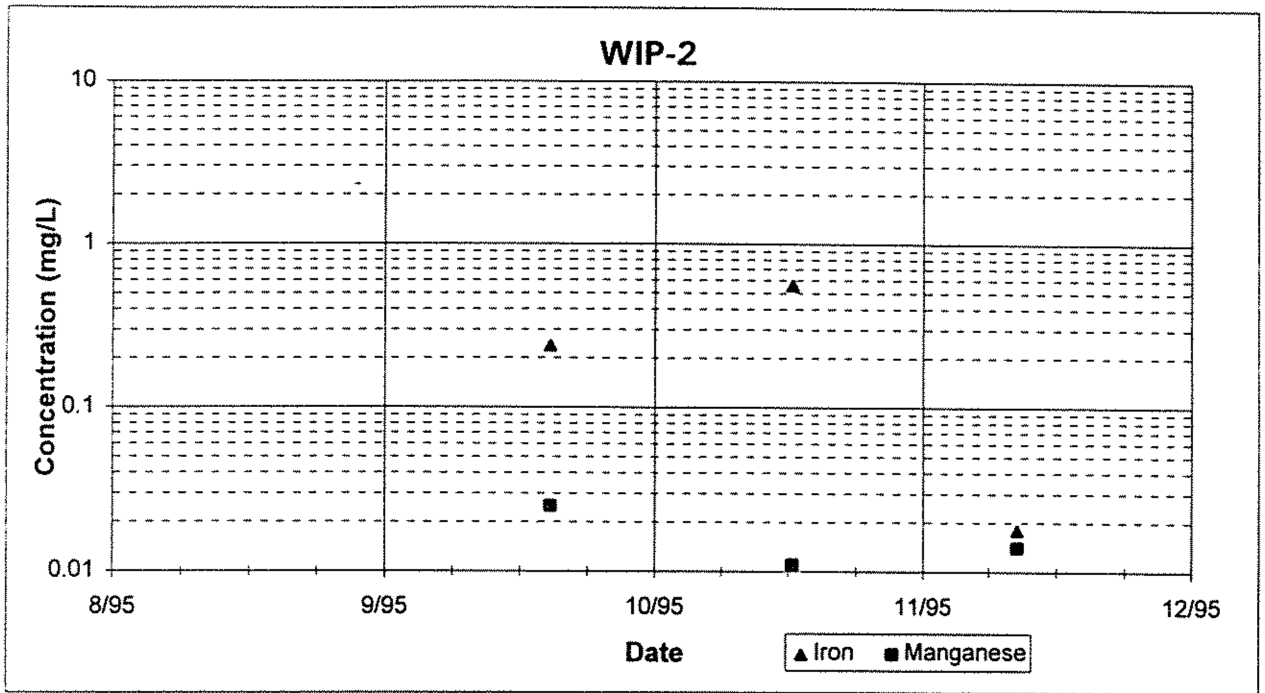


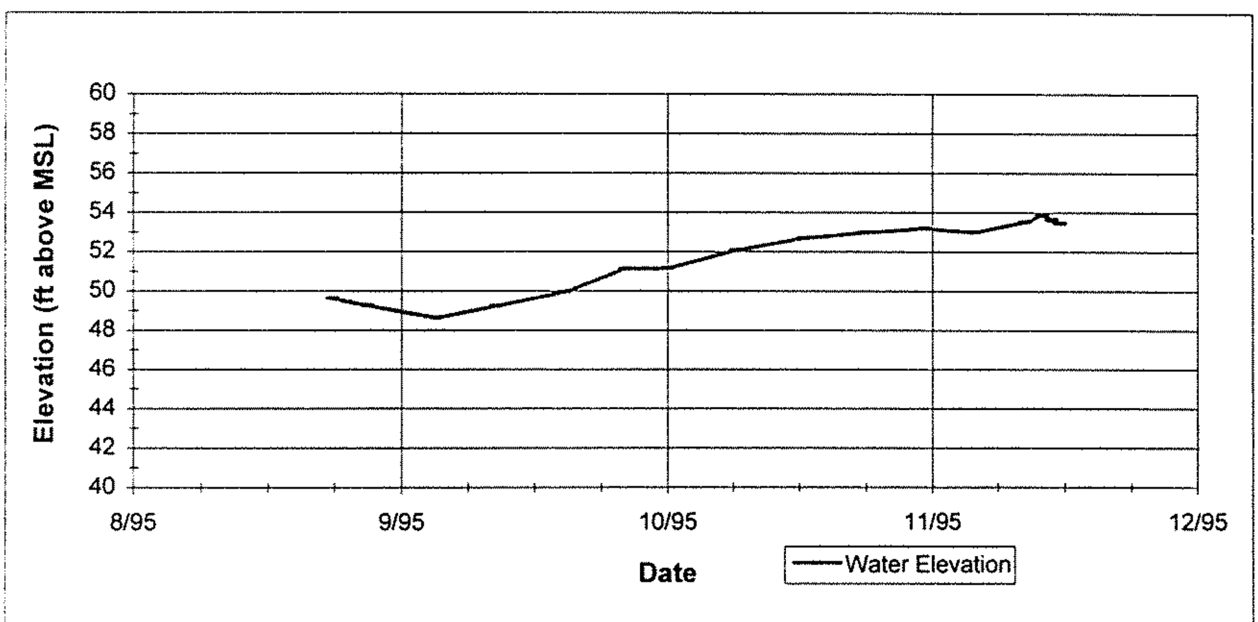
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



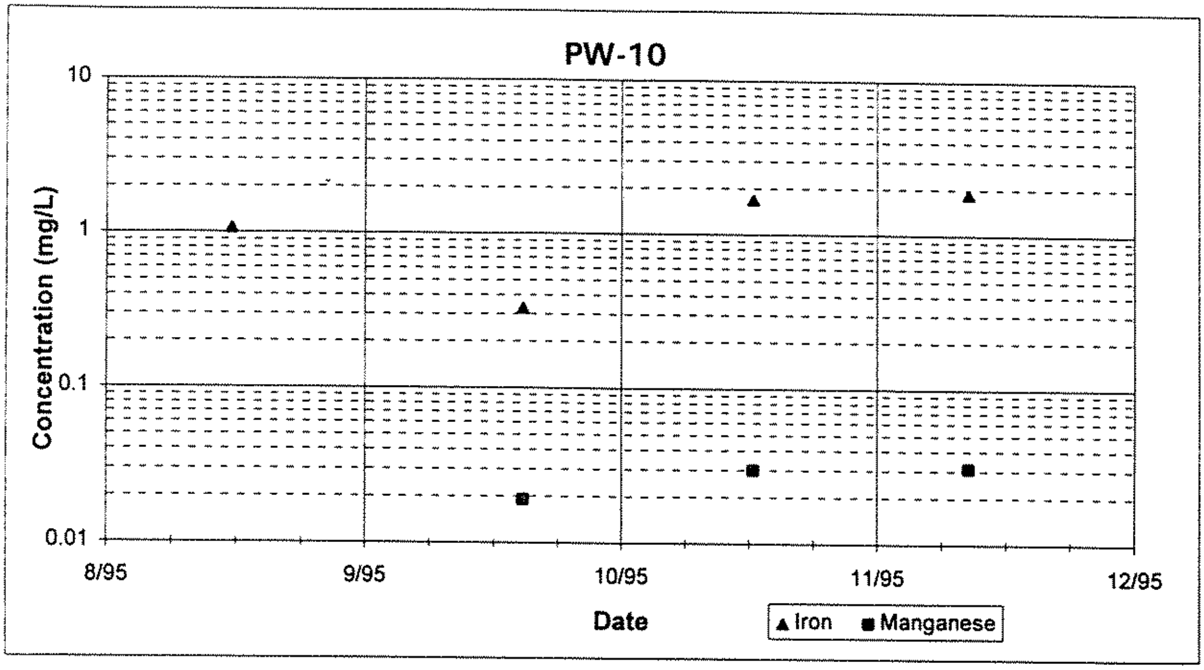


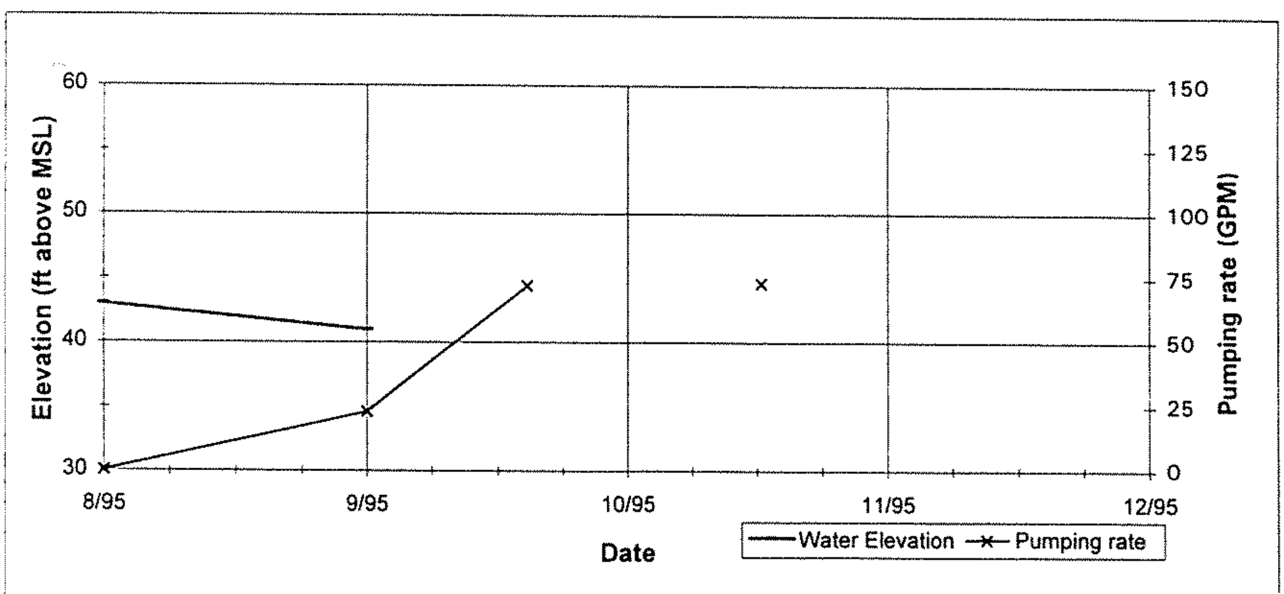
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



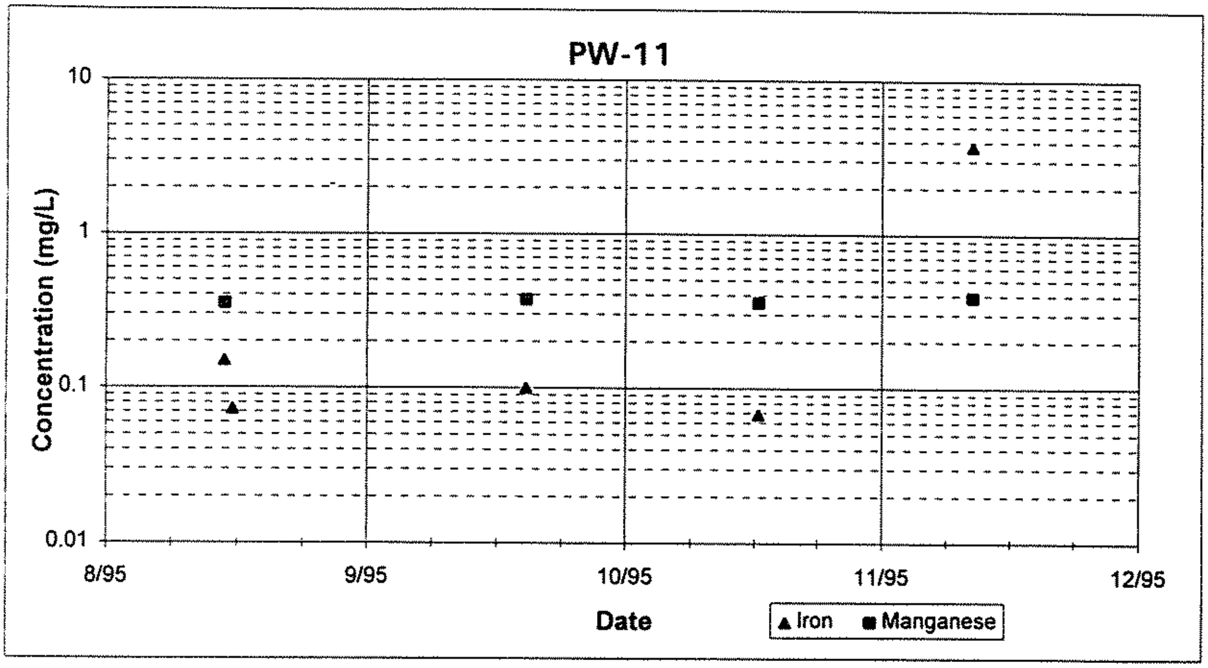


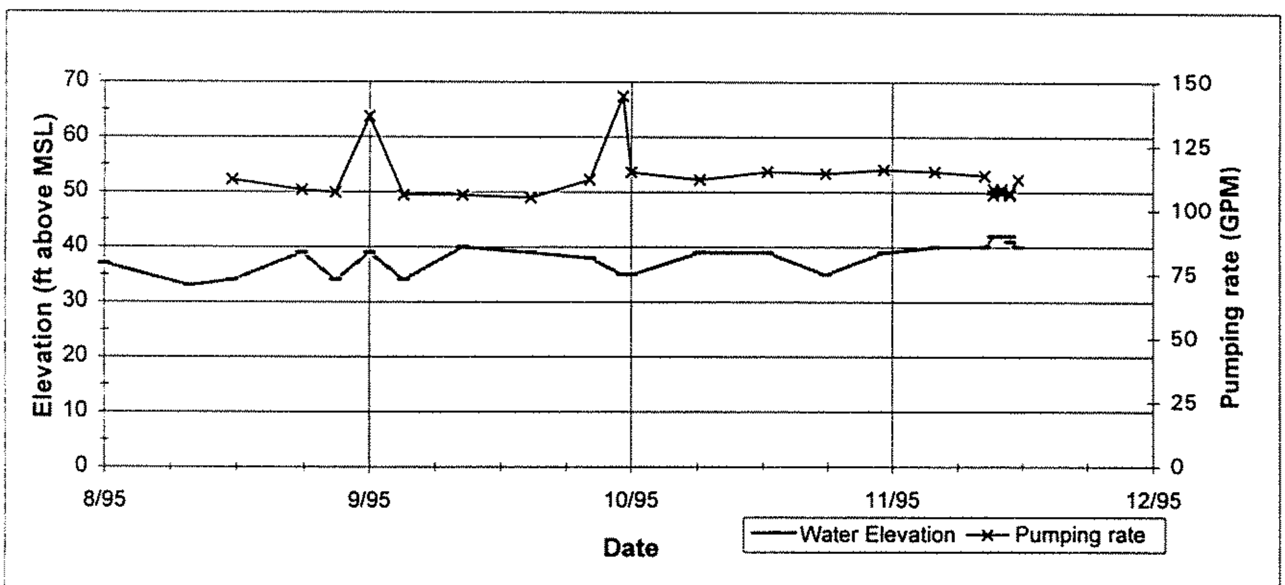
Iron, Manganese and Water Elevations
August 11 to November 17, 1995



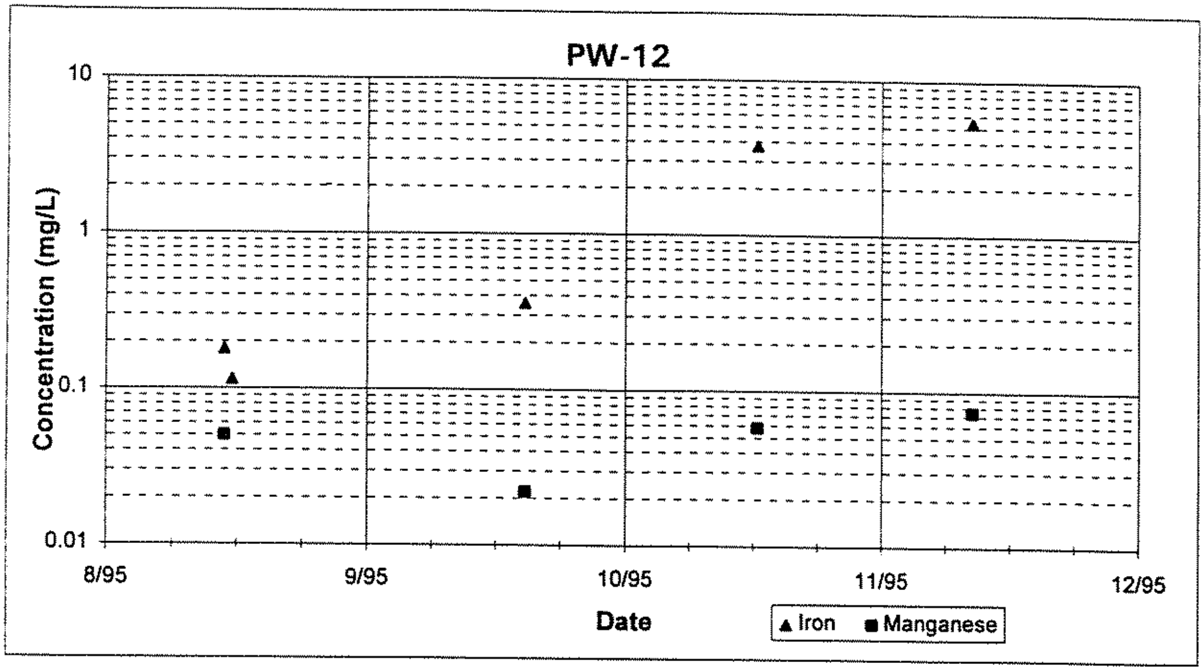


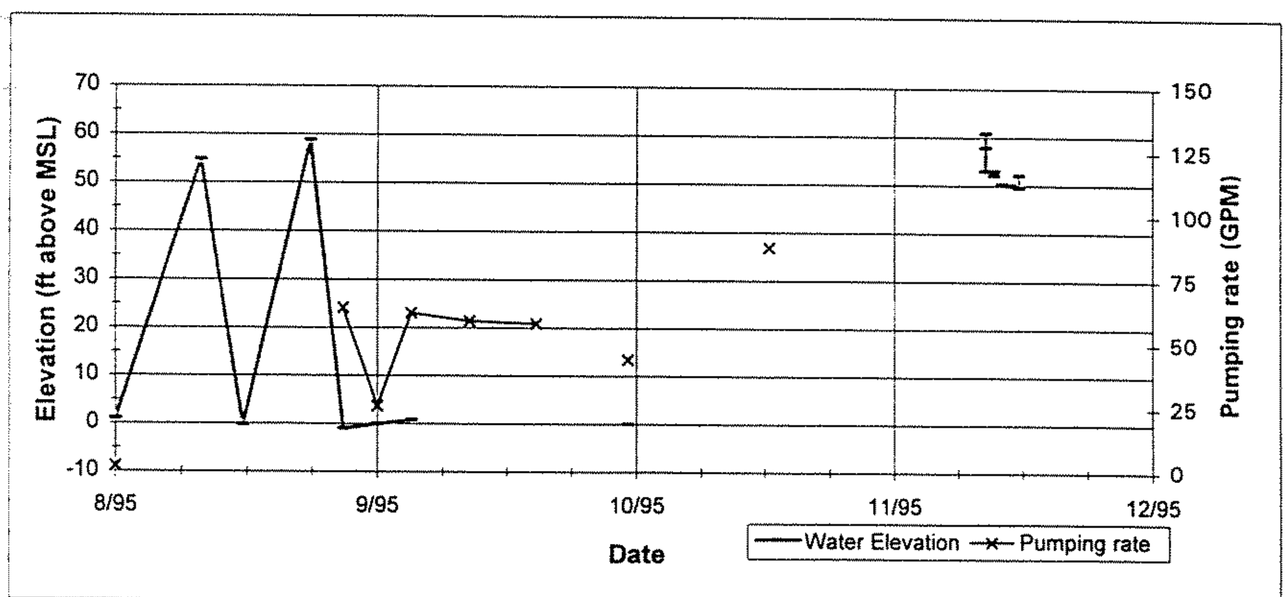
Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995



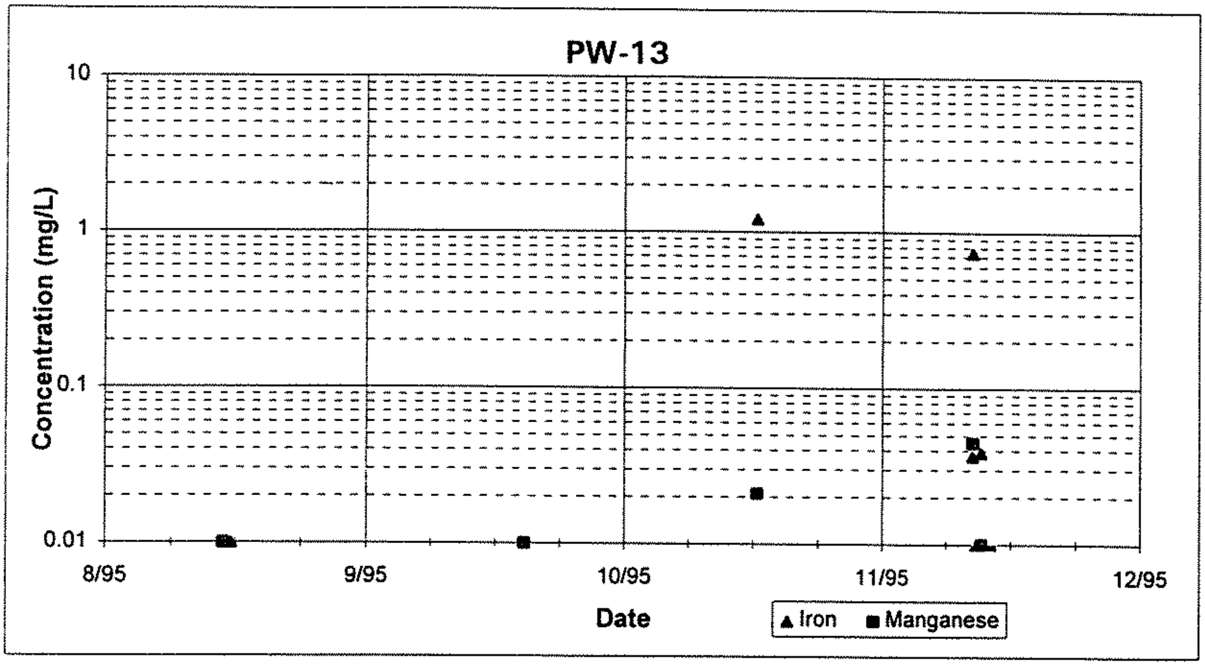


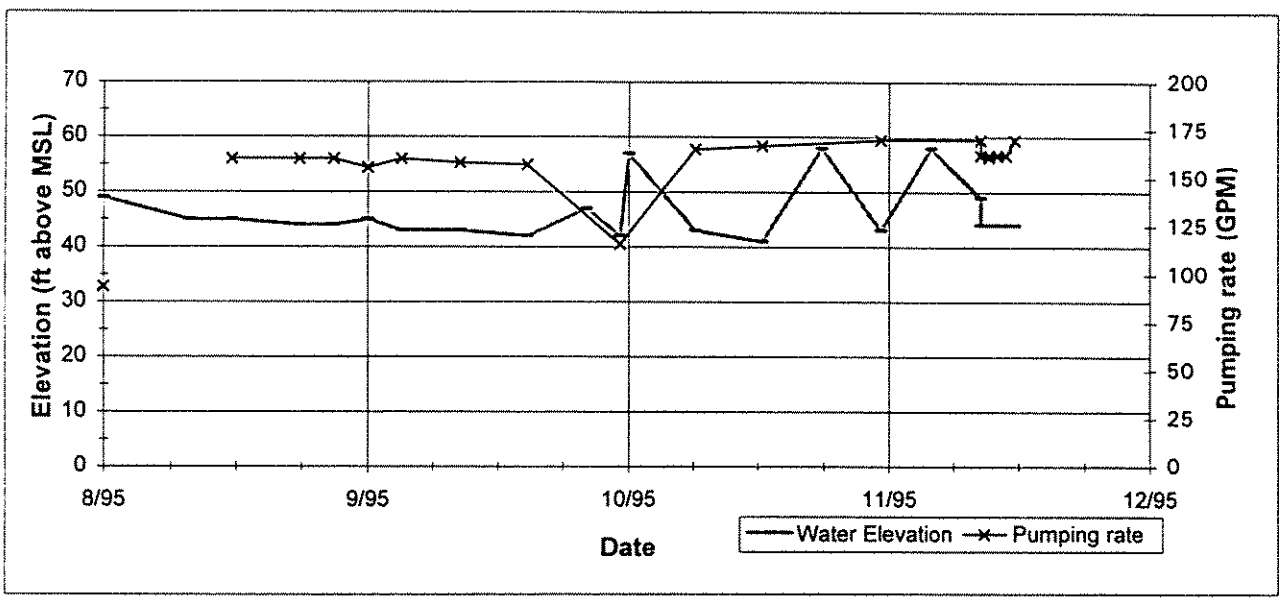
Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995



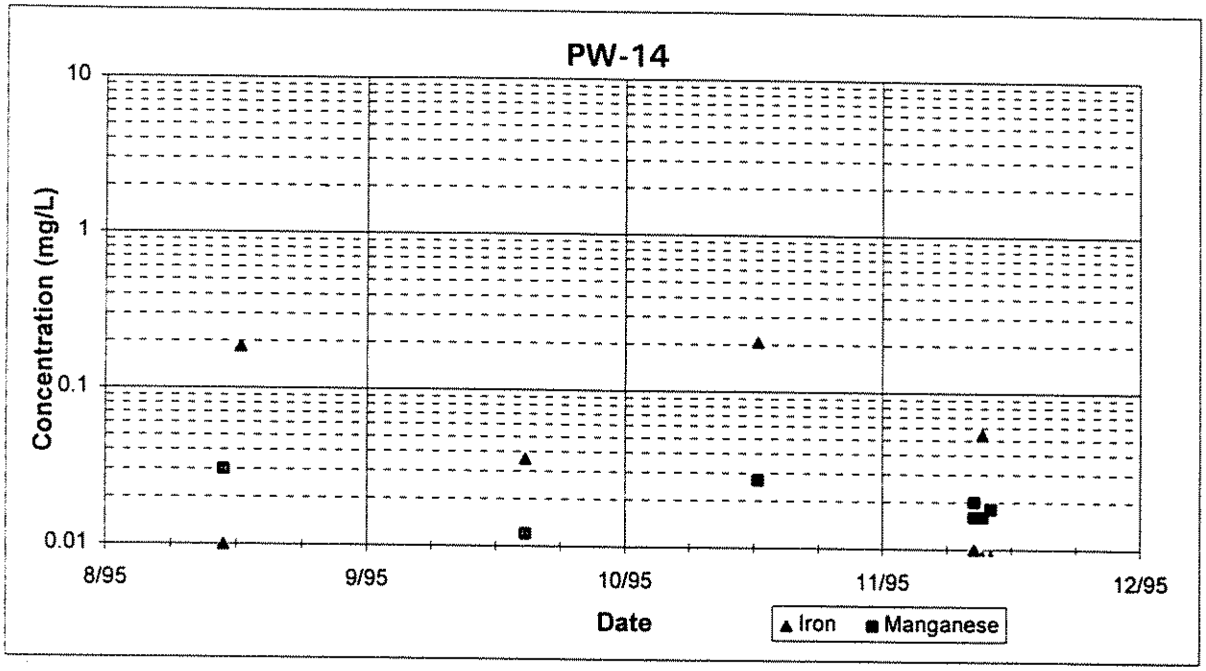


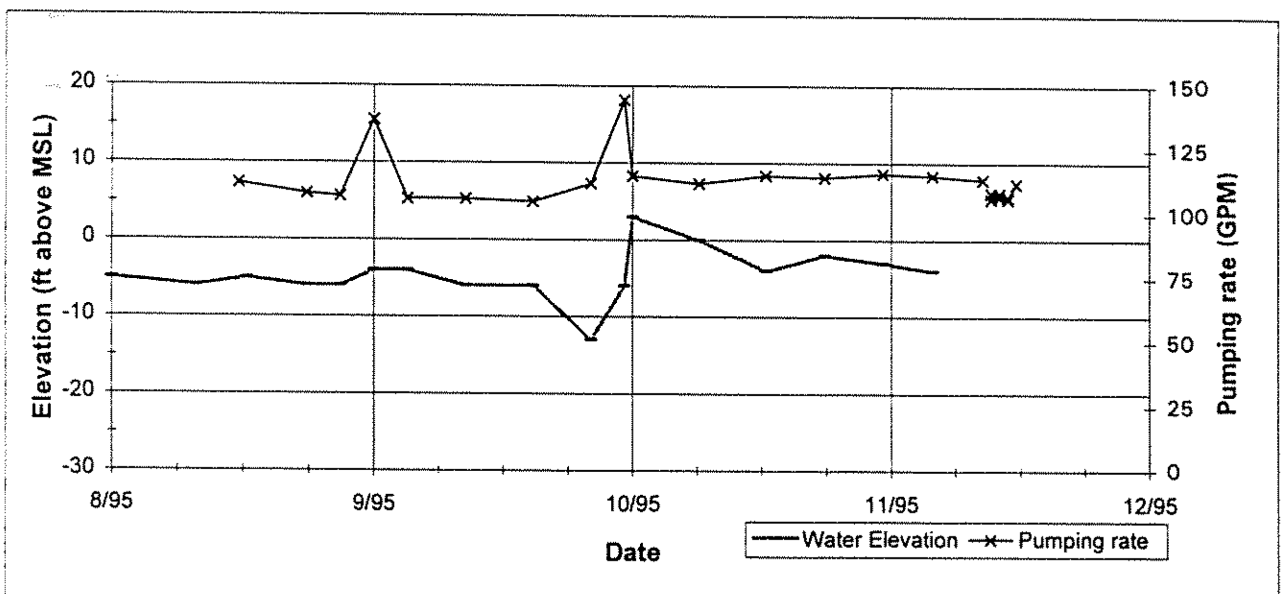
Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995



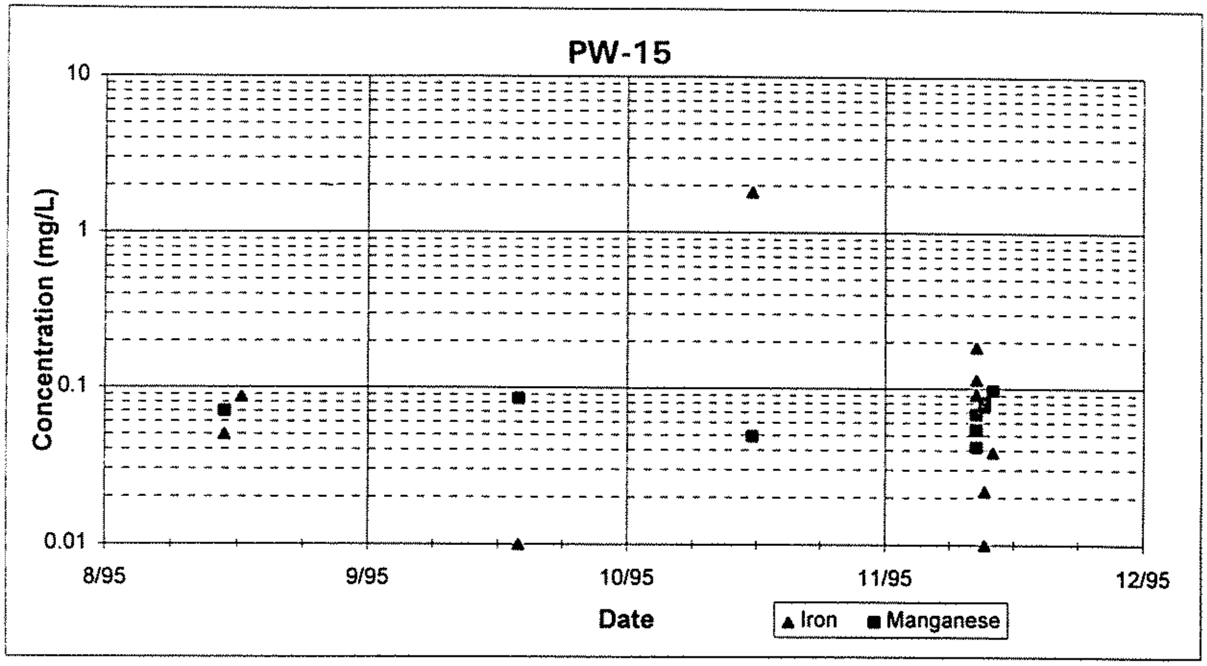


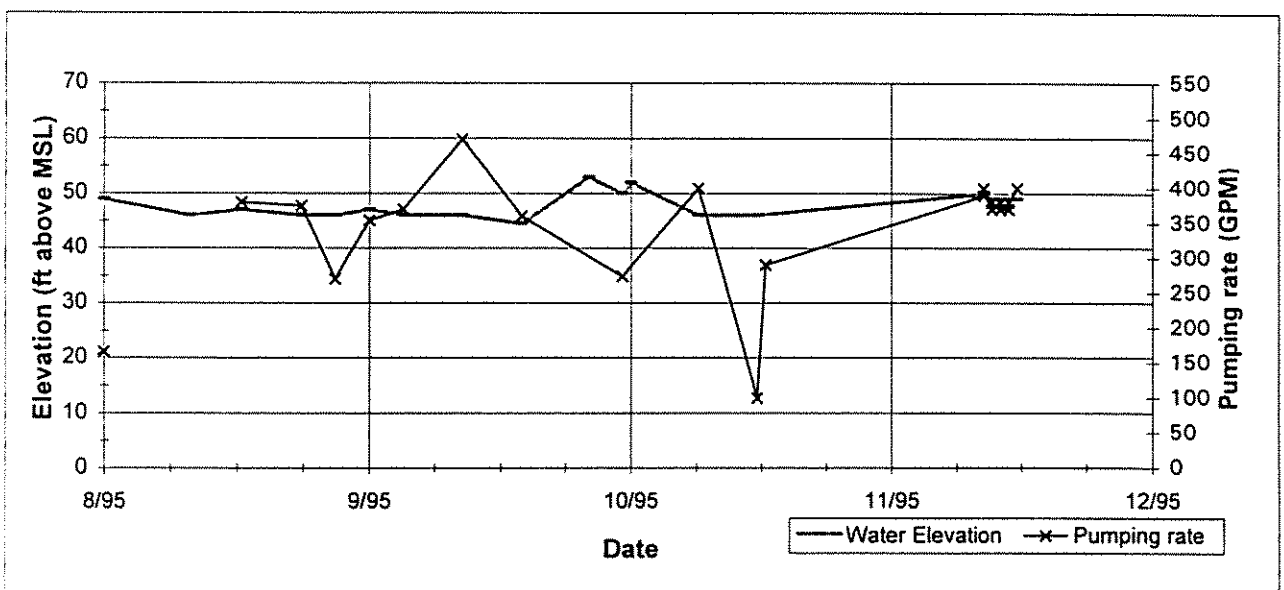
Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995



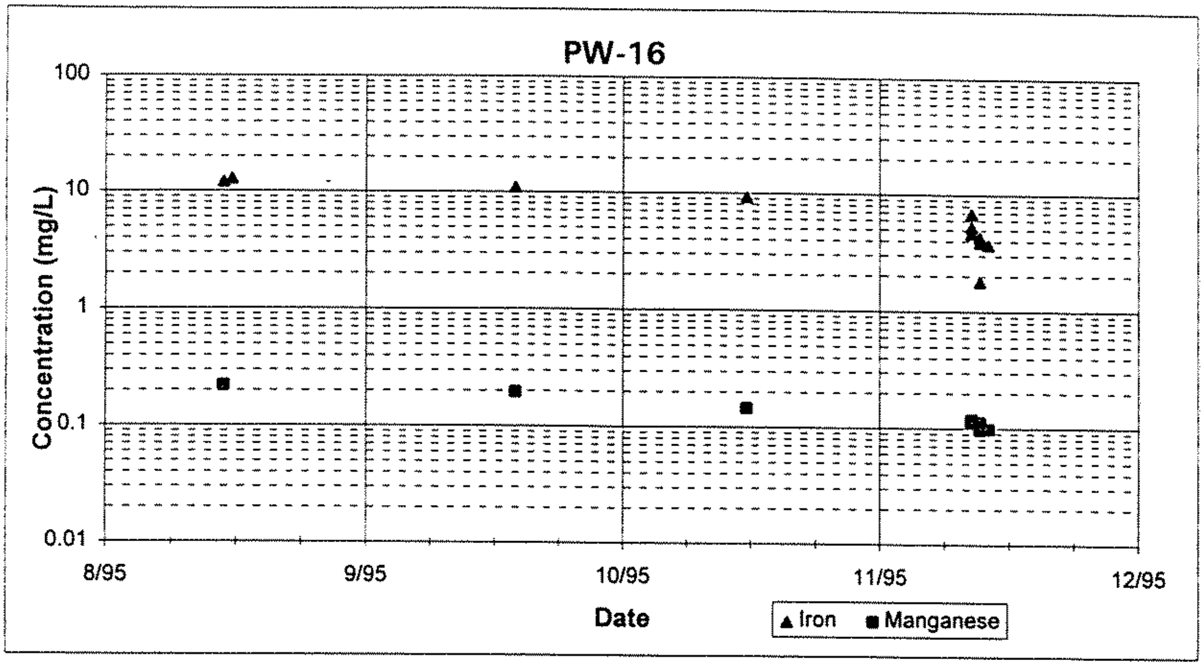


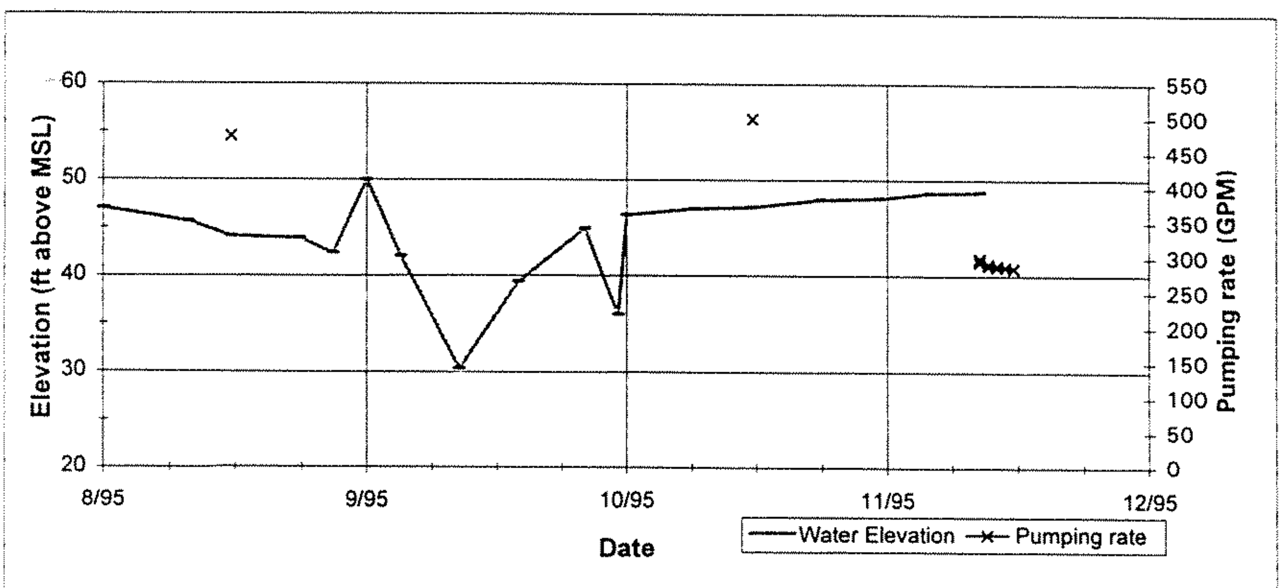
Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995



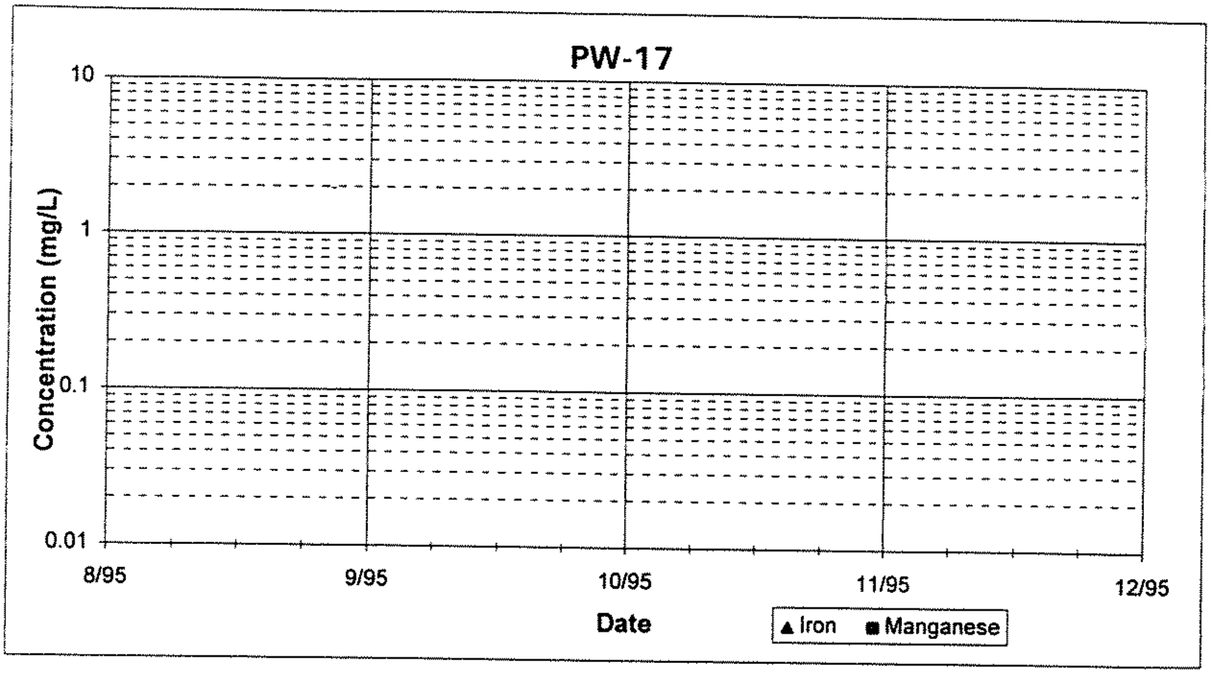


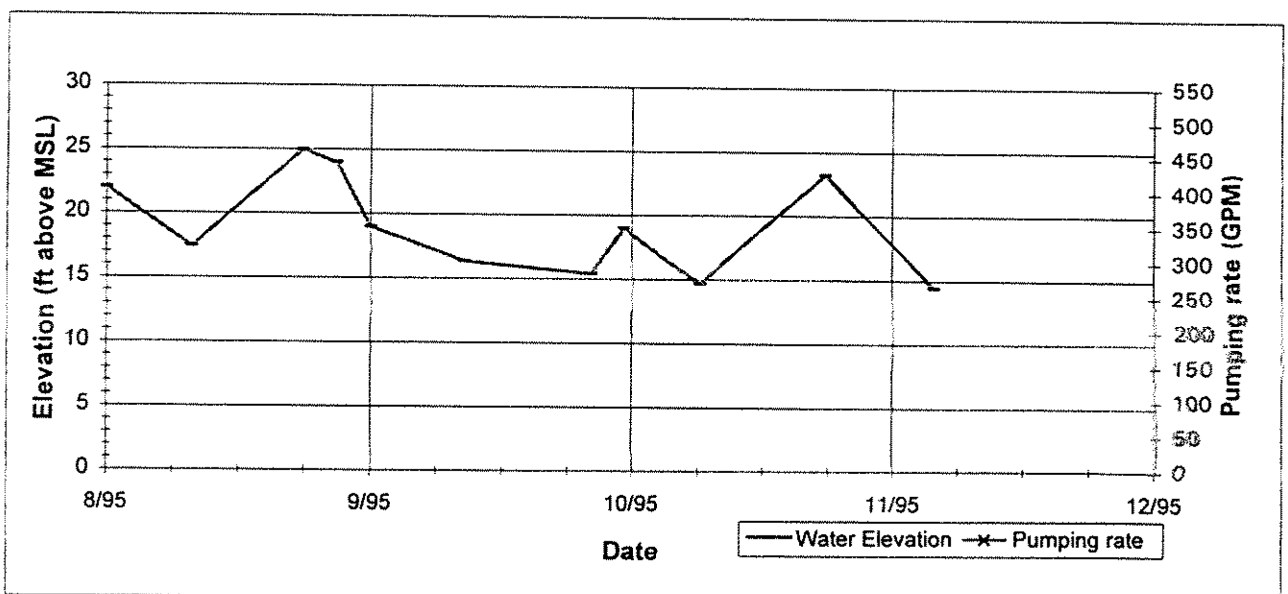
Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995



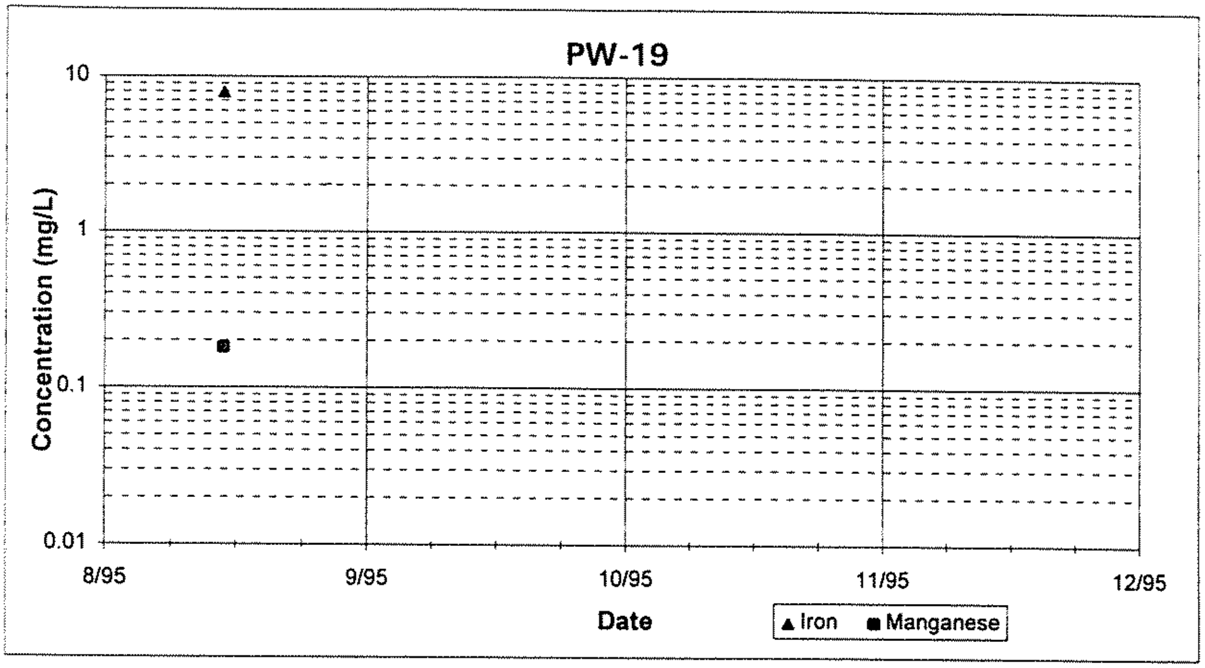


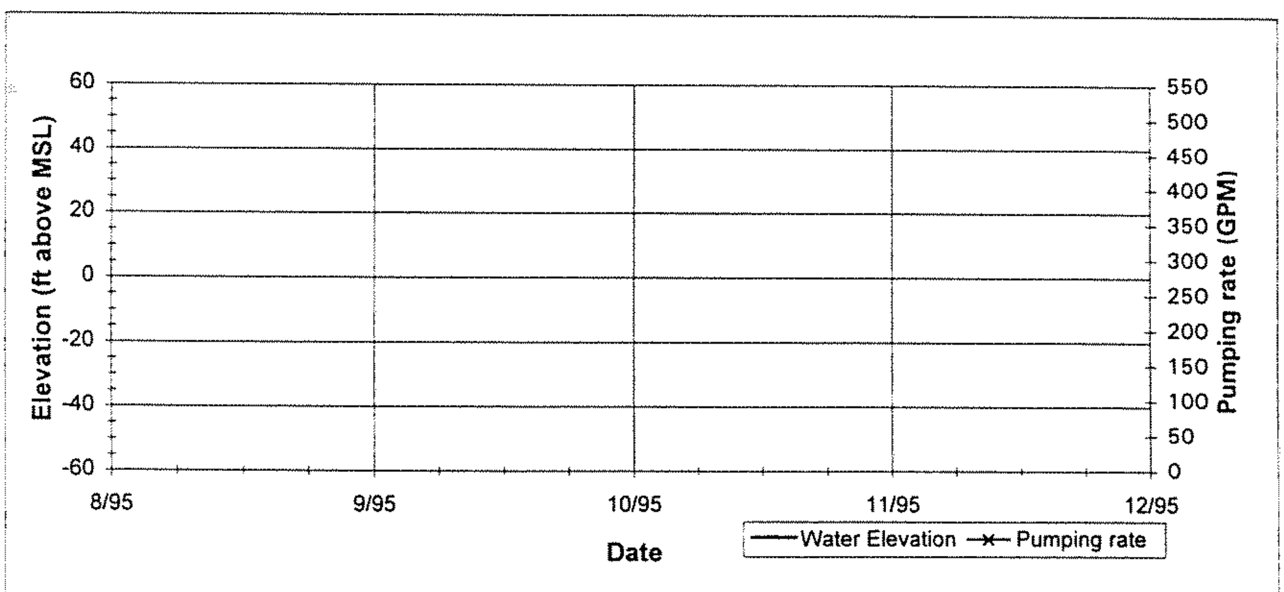
Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995





Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995





Iron, Manganese, Water Elevations and Pumping Rates
August 11 to November 17, 1995

ATTACHMENT 3
Tabular Historical Water Quality Data - Well, Date, Individual Parameter Summary

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	CH-1	4/26/94	DO	LLI	0.63		MG/L	Duffield Report - June, 1994
Pot	CH-1	8/16/95	DO		0.63		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	DO		2.02		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	10/18/95	DO		1.3		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	DO		2.08		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/15/95	DO		1.26		MG/L	Newark Pump Test 11/95
Pot	CH-1	4/26/94	Eh	LLI	60		mV	Duffield Report - June, 1994
Pot	CH-1	8/16/95	Eh		-268		mV	Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	Eh		-12		mV	Tetra Tech report 10/4/95
Pot	CH-1	10/18/95	Eh		-32		mV	Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	Eh		-30		mV	Tetra Tech report 11/9/95
Pot	CH-1	11/15/95	Eh		7		mV	Newark Pump Test 11/95
Pot	CH-1	4/26/94	IRON (TOTAL)	LLI	0.16		MG/L	Duffield Report - June, 1994
Pot	CH-1	8/16/95	IRON (TOTAL)		1.67		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	IRON (DISSOLVED)		1.63		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	10/18/95	IRON (DISSOLVED)		1.55		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	IRON (DISSOLVED)		1.37		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/15/95	IRON (DISSOLVED)		1.36		MG/L	Newark Pump Test 11/95
Pot	CH-1	4/26/94	MANGANESE (TOTAL)	LLI	0.081		MG/L	Duffield Report - June, 1994
Pot	CH-1	9/20/95	MANGANESE (DISSOLVED)		0.317		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	10/18/95	MANGANESE (DISSOLVED)		0.186		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	MANGANESE (DISSOLVED)		0.192		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/15/95	MANGANESE (DISSOLVED)		0.156		MG/L	Newark Pump Test 11/95
Pot	CH-1	8/16/95	pH		6.58			Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	pH		6.71			Tetra Tech report 10/4/95
Pot	CH-1	10/18/95	pH		7.28			Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	pH		7.55			Tetra Tech report 11/9/95
Pot	CH-1	11/15/95	pH		6.89			Newark Pump Test 11/95
Col	CH-1A	4/26/94	DO	LLI	7.3		MG/L	Duffield Report - June, 1994
Col	CH-1A	8/16/95	DO		4.33		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	DO		7.8		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	10/18/95	DO		6.07			Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	DO		9.2			Tetra Tech report 11/9/95
Col	CH-1A	11/15/95	DO		8.6		MG/L	Newark Pump Test 11/95
Col	CH-1A	4/26/94	Eh	LLI	269		mV	Duffield Report - June, 1994
Col	CH-1A	8/16/95	Eh		-63		mV	Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	Eh		184		mV	Tetra Tech report 10/4/95
Col	CH-1A	10/18/95	Eh		74		mV	Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	Eh		166			Tetra Tech report 11/9/95
Col	CH-1A	11/15/95	Eh		311		mV	Newark Pump Test 11/95
Col	CH-1A	4/26/94	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - June, 1994
Col	CH-1A	8/16/95	IRON (TOTAL)		0.712		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	IRON (DISSOLVED)		0.033		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	10/18/95	IRON (DISSOLVED)		0.043		MG/L	Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	IRON (DISSOLVED)		0.053			Tetra Tech report 11/9/95
Col	CH-1A	11/15/95	IRON (DISSOLVED)		0.064		MG/L	Newark Pump Test 11/95
Col	CH-1A	4/26/94	MANGANESE (TOTAL)	LLI	0.046		MG/L	Duffield Report - June, 1994
Col	CH-1A	9/20/95	MANGANESE (DISSOLVED)		0.075		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	10/18/95	MANGANESE (DISSOLVED)		0.069		MG/L	Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	MANGANESE (DISSOLVED)		0.066			Tetra Tech report 11/9/95
Col	CH-1A	11/15/95	MANGANESE (DISSOLVED)		0.056		MG/L	Newark Pump Test 11/95
Col	CH-1A	8/16/95	pH		5.21			Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	pH		5.2			Tetra Tech report 10/4/95
Col	CH-1A	10/18/95	pH		5.44		MG/L	Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	pH		6.83			Tetra Tech report 11/9/95
Col	CH-1A	11/15/95	pH		5.16			Newark Pump Test 11/95
Pot	CH-2	4/26/94	DO	LLI	0.3		MG/L	Duffield Report - June, 1994
Pot	CH-2	8/16/95	DO		2.49		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	9/19/95	DO		1.67		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	10/17/95	DO		1.43		MG/L	Tetra Tech report 11/9/95
Pot	CH-2	11/15/95	DO		1.5		MG/L	Newark Pump Test 11/95
Pot	CH-2	4/26/94	Eh	LLI	-121		mV	Duffield Report - June, 1994
Pot	CH-2	8/16/95	Eh		-91		mV	Tetra Tech report 10/4/95
Pot	CH-2	9/19/95	Eh		-52		mV	Tetra Tech report 10/4/95
Pot	CH-2	10/17/95	Eh		-20		mV	Tetra Tech report 11/9/95
Pot	CH-2	11/15/95	Eh		-6		mV	Newark Pump Test 11/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	CH-2	4/26/94	IRON (TOTAL)	LLI	5.9		MG/L	Duffield Report - June, 1994
Pot	CH-2	8/16/95	IRON (TOTAL)		10.4		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	9/19/95	IRON (DISSOLVED)		10.7		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	10/17/95	IRON (DISSOLVED)		11.1		MG/L	Tetra Tech report 11/9/95
Pot	CH-2	11/15/95	IRON (DISSOLVED)		13		MG/L	Newark Pump Test 11/95
Pot	CH-2	4/26/94	MANGANESE (TOTAL)	LLI	0.128		MG/L	Duffield Report - June, 1994
Pot	CH-2	9/19/95	MANGANESE (DISSOLVED)		0.252		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	10/17/95	MANGANESE (DISSOLVED)		0.233		MG/L	Tetra Tech report 11/9/95
Pot	CH-2	11/15/95	MANGANESE (DISSOLVED)		0.242		MG/L	Newark Pump Test 11/95
Pot	CH-2	8/16/95	pH		6.36			Tetra Tech report 10/4/95
Pot	CH-2	9/19/95	pH		6.51			Tetra Tech report 10/4/95
Pot	CH-2	10/17/95	pH		7.2			Tetra Tech report 11/9/95
Pot	CH-2	11/15/95	pH		6.39			Newark Pump Test 11/95
Col	CH-2A	4/26/94	DO	LLI	5.8		MG/L	Duffield Report - June, 1994
Col	CH-2A	8/16/95	DO		3.56		MG/L	Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	DO		3.78		MG/L	Tetra Tech report 10/4/95
Col	CH-2A	10/17/95	DO		4.72		MG/L	Tetra Tech report 11/9/95
Col	CH-2A	11/15/95	DO		4.46		MG/L	Newark Pump Test 11/95
Col	CH-2A	4/26/94	Eh	LLI	254		mV	Duffield Report - June, 1994
Col	CH-2A	8/16/95	Eh		-44		mV	Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	Eh		149		mV	Tetra Tech report 10/4/95
Col	CH-2A	10/17/95	Eh		145		mV	Tetra Tech report 11/9/95
Col	CH-2A	11/15/95	Eh		43		mV	Newark Pump Test 11/95
Col	CH-2A	4/26/94	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - June, 1994
Col	CH-2A	8/16/95	IRON (TOTAL)		0.064		MG/L	Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 10/4/95
Col	CH-2A	10/17/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 11/9/95
Col	CH-2A	11/15/95	IRON (DISSOLVED)		0.015		MG/L	Newark Pump Test 11/95
Col	CH-2A	4/26/94	MANGANESE (TOTAL)	LLI	0.018		MG/L	Duffield Report - June, 1994
Col	CH-2A	9/19/95	MANGANESE (DISSOLVED)		0.027		MG/L	Tetra Tech report 10/4/95
Col	CH-2A	10/17/95	MANGANESE (DISSOLVED)		0.028		MG/L	Tetra Tech report 11/9/95
Col	CH-2A	11/15/95	MANGANESE (DISSOLVED)		0.029		MG/L	Newark Pump Test 11/95
Col	CH-2A	8/16/95	pH		5.41			Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	pH		5.46			Tetra Tech report 10/4/95
Col	CH-2A	10/17/95	pH		5.91			Tetra Tech report 11/9/95
Col	CH-2A	11/15/95	pH		5.46			Newark Pump Test 11/95
Col	DTP-2	9/20/95	DO		6.06		MG/L	Tetra Tech report 10/4/95
Col	DTP-2	10/18/95	DO		5.71		MG/L	Tetra Tech report 11/9/95
Col	DTP-2	11/13/95	DO		5.65		MG/L	Newark Pump Test 11/95
Col	DTP-2	9/11/91	Eh		180		mV	Tetra Tech XLS table
Col	DTP-2	9/20/95	Eh		149			Tetra Tech report 10/4/95
Col	DTP-2	10/18/95	Eh		194		mV	Tetra Tech report 11/9/95
Col	DTP-2	9/11/91	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech XLS table
Col	DTP-2	9/20/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 10/4/95
Col	DTP-2	10/18/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 11/9/95
Col	DTP-2	11/13/95	IRON (DISSOLVED)		0.009		MG/L	Newark Pump Test 11/95
Col	DTP-2	9/20/95	MANGANESE (DISSOLVED)		0.025		MG/L	Tetra Tech report 10/4/95
Col	DTP-2	10/18/95	MANGANESE (DISSOLVED)		0.028		MG/L	Tetra Tech report 11/9/95
Col	DTP-2	11/13/95	MANGANESE (DISSOLVED)		0.025		MG/L	Newark Pump Test 11/95
Col	DTP-2	9/11/91	pH		5.73			Tetra Tech XLS table
Col	DTP-2	9/20/95	pH		4.95			Tetra Tech report 10/4/95
Col	DTP-2	10/18/95	pH		5.33			Tetra Tech report 11/9/95
Col	DTP-2	11/13/95	pH		5.29			Newark Pump Test 11/95
Col	DTP-4	9/11/91	Eh		206		mV	Tetra Tech XLS table
Col	DTP-4	9/11/91	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech XLS table
Col	DTP-4	9/11/91	pH		6.17			Tetra Tech XLS table
Pot	NLW-10	9/19/95	DO		0.03		MG/L	Tetra Tech report 10/4/95
Pot	NLW-10	10/17/95	DO		0.75		MG/L	Tetra Tech report 11/9/95
Pot	NLW-10	11/13/95	DO		0.03		MG/L	Newark Pump Test 11/95
Pot	NLW-10	9/19/95	Eh		-77		mV	Tetra Tech report 10/4/95
Pot	NLW-10	10/17/95	Eh		43		mV	Tetra Tech report 11/9/95
Pot	NLW-10	7/17/89	IRON (DISSOLVED)		0.38		MG/L	Tetra Tech XLS table
Pot	NLW-10	7/11/90	IRON (DISSOLVED)		0.18		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/3/91	IRON (DISSOLVED)		0.4		MG/L	Tetra Tech XLS table
Pot	NLW-10	11/12/92	IRON (DISSOLVED)		17.9		MG/L	Tetra Tech XLS table
Pot	NLW-10	10/1/93	IRON (DISSOLVED)		33.2		MG/L	Tetra Tech XLS table

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	NLW-10	9/13/94	IRON (DISSOLVED)		4.14		MG/L	Tetra Tech XLS table
Pot	NLW-10	8/17/95	IRON (TOTAL)		1.54		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/19/95	IRON (DISSOLVED)		0.107		MG/L	Tetra Tech report 10/4/95
Pot	NLW-10	10/17/95	IRON (DISSOLVED)		0.55		MG/L	Tetra Tech report 11/9/95
Pot	NLW-10	11/13/95	IRON (DISSOLVED)		6.9		MG/L	Newark Pump Test 11/95
Pot	NLW-10	7/17/89	MANGANESE (DISSOLVED)		0.01		MG/L	Tetra Tech XLS table
Pot	NLW-10	7/11/90	MANGANESE (DISSOLVED)		0.02		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/3/91	MANGANESE (DISSOLVED)		0.11		MG/L	Tetra Tech XLS table
Pot	NLW-10	11/12/92	MANGANESE (DISSOLVED)		0.26		MG/L	Tetra Tech XLS table
Pot	NLW-10	10/1/93	MANGANESE (DISSOLVED)		0.42		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/13/94	MANGANESE (DISSOLVED)		0.11		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/19/95	MANGANESE (DISSOLVED)		0.013		MG/L	Tetra Tech report 10/4/95
Pot	NLW-10	10/17/95	MANGANESE (DISSOLVED)		0.094		MG/L	Tetra Tech report 11/9/95
Pot	NLW-10	11/13/95	MANGANESE (DISSOLVED)		0.348		MG/L	Newark Pump Test 11/95
Pot	NLW-10	7/11/90	pH		9.11			Tetra Tech XLS table
Pot	NLW-10	9/3/91	pH		6.7			Tetra Tech XLS table
Pot	NLW-10	11/12/92	pH		6.7			Tetra Tech XLS table
Pot	NLW-10	10/1/93	pH		6.31			Tetra Tech XLS table
Pot	NLW-10	9/13/94	pH		6.24			Tetra Tech XLS table
Pot	NLW-10	9/19/95	pH		8.31			Tetra Tech report 10/4/95
Pot	NLW-10	10/17/95	pH		7.75			Tetra Tech report 11/9/95
Pot	NLW-10	11/13/95	pH		7.76			Newark Pump Test 11/95
Col	NLW-11	9/19/95	DO		0.58		MG/L	Tetra Tech report 10/4/95
Col	NLW-11	10/17/95	DO		1.42		MG/L	Tetra Tech report 11/9/95
Col	NLW-11	11/13/95	DO		1.31		MG/L	Newark Pump Test 11/95
Col	NLW-11	8/17/95	Eh		-200		mV	Tetra Tech XLS table
Col	NLW-11	9/19/95	Eh		-78		mV	Tetra Tech report 10/4/95
Col	NLW-11	10/17/95	Eh		-190		mV	Tetra Tech report 11/9/95
Col	NLW-11	7/17/89	IRON (DISSOLVED)		12.8		MG/L	Tetra Tech XLS table
Col	NLW-11	7/11/90	IRON (DISSOLVED)		18.7		MG/L	Tetra Tech XLS table
Col	NLW-11	9/3/91	IRON (DISSOLVED)		32.7		MG/L	Tetra Tech XLS table
Col	NLW-11	11/12/92	IRON (DISSOLVED)		62.2		MG/L	Tetra Tech XLS table
Col	NLW-11	10/1/93	IRON (DISSOLVED)		45		MG/L	Tetra Tech XLS table
Col	NLW-11	9/13/94	IRON (DISSOLVED)		37.5		MG/L	Tetra Tech XLS table
Col	NLW-11	8/17/95	IRON (TOTAL)		172		MG/L	Tetra Tech XLS table
Col	NLW-11	9/19/95	IRON (DISSOLVED)		32.3		MG/L	Tetra Tech report 10/4/95
Col	NLW-11	10/17/95	IRON (DISSOLVED)		35.8		MG/L	Tetra Tech report 11/9/95
Col	NLW-11	11/13/95	IRON (DISSOLVED)		45.6		MG/L	Newark Pump Test 11/95
Col	NLW-11	7/17/89	MANGANESE (DISSOLVED)		6.25		MG/L	Tetra Tech XLS table
Col	NLW-11	7/11/90	MANGANESE (DISSOLVED)		2.24		MG/L	Tetra Tech XLS table
Col	NLW-11	9/3/91	MANGANESE (DISSOLVED)		1.7		MG/L	Tetra Tech XLS table
Col	NLW-11	11/12/92	MANGANESE (DISSOLVED)		1.87		MG/L	Tetra Tech XLS table
Col	NLW-11	10/1/93	MANGANESE (DISSOLVED)		2.61		MG/L	Tetra Tech XLS table
Col	NLW-11	9/13/94	MANGANESE (DISSOLVED)		2.68		MG/L	Tetra Tech XLS table
Col	NLW-11	9/19/95	MANGANESE (DISSOLVED)		0.739		MG/L	Tetra Tech report 10/4/95
Col	NLW-11	10/17/95	MANGANESE (DISSOLVED)		0.884		MG/L	Tetra Tech report 11/9/95
Col	NLW-11	11/13/95	MANGANESE (DISSOLVED)		0.878		MG/L	Newark Pump Test 11/95
Col	NLW-11	7/11/90	pH		6.48			Tetra Tech XLS table
Col	NLW-11	9/3/91	pH		6.1			Tetra Tech XLS table
Col	NLW-11	11/12/92	pH		7.2			Tetra Tech XLS table
Col	NLW-11	10/1/93	pH		5.97			Tetra Tech XLS table
Col	NLW-11	9/13/94	pH		6.24			Tetra Tech XLS table
Col	NLW-11	8/17/95	pH		9.32			Tetra Tech XLS table
Col	NLW-11	9/19/95	pH		6.34			Tetra Tech report 10/4/95
Col	NLW-11	10/17/95	pH		6.49			Tetra Tech report 11/9/95
Col	NLW-11	11/13/95	pH		6.53			Newark Pump Test 11/95
Col	OW-11	8/16/95	DO		5.14		MG/L	Tetra Tech XLS table
Col	OW-11	8/16/95	Eh		-95		mV	Tetra Tech XLS table
Col	OW-11	8/16/95	IRON (TOTAL)		113		MG/L	Tetra Tech XLS table
Col	OW-11	8/16/95	pH		5.64			Tetra Tech XLS table
Pot	OW-14	8/17/95	Eh		-270		mV	Tetra Tech XLS table
Pot	OW-14	8/17/95	IRON (TOTAL)		29.5		MG/L	Tetra Tech XLS table
Pot	OW-14	8/17/95	pH		9.9			Tetra Tech XLS table
Col	OW-15	8/16/93	DO	LLI	0.4		MG/L	Duffield Report - June, 1994
Col	OW-15	9/9/93	DO	LLI	0.4		MG/L	Duffield Report - June, 1994
Col	OW-15	4/26/94	DO	LLI	0.4		MG/L	Duffield Report - June, 1994

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	OW-15	8/17/95	DO		2.25		MG/L	Tetra Tech XLS table
Col	OW-15	9/19/95	DO		2.25		MG/L	Tetra Tech report 10/4/95
Col	OW-15	10/17/95	DO		1.87		MG/L	Tetra Tech report 11/9/95
Col	OW-15	11/15/95	DO		1.97		MG/L	Newark Pump Test 11/95
Col	OW-15	8/16/93	Eh	LLI	63		mV	Duffield Report - June, 1994
Col	OW-15	9/9/93	Eh	LLI	18		mV	Duffield Report - June, 1994
Col	OW-15	4/26/94	Eh	LLI	-32		mV	Duffield Report - June, 1994
Col	OW-15	8/17/95	Eh		-857		mV	Tetra Tech XLS table
Col	OW-15	9/19/95	Eh		218		mV	Tetra Tech report 10/4/95
Col	OW-15	10/17/95	Eh		33		mV	Tetra Tech report 11/9/95
Col	OW-15	11/15/95	Eh		197		mV	Newark Pump Test 11/95
Col	OW-15	9/19/95	IRON (DISSOLVED)		0.589		MG/L	Tetra Tech report 10/4/95
Col	OW-15	10/17/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 11/9/95
Col	OW-15	11/15/95	IRON (DISSOLVED)		0.025		MG/L	Newark Pump Test 11/95
Col	OW-15	11/5/90	IRON (TOTAL)	ALI	27.2		MG/L	Duffield Report - Aug, 1993
Col	OW-15	11/5/90	IRON (TOTAL)	DPH	22		MG/L	Duffield Report - Aug, 1993
Col	OW-15	8/16/93	IRON (TOTAL)	LLI	17.1		MG/L	Duffield Report - Oct, 1993
Col	OW-15	9/9/93	IRON (TOTAL)	LLI	17.6		MG/L	Duffield Report - Oct, 1993
Col	OW-15	4/26/94	IRON (TOTAL)	LLI	23.2		MG/L	Duffield Report - June, 1994
Col	OW-15	8/17/95	IRON (TOTAL)		0.977		MG/L	Tetra Tech XLS table
Col	OW-15	9/19/95	MANGANESE (DISSOLVED)		6.62		MG/L	Tetra Tech report 10/4/95
Col	OW-15	10/17/95	MANGANESE (DISSOLVED)		4.73		MG/L	Tetra Tech report 11/9/95
Col	OW-15	11/15/95	MANGANESE (DISSOLVED)		5.01		MG/L	Newark Pump Test 11/95
Col	OW-15	11/5/90	MANGANESE (TOTAL)	ALI	10		MG/L	Duffield Report - Aug, 1993
Col	OW-15	11/5/90	MANGANESE (TOTAL)	DPH	12		MG/L	Duffield Report - Aug, 1993
Col	OW-15	8/16/93	MANGANESE (TOTAL)	LLI	2.12		MG/L	Duffield Report - Oct, 1993
Col	OW-15	9/9/93	MANGANESE (TOTAL)	LLI	2.05		MG/L	Duffield Report - Oct, 1993
Col	OW-15	4/26/94	MANGANESE (TOTAL)	LLI	3.94		MG/L	Duffield Report - June, 1994
Col	OW-15	11/5/90	pH	ALI	6.5			Duffield Report - Aug, 1993
Col	OW-15	11/5/90	pH	DPH	6.7			Duffield Report - Aug, 1993
Col	OW-15	8/16/93	pH	LLI	6.3			Duffield Report - Oct, 1993
Col	OW-15	9/9/93	pH	LLI	5.95			Duffield Report - Oct, 1993
Col	OW-15	8/17/95	pH		4.91			Tetra Tech XLS table
Col	OW-15	9/19/95	pH		4.76			Tetra Tech report 10/4/95
Col	OW-15	10/17/95	pH		5.19			Tetra Tech report 11/9/95
Col	OW-15	11/15/95	pH		4.77			Newark Pump Test 11/95
Col	OW-15	11/5/90	TDS	ALI	340		MG/L	Duffield Report - Aug, 1993
Col	OW-15	11/5/90	TDS	DPH	327		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	8/16/93	DO	LLI	1		MG/L	Duffield Report - June, 1994
Pot	OW-16A	4/26/94	DO	LLI	0.2		MG/L	Duffield Report - June, 1994
Pot	OW-16A	9/19/95	DO		2.12		MG/L	Tetra Tech report 10/4/95
Pot	OW-16A	10/17/95	DO		2.13		MG/L	Tetra Tech report 11/9/95
Pot	OW-16A	11/15/95	DO		2.24		MG/L	Newark Pump Test 11/95
Pot	OW-16A	8/16/93	Eh	LLI	-54		mV	Duffield Report - June, 1994
Pot	OW-16A	4/26/94	Eh	LLI	53		mV	Duffield Report - June, 1994
Pot	OW-16A	8/16/95	Eh		-165		mV	Tetra Tech XLS table
Pot	OW-16A	9/19/95	Eh		35		mV	Tetra Tech report 10/4/95
Pot	OW-16A	10/17/95	Eh		14		mV	Tetra Tech report 11/9/95
Pot	OW-16A	11/15/95	Eh		17		mV	Newark Pump Test 11/95
Pot	OW-16A	9/19/95	IRON (DISSOLVED)		20.1		MG/L	Tetra Tech report 10/4/95
Pot	OW-16A	10/17/95	IRON (DISSOLVED)		24.2		MG/L	Tetra Tech report 11/9/95
Pot	OW-16A	11/15/95	IRON (DISSOLVED)		18.9		MG/L	Newark Pump Test 11/95
Pot	OW-16A	8/10/90	IRON (TOTAL)	ALI	44		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	9/19/90	IRON (TOTAL)	ALI	23		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	IRON (TOTAL)	DPH	14		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	IRON (TOTAL)	ALI	17.7		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	8/17/93	IRON (TOTAL)	LLI	24.9		MG/L	Duffield Report - Oct, 1993
Pot	OW-16A	4/26/94	IRON (TOTAL)	LLI	21		MG/L	Duffield Report - June, 1994
Pot	OW-16A	8/16/95	IRON (TOTAL)		24.5		MG/L	Tetra Tech XLS table
Pot	OW-16A	9/19/95	MANGANESE (DISSOLVED)		0.363		MG/L	Tetra Tech report 10/4/95
Pot	OW-16A	10/17/95	MANGANESE (DISSOLVED)		0.388		MG/L	Tetra Tech report 11/9/95
Pot	OW-16A	11/15/95	MANGANESE (DISSOLVED)		0.37		MG/L	Newark Pump Test 11/95
Pot	OW-16A	8/10/90	MANGANESE (TOTAL)	ALI	0.61		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	9/19/90	MANGANESE (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	MANGANESE (TOTAL)	DPH	0.43		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	MANGANESE (TOTAL)	ALI	0.32		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	OW-16A	8/17/93	MANGANESE (TOTAL)	LLI	0.289		MG/L	Duffield Report - Oct, 1993
Pot	OW-16A	4/26/94	MANGANESE (TOTAL)	LLI	0.323		MG/L	Duffield Report - June, 1994
Pot	OW-16A	8/10/90	pH	ALI	6.6			Duffield Report - Aug, 1993
Pot	OW-16A	9/19/90	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	pH	DPH	5.6			Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	OW-16A	8/17/93	pH	LLI	5.6			Duffield Report - Oct, 1993
Pot	OW-16A	8/16/95	pH		5.13			Tetra Tech XLS table
Pot	OW-16A	9/19/95	pH		5.05			Tetra Tech report 10/4/95
Pot	OW-16A	10/17/95	pH		5.82			Tetra Tech report 11/9/95
Pot	OW-16A	11/15/95	pH		5.29			Newark Pump Test 11/95
Pot	OW-16A	8/10/90	TDS	ALI	230		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	9/19/90	TDS	ALI	160		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	TDS	DPH	140		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	TDS	ALI	140		MG/L	Duffield Report - Aug, 1993
Pot	OW-16B	8/16/93	DO	LLI	0.3		MG/L	Duffield Report - June, 1994
Pot	OW-16B	9/9/93	DO	LLI	0.4		MG/L	Duffield Report - June, 1994
Pot	OW-16B	4/26/94	DO	LLI	0.9		MG/L	Duffield Report - June, 1994
Pot	OW-16B	9/19/95	DO		2.12		MG/L	Tetra Tech report 10/4/95
Pot	OW-16B	10/17/95	DO		2.03		MG/L	Tetra Tech report 11/9/95
Pot	OW-16B	8/16/93	Eh	LLI	121		mV	Duffield Report - June, 1994
Pot	OW-16B	9/9/93	Eh	LLI	165		mV	Duffield Report - June, 1994
Pot	OW-16B	4/26/94	Eh	LLI	144		mV	Duffield Report - June, 1994
Pot	OW-16B	8/16/95	Eh		-268		mV	Tetra Tech XLS table
Pot	OW-16B	9/19/95	Eh		40		mV	Tetra Tech report 10/4/95
Pot	OW-16B	10/17/95	Eh		88		mV	Tetra Tech report 11/9/95
Pot	OW-16B	9/19/95	IRON (DISSOLVED)		17.6		MG/L	Tetra Tech report 10/4/95
Pot	OW-16B	10/17/95	IRON (DISSOLVED)		14.5		MG/L	Tetra Tech report 11/9/95
Pot	OW-16B	8/17/93	IRON (TOTAL)	LLI	10.4		MG/L	Duffield Report - Oct, 1993
Pot	OW-16B	9/9/93	IRON (TOTAL)	LLI	16.5		MG/L	Duffield Report - Oct, 1993
Pot	OW-16B	4/26/94	IRON (TOTAL)	LLI	13.1		MG/L	Duffield Report - June, 1994
Pot	OW-16B	8/16/95	IRON (TOTAL)		19.9		MG/L	Tetra Tech XLS table
Pot	OW-16B	9/19/95	MANGANESE (DISSOLVED)		0.307		MG/L	Tetra Tech report 10/4/95
Pot	OW-16B	10/17/95	MANGANESE (DISSOLVED)		0.257		MG/L	Tetra Tech report 11/9/95
Pot	OW-16B	8/17/93	MANGANESE (TOTAL)	LLI	0.182		MG/L	Duffield Report - Oct, 1993
Pot	OW-16B	9/9/93	MANGANESE (TOTAL)	LLI	0.308		MG/L	Duffield Report - Oct, 1993
Pot	OW-16B	4/26/94	MANGANESE (TOTAL)	LLI	0.242		MG/L	Duffield Report - June, 1994
Pot	OW-16B	8/17/93	pH	LLI	5.3			Duffield Report - Oct, 1993
Pot	OW-16B	9/9/93	pH	LLI	5.2			Duffield Report - Oct, 1993
Pot	OW-16B	8/16/95	pH		5.1			Tetra Tech XLS table
Pot	OW-16B	9/19/95	pH		5.04			Tetra Tech report 10/4/95
Pot	OW-16B	10/17/95	pH		5.67			Tetra Tech report 11/9/95
Pot	PW-10	8/16/93	DO	LLI	3.3		MG/L	Duffield Report - June, 1994
Pot	PW-10	8/16/95	DO		0.22		MG/L	Tetra Tech XLS table
Pot	PW-10	9/20/95	DO		1.62		MG/L	Tetra Tech report 10/4/95
Pot	PW-10	10/18/95	DO		0.64		MG/L	Tetra Tech report 11/9/95
Pot	PW-10	11/13/95	DO		1.38			Newark Pump Test 11/95
Pot	PW-10	8/16/93	Eh	LLI	356		mV	Duffield Report - June, 1994
Pot	PW-10	8/16/95	Eh		-53		mV	Tetra Tech XLS table
Pot	PW-10	9/20/95	Eh		149		mV	Tetra Tech report 10/4/95
Pot	PW-10	10/18/95	Eh		152		mV	Tetra Tech report 11/9/95
Pot	PW-10	6/30/86	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/31/89	IRON (TOTAL)	DPH	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	12/1/89	IRON (TOTAL)	ALI	0.06		MG/L	Tetra Tech fax 12/95
Pot	PW-10	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/11/90	IRON (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/10/90	IRON (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	1/10/91	IRON (TOTAL)	ALI	0.07		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	2/13/91	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	3/11/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	4/11/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/15/91	IRON (TOTAL)	ALI	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/10/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	9/16/91	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/20/92	IRON (TOTAL)	ALI	0.22		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-10	7/8/92	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	10/7/92	IRON (TOTAL)	ALI	0.07		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/14/93	IRON (TOTAL)	ALI	0.36		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	8/16/93	IRON (TOTAL)	LLI	0.4		MG/L	Duffield Report - Oct, 1993
Pot	PW-10	5/23/95	IRON (TOTAL)	DPH	1.8		MG/L	DPH Sheets 5/95 sampling
Pot	PW-10	8/16/95	IRON (TOTAL)		1.07		MG/L	Tetra Tech XLS table
Pot	PW-10	9/20/95	IRON (TOTAL)		0.33		MG/L	Tetra Tech report 10/4/95
Pot	PW-10	10/18/95	IRON (TOTAL)		1.69		MG/L	Tetra Tech report 11/9/95
Pot	PW-10	11/13/95	IRON (TOTAL)		1.86		MG/L	Newark Pump Test 11/95
Pot	PW-10	6/11/90	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/10/90	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	1/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	2/13/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	3/11/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	4/11/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/15/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/10/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	9/16/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/20/92	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/8/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-10	10/7/92	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/14/93	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	8/16/93	MANGANESE (TOTAL)	LLI	0.018		MG/L	Duffield Report - Oct, 1993
Pot	PW-10	5/23/95	MANGANESE (TOTAL)	DPH	0.03		MG/L	DPH Sheets 5/95 sampling
Pot	PW-10	9/20/95	MANGANESE (TOTAL)		0.019		MG/L	Tetra Tech report 10/4/95
Pot	PW-10	10/18/95	MANGANESE (TOTAL)		0.03		MG/L	Tetra Tech report 11/9/95
Pot	PW-10	11/13/95	MANGANESE (TOTAL)		0.031		MG/L	Newark Pump Test 11/95
Pot	PW-10	6/30/86	pH	DPH	6.2			Duffield Report - Aug, 1993
Pot	PW-10	6/29/88	pH	DPH	5.7			Duffield Report - Aug, 1993
Pot	PW-10	5/31/89	pH	DPH	5.4			Duffield Report - Aug, 1993
Pot	PW-10	6/6/90	pH	DPH	5.6			Duffield Report - Aug, 1993
Pot	PW-10	6/11/90	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-10	1/10/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-10	2/13/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-10	3/11/91	pH	ALI	4.5			Duffield Report - Aug, 1993
Pot	PW-10	4/11/91	pH	ALI	5			Duffield Report - Aug, 1993
Pot	PW-10	5/15/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-10	7/10/91	pH	ALI	4.7			Duffield Report - Aug, 1993
Pot	PW-10	9/16/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-10	5/20/92	pH	ALI	5			Duffield Report - Aug, 1993
Pot	PW-10	7/8/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-10	10/7/92	pH	ALI	5			Duffield Report - Aug, 1993
Pot	PW-10	5/14/93	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-10	8/16/93	pH	LLI	5.7			Duffield Report - Oct, 1993
Pot	PW-10	5/23/95	pH	DPH	5.4			DPH Sheets 5/95 sampling
Pot	PW-10	8/16/95	pH		5.01			Tetra Tech XLS table
Pot	PW-10	9/20/95	pH		5.08			Tetra Tech report 10/4/95
Pot	PW-10	10/18/95	pH		5.41			Tetra Tech report 11/9/95
Pot	PW-10	11/13/95	pH		5.49		mV	Newark Pump Test 11/95
Pot	PW-10	6/30/86	TDS	DPH	101		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/29/88	TDS	DPH	139		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/31/89	TDS	DPH	81		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/11/90	TDS	ALI	150		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/23/95	TDS	DPH	136		MG/L	DPH Sheets 5/95 sampling
Pot	PW-10	5/14/93	TURBIDITY	ALI	0.5		NTU	Duffield Report - Aug, 1993
Col	PW-11	8/16/93	DO	LLI	5.7		MG/L	Duffield Report - June, 1994
Col	PW-11	9/9/93	DO	LLI	4.3		MG/L	Duffield Report - June, 1994
Col	PW-11	3/17/95	DO		6.8		MG/L	Report dated 4/4/95
Col	PW-11	8/16/95	DO		4.16		MG/L	Tetra Tech XLS table
Col	PW-11	9/12/95	DO		2.79		MG/L	Tetra Tech XLS table
Col	PW-11	9/20/95	DO		4.64		MG/L	Tetra Tech report 10/4/95
Col	PW-11	9/27/95	DO		4.35		MG/L	Tetra Tech report 10/4/95
Col	PW-11	10/2/95	DO		2.63		MG/L	Tetra Tech report 10/4/95
Col	PW-11	10/10/95	DO		4.09		MG/L	Tetra Tech report 11/9/95
Col	PW-11	10/18/95	DO		6.13		MG/L	Tetra Tech report 11/9/95
Col	PW-11	10/25/95	DO		5.13		MG/L	Tetra Tech report 11/9/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-11	11/1/95	DO		4.88		MG/L	Tetra Tech report 11/9/95
Col	PW-11	11/7/95	DO		6.01		MG/L	Tetra Tech report 11/9/95
Col	PW-11	11/13/1995(0825)	DO		6.14		MG/L	Newark Pump Test 11/95
Col	PW-11	11/15/1995(1450)	DO		4.83		MG/L	Newark Pump Test 11/95
Col	PW-11	11/16/95(1000)	DO		6.37		MG/L	Newark Pump Test 11/95
Col	PW-11	11/16/95(1544)	DO		6.3		MG/L	Newark Pump Test 11/95
Col	PW-11	11/17/95(0845)	DO		5.11		MG/L	Newark Pump Test 11/95
Col	PW-11	8/16/93	Eh	LLI	256		mV	Duffield Report - June, 1994
Col	PW-11	9/9/93	Eh	LLI	210		mV	Duffield Report - June, 1994
Col	PW-11	8/16/95	Eh		-84			Tetra Tech XLS table
Col	PW-11	9/20/95	Eh		142			Tetra Tech report 10/4/95
Col	PW-11	9/27/95	Eh		183		mV	Tetra Tech report 10/4/95
Col	PW-11	10/2/95	Eh		162		mV	Tetra Tech report 10/4/95
Col	PW-11	10/10/95	Eh		163		mV	Tetra Tech report 11/9/95
Col	PW-11	10/18/95	Eh		143		mV	Tetra Tech report 11/9/95
Col	PW-11	10/25/95	Eh		151		mV	Tetra Tech report 11/9/95
Col	PW-11	11/1/95	Eh		151		mV	Tetra Tech report 11/9/95
Col	PW-11	11/7/95	Eh		139		mV	Tetra Tech report 11/9/95
Col	PW-11	11/15/1995(1450)	Eh		235		mV	Newark Pump Test 11/95
Col	PW-11	11/16/95(1000)	Eh		292		mV	Newark Pump Test 11/95
Col	PW-11	6/14/82	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/29/83	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/20/84	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/12/85	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/30/86	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/10/87	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/29/88	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	12/1/89	IRON (TOTAL)	ALI	0.21		MG/L	Tetra Tech fax 12/95
Col	PW-11	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/11/90	IRON (TOTAL)	ALI	0.41		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/10/91	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-11	2/13/91	IRON (TOTAL)	ALI	0.14		MG/L	Duffield Report - Aug, 1993
Col	PW-11	3/11/91	IRON (TOTAL)	ALI	0.19		MG/L	Duffield Report - Aug, 1993
Col	PW-11	4/11/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/15/91	IRON (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Col	PW-11	7/10/91	IRON (TOTAL)	ALI	0.16		MG/L	Duffield Report - Aug, 1993
Col	PW-11	9/16/91	IRON (TOTAL)	ALI	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-11	11/5/91	IRON (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/29/92	IRON (TOTAL)	ALI	0.36		MG/L	Duffield Report - Aug, 1993
Col	PW-11	3/18/92	IRON (TOTAL)	ALI	0.09		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/20/92	IRON (TOTAL)	ALI	0.06		MG/L	Duffield Report - Aug, 1993
Col	PW-11	7/8/92	IRON (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-11	10/7/92	IRON (TOTAL)	ALI	0.09		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/14/93	IRON (TOTAL)	ALI	0.16		MG/L	Duffield Report - Aug, 1993
Col	PW-11	8/16/93	IRON (TOTAL)	LLI	0.41		MG/L	Duffield Report - Oct, 1993
Col	PW-11	9/9/93	IRON (TOTAL)	LLI	0.16		MG/L	Duffield Report - Oct, 1993
Col	PW-11	3/17/95	IRON (TOTAL)		0.177		MG/L	Report dated 4/4/95
Col	PW-11	5/23/95	IRON (TOTAL)	DPH	0.39		MG/L	DPH Sheets 5/95 sampling
Col	PW-11	8/15/95	IRON (TOTAL)		0.15		MG/L	Tetra Tech report 10/4/95
Col	PW-11	8/16/95	IRON (TOTAL)		0.073		MG/L	Tetra Tech XLS table
Col	PW-11	9/20/95	IRON (TOTAL)		0.1		MG/L	Tetra Tech report 10/4/95
Col	PW-11	10/18/95	IRON (TOTAL)		0.068		MG/L	Tetra Tech report 11/9/95
Col	PW-11	11/13/1995(0825)	IRON (TOTAL)		3.73		MG/L	Newark Pump Test 11/95
Col	PW-11	6/11/90	MANGANESE (TOTAL)	ALI	0.41		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/10/91	MANGANESE (TOTAL)	ALI	0.49		MG/L	Duffield Report - Aug, 1993
Col	PW-11	2/13/91	MANGANESE (TOTAL)	ALI	0.45		MG/L	Duffield Report - Aug, 1993
Col	PW-11	3/11/91	MANGANESE (TOTAL)	ALI	0.42		MG/L	Duffield Report - Aug, 1993
Col	PW-11	4/11/91	MANGANESE (TOTAL)	ALI	0.49		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/15/91	MANGANESE (TOTAL)	ALI	0.39		MG/L	Duffield Report - Aug, 1993
Col	PW-11	7/10/91	MANGANESE (TOTAL)	ALI	0.36		MG/L	Duffield Report - Aug, 1993
Col	PW-11	9/16/91	MANGANESE (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Col	PW-11	11/5/91	MANGANESE (TOTAL)	ALI	0.32		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/29/92	MANGANESE (TOTAL)	ALI	0.28		MG/L	Duffield Report - Aug, 1993
Col	PW-11	3/18/92	MANGANESE (TOTAL)	ALI	0.31		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/20/92	MANGANESE (TOTAL)	ALI	0.32		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-11	7/8/92	MANGANESE (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	10/7/92	MANGANESE (TOTAL)	ALI	0.3		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/14/93	MANGANESE (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Col	PW-11	8/16/93	MANGANESE (TOTAL)	LLI	0.063		MG/L	Duffield Report - Oct, 1993
Col	PW-11	9/9/93	MANGANESE (TOTAL)	LLI	0.226		MG/L	Duffield Report - Oct, 1993
Col	PW-11	3/17/95	MANGANESE (TOTAL)		0.319		MG/L	Report dated 4/4/95
Col	PW-11	5/23/95	MANGANESE (TOTAL)	DPH	0.34		MG/L	DPH Sheets 5/95 sampling
Col	PW-11	8/15/95	MANGANESE (TOTAL)		0.35		MG/L	Tetra Tech report 10/4/95
Col	PW-11	9/20/95	MANGANESE (TOTAL)		0.371		MG/L	Tetra Tech report 10/4/95
Col	PW-11	10/18/95	MANGANESE (TOTAL)		0.357		MG/L	Tetra Tech report 11/9/95
Col	PW-11	11/13/1995(0825)	MANGANESE (TOTAL)		0.387		MG/L	Newark Pump Test 11/95
Col	PW-11	6/14/82	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-11	6/29/83	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-11	6/20/84	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-11	6/12/85	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-11	6/30/86	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-11	6/10/87	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-11	6/29/88	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-11	5/31/89	pH	DPH	5.7			Duffield Report - Aug, 1993
Col	PW-11	6/6/90	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-11	6/11/90	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-11	1/10/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Col	PW-11	2/13/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-11	3/11/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-11	4/11/91	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-11	5/15/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-11	7/10/91	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-11	9/16/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-11	11/5/91	pH	ALI	6.7			Duffield Report - Aug, 1993
Col	PW-11	1/29/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-11	3/18/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-11	5/20/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-11	7/8/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-11	10/7/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-11	5/14/93	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-11	8/16/93	pH	LLI	5.36			Duffield Report - Oct, 1993
Col	PW-11	9/9/93	pH	LLI	7			Duffield Report - Oct, 1993
Col	PW-11	3/17/95	pH		5.2			Report dated 4/4/95
Col	PW-11	5/23/95	pH	DPH	5.7			DPH Sheets 5/95 sampling
Col	PW-11	8/16/95	pH		5.21			Tetra Tech XLS table
Col	PW-11	9/12/95	pH		5.33			Tetra Tech XLS table
Col	PW-11	9/20/95	pH		5.4			Tetra Tech report 10/4/95
Col	PW-11	9/27/95	pH		5.44			Tetra Tech report 10/4/95
Col	PW-11	10/2/95	pH		5.45			Tetra Tech report 10/4/95
Col	PW-11	10/10/95	pH		5.35			Tetra Tech report 11/9/95
Col	PW-11	10/18/95	pH		5.66			Tetra Tech report 11/9/95
Col	PW-11	10/25/95	pH		5.65			Tetra Tech report 11/9/95
Col	PW-11	11/1/95	pH		6.01			Tetra Tech report 11/9/95
Col	PW-11	11/7/95	pH		5.63			Tetra Tech report 11/9/95
Col	PW-11	11/13/1995(0825)	pH		5.64			Newark Pump Test 11/95
Col	PW-11	11/15/1995(1450)	pH		5.35			Newark Pump Test 11/95
Col	PW-11	11/16/95(1000)	pH		5.69			Newark Pump Test 11/95
Col	PW-11	11/16/95(1544)	pH		5.59			Newark Pump Test 11/95
Col	PW-11	11/17/95(0845)	pH		5.63			Newark Pump Test 11/95
Col	PW-11	6/14/82	TDS	DPH	108		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/29/83	TDS	DPH	130		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/20/84	TDS	DPH	110		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/12/85	TDS	DPH	136		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/30/86	TDS	DPH	118		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/10/87	TDS	DPH	149		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/29/88	TDS	DPH	133		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/31/89	TDS	DPH	187		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/11/90	TDS	ALI	170		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/23/95	TDS	DPH	156		MG/L	DPH Sheets 5/95 sampling
Col	PW-11	5/14/93	TURBIDITY	ALI	0.4		NTU	Duffield Report - Aug, 1993
Pot	PW-12	8/16/93	DO	LLI	5.2		MG/L	Duffield Report - June, 1994

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-12	4/26/94	DO	LLI	2.8		MG/L	Duffield Report - June, 1994
Pot	PW-12	3/17/95	DO		4.4		MG/L	Report dated 4/4/95
Pot	PW-12	8/16/95	DO		7.84		MG/L	Tetra Tech XLS table
Pot	PW-12	9/5/95	DO		0.63		MG/L	Tetra Tech XLS table
Pot	PW-12	9/12/95	DO		0.15		MG/L	Tetra Tech XLS table
Pot	PW-12	9/20/95	DO		0.19		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	10/18/95	DO		0.48		MG/L	Tetra Tech report 11/9/95
Pot	PW-12	11/13/95	DO		0.5		MG/L	Newark Pump Test 11/95
Pot	PW-12	8/16/93	Eh	LLI	243		mV	Duffield Report - June, 1994
Pot	PW-12	4/26/94	Eh	LLI	233		mV	Duffield Report - June, 1994
Pot	PW-12	5/23/95	Eh	DPH			mV	Tetra Tech XLS table
Pot	PW-12	8/16/95	Eh		-41		mV	Tetra Tech XLS table
Pot	PW-12	9/5/95	Eh		126		mV	Tetra Tech XLS table
Pot	PW-12	9/20/95	Eh		180		mV	Tetra Tech report 10/4/95
Pot	PW-12	10/18/95	Eh		123		mV	Tetra Tech report 11/9/95
Pot	PW-12	9/11/79	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/10/80	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/14/82	IRON (TOTAL)	DPH	0.35		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/29/83	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/20/84	IRON (TOTAL)	DPH	0.55		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/12/85	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/30/86	IRON (TOTAL)	DPH	0.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/10/87	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/29/88	IRON (TOTAL)	DPH	0.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	12/1/89	IRON (TOTAL)	ALI	2.3		MG/L	Tetra Tech fax 12/95
Pot	PW-12	1/1/90	IRON (TOTAL)	ALI	1.78		MG/L	Tetra Tech fax 12/95
Pot	PW-12	2/1/90	IRON (TOTAL)	ALI	2.8		MG/L	Tetra Tech fax 12/95
Pot	PW-12	4/1/90	IRON (TOTAL)	ALI	3		MG/L	Tetra Tech fax 12/95
Pot	PW-12	5/1/90	IRON (TOTAL)	ALI	0.66		MG/L	Tetra Tech fax 12/95
Pot	PW-12	6/6/90	IRON (TOTAL)	DPH	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/11/90	IRON (TOTAL)	ALI	0.54		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/10/91	IRON (TOTAL)	ALI	0.44		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	2/13/91	IRON (TOTAL)	ALI	0.38		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	3/11/91	IRON (TOTAL)	ALI	0.52		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	4/11/91	IRON (TOTAL)	ALI	0.53		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/15/91	IRON (TOTAL)	ALI	0.56		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/10/91	IRON (TOTAL)	ALI	0.58		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	9/16/91	IRON (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	11/5/91	IRON (TOTAL)	ALI	0.62		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/29/92	IRON (TOTAL)	ALI	2.17		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	3/18/92	IRON (TOTAL)	ALI	1.59		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/20/92	IRON (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/8/92	IRON (TOTAL)	ALI	2.58		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	10/7/92	IRON (TOTAL)	ALI	3.92		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/14/93	IRON (TOTAL)	ALI	0.75		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	8/16/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Pot	PW-12	4/26/94	IRON (TOTAL)	LLI	1.81		MG/L	Duffield Report - June, 1994
Pot	PW-12	3/17/95	IRON (TOTAL)		0.232		MG/L	Report dated 4/4/95
Pot	PW-12	5/23/95	IRON (TOTAL)	DPH	1.1		MG/L	DPH Sheets 5/95 sampling
Pot	PW-12	8/15/95	IRON (TOTAL)		0.18		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	8/16/95	IRON (TOTAL)		0.115		MG/L	Tetra Tech XLS table
Pot	PW-12	9/20/95	IRON (TOTAL)		0.359		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	10/18/95	IRON (TOTAL)		3.77		MG/L	Tetra Tech report 11/9/95
Pot	PW-12	11/13/95	IRON (TOTAL)		5.42		MG/L	Newark Pump Test 11/95
Pot	PW-12	6/11/90	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	2/13/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	3/11/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	4/11/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/15/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/10/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	9/16/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	11/5/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/29/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	3/18/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-12	5/20/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/8/92	MANGANESE (TOTAL)	ALI	0.04		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	10/7/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/14/93	MANGANESE (TOTAL)	ALI	0.15		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	8/16/93	MANGANESE (TOTAL)	LLI	0.08		MG/L	Duffield Report - Oct, 1993
Pot	PW-12	4/26/94	MANGANESE (TOTAL)	LLI	0.035		MG/L	Duffield Report - June, 1994
Pot	PW-12	3/17/95	MANGANESE (TOTAL)		0.019		MG/L	Report dated 4/4/95
Pot	PW-12	5/23/95	MANGANESE (TOTAL)	DPH	0.04		MG/L	DPH Sheets 5/95 sampling
Pot	PW-12	8/15/95	MANGANESE (TOTAL)		0.05		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	9/20/95	MANGANESE (TOTAL)		0.022		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	10/18/95	MANGANESE (TOTAL)		0.058		MG/L	Tetra Tech report 11/9/95
Pot	PW-12	11/13/95	MANGANESE (TOTAL)		0.074		MG/L	Newark Pump Test 11/95
Pot	PW-12	9/11/79	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-12	7/10/80	pH	DPH	5.4			Duffield Report - Aug, 1993
Pot	PW-12	6/14/82	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-12	6/29/83	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-12	6/20/84	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-12	6/12/85	pH	DPH	5			Duffield Report - Aug, 1993
Pot	PW-12	6/30/86	pH	DPH	4.9			Duffield Report - Aug, 1993
Pot	PW-12	6/10/87	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-12	6/29/88	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-12	5/31/89	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-12	6/6/90	pH	DPH	5.4			Duffield Report - Aug, 1993
Pot	PW-12	6/11/90	pH	ALI	4.7			Duffield Report - Aug, 1993
Pot	PW-12	1/10/91	pH	ALI	4.4			Duffield Report - Aug, 1993
Pot	PW-12	2/13/91	pH	ALI	4.2			Duffield Report - Aug, 1993
Pot	PW-12	3/11/91	pH	ALI	4.3			Duffield Report - Aug, 1993
Pot	PW-12	4/11/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-12	5/15/91	pH	ALI	4.4			Duffield Report - Aug, 1993
Pot	PW-12	7/10/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-12	9/16/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-12	11/5/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-12	1/29/92	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-12	3/18/92	pH	ALI	5			Duffield Report - Aug, 1993
Pot	PW-12	5/20/92	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-12	7/8/92	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-12	10/7/92	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-12	5/14/93	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-12	8/16/93	pH	LLI	6.55			Duffield Report - Oct, 1993
Pot	PW-12	3/17/95	pH		4.8			Report dated 4/4/95
Pot	PW-12	5/23/95	pH	DPH	5.4			DPH Sheets 5/95 sampling
Pot	PW-12	8/16/95	pH		4.86			Tetra Tech XLS table
Pot	PW-12	9/5/95	pH		4.39			Tetra Tech XLS table
Pot	PW-12	9/12/95	pH		4.56			Tetra Tech XLS table
Pot	PW-12	9/20/95	pH		4.86			Tetra Tech report 10/4/95
Pot	PW-12	10/18/95	pH		5.4			Tetra Tech report 11/9/95
Pot	PW-12	11/13/95	pH		5.61			Newark Pump Test 11/95
Pot	PW-12	7/10/80	TDS	DPH	87		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/14/82	TDS	DPH	53		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/29/83	TDS	DPH	67		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/20/84	TDS	DPH	57		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/12/85	TDS	DPH	95		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/30/86	TDS	DPH	47		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/10/87	TDS	DPH	69		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/29/88	TDS	DPH	53		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/31/89	TDS	DPH	66		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/11/90	TDS	ALI	64		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/23/95	TDS	DPH	54		MG/L	DPH Sheets 5/95 sampling
Pot	PW-12	5/14/93	TURBIDITY	ALI	3.9		NTU	Duffield Report - Aug, 1993
Col	PW-13	8/16/93	DO	LLI	4.5		MG/L	Duffield Report - June, 1994
Col	PW-13	9/9/93	DO	LLI	7.6		MG/L	Duffield Report - June, 1994
Col	PW-13	4/26/94	DO	LLI	8.4		MG/L	Duffield Report - June, 1994
Col	PW-13	3/17/95	DO		7.8		MG/L	Report dated 4/4/95
Col	PW-13	8/16/95	DO		9.47		MG/L	Tetra Tech XLS table
Col	PW-13	9/5/95	DO		4.04		MG/L	Tetra Tech XLS table
Col	PW-13	9/12/95	DO		5.09		MG/L	Tetra Tech XLS table

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-13	9/20/95	DO		6.11		MG/L	Tetra Tech report 10/4/95
Col	PW-13	10/10/95	DO		5.39		MG/L	Tetra Tech report 11/9/95
Col	PW-13	10/18/95	DO		3.93		MG/L	Tetra Tech report 11/9/95
Col	PW-13	11/1/95	DO		5.5		MG/L	Tetra Tech report 11/9/95
Col	PW-13	11/13/95(0952)	DO		4.97		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(1605)	DO		5.77		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(2201)	DO		8.31		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(0750)	DO		7.19		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	DO		5.65		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	DO		7.02		MG/L	Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	DO		7.05		MG/L	Newark Pump Test 11/95
Col	PW-13	11/15/95(1435)	DO		6.91		MG/L	Newark Pump Test 11/95
Col	PW-13	11/16/95(0907)	DO		6.85		MG/L	Newark Pump Test 11/95
Col	PW-13	11/16/95(1702)	DO		7.8		MG/L	Newark Pump Test 11/95
Col	PW-13	11/17/95(0820)	DO		6.47		MG/L	Newark Pump Test 11/95
Col	PW-13	8/16/93	Eh	LLI	208		mV	Duffield Report - June, 1994
Col	PW-13	9/9/93	Eh	LLI	283		mV	Duffield Report - June, 1994
Col	PW-13	4/26/94	Eh	LLI	291		mV	Duffield Report - June, 1994
Col	PW-13	8/16/95	Eh		-59		mV	Tetra Tech XLS table
Col	PW-13	9/5/95	Eh		47		mV	Tetra Tech XLS table
Col	PW-13	9/20/95	Eh		74		mV	Tetra Tech report 10/4/95
Col	PW-13	10/10/95	Eh		148		mV	Tetra Tech report 11/9/95
Col	PW-13	10/18/95	Eh		166		mV	Tetra Tech report 11/9/95
Col	PW-13	11/1/95	Eh		303		mV	Tetra Tech report 11/9/95
Col	PW-13	11/14/95(1435)	Eh		260		mV	Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	Eh		305		mV	Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	Eh		321		mV	Newark Pump Test 11/95
Col	PW-13	11/15/95(1435)	Eh		213		mV	Newark Pump Test 11/95
Col	PW-13	11/16/95(0907)	Eh		308		mV	Newark Pump Test 11/95
Col	PW-13	10/13/66	IRON (TOTAL)	OLI	0.15		MG/L	Duffield Report - Aug, 1993
Col	PW-13	9/11/79	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/10/80	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/14/82	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/29/83	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/20/84	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/12/85	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/30/86	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/10/87	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	12/1/89	IRON (TOTAL)	ALI	0.18		MG/L	Tetra Tech fax 12/95
Col	PW-13	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/11/90	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/10/91	IRON (TOTAL)	ALI	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-13	2/13/91	IRON (TOTAL)	ALI	0.28		MG/L	Duffield Report - Aug, 1993
Col	PW-13	3/11/91	IRON (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	4/11/91	IRON (TOTAL)	ALI	0.17		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/15/91	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/10/91	IRON (TOTAL)	ALI	0.21		MG/L	Duffield Report - Aug, 1993
Col	PW-13	9/16/91	IRON (TOTAL)	ALI	0.42		MG/L	Duffield Report - Aug, 1993
Col	PW-13	11/5/91	IRON (TOTAL)	ALI	0.09		MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/29/92	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-13	3/18/92	IRON (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/20/92	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/8/92	IRON (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Col	PW-13	10/7/92	IRON (TOTAL)	ALI	0.06		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/14/93	IRON (TOTAL)	ALI	1.72		MG/L	Duffield Report - Aug, 1993
Col	PW-13	8/16/93	IRON (TOTAL)	LLI	0.62		MG/L	Duffield Report - Oct, 1993
Col	PW-13	9/9/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Col	PW-13	4/26/94	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - June, 1994
Col	PW-13	3/17/95	IRON (TOTAL)		0.02		MG/L	Report dated 4/4/95
Col	PW-13	5/23/95	IRON (TOTAL)	DPH	0.22		MG/L	DPH Sheets 5/95 sampling
Col	PW-13	8/15/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-13	8/16/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech XLS table
Col	PW-13	9/20/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-13	10/18/95	IRON (TOTAL)		1.21		MG/L	Tetra Tech report 11/9/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-13	11/13/95(0952)	IRON (TOTAL)		0.741		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(1605)	IRON (TOTAL)		0.037		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(2201)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(0750)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	IRON (TOTAL)		0.039		MG/L	Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	10/13/66	MANGANESE (TOTAL)	OLI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/11/90	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/10/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	2/13/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-13	3/11/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	4/11/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/15/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-13	9/16/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	11/5/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/29/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	3/18/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/20/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/8/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Col	PW-13	10/7/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/14/93	MANGANESE (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-13	8/16/93	MANGANESE (TOTAL)	LLI	0.099		MG/L	Duffield Report - Oct, 1993
Col	PW-13	9/9/93	MANGANESE (TOTAL)	LLI	0.056		MG/L	Duffield Report - Oct, 1993
Col	PW-13	4/26/94	MANGANESE (TOTAL)	LLI	0.01		MG/L	Duffield Report - June, 1994
Col	PW-13	3/17/95	MANGANESE (TOTAL)		0	U	MG/L	Report dated 4/4/95
Col	PW-13	5/23/95	MANGANESE (TOTAL)	DPH	0.02		MG/L	DPH Sheets 5/95 sampling
Col	PW-13	8/15/95	MANGANESE (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-13	9/20/95	MANGANESE (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-13	10/18/95	MANGANESE (TOTAL)		0.021		MG/L	Tetra Tech report 11/9/95
Col	PW-13	11/13/95(0952)	MANGANESE (TOTAL)		0.045		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(1605)	MANGANESE (TOTAL)		0.007		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(2201)	MANGANESE (TOTAL)		0.006		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(0750)	MANGANESE (TOTAL)		0.007		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	MANGANESE (TOTAL)		0	U	MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	MANGANESE (TOTAL)		0	U	MG/L	Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	MANGANESE (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	10/13/66	pH	OLI	6.6			Duffield Report - Aug, 1993
Col	PW-13	9/11/79	pH	DPH	5.8			Duffield Report - Aug, 1993
Col	PW-13	7/10/80	pH	DPH	6.6			Duffield Report - Aug, 1993
Col	PW-13	6/14/82	pH	DPH	5.7			Duffield Report - Aug, 1993
Col	PW-13	6/29/83	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-13	6/20/84	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-13	6/12/85	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-13	6/30/86	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-13	6/10/87	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-13	6/29/88	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-13	5/31/89	pH	DPH	5.8			Duffield Report - Aug, 1993
Col	PW-13	6/6/90	pH	DPH	6			Duffield Report - Aug, 1993
Col	PW-13	6/11/90	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-13	1/10/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-13	2/13/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Col	PW-13	3/11/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-13	4/11/91	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-13	5/15/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-13	7/10/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-13	9/16/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-13	11/5/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-13	1/29/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-13	3/18/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-13	5/20/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-13	7/8/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-13	10/7/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-13	5/14/93	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-13	8/16/93	pH	LLI	5.55			Duffield Report - Oct, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-13	9/9/93	pH	LLI	5.75			Duffield Report - Oct, 1993
Col	PW-13	3/17/95	pH		5.3			Report dated 4/4/95
Col	PW-13	5/23/95	pH	DPH	5.6			DPH Sheets 5/95 sampling
Col	PW-13	8/16/95	pH		5.15			Tetra Tech XLS table
Col	PW-13	9/5/95	pH		4.99			Tetra Tech XLS table
Col	PW-13	9/12/95	pH		5.35			Tetra Tech XLS table
Col	PW-13	9/20/95	pH		5.36			Tetra Tech report 10/4/95
Col	PW-13	10/10/95	pH		5.43			Tetra Tech report 11/9/95
Col	PW-13	10/18/95	pH		5.61			Tetra Tech report 11/9/95
Col	PW-13	11/1/95	pH		5.97			Tetra Tech report 11/9/95
Col	PW-13	11/13/95(0952)	pH		5.49			Newark Pump Test 11/95
Col	PW-13	11/13/95(1605)	pH		5.65			Newark Pump Test 11/95
Col	PW-13	11/13/95(2201)	pH		5.73			Newark Pump Test 11/95
Col	PW-13	11/14/95(0750)	pH		5.34			Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	pH		5.34			Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	pH		5.42			Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	pH		5.32			Newark Pump Test 11/95
Col	PW-13	11/15/95(1435)	pH		5.38			Newark Pump Test 11/95
Col	PW-13	11/16/95(0907)	pH		5.46			Newark Pump Test 11/95
Col	PW-13	11/16/95(1702)	pH		5.61			Newark Pump Test 11/95
Col	PW-13	11/17/95(0820)	pH		5.47			Newark Pump Test 11/95
Col	PW-13	10/13/66	TDS	OLI	90		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/10/80	TDS	DPH	165		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/14/82	TDS	DPH	152		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/29/83	TDS	DPH	145		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/20/84	TDS	DPH	169		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/12/85	TDS	DPH	117		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/30/86	TDS	DPH	134		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/10/87	TDS	DPH	149		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/29/88	TDS	DPH	136		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/31/89	TDS	DPH	154		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/11/90	TDS	ALI	150		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/23/95	TDS	DPH	177		MG/L	DPH Sheets 5/95 sampling
Col	PW-13	5/14/93	TURBIDITY	ALI	5.7		NTU	Duffield Report - Aug, 1993
Pot	PW-14	8/16/93	DO	LLI	4.4		MG/L	Duffield Report - June, 1994
Pot	PW-14	9/9/93	DO	LLI	7.6		MG/L	Duffield Report - June, 1994
Pot	PW-14	4/26/94	DO	LLI	5.1		MG/L	Duffield Report - June, 1994
Pot	PW-14	3/17/95	DO		7		MG/L	Report dated 4/4/95
Pot	PW-14	9/5/95	DO		3.61		MG/L	Tetra Tech XLS table
Pot	PW-14	9/12/95	DO		4.26		MG/L	Tetra Tech XLS table
Pot	PW-14	9/20/95	DO		4.68		MG/L	Tetra Tech report 10/4/95
Pot	PW-14	10/18/95	DO		6.73		MG/L	Tetra Tech report 11/9/95
Pot	PW-14	11/13/95(1010)	DO		4.75		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1550)	DO		5.04		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(0815)	DO		5.95		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	DO		5.84		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	DO		6.64		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/15/95(1440)	DO		6.56		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/16/95(0940)	DO		6.86		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/16/95(1646)	DO		6.15		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/17/95(0831)	DO		6.09		MG/L	Newark Pump Test 11/95
Pot	PW-14	8/16/93	Eh	LLI	261		mV	Duffield Report - June, 1994
Pot	PW-14	9/9/93	Eh	LLI	252		mV	Duffield Report - June, 1994
Pot	PW-14	4/26/94	Eh	LLI	292		mV	Duffield Report - June, 1994
Pot	PW-14	8/17/95	Eh		-86		mV	Tetra Tech XLS table
Pot	PW-14	9/5/95	Eh		48		mV	Tetra Tech XLS table
Pot	PW-14	9/20/95	Eh		195		mV	Tetra Tech report 10/4/95
Pot	PW-14	10/18/95	Eh		186		mV	Tetra Tech report 11/9/95
Pot	PW-14	11/14/95(1515)	Eh		272		mV	Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	Eh		302		mV	Newark Pump Test 11/95
Pot	PW-14	11/15/95(1440)	Eh		247		mV	Newark Pump Test 11/95
Pot	PW-14	11/16/95(0940)	Eh		308		mV	Newark Pump Test 11/95
Pot	PW-14	10/13/66	IRON (TOTAL)	OLI	0.1			Duffield Report - Aug, 1993
Pot	PW-14	6/14/82	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/29/83	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/20/84	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-14	6/12/85	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/30/86	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/10/87	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	12/1/89	IRON (TOTAL)	ALI	2.8		MG/L	Tetra Tech fax 12/95
Pot	PW-14	1/1/90	IRON (TOTAL)	ALI	0.22		MG/L	Tetra Tech fax 12/95
Pot	PW-14	2/1/90	IRON (TOTAL)	ALI	0.37		MG/L	Tetra Tech fax 12/95
Pot	PW-14	4/1/90	IRON (TOTAL)	ALI	0.11		MG/L	Tetra Tech fax 12/95
Pot	PW-14	5/1/90	IRON (TOTAL)	ALI	0.16		MG/L	Tetra Tech fax 12/95
Pot	PW-14	6/11/90	IRON (TOTAL)	ALI	0.06		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/10/91	IRON (TOTAL)	ALI	0.52		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	2/13/91	IRON (TOTAL)	ALI	0.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	3/11/91	IRON (TOTAL)	ALI	0.85		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	4/11/91	IRON (TOTAL)	ALI	0.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/15/91	IRON (TOTAL)	ALI	0.44		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	7/10/91	IRON (TOTAL)	ALI	0.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	9/16/91	IRON (TOTAL)	ALI	0.52		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	11/5/91	IRON (TOTAL)	ALI	0.17		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/29/92	IRON (TOTAL)	ALI	0.44		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	3/18/92	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/20/92	IRON (TOTAL)	ALI	0.37		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	7/8/92	IRON (TOTAL)	ALI	0.25		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	10/7/92	IRON (TOTAL)	ALI	4.33		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/14/93	IRON (TOTAL)	ALI	2.67		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	8/16/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Pot	PW-14	9/9/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Pot	PW-14	4/26/94	IRON (TOTAL)	LLI	0.12		MG/L	Duffield Report - June, 1994
Pot	PW-14	3/17/95	IRON (TOTAL)		0.06		MG/L	Report dated 4/4/95
Pot	PW-14	5/23/95	IRON (TOTAL)	DPH	0.1		MG/L	DPH Sheets 5/95 sampling
Pot	PW-14	8/15/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Pot	PW-14	8/17/95	IRON (TOTAL)		0.184		MG/L	Tetra Tech XLS table
Pot	PW-14	9/20/95	IRON (TOTAL)		0.036		MG/L	Tetra Tech report 10/4/95
Pot	PW-14	10/18/95	IRON (TOTAL)		0.208		MG/L	Tetra Tech report 11/9/95
Pot	PW-14	11/13/95(1010)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1550)	IRON (TOTAL)		0.01		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(0815)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	IRON (TOTAL)		0.054		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Pot	PW-14	10/13/66	MANGANESE (TOTAL)	OLI	0	U		Duffield Report - Aug, 1993
Pot	PW-14	6/11/90	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/10/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	2/13/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	3/11/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	4/11/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/15/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	7/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	9/16/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	11/5/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/29/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	3/18/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/20/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	7/8/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	10/7/92	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/14/93	MANGANESE (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	8/16/93	MANGANESE (TOTAL)	LLI	0.053		MG/L	Duffield Report - Oct, 1993
Pot	PW-14	9/9/93	MANGANESE (TOTAL)	LLI	0.023		MG/L	Duffield Report - Oct, 1993
Pot	PW-14	4/26/94	MANGANESE (TOTAL)	LLI	0.015		MG/L	Duffield Report - June, 1994
Pot	PW-14	3/17/95	MANGANESE (TOTAL)		0	U	MG/L	Report dated 4/4/95
Pot	PW-14	5/23/95	MANGANESE (TOTAL)	DPH	0	U	MG/L	DPH Sheets 5/95 sampling
Pot	PW-14	8/15/95	MANGANESE (TOTAL)		0.03		MG/L	Tetra Tech report 10/4/95
Pot	PW-14	9/20/95	MANGANESE (TOTAL)		0.012		MG/L	Tetra Tech report 10/4/95
Pot	PW-14	10/18/95	MANGANESE (TOTAL)		0.027		MG/L	Tetra Tech report 11/9/95
Pot	PW-14	11/13/95(1010)	MANGANESE (TOTAL)		0.02		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1550)	MANGANESE (TOTAL)		0.016		MG/L	Newark Pump Test 11/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-14	11/14/95(0815)	MANGANESE (TOTAL)		0.016		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	MANGANESE (TOTAL)		0.016		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	MANGANESE (TOTAL)		0.018		MG/L	Newark Pump Test 11/95
Pot	PW-14	10/13/66	pH	OLI	6.8			Duffield Report - Aug, 1993
Pot	PW-14	6/14/82	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-14	6/29/83	pH	DPH	6			Duffield Report - Aug, 1993
Pot	PW-14	6/20/84	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-14	6/12/85	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-14	6/30/86	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-14	6/10/87	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-14	6/29/88	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-14	5/31/89	pH	DPH	5.4			Duffield Report - Aug, 1993
Pot	PW-14	6/6/90	pH	DPH	5.7			Duffield Report - Aug, 1993
Pot	PW-14	6/11/90	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-14	1/10/91	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-14	2/13/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-14	3/11/91	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-14	4/11/91	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	5/15/91	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-14	7/10/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-14	9/16/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-14	11/5/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-14	1/29/92	pH	ALI	5.7			Duffield Report - Aug, 1993
Pot	PW-14	3/18/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	5/20/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	7/8/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	10/7/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	5/14/93	pH	ALI	4.5			Duffield Report - Aug, 1993
Pot	PW-14	8/16/93	pH	LLI	5.45			Duffield Report - Oct, 1993
Pot	PW-14	9/9/93	pH	LLI	5.2			Duffield Report - Oct, 1993
Pot	PW-14	3/17/95	pH		5			Report dated 4/4/95
Pot	PW-14	5/23/95	pH	DPH	5.3			DPH Sheets 5/95 sampling
Pot	PW-14	8/17/95	pH		6.03			Tetra Tech XLS table
Pot	PW-14	9/5/95	pH		4.81			Tetra Tech XLS table
Pot	PW-14	9/12/95	pH		5.16			Tetra Tech XLS table
Pot	PW-14	9/20/95	pH		5.22			Tetra Tech report 10/4/95
Pot	PW-14	10/18/95	pH		5.26			Tetra Tech report 11/9/95
Pot	PW-14	11/13/95(1010)	pH		5.31			Newark Pump Test 11/95
Pot	PW-14	11/13/95(1550)	pH		5.42			Newark Pump Test 11/95
Pot	PW-14	11/14/95(0815)	pH		5.12			Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	pH		5.24			Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	pH		5.13			Newark Pump Test 11/95
Pot	PW-14	11/15/95(1440)	pH		5.09			Newark Pump Test 11/95
Pot	PW-14	11/16/95(0940)	pH		5.28			Newark Pump Test 11/95
Pot	PW-14	11/16/95(1646)	pH		5.48			Newark Pump Test 11/95
Pot	PW-14	11/17/95(0831)	pH		5.48			Newark Pump Test 11/95
Pot	PW-14	10/13/66	TDS	OLI	60			Duffield Report - Aug, 1993
Pot	PW-14	6/14/82	TDS	DPH	134		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/29/83	TDS	DPH	139		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/20/84	TDS	DPH	159		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/12/85	TDS	DPH	75		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/30/86	TDS	DPH	152		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/10/87	TDS	DPH	168		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/29/88	TDS	DPH	151		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/31/89	TDS	DPH	185		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/11/90	TDS	ALI	170		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/23/95	TDS	DPH	213		MG/L	DPH Sheets 5/95 sampling
Pot	PW-14	5/14/93	TURBIDITY	ALI	11		NTU	Duffield Report - Aug, 1993
Col	PW-15	8/16/93	DO	LLI	4.2		MG/L	Duffield Report - June, 1994
Col	PW-15	9/9/93	DO	LLI	4		MG/L	Duffield Report - June, 1994
Col	PW-15	4/26/94	DO	LLI	6.9		MG/L	Duffield Report - June, 1994
Col	PW-15	3/17/95	DO		6.2		MG/L	Report dated 4/4/95
Col	PW-15	8/17/95	DO		3.58		MG/L	Tetra Tech XLS table
Col	PW-15	9/5/95	DO		3.31		MG/L	Tetra Tech XLS table
Col	PW-15	9/12/95	DO		4.01		MG/L	Tetra Tech XLS table
Col	PW-15	9/19/95	DO		4.73		MG/L	Tetra Tech report 10/4/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-15	10/10/95	DO		3.75		MG/L	Tetra Tech report 11/9/95
Col	PW-15	10/17/95	DO		4.75		MG/L	Tetra Tech report 11/9/95
Col	PW-15	11/13/95(1025)	DO		4.16		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(1525)	DO		4.71		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(2215)	DO		6.76		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(0835)	DO		5.31		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	DO		3.91		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	DO		3.95		MG/L	Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	DO		5.31		MG/L	Newark Pump Test 11/95
Col	PW-15	11/15/95(1500)	DO		5.54		MG/L	Newark Pump Test 11/95
Col	PW-15	11/16/95(1602)	DO		4.68		MG/L	Newark Pump Test 11/95
Col	PW-15	11/17/95(0855)	DO		4.19		MG/L	Newark Pump Test 11/95
Col	PW-15	8/16/93	Eh	LLI	272		mV	Duffield Report - June, 1994
Col	PW-15	9/9/93	Eh	LLI	187		mV	Duffield Report - June, 1994
Col	PW-15	4/26/94	Eh	LLI	278		mV	Duffield Report - June, 1994
Col	PW-15	8/17/95	Eh		-1092		mV	Tetra Tech XLS table
Col	PW-15	9/5/95	Eh		28		mV	Tetra Tech XLS table
Col	PW-15	9/19/95	Eh		7		mV	Tetra Tech report 10/4/95
Col	PW-15	10/10/95	Eh		200		mV	Tetra Tech report 11/9/95
Col	PW-15	10/17/95	Eh		197		mV	Tetra Tech report 11/9/95
Col	PW-15	11/14/95(1545)	Eh		244		mV	Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	Eh		288		mV	Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	Eh		629		mV	Newark Pump Test 11/95
Col	PW-15	11/15/95(1500)	Eh		224		mV	Newark Pump Test 11/95
Col	PW-15	5/17/68	IRON (TOTAL)	LL	0.27		MG/L	Duffield Report - Aug, 1993
Col	PW-15	9/11/79	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/80	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/14/82	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/29/83	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/20/84	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/12/85	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/30/86	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/31/89	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-15	12/1/89	IRON (TOTAL)	ALI	1.7		MG/L	Tetra Tech fax 12/95
Col	PW-15	1/1/90	IRON (TOTAL)	ALI	1.4		MG/L	Tetra Tech fax 12/95
Col	PW-15	2/1/90	IRON (TOTAL)	ALI	2		MG/L	Tetra Tech fax 12/95
Col	PW-15	4/1/90	IRON (TOTAL)	ALI	2.3		MG/L	Tetra Tech fax 12/95
Col	PW-15	5/1/90	IRON (TOTAL)	ALI	2.5		MG/L	Tetra Tech fax 12/95
Col	PW-15	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/11/90	IRON (TOTAL)	ALI	2.5		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/90	IRON (TOTAL)	ALI	2.5		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/22/91	IRON (TOTAL)	ALI	2.1		MG/L	Duffield Report - Aug, 1993
Col	PW-15	2/13/91	IRON (TOTAL)	ALI	1.95		MG/L	Duffield Report - Aug, 1993
Col	PW-15	3/11/91	IRON (TOTAL)	ALI	1.78		MG/L	Duffield Report - Aug, 1993
Col	PW-15	4/11/91	IRON (TOTAL)	ALI	1.84		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/15/91	IRON (TOTAL)	ALI	1.47		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/91	IRON (TOTAL)	ALI	1.52		MG/L	Duffield Report - Aug, 1993
Col	PW-15	9/16/91	IRON (TOTAL)	ALI	1.12		MG/L	Duffield Report - Aug, 1993
Col	PW-15	11/5/91	IRON (TOTAL)	ALI	1.18		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/29/92	IRON (TOTAL)	ALI	1.22		MG/L	Duffield Report - Aug, 1993
Col	PW-15	3/18/92	IRON (TOTAL)	ALI	1.38		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/20/92	IRON (TOTAL)	ALI	1.03		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/8/92	IRON (TOTAL)	ALI	1.03		MG/L	Duffield Report - Aug, 1993
Col	PW-15	10/7/92	IRON (TOTAL)	ALI	0.88		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/14/93	IRON (TOTAL)	ALI	0.44		MG/L	Duffield Report - Aug, 1993
Col	PW-15	8/16/93	IRON (TOTAL)	LLI	0.25		MG/L	Duffield Report - Oct, 1993
Col	PW-15	9/9/93	IRON (TOTAL)	LLI	0.2		MG/L	Duffield Report - Oct, 1993
Col	PW-15	4/26/94	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - June, 1994
Col	PW-15	3/17/95	IRON (TOTAL)		0.03		MG/L	Report dated 4/4/95
Col	PW-15	5/23/95	IRON (TOTAL)	DPH	0	U	MG/L	DPH Sheets 5/95 sampling
Col	PW-15	8/15/95	IRON (TOTAL)		0.05		MG/L	Tetra Tech report 10/4/95
Col	PW-15	8/17/95	IRON (TOTAL)		0.087		MG/L	Tetra Tech XLS table
Col	PW-15	9/19/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-15	10/17/95	IRON (TOTAL)		1.82		MG/L	Tetra Tech report 11/9/95
Col	PW-15	11/13/95(1025)	IRON (TOTAL)		0.114		MG/L	Newark Pump Test 11/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-15	11/13/95(1525)	IRON (TOTAL)		0.184		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(2215)	IRON (TOTAL)		0.091		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(0835)	IRON (TOTAL)		0.022		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	IRON (TOTAL)		0	U	MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	IRON (TOTAL)		0	U	MG/L	Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	IRON (TOTAL)		0.039		MG/L	Newark Pump Test 11/95
Col	PW-15	5/17/68	MANGANESE (TOTAL)	LL	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/11/90	MANGANESE (TOTAL)	ALI	0.9		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/90	MANGANESE (TOTAL)	ALI	0.79		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/22/91	MANGANESE (TOTAL)	ALI	0.63		MG/L	Duffield Report - Aug, 1993
Col	PW-15	2/13/91	MANGANESE (TOTAL)	ALI	0.56		MG/L	Duffield Report - Aug, 1993
Col	PW-15	3/11/91	MANGANESE (TOTAL)	ALI	0.53		MG/L	Duffield Report - Aug, 1993
Col	PW-15	4/11/91	MANGANESE (TOTAL)	ALI	0.58		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/15/91	MANGANESE (TOTAL)	ALI	0.43		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/91	MANGANESE (TOTAL)	ALI	0.16		MG/L	Duffield Report - Aug, 1993
Col	PW-15	9/16/91	MANGANESE (TOTAL)	ALI	0.25		MG/L	Duffield Report - Aug, 1993
Col	PW-15	11/5/91	MANGANESE (TOTAL)	ALI	0.22		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/29/92	MANGANESE (TOTAL)	ALI	0.21		MG/L	Duffield Report - Aug, 1993
Col	PW-15	3/18/92	MANGANESE (TOTAL)	ALI	0.28		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/20/92	MANGANESE (TOTAL)	ALI	0.3		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/8/92	MANGANESE (TOTAL)	ALI	0.22		MG/L	Duffield Report - Aug, 1993
Col	PW-15	10/7/92	MANGANESE (TOTAL)	ALI	0.15		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/14/93	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Col	PW-15	8/16/93	MANGANESE (TOTAL)	LLI	0.027		MG/L	Duffield Report - Oct, 1993
Col	PW-15	9/9/93	MANGANESE (TOTAL)	LLI	0.027		MG/L	Duffield Report - Oct, 1993
Col	PW-15	4/26/94	MANGANESE (TOTAL)	LLI	0.064		MG/L	Duffield Report - June, 1994
Col	PW-15	3/17/95	MANGANESE (TOTAL)		0.054		MG/L	Report dated 4/4/95
Col	PW-15	5/23/95	MANGANESE (TOTAL)	DPH	0.02		MG/L	DPH Sheets 5/95 sampling
Col	PW-15	8/15/95	MANGANESE (TOTAL)		0.07		MG/L	Tetra Tech report 10/4/95
Col	PW-15	9/19/95	MANGANESE (TOTAL)		0.085		MG/L	Tetra Tech report 10/4/95
Col	PW-15	10/17/95	MANGANESE (TOTAL)		0.049		MG/L	Tetra Tech report 11/9/95
Col	PW-15	11/13/95(1025)	MANGANESE (TOTAL)		0.042		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(1525)	MANGANESE (TOTAL)		0.054		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(2215)	MANGANESE (TOTAL)		0.068		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(0835)	MANGANESE (TOTAL)		0.079		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	MANGANESE (TOTAL)		0.078		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	MANGANESE (TOTAL)		0.08		MG/L	Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	MANGANESE (TOTAL)		0.097		MG/L	Newark Pump Test 11/95
Col	PW-15	5/17/68	pH	LL	5.8			Duffield Report - Aug, 1993
Col	PW-15	9/11/79	pH	DPH	6.6			Duffield Report - Aug, 1993
Col	PW-15	7/10/80	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-15	6/14/82	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-15	6/29/83	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-15	6/20/84	pH	DPH	5.4			Duffield Report - Aug, 1993
Col	PW-15	6/12/85	pH	DPH	5.3			Duffield Report - Aug, 1993
Col	PW-15	6/30/86	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-15	6/29/88	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-15	5/31/89	pH	DPH	6.3			Duffield Report - Aug, 1993
Col	PW-15	6/6/90	pH	DPH	6.3			Duffield Report - Aug, 1993
Col	PW-15	6/11/90	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-15	1/22/91	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-15	2/13/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-15	3/11/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-15	4/11/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-15	5/15/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-15	7/10/91	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-15	9/16/91	pH	ALI	5.8			Duffield Report - Aug, 1993
Col	PW-15	11/5/91	pH	ALI	5.7			Duffield Report - Aug, 1993
Col	PW-15	1/29/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-15	3/18/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-15	5/20/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-15	7/8/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-15	10/7/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-15	5/14/93	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-15	8/16/93	pH	LLI	5.6			Duffield Report - Oct, 1993
Col	PW-15	9/9/93	pH	LLI	6.85			Duffield Report - Oct, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-15	3/17/95	pH		5.2			Report dated 4/4/95
Col	PW-15	5/23/95	pH	DPH	5.5			DPH Sheets 5/95 sampling
Col	PW-15	8/17/95	pH		5.13			Tetra Tech XLS table
Col	PW-15	9/5/95	pH		4.71			Tetra Tech XLS table
Col	PW-15	9/12/95	pH		5.34			Tetra Tech XLS table
Col	PW-15	9/19/95	pH		5.36			Tetra Tech report 10/4/95
Col	PW-15	10/10/95	pH		5.26			Tetra Tech report 11/9/95
Col	PW-15	10/17/95	pH		5.75			Tetra Tech report 11/9/95
Col	PW-15	11/13/95(1025)	pH		5.61			Newark Pump Test 11/95
Col	PW-15	11/13/95(1525)	pH		5.61			Newark Pump Test 11/95
Col	PW-15	11/13/95(2215)	pH		5.46			Newark Pump Test 11/95
Col	PW-15	11/14/95(0835)	pH		5.42			Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	pH		5.42			Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	pH		5.42			Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	pH		5.3			Newark Pump Test 11/95
Col	PW-15	11/15/95(1500)	pH		5.38			Newark Pump Test 11/95
Col	PW-15	11/16/95(1602)	pH		5.46			Newark Pump Test 11/95
Col	PW-15	11/17/95(0855)	pH		5.56			Newark Pump Test 11/95
Col	PW-15	5/17/68	TDS	LL	82		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/80	TDS	DPH	159		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/14/82	TDS	DPH	104		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/29/83	TDS	DPH	123		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/20/84	TDS	DPH	135		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/12/85	TDS	DPH	123		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/30/86	TDS	DPH	134		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/29/88	TDS	DPH	143		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/31/89	TDS	DPH	191		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/11/90	TDS	ALI	160		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/23/95	TDS	DPH	102	U	MG/L	DPH Sheets 5/95 sampling
Col	PW-15	5/14/93	TURBIDITY	ALI	1.2		NTU	Duffield Report - Aug, 1993
Pot	PW-16	9/9/93	DO	LLI	0.6		MG/L	Duffield Report - June, 1994
Pot	PW-16	4/26/94	DO	LLI	0.3		MG/L	Duffield Report - June, 1994
Pot	PW-16	3/17/95	DO		2.7		MG/L	Report dated 4/4/95
Pot	PW-16	8/16/95	DO		1.08		MG/L	Tetra Tech XLS table
Pot	PW-16	9/19/95	DO		2.16		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	10/17/95	DO		0.65		MG/L	Tetra Tech report 11/9/95
Pot	PW-16	11/13/1995(1105)	DO		1.79		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1540)	DO		1.69		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(2230)	DO		3.03		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(0850)	DO		1.07		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	DO		1.35		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	DO		1.9		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	DO		1.58		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(1515)	DO		2.08		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1032)	DO		1.81		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1630)	DO		1.04		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/17/1995(0920)	DO		0.75		MG/L	Newark Pump Test 11/95
Pot	PW-16	9/9/93	Eh	LLI	207		mV	Duffield Report - June, 1994
Pot	PW-16	4/26/94	Eh	LLI	141		mV	Duffield Report - June, 1994
Pot	PW-16	8/16/95	Eh		-102		mV	Tetra Tech XLS table
Pot	PW-16	9/19/95	Eh		40		mV	Tetra Tech report 10/4/95
Pot	PW-16	10/17/95	Eh		-30		mV	Tetra Tech report 11/9/95
Pot	PW-16	11/14/1995(1605)	Eh		243		mV	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	Eh		248		mV	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	Eh		268		mV	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(1515)	Eh		196		mV	Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1032)	Eh		273		mV	Newark Pump Test 11/95
Pot	PW-16	8/19/68	IRON (TOTAL)	BGB	0.42		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/13/70	IRON (TOTAL)	BGB	0.72		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/4/70	IRON (TOTAL)	BGB	0.26		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/23/78	IRON (TOTAL)	BGB	0.56		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	9/11/79	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/80	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/14/82	IRON (TOTAL)	DPH	0.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/29/83	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/20/84	IRON (TOTAL)	DPH	0.25		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-16	6/12/85	IRON (TOTAL)	DPH	0.65		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/30/86	IRON (TOTAL)	DPH	0.55		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/10/87	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/29/88	IRON (TOTAL)	DPH	0.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	12/1/89	IRON (TOTAL)	ALI	1.3		MG/L	Tetra Tech fax 12/95
Pot	PW-16	1/1/90	IRON (TOTAL)	ALI	0.98		MG/L	Tetra Tech fax 12/95
Pot	PW-16	2/2/90	IRON (TOTAL)	ALI	7.3		MG/L	Tetra Tech fax 12/95
Pot	PW-16	4/1/90	IRON (TOTAL)	ALI	3.5		MG/L	Tetra Tech fax 12/95
Pot	PW-16	5/1/90	IRON (TOTAL)	ALI	2.4		MG/L	Tetra Tech fax 12/95
Pot	PW-16	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/11/90	IRON (TOTAL)	ALI	2.7		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/90	IRON (TOTAL)	ALI	3.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/22/91	IRON (TOTAL)	ALI	6.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/13/91	IRON (TOTAL)	ALI	3.17		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/11/91	IRON (TOTAL)	ALI	6		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	4/11/91	IRON (TOTAL)	ALI	8.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/15/91	IRON (TOTAL)	ALI	8.9		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/91	IRON (TOTAL)	ALI	12.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	9/16/91	IRON (TOTAL)	ALI	13.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	11/5/91	IRON (TOTAL)	ALI	16.8		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/29/92	IRON (TOTAL)	ALI	16.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/18/92	IRON (TOTAL)	ALI	16.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/20/92	IRON (TOTAL)	ALI	15.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/8/92	IRON (TOTAL)	ALI	16.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	10/7/92	IRON (TOTAL)	ALI	20		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/14/93	IRON (TOTAL)	ALI	5.53		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	9/9/93	IRON (TOTAL)	LLI	6.98		MG/L	Duffield Report - Oct, 1993
Pot	PW-16	4/26/94	IRON (TOTAL)	LLI	14.2		MG/L	Duffield Report - June, 1994
Pot	PW-16	3/17/95	IRON (TOTAL)		5.1		MG/L	Report dated 4/4/95
Pot	PW-16	5/23/95	IRON (TOTAL)	DPH	5.5		MG/L	DPH Sheets 5/95 sampling
Pot	PW-16	8/15/95	IRON (TOTAL)		12		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	8/16/95	IRON (TOTAL)		12.8		MG/L	Tetra Tech XLS table
Pot	PW-16	9/19/95	IRON (TOTAL)		11		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	10/17/95	IRON (TOTAL)		9.27		MG/L	Tetra Tech report 11/9/95
Pot	PW-16	11/13/1995(1105)	IRON (TOTAL)		6.86		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1540)	IRON (TOTAL)		5.32		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(2230)	IRON (TOTAL)		4.67		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(0850)	IRON (TOTAL)		4.32		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	IRON (TOTAL)		3.9		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	IRON (TOTAL)		1.8		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	IRON (TOTAL)		3.73		MG/L	Newark Pump Test 11/95
Pot	PW-16	8/19/68	MANGANESE (TOTAL)	BGB	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/13/70	MANGANESE (TOTAL)	BGB	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/4/70	MANGANESE (TOTAL)	BGB	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/23/78	MANGANESE (TOTAL)	BGB	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/11/90	MANGANESE (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/90	MANGANESE (TOTAL)	ALI	0.07		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/22/91	MANGANESE (TOTAL)	ALI	0.11		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/13/91	MANGANESE (TOTAL)	ALI	0.07		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/11/91	MANGANESE (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	4/11/91	MANGANESE (TOTAL)	ALI	0.16		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/15/91	MANGANESE (TOTAL)	ALI	0.17		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/91	MANGANESE (TOTAL)	ALI	0.19		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	9/16/91	MANGANESE (TOTAL)	ALI	0.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	11/5/91	MANGANESE (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/29/92	MANGANESE (TOTAL)	ALI	0.19		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/18/92	MANGANESE (TOTAL)	ALI	0.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/20/92	MANGANESE (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/8/92	MANGANESE (TOTAL)	ALI	0.22		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	10/7/92	MANGANESE (TOTAL)	ALI	0.26		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/14/93	MANGANESE (TOTAL)	ALI	0.09		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	9/9/93	MANGANESE (TOTAL)	LLI	0.168		MG/L	Duffield Report - Oct, 1993
Pot	PW-16	4/26/94	MANGANESE (TOTAL)	LLI	0.207		MG/L	Duffield Report - June, 1994
Pot	PW-16	3/17/95	MANGANESE (TOTAL)		0.1		MG/L	Report dated 4/4/95
Pot	PW-16	5/23/95	MANGANESE (TOTAL)	DPH	0.11		MG/L	DPH Sheets 5/95 sampling

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-16	8/15/95	MANGANESE (TOTAL)		0.22		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	9/19/95	MANGANESE (TOTAL)		0.195		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	10/17/95	MANGANESE (TOTAL)		0.146		MG/L	Tetra Tech report 11/9/95
Pot	PW-16	11/13/1995(1105)	MANGANESE (TOTAL)		0.114		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1540)	MANGANESE (TOTAL)		0.118		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(2230)	MANGANESE (TOTAL)		0.119		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(0850)	MANGANESE (TOTAL)		0.113		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	MANGANESE (TOTAL)		0.103		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	MANGANESE (TOTAL)		0.097		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	MANGANESE (TOTAL)		0.099		MG/L	Newark Pump Test 11/95
Pot	PW-16	8/19/68	pH	BGB	5.7			Duffield Report - Aug, 1993
Pot	PW-16	2/13/70	pH	BGB	5.7			Duffield Report - Aug, 1993
Pot	PW-16	3/4/70	pH	BGB	5.8			Duffield Report - Aug, 1993
Pot	PW-16	2/23/78	pH	BGB	5.1			Duffield Report - Aug, 1993
Pot	PW-16	9/11/79	pH	DPH	5.6			Duffield Report - Aug, 1993
Pot	PW-16	7/10/80	pH	DPH	5.3			Duffield Report - Aug, 1993
Pot	PW-16	6/14/82	pH	DPH	5			Duffield Report - Aug, 1993
Pot	PW-16	6/29/83	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-16	6/20/84	pH	DPH	5.1			Duffield Report - Aug, 1993
Pot	PW-16	6/12/85	pH	DPH	5			Duffield Report - Aug, 1993
Pot	PW-16	6/30/86	pH	DPH	4.5			Duffield Report - Aug, 1993
Pot	PW-16	6/10/87	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-16	6/29/88	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-16	5/31/89	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-16	6/6/90	pH	DPH	5.3			Duffield Report - Aug, 1993
Pot	PW-16	6/11/90	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-16	1/22/91	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-16	2/13/91	pH	ALI	4.5			Duffield Report - Aug, 1993
Pot	PW-16	3/11/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-16	4/11/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-16	5/15/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-16	7/10/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-16	9/16/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-16	11/5/91	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-16	1/29/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Pot	PW-16	3/18/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-16	5/20/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-16	7/8/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-16	10/7/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-16	5/14/93	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-16	9/9/93	pH	LLI	5.5			Duffield Report - Oct, 1993
Pot	PW-16	3/17/95	pH		4.8			Report dated 4/4/95
Pot	PW-16	5/23/95	pH	DPH	5.3			DPH Sheets 5/95 sampling
Pot	PW-16	8/16/95	pH		5.33			Tetra Tech XLS table
Pot	PW-16	9/19/95	pH		4.88			Tetra Tech report 10/4/95
Pot	PW-16	10/17/95	pH		6.68			Tetra Tech report 11/9/95
Pot	PW-16	11/13/1995(1105)	pH		5.31			Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1540)	pH		5.18			Newark Pump Test 11/95
Pot	PW-16	11/13/1995(2230)	pH		5.17			Newark Pump Test 11/95
Pot	PW-16	11/14/1995(0850)	pH		4.89			Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	pH		4.85			Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	pH		4.92			Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	pH		4.82			Newark Pump Test 11/95
Pot	PW-16	11/15/1995(1515)	pH		4.77			Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1032)	pH		5.04			Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1630)	pH		5.03			Newark Pump Test 11/95
Pot	PW-16	11/17/1995(0920)	pH		5.05			Newark Pump Test 11/95
Pot	PW-16	7/10/80	TDS	DPH	76		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/14/82	TDS	DPH	81		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/29/83	TDS	DPH	74		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/20/84	TDS	DPH	52		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/12/85	TDS	DPH	74		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/30/86	TDS	DPH	62		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/10/87	TDS	DPH	75		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/29/88	TDS	DPH	64		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/31/89	TDS	DPH	77		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-16	6/11/90	TDS	ALI	72		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/23/95	TDS	DPH	68		MG/L	DPH Sheets 5/95 sampling
Pot	PW-16	5/14/93	TURBIDITY	ALI	2.5		NTU	Duffield Report - Aug, 1993
Col	PW-17	8/16/93	DO	LLI	4.4		MG/L	Duffield Report - June, 1994
Col	PW-17	9/9/93	DO	LLI	5		MG/L	Duffield Report - June, 1994
Col	PW-17	8/16/93	Eh	LLI	254		mV	Duffield Report - June, 1994
Col	PW-17	9/9/93	Eh	LLI	375		mV	Duffield Report - June, 1994
Col	PW-17	9/11/79	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/10/80	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/14/82	IRON (TOTAL)	DPH	0.35		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/20/84	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/12/85	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/30/86	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/10/87	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-17	12/1/89	IRON (TOTAL)	ALI	0.06		MG/L	Tetra Tech fax 12/95
Col	PW-17	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/11/90	IRON (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-17	1/10/91	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-17	2/13/91	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-17	3/11/91	IRON (TOTAL)	ALI	0.06		MG/L	Duffield Report - Aug, 1993
Col	PW-17	4/11/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/15/91	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/10/91	IRON (TOTAL)	ALI	0.25		MG/L	Duffield Report - Aug, 1993
Col	PW-17	9/16/91	IRON (TOTAL)	ALI	0.21		MG/L	Duffield Report - Aug, 1993
Col	PW-17	11/5/91	IRON (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Col	PW-17	1/29/92	IRON (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Col	PW-17	3/18/92	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/20/92	IRON (TOTAL)	ALI	0.21		MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/8/92	IRON (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Col	PW-17	10/7/92	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/14/93	IRON (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Col	PW-17	8/16/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Col	PW-17	9/9/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Col	PW-17	6/1/90	MANGANESE (TOTAL)	ALI	0	U	MG/L	Tetra Tech fax 12/95
Col	PW-17	1/10/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	2/13/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-17	3/11/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	4/11/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/15/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-17	11/5/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	1/29/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	3/18/92	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/20/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/8/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	10/7/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/14/93	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Col	PW-17	8/16/93	MANGANESE (TOTAL)	LLI	0.029		MG/L	Duffield Report - Oct, 1993
Col	PW-17	9/9/93	MANGANESE (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Col	PW-17	9/11/79	pH	DPH	7			Duffield Report - Aug, 1993
Col	PW-17	7/10/80	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-17	6/14/82	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-17	6/20/84	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-17	6/12/85	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-17	6/30/86	pH	DPH	5.7			Duffield Report - Aug, 1993
Col	PW-17	6/10/87	pH	DPH	6.4			Duffield Report - Aug, 1993
Col	PW-17	6/29/88	pH	DPH	6.5			Duffield Report - Aug, 1993
Col	PW-17	5/31/89	pH	DPH	6			Duffield Report - Aug, 1993
Col	PW-17	6/6/90	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-17	6/11/90	pH	ALI	5.7			Duffield Report - Aug, 1993
Col	PW-17	1/10/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-17	2/13/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-17	3/11/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-17	4/11/91	pH	ALI	5.6			Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-17	5/15/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-17	7/10/91	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-17	9/16/91	pH	ALI	5.8			Duffield Report - Aug, 1993
Col	PW-17	11/5/91	pH	ALI	5.8			Duffield Report - Aug, 1993
Col	PW-17	1/29/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-17	3/18/92	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-17	5/20/92	pH	ALI	5.7			Duffield Report - Aug, 1993
Col	PW-17	7/8/92	pH	ALI	5.7			Duffield Report - Aug, 1993
Col	PW-17	10/7/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-17	5/14/93	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-17	8/16/93	pH	LLI	5.95			Duffield Report - Oct, 1993
Col	PW-17	9/9/93	pH	LLI	5.95			Duffield Report - Oct, 1993
Col	PW-17	7/10/80	TDS	DPH	15		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/14/82	TDS	DPH	116		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/20/84	TDS	DPH	87		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/12/85	TDS	DPH	77		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/30/86	TDS	DPH	112		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/10/87	TDS	DPH	111		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/29/88	TDS	DPH	107		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/31/89	TDS	DPH	62		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/11/90	TDS	DPH	120		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/14/93	TURBIDITY	ALI	0.9		NTU	Duffield Report - Aug, 1993
Col	PW-18	9/9/93	DO	LLI	8		MG/L	Duffield Report - June, 1994
Col	PW-18	9/9/93	Eh	LLI	236		mV	Duffield Report - June, 1994
Col	PW-18	6/13/72	IRON (TOTAL)	BAI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-18	12/2/76	IRON (TOTAL)	BAI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-18	12/7/76	IRON (TOTAL)	DPH	0.15		MG/L	Duffield Report - Aug, 1993
Col	PW-18	9/9/93	IRON (TOTAL)	LLI	0.21		MG/L	Duffield Report - Oct, 1993
Col	PW-18	6/13/72	MANGANESE (TOTAL)	BAI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-18	12/2/76	MANGANESE (TOTAL)	BAI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-18	9/9/93	MANGANESE (TOTAL)	LLI	0.02		MG/L	Duffield Report - Oct, 1993
Col	PW-18	6/13/72	pH	BAI	6.7			Duffield Report - Aug, 1993
Col	PW-18	12/2/76	pH	BAI	7.6			Duffield Report - Aug, 1993
Col	PW-18	12/7/76	pH	DPH	6			Duffield Report - Aug, 1993
Col	PW-18	9/9/93	pH	LLI	7.6			Duffield Report - Oct, 1993
Pot	PW-19	9/9/93	DO	LLI	1.6		MG/L	Duffield Report - June, 1994
Pot	PW-19	4/26/94	DO	LLI	0.2		MG/L	Duffield Report - June, 1994
Pot	PW-19	9/9/93	Eh	LLI	177		mV	Duffield Report - June, 1994
Pot	PW-19	4/26/94	Eh	LLI	-51		mV	Duffield Report - June, 1994
Pot	PW-19	6/13/72	IRON (TOTAL)	BAI	5.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	12/6/76	IRON (TOTAL)	BAI	3.6		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	12/7/76	IRON (TOTAL)	DPH	4.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	10/11/78	IRON (TOTAL)	DPH	3.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	7/10/80	IRON (TOTAL)	DPH	0.8		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/14/82	IRON (TOTAL)	DPH	2.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/29/83	IRON (TOTAL)	DPH	0.55		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/20/84	IRON (TOTAL)	DPH	2.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/12/85	IRON (TOTAL)	DPH	2.6		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/30/86	IRON (TOTAL)	DPH	4.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/10/87	IRON (TOTAL)	DPH	4.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	5/31/89	IRON (TOTAL)	DPH	6.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	5/20/92	IRON (TOTAL)	ALI	4		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	10/7/92	IRON (TOTAL)	ALI	3.78		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	9/9/93	IRON (TOTAL)	LLI	3.25		MG/L	Duffield Report - Oct, 1993
Pot	PW-19	4/26/94	IRON (TOTAL)	LLI	7.95		MG/L	Duffield Report - June, 1994
Pot	PW-19	5/23/95	IRON (TOTAL)	DPH	7		MG/L	DPH Sheets 5/95 sampling
Pot	PW-19	8/15/95	IRON (TOTAL)		7.9		MG/L	Tetra Tech report 11/9/95
Pot	PW-19	6/13/72	MANGANESE (TOTAL)	BAI	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	12/6/76	MANGANESE (TOTAL)	BAI	0.14		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	9/16/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-19	5/20/92	MANGANESE (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	10/7/92	MANGANESE (TOTAL)	ALI	0.11		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	9/9/93	MANGANESE (TOTAL)	LLI	0.153		MG/L	Duffield Report - Oct, 1993
Pot	PW-19	4/26/94	MANGANESE (TOTAL)	LLI	0.151		MG/L	Duffield Report - June, 1994
Pot	PW-19	5/23/95	MANGANESE (TOTAL)	DPH	0.16		MG/L	DPH Sheets 5/95 sampling
Pot	PW-19	8/15/95	MANGANESE (TOTAL)		0.18		MG/L	Tetra Tech report 11/9/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-19	6/13/72	pH	BAI	6.2			Duffield Report - Aug, 1993
Pot	PW-19	12/6/76	pH	BAI	6.5			Duffield Report - Aug, 1993
Pot	PW-19	12/7/76	pH	DPH	6.1			Duffield Report - Aug, 1993
Pot	PW-19	10/11/78	pH	DPH	5.3			Duffield Report - Aug, 1993
Pot	PW-19	7/10/80	pH	DPH	6			Duffield Report - Aug, 1993
Pot	PW-19	6/14/82	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-19	6/29/83	pH	DPH	6.3			Duffield Report - Aug, 1993
Pot	PW-19	6/20/84	pH	DPH	5.7			Duffield Report - Aug, 1993
Pot	PW-19	6/12/85	pH	DPH	5.7			Duffield Report - Aug, 1993
Pot	PW-19	6/30/86	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-19	6/10/87	pH	DPH	6.8			Duffield Report - Aug, 1993
Pot	PW-19	6/29/88	pH	DPH	6.5			Duffield Report - Aug, 1993
Pot	PW-19	5/20/92	pH	ALI	5.8			Duffield Report - Aug, 1993
Pot	PW-19	10/7/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-19	9/9/93	pH	LLI	5.7			Duffield Report - Oct, 1993
Pot	PW-19	5/23/95	pH	DPH	6.3			DPH Sheets 5/95 sampling
Pot	PW-19	7/10/80	TDS	DPH	79		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/14/82	TDS	DPH	363		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/29/83	TDS	DPH	74		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/20/84	TDS	DPH	73		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/12/85	TDS	DPH	79		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/30/86	TDS	DPH	56		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/10/87	TDS	DPH	72		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/29/88	TDS	DPH	108		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	5/23/95	TDS	DPH	60		MG/L	DPH Sheets 5/95 sampling
Col	PW-8	9/5/95	DO		0.54		MG/L	Tetra Tech XLS table
Col	PW-8	9/5/95	Eh		45		mV	Tetra Tech XLS table
Col	PW-8	10/13/66	IRON (TOTAL)	OLI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	9/11/79	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	7/10/80	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/14/82	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/29/83	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/20/84	IRON (TOTAL)	DPH	0.25		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/12/85	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/30/86	IRON (TOTAL)	DPH	0.55		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/10/87	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/29/88	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-8	10/13/66	MANGANESE (TOTAL)	OLI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	10/13/66	pH	OLI	6.6			Duffield Report - Aug, 1993
Col	PW-8	9/11/79	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-8	7/10/80	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-8	6/14/82	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-8	6/29/83	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-8	6/20/84	pH	DPH	5.4			Duffield Report - Aug, 1993
Col	PW-8	6/12/85	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-8	6/30/86	pH	DPH	6.3			Duffield Report - Aug, 1993
Col	PW-8	6/10/87	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-8	6/29/88	pH	DPH	6.5			Duffield Report - Aug, 1993
Col	PW-8	9/5/95	pH		5.36			Tetra Tech XLS table
Col	PW-8	10/13/66	TDS	OLI	120		MG/L	Duffield Report - Aug, 1993
Col	PW-8	7/10/80	TDS	DPH	207		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/14/82	TDS	DPH	217		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/29/83	TDS	DPH	166		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/20/84	TDS	DPH	214		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/12/85	TDS	DPH	115		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/30/86	TDS	DPH	171		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/10/87	TDS	DPH	170		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/29/88	TDS	DPH	185		MG/L	Duffield Report - Aug, 1993
Col	PW-8	9/11/79	TURBIDITY	DPH	0.2		NTU	Duffield Report - Aug, 1993
Col	WIP-2	9/20/95	DO		0.42		MG/L	Tetra Tech report 10/4/95
Col	WIP-2	10/18/95	DO		1.97		MG/L	Tetra Tech report 11/9/95
Col	WIP-2	11/13/95	DO		4.97		MG/L	Newark Pump Test 11/95
Col	WIP-2	3/8/91	Eh		340		mV	Tetra Tech XLS table
Col	WIP-2	9/20/95	Eh		95			Tetra Tech report 10/4/95
Col	WIP-2	10/18/95	Eh		286		mV	Tetra Tech report 11/9/95
Col	WIP-2	3/8/91	IRON (DISSOLVED)		0.08		MG/L	Tetra Tech XLS table

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	WIP-2	9/20/95	IRON (DISSOLVED)		0.238		MG/L	Tetra Tech report 10/4/95
Col	WIP-2	10/18/95	IRON (DISSOLVED)		0.559		MG/L	Tetra Tech report 11/9/95
Col	WIP-2	11/13/95	IRON (DISSOLVED)		0.018		MG/L	Newark Pump Test 11/95
Col	WIP-2	9/20/95	MANGANESE (DISSOLVED)		0.025		MG/L	Tetra Tech report 10/4/95
Col	WIP-2	10/18/95	MANGANESE (DISSOLVED)		0.011		MG/L	Tetra Tech report 11/9/95
Col	WIP-2	11/13/95	MANGANESE (DISSOLVED)		0.014		MG/L	Newark Pump Test 11/95
Col	WIP-2	3/8/91	pH		5.71			Tetra Tech XLS table
Col	WIP-2	9/20/95	pH		5.02			Tetra Tech report 10/4/95
Col	WIP-2	10/18/95	pH		5.45			Tetra Tech report 11/9/95
Col	WIP-2	11/13/95	pH		5.55			Newark Pump Test 11/95

ATTACHMENT 4
Tabular Historical Water Quality Data - Well, Date, All Parameter Summary

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	CH-1	4/26/94	DO	LLI	0.63		MG/L	Duffield Report - June, 1994
Pot	CH-1	4/26/94	Eh	LLI	60		mV	Duffield Report - June, 1994
Pot	CH-1	4/26/94	IRON (TOTAL)	LLI	0.16		MG/L	Duffield Report - June, 1994
Pot	CH-1	4/26/94	MANGANESE (TOTAL)	LLI	0.081		MG/L	Duffield Report - June, 1994
Pot	CH-1	8/16/95	DO		0.63		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	8/16/95	Eh		-268		mV	Tetra Tech report 10/4/95
Pot	CH-1	8/16/95	IRON (TOTAL)		1.67		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	8/16/95	pH		6.58			Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	DO		2.02		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	Eh		-12		mV	Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	IRON (DISSOLVED)		1.63		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	MANGANESE (DISSOLVED)		0.317		MG/L	Tetra Tech report 10/4/95
Pot	CH-1	9/20/95	pH		6.71			Tetra Tech report 10/4/95
Pot	CH-1	10/18/95	DO		1.3		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	10/18/95	Eh		-32		mV	Tetra Tech report 11/9/95
Pot	CH-1	10/18/95	IRON (DISSOLVED)		1.55		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	10/18/95	MANGANESE (DISSOLVED)		0.186		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	10/18/95	pH		7.28			Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	DO		2.08		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	Eh		-30		mV	Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	IRON (DISSOLVED)		1.37		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	MANGANESE (DISSOLVED)		0.192		MG/L	Tetra Tech report 11/9/95
Pot	CH-1	11/1/95	pH		7.55			Tetra Tech report 11/9/95
Pot	CH-1	11/15/95	DO		1.26		MG/L	Newark Pump Test 11/95
Pot	CH-1	11/15/95	Eh		7		mV	Newark Pump Test 11/95
Pot	CH-1	11/15/95	IRON (DISSOLVED)		1.36		MG/L	Newark Pump Test 11/95
Pot	CH-1	11/15/95	MANGANESE (DISSOLVED)		0.156		MG/L	Newark Pump Test 11/95
Pot	CH-1	11/15/95	pH		6.89			Newark Pump Test 11/95
Col	CH-1A	4/26/94	DO	LLI	7.3		MG/L	Duffield Report - June, 1994
Col	CH-1A	4/26/94	Eh	LLI	269		mV	Duffield Report - June, 1994
Col	CH-1A	4/26/94	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - June, 1994
Col	CH-1A	4/26/94	MANGANESE (TOTAL)	LLI	0.046		MG/L	Duffield Report - June, 1994
Col	CH-1A	8/16/95	DO		4.33		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	8/16/95	Eh		-63		mV	Tetra Tech report 10/4/95
Col	CH-1A	8/16/95	IRON (TOTAL)		0.712		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	8/16/95	pH		5.21			Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	DO		7.8		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	Eh		184		mV	Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	IRON (DISSOLVED)		0.033		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	MANGANESE (DISSOLVED)		0.075		MG/L	Tetra Tech report 10/4/95
Col	CH-1A	9/20/95	pH		5.2			Tetra Tech report 10/4/95
Col	CH-1A	10/18/95	DO		6.07			Tetra Tech report 11/9/95
Col	CH-1A	10/18/95	Eh		74		mV	Tetra Tech report 11/9/95
Col	CH-1A	10/18/95	IRON (DISSOLVED)		0.043		MG/L	Tetra Tech report 11/9/95
Col	CH-1A	10/18/95	MANGANESE (DISSOLVED)		0.069		MG/L	Tetra Tech report 11/9/95
Col	CH-1A	10/18/95	pH		5.44		MG/L	Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	DO		9.2			Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	Eh		166			Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	IRON (DISSOLVED)		0.053			Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	MANGANESE (DISSOLVED)		0.066			Tetra Tech report 11/9/95
Col	CH-1A	11/1/95	pH		6.83			Tetra Tech report 11/9/95
Col	CH-1A	11/15/95	DO		8.6		MG/L	Newark Pump Test 11/95
Col	CH-1A	11/15/95	Eh		311		mV	Newark Pump Test 11/95
Col	CH-1A	11/15/95	IRON (DISSOLVED)		0.064		MG/L	Newark Pump Test 11/95
Col	CH-1A	11/15/95	MANGANESE (DISSOLVED)		0.056		MG/L	Newark Pump Test 11/95
Col	CH-1A	11/15/95	pH		5.16			Newark Pump Test 11/95
Pot	CH-2	4/26/94	DO	LLI	0.3		MG/L	Duffield Report - June, 1994
Pot	CH-2	4/26/94	Eh	LLI	-121		mV	Duffield Report - June, 1994
Pot	CH-2	4/26/94	IRON (TOTAL)	LLI	5.9		MG/L	Duffield Report - June, 1994
Pot	CH-2	4/26/94	MANGANESE (TOTAL)	LLI	0.128		MG/L	Duffield Report - June, 1994
Pot	CH-2	8/16/95	DO		2.49		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	8/16/95	Eh		-91		mV	Tetra Tech report 10/4/95
Pot	CH-2	8/16/95	IRON (TOTAL)		10.4		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	8/16/95	pH		6.36			Tetra Tech report 10/4/95
Pot	CH-2	9/19/95	DO		1.67		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	9/19/95	Eh		-52		mV	Tetra Tech report 10/4/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	CH-2	9/19/95	IRON (DISSOLVED)		10.7		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	9/19/95	MANGANESE (DISSOLVED)		0.252		MG/L	Tetra Tech report 10/4/95
Pot	CH-2	9/19/95	pH		6.51			Tetra Tech report 10/4/95
Pot	CH-2	10/17/95	DO		1.43		MG/L	Tetra Tech report 11/9/95
Pot	CH-2	10/17/95	Eh		-20		mV	Tetra Tech report 11/9/95
Pot	CH-2	10/17/95	IRON (DISSOLVED)		11.1		MG/L	Tetra Tech report 11/9/95
Pot	CH-2	10/17/95	MANGANESE (DISSOLVED)		0.233		MG/L	Tetra Tech report 11/9/95
Pot	CH-2	10/17/95	pH		7.2			Tetra Tech report 11/9/95
Pot	CH-2	11/15/95	DO		1.5		MG/L	Newark Pump Test 11/95
Pot	CH-2	11/15/95	Eh		-6		mV	Newark Pump Test 11/95
Pot	CH-2	11/15/95	IRON (DISSOLVED)		13		MG/L	Newark Pump Test 11/95
Pot	CH-2	11/15/95	MANGANESE (DISSOLVED)		0.242		MG/L	Newark Pump Test 11/95
Pot	CH-2	11/15/95	pH		6.39			Newark Pump Test 11/95
Col	CH-2A	4/26/94	DO	LLI	5.8		MG/L	Duffield Report - June, 1994
Col	CH-2A	4/26/94	Eh	LLI	254		mV	Duffield Report - June, 1994
Col	CH-2A	4/26/94	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - June, 1994
Col	CH-2A	4/26/94	MANGANESE (TOTAL)	LLI	0.018		MG/L	Duffield Report - June, 1994
Col	CH-2A	8/16/95	DO		3.56		MG/L	Tetra Tech report 10/4/95
Col	CH-2A	8/16/95	Eh		-44		mV	Tetra Tech report 10/4/95
Col	CH-2A	8/16/95	IRON (TOTAL)		0.064		MG/L	Tetra Tech report 10/4/95
Col	CH-2A	8/16/95	pH		5.41			Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	DO		3.78		MG/L	Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	Eh		149		mV	Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	MANGANESE (DISSOLVED)		0.027		MG/L	Tetra Tech report 10/4/95
Col	CH-2A	9/19/95	pH		5.46			Tetra Tech report 10/4/95
Col	CH-2A	10/17/95	DO		4.72		MG/L	Tetra Tech report 11/9/95
Col	CH-2A	10/17/95	Eh		145		mV	Tetra Tech report 11/9/95
Col	CH-2A	10/17/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 11/9/95
Col	CH-2A	10/17/95	MANGANESE (DISSOLVED)		0.028		MG/L	Tetra Tech report 11/9/95
Col	CH-2A	10/17/95	pH		5.91			Tetra Tech report 11/9/95
Col	CH-2A	11/15/95	DO		4.46		MG/L	Newark Pump Test 11/95
Col	CH-2A	11/15/95	Eh		43		mV	Newark Pump Test 11/95
Col	CH-2A	11/15/95	IRON (DISSOLVED)		0.015		MG/L	Newark Pump Test 11/95
Col	CH-2A	11/15/95	MANGANESE (DISSOLVED)		0.029		MG/L	Newark Pump Test 11/95
Col	CH-2A	11/15/95	pH		5.46			Newark Pump Test 11/95
Col	DTP-2	9/11/91	Eh		180		mV	Tetra Tech XLS table
Col	DTP-2	9/11/91	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech XLS table
Col	DTP-2	9/11/91	pH		5.73			Tetra Tech XLS table
Col	DTP-2	9/20/95	DO		6.06		MG/L	Tetra Tech report 10/4/95
Col	DTP-2	9/20/95	Eh		149			Tetra Tech report 10/4/95
Col	DTP-2	9/20/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 10/4/95
Col	DTP-2	9/20/95	MANGANESE (DISSOLVED)		0.025		MG/L	Tetra Tech report 10/4/95
Col	DTP-2	9/20/95	pH		4.95			Tetra Tech report 10/4/95
Col	DTP-2	10/18/95	DO		5.71		MG/L	Tetra Tech report 11/9/95
Col	DTP-2	10/18/95	Eh		194		mV	Tetra Tech report 11/9/95
Col	DTP-2	10/18/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 11/9/95
Col	DTP-2	10/18/95	MANGANESE (DISSOLVED)		0.028		MG/L	Tetra Tech report 11/9/95
Col	DTP-2	10/18/95	pH		5.33			Tetra Tech report 11/9/95
Col	DTP-2	11/13/95	DO		5.65		MG/L	Newark Pump Test 11/95
Col	DTP-2	11/13/95	IRON (DISSOLVED)		0.009		MG/L	Newark Pump Test 11/95
Col	DTP-2	11/13/95	MANGANESE (DISSOLVED)		0.025		MG/L	Newark Pump Test 11/95
Col	DTP-2	11/13/95	pH		5.29			Newark Pump Test 11/95
Col	DTP-4	9/11/91	Eh		206		mV	Tetra Tech XLS table
Col	DTP-4	9/11/91	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech XLS table
Col	DTP-4	9/11/91	pH		6.17			Tetra Tech XLS table
Pot	NLW-10	7/17/89	IRON (DISSOLVED)		0.38		MG/L	Tetra Tech XLS table
Pot	NLW-10	7/17/89	MANGANESE (DISSOLVED)		0.01		MG/L	Tetra Tech XLS table
Pot	NLW-10	7/11/90	IRON (DISSOLVED)		0.18		MG/L	Tetra Tech XLS table
Pot	NLW-10	7/11/90	MANGANESE (DISSOLVED)		0.02		MG/L	Tetra Tech XLS table
Pot	NLW-10	7/11/90	pH		9.11			Tetra Tech XLS table
Pot	NLW-10	9/3/91	IRON (DISSOLVED)		0.4		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/3/91	MANGANESE (DISSOLVED)		0.11		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/3/91	pH		6.7			Tetra Tech XLS table
Pot	NLW-10	11/12/92	IRON (DISSOLVED)		17.9		MG/L	Tetra Tech XLS table
Pot	NLW-10	11/12/92	MANGANESE (DISSOLVED)		0.26		MG/L	Tetra Tech XLS table

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	NLW-10	11/12/92	pH		6.7			Tetra Tech XLS table
Pot	NLW-10	10/1/93	IRON (DISSOLVED)		33.2		MG/L	Tetra Tech XLS table
Pot	NLW-10	10/1/93	MANGANESE (DISSOLVED)		0.42		MG/L	Tetra Tech XLS table
Pot	NLW-10	10/1/93	pH		6.31			Tetra Tech XLS table
Pot	NLW-10	9/13/94	IRON (DISSOLVED)		4.14		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/13/94	MANGANESE (DISSOLVED)		0.11		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/13/94	pH		6.24			Tetra Tech XLS table
Pot	NLW-10	8/17/95	IRON (TOTAL)		1.54		MG/L	Tetra Tech XLS table
Pot	NLW-10	9/19/95	DO		0.03		MG/L	Tetra Tech report 10/4/95
Pot	NLW-10	9/19/95	Eh		-77		mV	Tetra Tech report 10/4/95
Pot	NLW-10	9/19/95	IRON (DISSOLVED)		0.107		MG/L	Tetra Tech report 10/4/95
Pot	NLW-10	9/19/95	MANGANESE (DISSOLVED)		0.013		MG/L	Tetra Tech report 10/4/95
Pot	NLW-10	9/19/95	pH		8.31			Tetra Tech report 10/4/95
Pot	NLW-10	10/17/95	DO		0.75		MG/L	Tetra Tech report 11/9/95
Pot	NLW-10	10/17/95	Eh		43		mV	Tetra Tech report 11/9/95
Pot	NLW-10	10/17/95	IRON (DISSOLVED)		0.55		MG/L	Tetra Tech report 11/9/95
Pot	NLW-10	10/17/95	MANGANESE (DISSOLVED)		0.094		MG/L	Tetra Tech report 11/9/95
Pot	NLW-10	10/17/95	pH		7.75			Tetra Tech report 11/9/95
Pot	NLW-10	11/13/95	DO		0.03		MG/L	Newark Pump Test 11/95
Pot	NLW-10	11/13/95	IRON (DISSOLVED)		6.9		MG/L	Newark Pump Test 11/95
Pot	NLW-10	11/13/95	MANGANESE (DISSOLVED)		0.348		MG/L	Newark Pump Test 11/95
Pot	NLW-10	11/13/95	pH		7.76			Newark Pump Test 11/95
Col	NLW-11	7/17/89	IRON (DISSOLVED)		12.8		MG/L	Tetra Tech XLS table
Col	NLW-11	7/17/89	MANGANESE (DISSOLVED)		6.25		MG/L	Tetra Tech XLS table
Col	NLW-11	7/11/90	IRON (DISSOLVED)		18.7		MG/L	Tetra Tech XLS table
Col	NLW-11	7/11/90	MANGANESE (DISSOLVED)		2.24		MG/L	Tetra Tech XLS table
Col	NLW-11	7/11/90	pH		6.48			Tetra Tech XLS table
Col	NLW-11	9/3/91	IRON (DISSOLVED)		32.7		MG/L	Tetra Tech XLS table
Col	NLW-11	9/3/91	MANGANESE (DISSOLVED)		1.7		MG/L	Tetra Tech XLS table
Col	NLW-11	9/3/91	pH		6.1			Tetra Tech XLS table
Col	NLW-11	11/12/92	IRON (DISSOLVED)		62.2		MG/L	Tetra Tech XLS table
Col	NLW-11	11/12/92	MANGANESE (DISSOLVED)		1.87		MG/L	Tetra Tech XLS table
Col	NLW-11	11/12/92	pH		7.2			Tetra Tech XLS table
Col	NLW-11	10/1/93	IRON (DISSOLVED)		45		MG/L	Tetra Tech XLS table
Col	NLW-11	10/1/93	MANGANESE (DISSOLVED)		2.61		MG/L	Tetra Tech XLS table
Col	NLW-11	10/1/93	pH		5.97			Tetra Tech XLS table
Col	NLW-11	9/13/94	IRON (DISSOLVED)		37.5		MG/L	Tetra Tech XLS table
Col	NLW-11	9/13/94	MANGANESE (DISSOLVED)		2.68		MG/L	Tetra Tech XLS table
Col	NLW-11	9/13/94	pH		6.24			Tetra Tech XLS table
Col	NLW-11	8/17/95	Eh		-200		mV	Tetra Tech XLS table
Col	NLW-11	8/17/95	IRON (TOTAL)		172		MG/L	Tetra Tech XLS table
Col	NLW-11	8/17/95	pH		9.32			Tetra Tech XLS table
Col	NLW-11	9/19/95	DO		0.58		MG/L	Tetra Tech report 10/4/95
Col	NLW-11	9/19/95	Eh		-78		mV	Tetra Tech report 10/4/95
Col	NLW-11	9/19/95	IRON (DISSOLVED)		32.3		MG/L	Tetra Tech report 10/4/95
Col	NLW-11	9/19/95	MANGANESE (DISSOLVED)		0.739		MG/L	Tetra Tech report 10/4/95
Col	NLW-11	9/19/95	pH		6.34			Tetra Tech report 10/4/95
Col	NLW-11	10/17/95	DO		1.42		MG/L	Tetra Tech report 11/9/95
Col	NLW-11	10/17/95	Eh		-190		mV	Tetra Tech report 11/9/95
Col	NLW-11	10/17/95	IRON (DISSOLVED)		35.8		MG/L	Tetra Tech report 11/9/95
Col	NLW-11	10/17/95	MANGANESE (DISSOLVED)		0.884		MG/L	Tetra Tech report 11/9/95
Col	NLW-11	10/17/95	pH		6.49			Tetra Tech report 11/9/95
Col	NLW-11	11/13/95	DO		1.31		MG/L	Newark Pump Test 11/95
Col	NLW-11	11/13/95	IRON (DISSOLVED)		45.6		MG/L	Newark Pump Test 11/95
Col	NLW-11	11/13/95	MANGANESE (DISSOLVED)		0.878		MG/L	Newark Pump Test 11/95
Col	NLW-11	11/13/95	pH		6.53			Newark Pump Test 11/95
Col	OW-11	8/16/95	DO		5.14		MG/L	Tetra Tech XLS table
Col	OW-11	8/16/95	Eh		-95		mV	Tetra Tech XLS table
Col	OW-11	8/16/95	IRON (TOTAL)		113		MG/L	Tetra Tech XLS table
Col	OW-11	8/16/95	pH		5.64			Tetra Tech XLS table
Pot	OW-14	8/17/95	Eh		-270		mV	Tetra Tech XLS table
Pot	OW-14	8/17/95	IRON (TOTAL)		29.5		MG/L	Tetra Tech XLS table
Pot	OW-14	8/17/95	pH		9.9			Tetra Tech XLS table
Col	OW-15	11/5/90	IRON (TOTAL)	ALI	27.2		MG/L	Duffield Report - Aug, 1993
Col	OW-15	11/5/90	IRON (TOTAL)	DPH	22		MG/L	Duffield Report - Aug, 1993
Col	OW-15	11/5/90	MANGANESE (TOTAL)	ALI	10		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	OW-15	11/5/90	MANGANESE (TOTAL)	DPH	12		MG/L	Duffield Report - Aug, 1993
Col	OW-15	11/5/90	pH	ALI	6.5			Duffield Report - Aug, 1993
Col	OW-15	11/5/90	pH	DPH	6.7			Duffield Report - Aug, 1993
Col	OW-15	11/5/90	TDS	ALI	340		MG/L	Duffield Report - Aug, 1993
Col	OW-15	11/5/90	TDS	DPH	327		MG/L	Duffield Report - Aug, 1993
Col	OW-15	8/16/93	DO	LLI	0.4		MG/L	Duffield Report - June, 1994
Col	OW-15	8/16/93	Eh	LLI	63		mV	Duffield Report - June, 1994
Col	OW-15	8/16/93	IRON (TOTAL)	LLI	17.1		MG/L	Duffield Report - Oct, 1993
Col	OW-15	8/16/93	MANGANESE (TOTAL)	LLI	2.12		MG/L	Duffield Report - Oct, 1993
Col	OW-15	8/16/93	pH	LLI	6.3			Duffield Report - Oct, 1993
Col	OW-15	9/9/93	DO	LLI	0.4		MG/L	Duffield Report - June, 1994
Col	OW-15	9/9/93	Eh	LLI	18		mV	Duffield Report - June, 1994
Col	OW-15	9/9/93	IRON (TOTAL)	LLI	17.6		MG/L	Duffield Report - Oct, 1993
Col	OW-15	9/9/93	MANGANESE (TOTAL)	LLI	2.05		MG/L	Duffield Report - Oct, 1993
Col	OW-15	9/9/93	pH	LLI	5.95			Duffield Report - Oct, 1993
Col	OW-15	4/26/94	DO	LLI	0.4		MG/L	Duffield Report - June, 1994
Col	OW-15	4/26/94	Eh	LLI	-32		mV	Duffield Report - June, 1994
Col	OW-15	4/26/94	IRON (TOTAL)	LLI	23.2		MG/L	Duffield Report - June, 1994
Col	OW-15	4/26/94	MANGANESE (TOTAL)	LLI	3.94		MG/L	Duffield Report - June, 1994
Col	OW-15	8/17/95	DO		2.25		MG/L	Tetra Tech XLS table
Col	OW-15	8/17/95	Eh		-857		mV	Tetra Tech XLS table
Col	OW-15	8/17/95	IRON (TOTAL)		0.977		MG/L	Tetra Tech XLS table
Col	OW-15	8/17/95	pH		4.91			Tetra Tech XLS table
Col	OW-15	9/19/95	DO		2.25		MG/L	Tetra Tech report 10/4/95
Col	OW-15	9/19/95	Eh		218		mV	Tetra Tech report 10/4/95
Col	OW-15	9/19/95	IRON (DISSOLVED)		0.589		MG/L	Tetra Tech report 10/4/95
Col	OW-15	9/19/95	MANGANESE (DISSOLVED)		6.62		MG/L	Tetra Tech report 10/4/95
Col	OW-15	9/19/95	pH		4.76			Tetra Tech report 10/4/95
Col	OW-15	10/17/95	DO		1.87		MG/L	Tetra Tech report 11/9/95
Col	OW-15	10/17/95	Eh		33		mV	Tetra Tech report 11/9/95
Col	OW-15	10/17/95	IRON (DISSOLVED)		0	U	MG/L	Tetra Tech report 11/9/95
Col	OW-15	10/17/95	MANGANESE (DISSOLVED)		4.73		MG/L	Tetra Tech report 11/9/95
Col	OW-15	10/17/95	pH		5.19			Tetra Tech report 11/9/95
Col	OW-15	11/15/95	DO		1.97		MG/L	Newark Pump Test 11/95
Col	OW-15	11/15/95	Eh		197		mV	Newark Pump Test 11/95
Col	OW-15	11/15/95	IRON (DISSOLVED)		0.025		MG/L	Newark Pump Test 11/95
Col	OW-15	11/15/95	MANGANESE (DISSOLVED)		5.01		MG/L	Newark Pump Test 11/95
Col	OW-15	11/15/95	pH		4.77			Newark Pump Test 11/95
Pot	OW-16A	8/10/90	IRON (TOTAL)	ALI	44		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	8/10/90	MANGANESE (TOTAL)	ALI	0.61		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	8/10/90	pH	ALI	6.6			Duffield Report - Aug, 1993
Pot	OW-16A	8/10/90	TDS	ALI	230		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	9/19/90	IRON (TOTAL)	ALI	23		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	9/19/90	MANGANESE (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	9/19/90	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	OW-16A	9/19/90	TDS	ALI	160		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	IRON (TOTAL)	DPH	14		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	IRON (TOTAL)	ALI	17.7		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	MANGANESE (TOTAL)	DPH	0.43		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	MANGANESE (TOTAL)	ALI	0.32		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	pH	DPH	5.6			Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	TDS	DPH	140		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	11/5/90	TDS	ALI	140		MG/L	Duffield Report - Aug, 1993
Pot	OW-16A	8/16/93	DO	LLI	1		MG/L	Duffield Report - June, 1994
Pot	OW-16A	8/16/93	Eh	LLI	-54		mV	Duffield Report - June, 1994
Pot	OW-16A	8/17/93	IRON (TOTAL)	LLI	24.9		MG/L	Duffield Report - Oct, 1993
Pot	OW-16A	8/17/93	MANGANESE (TOTAL)	LLI	0.289		MG/L	Duffield Report - Oct, 1993
Pot	OW-16A	8/17/93	pH	LLI	5.6			Duffield Report - Oct, 1993
Pot	OW-16A	4/26/94	DO	LLI	0.2		MG/L	Duffield Report - June, 1994
Pot	OW-16A	4/26/94	Eh	LLI	53		mV	Duffield Report - June, 1994
Pot	OW-16A	4/26/94	IRON (TOTAL)	LLI	21		MG/L	Duffield Report - June, 1994
Pot	OW-16A	4/26/94	MANGANESE (TOTAL)	LLI	0.323		MG/L	Duffield Report - June, 1994
Pot	OW-16A	8/16/95	Eh		-165		mV	Tetra Tech XLS table
Pot	OW-16A	8/16/95	IRON (TOTAL)		24.5		MG/L	Tetra Tech XLS table
Pot	OW-16A	8/16/95	pH		5.13			Tetra Tech XLS table

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	OW-16A	9/19/95	DO		2.12		MG/L	Tetra Tech report 10/4/95
Pot	OW-16A	9/19/95	Eh		35		mV	Tetra Tech report 10/4/95
Pot	OW-16A	9/19/95	IRON (DISSOLVED)		20.1		MG/L	Tetra Tech report 10/4/95
Pot	OW-16A	9/19/95	MANGANESE (DISSOLVED)		0.363		MG/L	Tetra Tech report 10/4/95
Pot	OW-16A	9/19/95	pH		5.05			Tetra Tech report 10/4/95
Pot	OW-16A	10/17/95	DO		2.13		MG/L	Tetra Tech report 11/9/95
Pot	OW-16A	10/17/95	Eh		14		mV	Tetra Tech report 11/9/95
Pot	OW-16A	10/17/95	IRON (DISSOLVED)		24.2		MG/L	Tetra Tech report 11/9/95
Pot	OW-16A	10/17/95	MANGANESE (DISSOLVED)		0.388		MG/L	Tetra Tech report 11/9/95
Pot	OW-16A	10/17/95	pH		5.82			Tetra Tech report 11/9/95
Pot	OW-16A	11/15/95	DO		2.24		MG/L	Newark Pump Test 11/95
Pot	OW-16A	11/15/95	Eh		17		mV	Newark Pump Test 11/95
Pot	OW-16A	11/15/95	IRON (DISSOLVED)		18.9		MG/L	Newark Pump Test 11/95
Pot	OW-16A	11/15/95	MANGANESE (DISSOLVED)		0.37		MG/L	Newark Pump Test 11/95
Pot	OW-16A	11/15/95	pH		5.29			Newark Pump Test 11/95
Pot	OW-16B	8/16/93	DO	LLI	0.3		MG/L	Duffield Report - June, 1994
Pot	OW-16B	8/16/93	Eh	LLI	121		mV	Duffield Report - June, 1994
Pot	OW-16B	8/17/93	IRON (TOTAL)	LLI	10.4		MG/L	Duffield Report - Oct, 1993
Pot	OW-16B	8/17/93	MANGANESE (TOTAL)	LLI	0.182		MG/L	Duffield Report - Oct, 1993
Pot	OW-16B	8/17/93	pH	LLI	5.3			Duffield Report - Oct, 1993
Pot	OW-16B	9/9/93	DO	LLI	0.4		MG/L	Duffield Report - June, 1994
Pot	OW-16B	9/9/93	Eh	LLI	165		mV	Duffield Report - June, 1994
Pot	OW-16B	9/9/93	IRON (TOTAL)	LLI	16.5		MG/L	Duffield Report - Oct, 1993
Pot	OW-16B	9/9/93	MANGANESE (TOTAL)	LLI	0.308		MG/L	Duffield Report - Oct, 1993
Pot	OW-16B	9/9/93	pH	LLI	5.2			Duffield Report - Oct, 1993
Pot	OW-16B	4/26/94	DO	LLI	0.9		MG/L	Duffield Report - June, 1994
Pot	OW-16B	4/26/94	Eh	LLI	144		mV	Duffield Report - June, 1994
Pot	OW-16B	4/26/94	IRON (TOTAL)	LLI	13.1		MG/L	Duffield Report - June, 1994
Pot	OW-16B	4/26/94	MANGANESE (TOTAL)	LLI	0.242		MG/L	Duffield Report - June, 1994
Pot	OW-16B	8/16/95	Eh		-268		mV	Tetra Tech XLS table
Pot	OW-16B	8/16/95	IRON (TOTAL)		19.9		MG/L	Tetra Tech XLS table
Pot	OW-16B	8/16/95	pH		5.1			Tetra Tech XLS table
Pot	OW-16B	9/19/95	DO		2.12		MG/L	Tetra Tech report 10/4/95
Pot	OW-16B	9/19/95	Eh		40		mV	Tetra Tech report 10/4/95
Pot	OW-16B	9/19/95	IRON (DISSOLVED)		17.6		MG/L	Tetra Tech report 10/4/95
Pot	OW-16B	9/19/95	MANGANESE (DISSOLVED)		0.307		MG/L	Tetra Tech report 10/4/95
Pot	OW-16B	9/19/95	pH		5.04			Tetra Tech report 10/4/95
Pot	OW-16B	10/17/95	DO		2.03		MG/L	Tetra Tech report 11/9/95
Pot	OW-16B	10/17/95	Eh		88		mV	Tetra Tech report 11/9/95
Pot	OW-16B	10/17/95	IRON (DISSOLVED)		14.5		MG/L	Tetra Tech report 11/9/95
Pot	OW-16B	10/17/95	MANGANESE (DISSOLVED)		0.257		MG/L	Tetra Tech report 11/9/95
Pot	OW-16B	10/17/95	pH		5.67			Tetra Tech report 11/9/95
Pot	PW-10	6/30/86	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/30/86	pH	DPH	6.2			Duffield Report - Aug, 1993
Pot	PW-10	6/30/86	TDS	DPH	101		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/29/88	pH	DPH	5.7			Duffield Report - Aug, 1993
Pot	PW-10	6/29/88	TDS	DPH	139		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/31/89	IRON (TOTAL)	DPH	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/31/89	pH	DPH	5.4			Duffield Report - Aug, 1993
Pot	PW-10	5/31/89	TDS	DPH	81		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	12/1/89	IRON (TOTAL)	ALI	0.06		MG/L	Tetra Tech fax 12/95
Pot	PW-10	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/6/90	pH	DPH	5.6			Duffield Report - Aug, 1993
Pot	PW-10	6/11/90	IRON (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/11/90	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	6/11/90	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-10	6/11/90	TDS	ALI	150		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/10/90	IRON (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/10/90	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	1/10/91	IRON (TOTAL)	ALI	0.07		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	1/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	1/10/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-10	2/13/91	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	2/13/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	2/13/91	pH	ALI	4.6			Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-10	3/11/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	3/11/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	3/11/91	pH	ALI	4.5			Duffield Report - Aug, 1993
Pot	PW-10	4/11/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	4/11/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	4/11/91	pH	ALI	5			Duffield Report - Aug, 1993
Pot	PW-10	5/15/91	IRON (TOTAL)	ALI	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/15/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/15/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-10	7/10/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/10/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/10/91	pH	ALI	4.7			Duffield Report - Aug, 1993
Pot	PW-10	9/16/91	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	9/16/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	9/16/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-10	5/20/92	IRON (TOTAL)	ALI	0.22		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/20/92	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/20/92	pH	ALI	5			Duffield Report - Aug, 1993
Pot	PW-10	7/8/92	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/8/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-10	7/8/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-10	10/7/92	IRON (TOTAL)	ALI	0.07		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	10/7/92	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	10/7/92	pH	ALI	5			Duffield Report - Aug, 1993
Pot	PW-10	5/14/93	IRON (TOTAL)	ALI	0.36		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/14/93	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-10	5/14/93	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-10	5/14/93	TURBIDITY	ALI	0.5		NTU	Duffield Report - Aug, 1993
Pot	PW-10	8/16/93	DO	LLI	3.3		MG/L	Duffield Report - June, 1994
Pot	PW-10	8/16/93	Eh	LLI	356		mV	Duffield Report - June, 1994
Pot	PW-10	8/16/93	IRON (TOTAL)	LLI	0.4		MG/L	Duffield Report - Oct, 1993
Pot	PW-10	8/16/93	MANGANESE (TOTAL)	LLI	0.018		MG/L	Duffield Report - Oct, 1993
Pot	PW-10	8/16/93	pH	LLI	5.7			Duffield Report - Oct, 1993
Pot	PW-10	5/23/95	IRON (TOTAL)	DPH	1.8		MG/L	DPH Sheets 5/95 sampling
Pot	PW-10	5/23/95	MANGANESE (TOTAL)	DPH	0.03		MG/L	DPH Sheets 5/95 sampling
Pot	PW-10	5/23/95	pH	DPH	5.4			DPH Sheets 5/95 sampling
Pot	PW-10	5/23/95	TDS	DPH	136		MG/L	DPH Sheets 5/95 sampling
Pot	PW-10	8/16/95	DO		0.22		MG/L	Tetra Tech XLS table
Pot	PW-10	8/16/95	Eh		-53		mV	Tetra Tech XLS table
Pot	PW-10	8/16/95	IRON (TOTAL)		1.07		MG/L	Tetra Tech XLS table
Pot	PW-10	8/16/95	pH		5.01			Tetra Tech XLS table
Pot	PW-10	9/20/95	DO		1.62		MG/L	Tetra Tech report 10/4/95
Pot	PW-10	9/20/95	Eh		149		mV	Tetra Tech report 10/4/95
Pot	PW-10	9/20/95	IRON (TOTAL)		0.33		MG/L	Tetra Tech report 10/4/95
Pot	PW-10	9/20/95	MANGANESE (TOTAL)		0.019		MG/L	Tetra Tech report 10/4/95
Pot	PW-10	9/20/95	pH		5.08			Tetra Tech report 10/4/95
Pot	PW-10	10/18/95	DO		0.64		MG/L	Tetra Tech report 11/9/95
Pot	PW-10	10/18/95	Eh		152		mV	Tetra Tech report 11/9/95
Pot	PW-10	10/18/95	IRON (TOTAL)		1.69		MG/L	Tetra Tech report 11/9/95
Pot	PW-10	10/18/95	MANGANESE (TOTAL)		0.03		MG/L	Tetra Tech report 11/9/95
Pot	PW-10	10/18/95	pH		5.41			Tetra Tech report 11/9/95
Pot	PW-10	11/13/95	DO		1.38			Newark Pump Test 11/95
Pot	PW-10	11/13/95	IRON (TOTAL)		1.86		MG/L	Newark Pump Test 11/95
Pot	PW-10	11/13/95	MANGANESE (TOTAL)		0.031		MG/L	Newark Pump Test 11/95
Pot	PW-10	11/13/95	pH		5.49		mV	Newark Pump Test 11/95
Col	PW-11	6/14/82	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/14/82	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-11	6/14/82	TDS	DPH	108		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/29/83	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/29/83	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-11	6/29/83	TDS	DPH	130		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/20/84	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/20/84	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-11	6/20/84	TDS	DPH	110		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/12/85	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/12/85	pH	DPH	5.5			Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-11	6/12/85	TDS	DPH	136		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/30/86	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/30/86	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-11	6/30/86	TDS	DPH	118		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/10/87	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/10/87	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-11	6/10/87	TDS	DPH	149		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/29/88	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/29/88	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-11	6/29/88	TDS	DPH	133		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/31/89	pH	DPH	5.7			Duffield Report - Aug, 1993
Col	PW-11	5/31/89	TDS	DPH	187		MG/L	Duffield Report - Aug, 1993
Col	PW-11	12/1/89	IRON (TOTAL)	ALI	0.21		MG/L	Tetra Tech fax 12/95
Col	PW-11	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/6/90	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-11	6/11/90	IRON (TOTAL)	ALI	0.41		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/11/90	MANGANESE (TOTAL)	ALI	0.41		MG/L	Duffield Report - Aug, 1993
Col	PW-11	6/11/90	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-11	6/11/90	TDS	ALI	170		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/10/91	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/10/91	MANGANESE (TOTAL)	ALI	0.49		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/10/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Col	PW-11	2/13/91	IRON (TOTAL)	ALI	0.14		MG/L	Duffield Report - Aug, 1993
Col	PW-11	2/13/91	MANGANESE (TOTAL)	ALI	0.45		MG/L	Duffield Report - Aug, 1993
Col	PW-11	2/13/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-11	3/11/91	IRON (TOTAL)	ALI	0.19		MG/L	Duffield Report - Aug, 1993
Col	PW-11	3/11/91	MANGANESE (TOTAL)	ALI	0.42		MG/L	Duffield Report - Aug, 1993
Col	PW-11	3/11/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-11	4/11/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Col	PW-11	4/11/91	MANGANESE (TOTAL)	ALI	0.49		MG/L	Duffield Report - Aug, 1993
Col	PW-11	4/11/91	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-11	5/15/91	IRON (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/15/91	MANGANESE (TOTAL)	ALI	0.39		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/15/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-11	7/10/91	IRON (TOTAL)	ALI	0.16		MG/L	Duffield Report - Aug, 1993
Col	PW-11	7/10/91	MANGANESE (TOTAL)	ALI	0.36		MG/L	Duffield Report - Aug, 1993
Col	PW-11	7/10/91	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-11	9/16/91	IRON (TOTAL)	ALI	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-11	9/16/91	MANGANESE (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Col	PW-11	9/16/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-11	11/5/91	IRON (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Col	PW-11	11/5/91	MANGANESE (TOTAL)	ALI	0.32		MG/L	Duffield Report - Aug, 1993
Col	PW-11	11/5/91	pH	ALI	6.7			Duffield Report - Aug, 1993
Col	PW-11	1/29/92	IRON (TOTAL)	ALI	0.36		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/29/92	MANGANESE (TOTAL)	ALI	0.28		MG/L	Duffield Report - Aug, 1993
Col	PW-11	1/29/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-11	3/18/92	IRON (TOTAL)	ALI	0.09		MG/L	Duffield Report - Aug, 1993
Col	PW-11	3/18/92	MANGANESE (TOTAL)	ALI	0.31		MG/L	Duffield Report - Aug, 1993
Col	PW-11	3/18/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-11	5/20/92	IRON (TOTAL)	ALI	0.06		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/20/92	MANGANESE (TOTAL)	ALI	0.32		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/20/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-11	7/8/92	IRON (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-11	7/8/92	MANGANESE (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-11	7/8/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-11	10/7/92	IRON (TOTAL)	ALI	0.09		MG/L	Duffield Report - Aug, 1993
Col	PW-11	10/7/92	MANGANESE (TOTAL)	ALI	0.3		MG/L	Duffield Report - Aug, 1993
Col	PW-11	10/7/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-11	5/14/93	IRON (TOTAL)	ALI	0.16		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/14/93	MANGANESE (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Col	PW-11	5/14/93	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-11	5/14/93	TURBIDITY	ALI	0.4		NTU	Duffield Report - Aug, 1993
Col	PW-11	8/16/93	DO	LLI	5.7		MG/L	Duffield Report - June, 1994
Col	PW-11	8/16/93	Eh	LLI	256		mV	Duffield Report - June, 1994
Col	PW-11	8/16/93	IRON (TOTAL)	LLI	0.41		MG/L	Duffield Report - Oct, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-11	8/16/93	MANGANESE (TOTAL)	LLI	0.063		MG/L	Duffield Report - Oct, 1993
Col	PW-11	8/16/93	pH	LLI	5.36			Duffield Report - Oct, 1993
Col	PW-11	9/9/93	DO	LLI	4.3		MG/L	Duffield Report - June, 1994
Col	PW-11	9/9/93	Eh	LLI	210		mV	Duffield Report - June, 1994
Col	PW-11	9/9/93	IRON (TOTAL)	LLI	0.16		MG/L	Duffield Report - Oct, 1993
Col	PW-11	9/9/93	MANGANESE (TOTAL)	LLI	0.226		MG/L	Duffield Report - Oct, 1993
Col	PW-11	9/9/93	pH	LLI	7			Duffield Report - Oct, 1993
Col	PW-11	3/17/95	DO		6.8		MG/L	Report dated 4/4/95
Col	PW-11	3/17/95	IRON (TOTAL)		0.177		MG/L	Report dated 4/4/95
Col	PW-11	3/17/95	MANGANESE (TOTAL)		0.319		MG/L	Report dated 4/4/95
Col	PW-11	3/17/95	pH		5.2			Report dated 4/4/95
Col	PW-11	5/23/95	IRON (TOTAL)	DPH	0.39		MG/L	DPH Sheets 5/95 sampling
Col	PW-11	5/23/95	MANGANESE (TOTAL)	DPH	0.34		MG/L	DPH Sheets 5/95 sampling
Col	PW-11	5/23/95	pH	DPH	5.7			DPH Sheets 5/95 sampling
Col	PW-11	5/23/95	TDS	DPH	156		MG/L	DPH Sheets 5/95 sampling
Col	PW-11	8/15/95	IRON (TOTAL)		0.15		MG/L	Tetra Tech report 10/4/95
Col	PW-11	8/15/95	MANGANESE (TOTAL)		0.35		MG/L	Tetra Tech report 10/4/95
Col	PW-11	8/16/95	DO		4.16		MG/L	Tetra Tech XLS table
Col	PW-11	8/16/95	Eh		-84			Tetra Tech XLS table
Col	PW-11	8/16/95	IRON (TOTAL)		0.073		MG/L	Tetra Tech XLS table
Col	PW-11	8/16/95	pH		5.21			Tetra Tech XLS table
Col	PW-11	9/12/95	DO		2.79		MG/L	Tetra Tech XLS table
Col	PW-11	9/12/95	pH		5.33			Tetra Tech XLS table
Col	PW-11	9/20/95	DO		4.64		MG/L	Tetra Tech report 10/4/95
Col	PW-11	9/20/95	Eh		142			Tetra Tech report 10/4/95
Col	PW-11	9/20/95	IRON (TOTAL)		0.1		MG/L	Tetra Tech report 10/4/95
Col	PW-11	9/20/95	MANGANESE (TOTAL)		0.371		MG/L	Tetra Tech report 10/4/95
Col	PW-11	9/20/95	pH		5.4			Tetra Tech report 10/4/95
Col	PW-11	9/27/95	DO		4.35		MG/L	Tetra Tech report 10/4/95
Col	PW-11	9/27/95	Eh		183		mV	Tetra Tech report 10/4/95
Col	PW-11	9/27/95	pH		5.44			Tetra Tech report 10/4/95
Col	PW-11	10/2/95	DO		2.63		MG/L	Tetra Tech report 10/4/95
Col	PW-11	10/2/95	Eh		162		mV	Tetra Tech report 10/4/95
Col	PW-11	10/2/95	pH		5.45			Tetra Tech report 10/4/95
Col	PW-11	10/10/95	DO		4.09		MG/L	Tetra Tech report 11/9/95
Col	PW-11	10/10/95	Eh		163		mV	Tetra Tech report 11/9/95
Col	PW-11	10/10/95	pH		5.35			Tetra Tech report 11/9/95
Col	PW-11	10/18/95	DO		6.13		MG/L	Tetra Tech report 11/9/95
Col	PW-11	10/18/95	Eh		143		mV	Tetra Tech report 11/9/95
Col	PW-11	10/18/95	IRON (TOTAL)		0.068		MG/L	Tetra Tech report 11/9/95
Col	PW-11	10/18/95	MANGANESE (TOTAL)		0.357		MG/L	Tetra Tech report 11/9/95
Col	PW-11	10/18/95	pH		5.66			Tetra Tech report 11/9/95
Col	PW-11	10/25/95	DO		5.13		MG/L	Tetra Tech report 11/9/95
Col	PW-11	10/25/95	Eh		151		mV	Tetra Tech report 11/9/95
Col	PW-11	10/25/95	pH		5.65			Tetra Tech report 11/9/95
Col	PW-11	11/1/95	DO		4.88		MG/L	Tetra Tech report 11/9/95
Col	PW-11	11/1/95	Eh		151		mV	Tetra Tech report 11/9/95
Col	PW-11	11/1/95	pH		6.01			Tetra Tech report 11/9/95
Col	PW-11	11/7/95	DO		6.01		MG/L	Tetra Tech report 11/9/95
Col	PW-11	11/7/95	Eh		139		mV	Tetra Tech report 11/9/95
Col	PW-11	11/7/95	pH		5.63			Tetra Tech report 11/9/95
Col	PW-11	11/13/1995(0825)	DO		6.14		MG/L	Newark Pump Test 11/95
Col	PW-11	11/13/1995(0825)	IRON (TOTAL)		3.73		MG/L	Newark Pump Test 11/95
Col	PW-11	11/13/1995(0825)	MANGANESE (TOTAL)		0.387		MG/L	Newark Pump Test 11/95
Col	PW-11	11/13/1995(0825)	pH		5.64			Newark Pump Test 11/95
Col	PW-11	11/15/1995(1450)	DO		4.83		MG/L	Newark Pump Test 11/95
Col	PW-11	11/15/1995(1450)	Eh		235		mV	Newark Pump Test 11/95
Col	PW-11	11/15/1995(1450)	pH		5.35			Newark Pump Test 11/95
Col	PW-11	11/16/95(1000)	DO		6.37		MG/L	Newark Pump Test 11/95
Col	PW-11	11/16/95(1000)	Eh		292		mV	Newark Pump Test 11/95
Col	PW-11	11/16/95(1000)	pH		5.69			Newark Pump Test 11/95
Col	PW-11	11/16/95(1544)	DO		6.3		MG/L	Newark Pump Test 11/95
Col	PW-11	11/16/95(1544)	pH		5.59			Newark Pump Test 11/95
Col	PW-11	11/17/95(0845)	DO		5.11		MG/L	Newark Pump Test 11/95
Col	PW-11	11/17/95(0845)	pH		5.63			Newark Pump Test 11/95
Pot	PW-12	9/11/79	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-12	9/11/79	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-12	7/10/80	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/10/80	pH	DPH	5.4			Duffield Report - Aug, 1993
Pot	PW-12	7/10/80	TDS	DPH	87		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/14/82	IRON (TOTAL)	DPH	0.35		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/14/82	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-12	6/14/82	TDS	DPH	53		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/29/83	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/29/83	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-12	6/29/83	TDS	DPH	67		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/20/84	IRON (TOTAL)	DPH	0.55		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/20/84	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-12	6/20/84	TDS	DPH	57		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/12/85	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/12/85	pH	DPH	5			Duffield Report - Aug, 1993
Pot	PW-12	6/12/85	TDS	DPH	95		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/30/86	IRON (TOTAL)	DPH	0.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/30/86	pH	DPH	4.9			Duffield Report - Aug, 1993
Pot	PW-12	6/30/86	TDS	DPH	47		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/10/87	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/10/87	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-12	6/10/87	TDS	DPH	69		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/29/88	IRON (TOTAL)	DPH	0.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/29/88	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-12	6/29/88	TDS	DPH	53		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/31/89	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-12	5/31/89	TDS	DPH	66		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	12/1/89	IRON (TOTAL)	ALI	2.3		MG/L	Tetra Tech fax 12/95
Pot	PW-12	1/1/90	IRON (TOTAL)	ALI	1.78		MG/L	Tetra Tech fax 12/95
Pot	PW-12	2/1/90	IRON (TOTAL)	ALI	2.8		MG/L	Tetra Tech fax 12/95
Pot	PW-12	4/1/90	IRON (TOTAL)	ALI	3		MG/L	Tetra Tech fax 12/95
Pot	PW-12	5/1/90	IRON (TOTAL)	ALI	0.66		MG/L	Tetra Tech fax 12/95
Pot	PW-12	6/6/90	IRON (TOTAL)	DPH	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/6/90	pH	DPH	5.4			Duffield Report - Aug, 1993
Pot	PW-12	6/11/90	IRON (TOTAL)	ALI	0.54		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/11/90	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	6/11/90	pH	ALI	4.7			Duffield Report - Aug, 1993
Pot	PW-12	6/11/90	TDS	ALI	64		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/10/91	IRON (TOTAL)	ALI	0.44		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/10/91	pH	ALI	4.4			Duffield Report - Aug, 1993
Pot	PW-12	2/13/91	IRON (TOTAL)	ALI	0.38		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	2/13/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	2/13/91	pH	ALI	4.2			Duffield Report - Aug, 1993
Pot	PW-12	3/11/91	IRON (TOTAL)	ALI	0.52		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	3/11/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	3/11/91	pH	ALI	4.3			Duffield Report - Aug, 1993
Pot	PW-12	4/11/91	IRON (TOTAL)	ALI	0.53		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	4/11/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	4/11/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-12	5/15/91	IRON (TOTAL)	ALI	0.56		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/15/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/15/91	pH	ALI	4.4			Duffield Report - Aug, 1993
Pot	PW-12	7/10/91	IRON (TOTAL)	ALI	0.58		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/10/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/10/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-12	9/16/91	IRON (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	9/16/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	9/16/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-12	11/5/91	IRON (TOTAL)	ALI	0.62		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	11/5/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	11/5/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-12	1/29/92	IRON (TOTAL)	ALI	2.17		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/29/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	1/29/92	pH	ALI	5.1			Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-12	3/18/92	IRON (TOTAL)	ALI	1.59		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	3/18/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	3/18/92	pH	ALI	5			Duffield Report - Aug, 1993
Pot	PW-12	5/20/92	IRON (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/20/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/20/92	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-12	7/8/92	IRON (TOTAL)	ALI	2.58		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/8/92	MANGANESE (TOTAL)	ALI	0.04		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	7/8/92	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-12	10/7/92	IRON (TOTAL)	ALI	3.92		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	10/7/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	10/7/92	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-12	5/14/93	IRON (TOTAL)	ALI	0.75		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/14/93	MANGANESE (TOTAL)	ALI	0.15		MG/L	Duffield Report - Aug, 1993
Pot	PW-12	5/14/93	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-12	5/14/93	TURBIDITY	ALI	3.9		NTU	Duffield Report - Aug, 1993
Pot	PW-12	8/16/93	DO	LLI	5.2		MG/L	Duffield Report - June, 1994
Pot	PW-12	8/16/93	Eh	LLI	243		mV	Duffield Report - June, 1994
Pot	PW-12	8/16/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Pot	PW-12	8/16/93	MANGANESE (TOTAL)	LLI	0.08		MG/L	Duffield Report - Oct, 1993
Pot	PW-12	8/16/93	pH	LLI	6.55			Duffield Report - Oct, 1993
Pot	PW-12	4/26/94	DO	LLI	2.8		MG/L	Duffield Report - June, 1994
Pot	PW-12	4/26/94	Eh	LLI	233		mV	Duffield Report - June, 1994
Pot	PW-12	4/26/94	IRON (TOTAL)	LLI	1.81		MG/L	Duffield Report - June, 1994
Pot	PW-12	4/26/94	MANGANESE (TOTAL)	LLI	0.035		MG/L	Duffield Report - June, 1994
Pot	PW-12	3/17/95	DO		4.4		MG/L	Report dated 4/4/95
Pot	PW-12	3/17/95	IRON (TOTAL)		0.232		MG/L	Report dated 4/4/95
Pot	PW-12	3/17/95	MANGANESE (TOTAL)		0.019		MG/L	Report dated 4/4/95
Pot	PW-12	3/17/95	pH		4.8			Report dated 4/4/95
Pot	PW-12	5/23/95	Eh	DPH			mV	Tetra Tech XLS table
Pot	PW-12	5/23/95	IRON (TOTAL)	DPH	1.1		MG/L	DPH Sheets 5/95 sampling
Pot	PW-12	5/23/95	MANGANESE (TOTAL)	DPH	0.04		MG/L	DPH Sheets 5/95 sampling
Pot	PW-12	5/23/95	pH	DPH	5.4			DPH Sheets 5/95 sampling
Pot	PW-12	5/23/95	TDS	DPH	54		MG/L	DPH Sheets 5/95 sampling
Pot	PW-12	8/15/95	IRON (TOTAL)		0.18		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	8/15/95	MANGANESE (TOTAL)		0.05		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	8/16/95	DO		7.84		MG/L	Tetra Tech XLS table
Pot	PW-12	8/16/95	Eh		-41		mV	Tetra Tech XLS table
Pot	PW-12	8/16/95	IRON (TOTAL)		0.115		MG/L	Tetra Tech XLS table
Pot	PW-12	8/16/95	pH		4.86			Tetra Tech XLS table
Pot	PW-12	9/5/95	DO		0.63		MG/L	Tetra Tech XLS table
Pot	PW-12	9/5/95	Eh		126		mV	Tetra Tech XLS table
Pot	PW-12	9/5/95	pH		4.39			Tetra Tech XLS table
Pot	PW-12	9/12/95	DO		0.15		MG/L	Tetra Tech XLS table
Pot	PW-12	9/12/95	pH		4.56			Tetra Tech XLS table
Pot	PW-12	9/20/95	DO		0.19		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	9/20/95	Eh		180		mV	Tetra Tech report 10/4/95
Pot	PW-12	9/20/95	IRON (TOTAL)		0.359		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	9/20/95	MANGANESE (TOTAL)		0.022		MG/L	Tetra Tech report 10/4/95
Pot	PW-12	9/20/95	pH		4.86			Tetra Tech report 10/4/95
Pot	PW-12	10/18/95	DO		0.48		MG/L	Tetra Tech report 11/9/95
Pot	PW-12	10/18/95	Eh		123		mV	Tetra Tech report 11/9/95
Pot	PW-12	10/18/95	IRON (TOTAL)		3.77		MG/L	Tetra Tech report 11/9/95
Pot	PW-12	10/18/95	MANGANESE (TOTAL)		0.058		MG/L	Tetra Tech report 11/9/95
Pot	PW-12	10/18/95	pH		5.4			Tetra Tech report 11/9/95
Pot	PW-12	11/13/95	DO		0.5		MG/L	Newark Pump Test 11/95
Pot	PW-12	11/13/95	IRON (TOTAL)		5.42		MG/L	Newark Pump Test 11/95
Pot	PW-12	11/13/95	MANGANESE (TOTAL)		0.074		MG/L	Newark Pump Test 11/95
Pot	PW-12	11/13/95	pH		5.61			Newark Pump Test 11/95
Col	PW-13	10/13/66	IRON (TOTAL)	OLI	0.15		MG/L	Duffield Report - Aug, 1993
Col	PW-13	10/13/66	MANGANESE (TOTAL)	OLI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	10/13/66	pH	OLI	6.6			Duffield Report - Aug, 1993
Col	PW-13	10/13/66	TDS	OLI	90		MG/L	Duffield Report - Aug, 1993
Col	PW-13	9/11/79	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	9/11/79	pH	DPH	5.8			Duffield Report - Aug, 1993
Col	PW-13	7/10/80	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-13	7/10/80	pH	DPH	6.6			Duffield Report - Aug, 1993
Col	PW-13	7/10/80	TDS	DPH	165		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/14/82	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/14/82	pH	DPH	5.7			Duffield Report - Aug, 1993
Col	PW-13	6/14/82	TDS	DPH	152		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/29/83	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/29/83	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-13	6/29/83	TDS	DPH	145		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/20/84	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/20/84	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-13	6/20/84	TDS	DPH	169		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/12/85	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/12/85	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-13	6/12/85	TDS	DPH	117		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/30/86	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/30/86	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-13	6/30/86	TDS	DPH	134		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/10/87	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/10/87	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-13	6/10/87	TDS	DPH	149		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/29/88	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-13	6/29/88	TDS	DPH	136		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/31/89	pH	DPH	5.8			Duffield Report - Aug, 1993
Col	PW-13	5/31/89	TDS	DPH	154		MG/L	Duffield Report - Aug, 1993
Col	PW-13	12/1/89	IRON (TOTAL)	ALI	0.18		MG/L	Tetra Tech fax 12/95
Col	PW-13	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/6/90	pH	DPH	6			Duffield Report - Aug, 1993
Col	PW-13	6/11/90	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/11/90	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	6/11/90	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-13	6/11/90	TDS	ALI	150		MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/10/91	IRON (TOTAL)	ALI	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/10/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/10/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-13	2/13/91	IRON (TOTAL)	ALI	0.28		MG/L	Duffield Report - Aug, 1993
Col	PW-13	2/13/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-13	2/13/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Col	PW-13	3/11/91	IRON (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-13	3/11/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	3/11/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-13	4/11/91	IRON (TOTAL)	ALI	0.17		MG/L	Duffield Report - Aug, 1993
Col	PW-13	4/11/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-13	4/11/91	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-13	5/15/91	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/15/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/15/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-13	7/10/91	IRON (TOTAL)	ALI	0.21		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/10/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-13	9/16/91	IRON (TOTAL)	ALI	0.42		MG/L	Duffield Report - Aug, 1993
Col	PW-13	9/16/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	9/16/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-13	11/5/91	IRON (TOTAL)	ALI	0.09		MG/L	Duffield Report - Aug, 1993
Col	PW-13	11/5/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	11/5/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-13	1/29/92	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/29/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	1/29/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-13	3/18/92	IRON (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Col	PW-13	3/18/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	3/18/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-13	5/20/92	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/20/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/20/92	pH	ALI	5.5			Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-13	7/8/92	IRON (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/8/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Col	PW-13	7/8/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-13	10/7/92	IRON (TOTAL)	ALI	0.06		MG/L	Duffield Report - Aug, 1993
Col	PW-13	10/7/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-13	10/7/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-13	5/14/93	IRON (TOTAL)	ALI	1.72		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/14/93	MANGANESE (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-13	5/14/93	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-13	5/14/93	TURBIDITY	ALI	5.7		NTU	Duffield Report - Aug, 1993
Col	PW-13	8/16/93	DO	LLI	4.5		MG/L	Duffield Report - June, 1994
Col	PW-13	8/16/93	Eh	LLI	208		mV	Duffield Report - June, 1994
Col	PW-13	8/16/93	IRON (TOTAL)	LLI	0.62		MG/L	Duffield Report - Oct, 1993
Col	PW-13	8/16/93	MANGANESE (TOTAL)	LLI	0.099		MG/L	Duffield Report - Oct, 1993
Col	PW-13	8/16/93	pH	LLI	5.55			Duffield Report - Oct, 1993
Col	PW-13	9/9/93	DO	LLI	7.6		MG/L	Duffield Report - June, 1994
Col	PW-13	9/9/93	Eh	LLI	283		mV	Duffield Report - June, 1994
Col	PW-13	9/9/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Col	PW-13	9/9/93	MANGANESE (TOTAL)	LLI	0.056		MG/L	Duffield Report - Oct, 1993
Col	PW-13	9/9/93	pH	LLI	5.75			Duffield Report - Oct, 1993
Col	PW-13	4/26/94	DO	LLI	8.4		MG/L	Duffield Report - June, 1994
Col	PW-13	4/26/94	Eh	LLI	291		mV	Duffield Report - June, 1994
Col	PW-13	4/26/94	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - June, 1994
Col	PW-13	4/26/94	MANGANESE (TOTAL)	LLI	0.01		MG/L	Duffield Report - June, 1994
Col	PW-13	3/17/95	DO		7.8		MG/L	Report dated 4/4/95
Col	PW-13	3/17/95	IRON (TOTAL)		0.02		MG/L	Report dated 4/4/95
Col	PW-13	3/17/95	MANGANESE (TOTAL)		0	U	MG/L	Report dated 4/4/95
Col	PW-13	3/17/95	pH		5.3			Report dated 4/4/95
Col	PW-13	5/23/95	IRON (TOTAL)	DPH	0.22		MG/L	DPH Sheets 5/95 sampling
Col	PW-13	5/23/95	MANGANESE (TOTAL)	DPH	0.02		MG/L	DPH Sheets 5/95 sampling
Col	PW-13	5/23/95	pH	DPH	5.6			DPH Sheets 5/95 sampling
Col	PW-13	5/23/95	TDS	DPH	177		MG/L	DPH Sheets 5/95 sampling
Col	PW-13	8/15/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-13	8/15/95	MANGANESE (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-13	8/16/95	DO		9.47		MG/L	Tetra Tech XLS table
Col	PW-13	8/16/95	Eh		-59		mV	Tetra Tech XLS table
Col	PW-13	8/16/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech XLS table
Col	PW-13	8/16/95	pH		5.15			Tetra Tech XLS table
Col	PW-13	9/5/95	DO		4.04		MG/L	Tetra Tech XLS table
Col	PW-13	9/5/95	Eh		47		mV	Tetra Tech XLS table
Col	PW-13	9/5/95	pH		4.99			Tetra Tech XLS table
Col	PW-13	9/12/95	DO		5.09		MG/L	Tetra Tech XLS table
Col	PW-13	9/12/95	pH		5.35			Tetra Tech XLS table
Col	PW-13	9/20/95	DO		6.11		MG/L	Tetra Tech report 10/4/95
Col	PW-13	9/20/95	Eh		74		mV	Tetra Tech report 10/4/95
Col	PW-13	9/20/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-13	9/20/95	MANGANESE (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-13	9/20/95	pH		5.36			Tetra Tech report 10/4/95
Col	PW-13	10/10/95	DO		5.39		MG/L	Tetra Tech report 11/9/95
Col	PW-13	10/10/95	Eh		148		mV	Tetra Tech report 11/9/95
Col	PW-13	10/10/95	pH		5.43			Tetra Tech report 11/9/95
Col	PW-13	10/18/95	DO		3.93		MG/L	Tetra Tech report 11/9/95
Col	PW-13	10/18/95	Eh		166		mV	Tetra Tech report 11/9/95
Col	PW-13	10/18/95	IRON (TOTAL)		1.21		MG/L	Tetra Tech report 11/9/95
Col	PW-13	10/18/95	MANGANESE (TOTAL)		0.021		MG/L	Tetra Tech report 11/9/95
Col	PW-13	10/18/95	pH		5.61			Tetra Tech report 11/9/95
Col	PW-13	11/1/95	DO		5.5		MG/L	Tetra Tech report 11/9/95
Col	PW-13	11/1/95	Eh		303		mV	Tetra Tech report 11/9/95
Col	PW-13	11/1/95	pH		5.97			Tetra Tech report 11/9/95
Col	PW-13	11/13/95(0952)	DO		4.97		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(0952)	IRON (TOTAL)		0.741		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(0952)	MANGANESE (TOTAL)		0.045		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(0952)	pH		5.49			Newark Pump Test 11/95
Col	PW-13	11/13/95(1605)	DO		5.77		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(1605)	IRON (TOTAL)		0.037		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(1605)	MANGANESE (TOTAL)		0.007		MG/L	Newark Pump Test 11/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-13	11/13/95(1605)	pH		5.65			Newark Pump Test 11/95
Col	PW-13	11/13/95(2201)	DO		8.31		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(2201)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(2201)	MANGANESE (TOTAL)		0.006		MG/L	Newark Pump Test 11/95
Col	PW-13	11/13/95(2201)	pH		5.73			Newark Pump Test 11/95
Col	PW-13	11/14/95(0750)	DO		7.19		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(0750)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(0750)	MANGANESE (TOTAL)		0.007		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(0750)	pH		5.34			Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	DO		5.65		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	Eh		260		mV	Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	MANGANESE (TOTAL)		0	U	MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(1435)	pH		5.34			Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	DO		7.02		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	Eh		305		mV	Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	IRON (TOTAL)		0.039		MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	MANGANESE (TOTAL)		0	U	MG/L	Newark Pump Test 11/95
Col	PW-13	11/14/95(2205)	pH		5.42			Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	DO		7.05		MG/L	Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	Eh		321		mV	Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	MANGANESE (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Col	PW-13	11/15/1995(0750)	pH		5.32			Newark Pump Test 11/95
Col	PW-13	11/15/95(1435)	DO		6.91		MG/L	Newark Pump Test 11/95
Col	PW-13	11/15/95(1435)	Eh		213		mV	Newark Pump Test 11/95
Col	PW-13	11/15/95(1435)	pH		5.38			Newark Pump Test 11/95
Col	PW-13	11/16/95(0907)	DO		6.85		MG/L	Newark Pump Test 11/95
Col	PW-13	11/16/95(0907)	Eh		308		mV	Newark Pump Test 11/95
Col	PW-13	11/16/95(0907)	pH		5.46			Newark Pump Test 11/95
Col	PW-13	11/16/95(1702)	DO		7.8		MG/L	Newark Pump Test 11/95
Col	PW-13	11/16/95(1702)	pH		5.61			Newark Pump Test 11/95
Col	PW-13	11/17/95(0820)	DO		6.47		MG/L	Newark Pump Test 11/95
Col	PW-13	11/17/95(0820)	pH		5.47			Newark Pump Test 11/95
Pot	PW-14	10/13/66	IRON (TOTAL)	OLI	0.1			Duffield Report - Aug, 1993
Pot	PW-14	10/13/66	MANGANESE (TOTAL)	OLI	0	U		Duffield Report - Aug, 1993
Pot	PW-14	10/13/66	pH	OLI	6.8			Duffield Report - Aug, 1993
Pot	PW-14	10/13/66	TDS	OLI	60			Duffield Report - Aug, 1993
Pot	PW-14	6/14/82	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/14/82	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-14	6/14/82	TDS	DPH	134		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/29/83	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/29/83	pH	DPH	6			Duffield Report - Aug, 1993
Pot	PW-14	6/29/83	TDS	DPH	139		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/20/84	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/20/84	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-14	6/20/84	TDS	DPH	159		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/12/85	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/12/85	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-14	6/12/85	TDS	DPH	75		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/30/86	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/30/86	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-14	6/30/86	TDS	DPH	152		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/10/87	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/10/87	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-14	6/10/87	TDS	DPH	168		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/29/88	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-14	6/29/88	TDS	DPH	151		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/31/89	pH	DPH	5.4			Duffield Report - Aug, 1993
Pot	PW-14	5/31/89	TDS	DPH	185		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	12/1/89	IRON (TOTAL)	ALI	2.8		MG/L	Tetra Tech fax 12/95
Pot	PW-14	1/1/90	IRON (TOTAL)	ALI	0.22		MG/L	Tetra Tech fax 12/95
Pot	PW-14	2/1/90	IRON (TOTAL)	ALI	0.37		MG/L	Tetra Tech fax 12/95
Pot	PW-14	4/1/90	IRON (TOTAL)	ALI	0.11		MG/L	Tetra Tech fax 12/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-14	5/1/90	IRON (TOTAL)	ALI	0.16		MG/L	Tetra Tech fax 12/95
Pot	PW-14	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/6/90	pH	DPH	5.7			Duffield Report - Aug, 1993
Pot	PW-14	6/11/90	IRON (TOTAL)	ALI	0.06		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/11/90	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	6/11/90	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-14	6/11/90	TDS	ALI	170		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/10/91	IRON (TOTAL)	ALI	0.52		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/10/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/10/91	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-14	2/13/91	IRON (TOTAL)	ALI	0.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	2/13/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	2/13/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-14	3/11/91	IRON (TOTAL)	ALI	0.85		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	3/11/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	3/11/91	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-14	4/11/91	IRON (TOTAL)	ALI	0.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	4/11/91	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	4/11/91	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	5/15/91	IRON (TOTAL)	ALI	0.44		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/15/91	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/15/91	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-14	7/10/91	IRON (TOTAL)	ALI	0.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	7/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	7/10/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-14	9/16/91	IRON (TOTAL)	ALI	0.52		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	9/16/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	9/16/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-14	11/5/91	IRON (TOTAL)	ALI	0.17		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	11/5/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	11/5/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-14	1/29/92	IRON (TOTAL)	ALI	0.44		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/29/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	1/29/92	pH	ALI	5.7			Duffield Report - Aug, 1993
Pot	PW-14	3/18/92	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	3/18/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	3/18/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	5/20/92	IRON (TOTAL)	ALI	0.37		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/20/92	MANGANESE (TOTAL)	ALI	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/20/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	7/8/92	IRON (TOTAL)	ALI	0.25		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	7/8/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-14	7/8/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	10/7/92	IRON (TOTAL)	ALI	4.33		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	10/7/92	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	10/7/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Pot	PW-14	5/14/93	IRON (TOTAL)	ALI	2.67		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/14/93	MANGANESE (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Pot	PW-14	5/14/93	pH	ALI	4.5			Duffield Report - Aug, 1993
Pot	PW-14	5/14/93	TURBIDITY	ALI	11		NTU	Duffield Report - Aug, 1993
Pot	PW-14	8/16/93	DO	LLI	4.4		MG/L	Duffield Report - June, 1994
Pot	PW-14	8/16/93	Eh	LLI	261		mV	Duffield Report - June, 1994
Pot	PW-14	8/16/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Pot	PW-14	8/16/93	MANGANESE (TOTAL)	LLI	0.053		MG/L	Duffield Report - Oct, 1993
Pot	PW-14	8/16/93	pH	LLI	5.45			Duffield Report - Oct, 1993
Pot	PW-14	9/9/93	DO	LLI	7.6		MG/L	Duffield Report - June, 1994
Pot	PW-14	9/9/93	Eh	LLI	252		mV	Duffield Report - June, 1994
Pot	PW-14	9/9/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Pot	PW-14	9/9/93	MANGANESE (TOTAL)	LLI	0.023		MG/L	Duffield Report - Oct, 1993
Pot	PW-14	9/9/93	pH	LLI	5.2			Duffield Report - Oct, 1993
Pot	PW-14	4/26/94	DO	LLI	5.1		MG/L	Duffield Report - June, 1994
Pot	PW-14	4/26/94	Eh	LLI	292		mV	Duffield Report - June, 1994
Pot	PW-14	4/26/94	IRON (TOTAL)	LLI	0.12		MG/L	Duffield Report - June, 1994
Pot	PW-14	4/26/94	MANGANESE (TOTAL)	LLI	0.015		MG/L	Duffield Report - June, 1994
Pot	PW-14	3/17/95	DO		7		MG/L	Report dated 4/4/95
Pot	PW-14	3/17/95	IRON (TOTAL)		0.06		MG/L	Report dated 4/4/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-14	3/17/95	MANGANESE (TOTAL)		0	U	MG/L	Report dated 4/4/95
Pot	PW-14	3/17/95	pH		5			Report dated 4/4/95
Pot	PW-14	5/23/95	IRON (TOTAL)	DPH	0.1		MG/L	DPH Sheets 5/95 sampling
Pot	PW-14	5/23/95	MANGANESE (TOTAL)	DPH	0	U	MG/L	DPH Sheets 5/95 sampling
Pot	PW-14	5/23/95	pH	DPH	5.3			DPH Sheets 5/95 sampling
Pot	PW-14	5/23/95	TDS	DPH	213		MG/L	DPH Sheets 5/95 sampling
Pot	PW-14	8/15/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Pot	PW-14	8/15/95	MANGANESE (TOTAL)		0.03		MG/L	Tetra Tech report 10/4/95
Pot	PW-14	8/17/95	Eh		-86		mV	Tetra Tech XLS table
Pot	PW-14	8/17/95	IRON (TOTAL)		0.184		MG/L	Tetra Tech XLS table
Pot	PW-14	8/17/95	pH		6.03			Tetra Tech XLS table
Pot	PW-14	9/5/95	DO		3.61		MG/L	Tetra Tech XLS table
Pot	PW-14	9/5/95	Eh		48		mV	Tetra Tech XLS table
Pot	PW-14	9/5/95	pH		4.81			Tetra Tech XLS table
Pot	PW-14	9/12/95	DO		4.26		MG/L	Tetra Tech XLS table
Pot	PW-14	9/12/95	pH		5.16			Tetra Tech XLS table
Pot	PW-14	9/20/95	DO		4.68		MG/L	Tetra Tech report 10/4/95
Pot	PW-14	9/20/95	Eh		195		mV	Tetra Tech report 10/4/95
Pot	PW-14	9/20/95	IRON (TOTAL)		0.036		MG/L	Tetra Tech report 10/4/95
Pot	PW-14	9/20/95	MANGANESE (TOTAL)		0.012		MG/L	Tetra Tech report 10/4/95
Pot	PW-14	9/20/95	pH		5.22			Tetra Tech report 10/4/95
Pot	PW-14	10/18/95	DO		6.73		MG/L	Tetra Tech report 11/9/95
Pot	PW-14	10/18/95	Eh		186		mV	Tetra Tech report 11/9/95
Pot	PW-14	10/18/95	IRON (TOTAL)		0.208		MG/L	Tetra Tech report 11/9/95
Pot	PW-14	10/18/95	MANGANESE (TOTAL)		0.027		MG/L	Tetra Tech report 11/9/95
Pot	PW-14	10/18/95	pH		5.26			Tetra Tech report 11/9/95
Pot	PW-14	11/13/95(1010)	DO		4.75		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1010)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1010)	MANGANESE (TOTAL)		0.02		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1010)	pH		5.31			Newark Pump Test 11/95
Pot	PW-14	11/13/95(1550)	DO		5.04		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1550)	IRON (TOTAL)		0.01		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1550)	MANGANESE (TOTAL)		0.016		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/13/95(1550)	pH		5.42			Newark Pump Test 11/95
Pot	PW-14	11/14/95(0815)	DO		5.95		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(0815)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(0815)	MANGANESE (TOTAL)		0.016		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(0815)	pH		5.12			Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	DO		5.84		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	Eh		272		mV	Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	IRON (TOTAL)		0.054		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	MANGANESE (TOTAL)		0.016		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/14/95(1515)	pH		5.24			Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	DO		6.64		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	Eh		302		mV	Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	IRON (TOTAL)		0.009		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	MANGANESE (TOTAL)		0.018		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/15/95(0800)	pH		5.13			Newark Pump Test 11/95
Pot	PW-14	11/15/95(1440)	DO		6.56		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/15/95(1440)	Eh		247		mV	Newark Pump Test 11/95
Pot	PW-14	11/15/95(1440)	pH		5.09			Newark Pump Test 11/95
Pot	PW-14	11/16/95(0940)	DO		6.86		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/16/95(0940)	Eh		308		mV	Newark Pump Test 11/95
Pot	PW-14	11/16/95(0940)	pH		5.28			Newark Pump Test 11/95
Pot	PW-14	11/16/95(1646)	DO		6.15		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/16/95(1646)	pH		5.48			Newark Pump Test 11/95
Pot	PW-14	11/17/95(0831)	DO		6.09		MG/L	Newark Pump Test 11/95
Pot	PW-14	11/17/95(0831)	pH		5.48			Newark Pump Test 11/95
Col	PW-15	5/17/68	IRON (TOTAL)	LL	0.27		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/17/68	MANGANESE (TOTAL)	LL	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/17/68	pH	LL	5.8			Duffield Report - Aug, 1993
Col	PW-15	5/17/68	TDS	LL	82		MG/L	Duffield Report - Aug, 1993
Col	PW-15	9/11/79	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	9/11/79	pH	DPH	6.6			Duffield Report - Aug, 1993
Col	PW-15	7/10/80	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/80	pH	DPH	5.6			Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-15	7/10/80	TDS	DPH	159		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/14/82	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/14/82	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-15	6/14/82	TDS	DPH	104		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/29/83	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/29/83	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-15	6/29/83	TDS	DPH	123		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/20/84	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/20/84	pH	DPH	5.4			Duffield Report - Aug, 1993
Col	PW-15	6/20/84	TDS	DPH	135		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/12/85	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/12/85	pH	DPH	5.3			Duffield Report - Aug, 1993
Col	PW-15	6/12/85	TDS	DPH	123		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/30/86	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/30/86	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-15	6/30/86	TDS	DPH	134		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/29/88	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-15	6/29/88	TDS	DPH	143		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/31/89	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/31/89	pH	DPH	6.3			Duffield Report - Aug, 1993
Col	PW-15	5/31/89	TDS	DPH	191		MG/L	Duffield Report - Aug, 1993
Col	PW-15	12/1/89	IRON (TOTAL)	ALI	1.7		MG/L	Tetra Tech fax 12/95
Col	PW-15	1/1/90	IRON (TOTAL)	ALI	1.4		MG/L	Tetra Tech fax 12/95
Col	PW-15	2/1/90	IRON (TOTAL)	ALI	2		MG/L	Tetra Tech fax 12/95
Col	PW-15	4/1/90	IRON (TOTAL)	ALI	2.3		MG/L	Tetra Tech fax 12/95
Col	PW-15	5/1/90	IRON (TOTAL)	ALI	2.5		MG/L	Tetra Tech fax 12/95
Col	PW-15	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/6/90	pH	DPH	6.3			Duffield Report - Aug, 1993
Col	PW-15	6/11/90	IRON (TOTAL)	ALI	2.5		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/11/90	MANGANESE (TOTAL)	ALI	0.9		MG/L	Duffield Report - Aug, 1993
Col	PW-15	6/11/90	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-15	6/11/90	TDS	ALI	160		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/90	IRON (TOTAL)	ALI	2.5		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/90	MANGANESE (TOTAL)	ALI	0.79		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/22/91	IRON (TOTAL)	ALI	2.1		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/22/91	MANGANESE (TOTAL)	ALI	0.63		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/22/91	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-15	2/13/91	IRON (TOTAL)	ALI	1.95		MG/L	Duffield Report - Aug, 1993
Col	PW-15	2/13/91	MANGANESE (TOTAL)	ALI	0.56		MG/L	Duffield Report - Aug, 1993
Col	PW-15	2/13/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-15	3/11/91	IRON (TOTAL)	ALI	1.78		MG/L	Duffield Report - Aug, 1993
Col	PW-15	3/11/91	MANGANESE (TOTAL)	ALI	0.53		MG/L	Duffield Report - Aug, 1993
Col	PW-15	3/11/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-15	4/11/91	IRON (TOTAL)	ALI	1.84		MG/L	Duffield Report - Aug, 1993
Col	PW-15	4/11/91	MANGANESE (TOTAL)	ALI	0.58		MG/L	Duffield Report - Aug, 1993
Col	PW-15	4/11/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-15	5/15/91	IRON (TOTAL)	ALI	1.47		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/15/91	MANGANESE (TOTAL)	ALI	0.43		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/15/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-15	7/10/91	IRON (TOTAL)	ALI	1.52		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/91	MANGANESE (TOTAL)	ALI	0.16		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/10/91	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-15	9/16/91	IRON (TOTAL)	ALI	1.12		MG/L	Duffield Report - Aug, 1993
Col	PW-15	9/16/91	MANGANESE (TOTAL)	ALI	0.25		MG/L	Duffield Report - Aug, 1993
Col	PW-15	9/16/91	pH	ALI	5.8			Duffield Report - Aug, 1993
Col	PW-15	11/5/91	IRON (TOTAL)	ALI	1.18		MG/L	Duffield Report - Aug, 1993
Col	PW-15	11/5/91	MANGANESE (TOTAL)	ALI	0.22		MG/L	Duffield Report - Aug, 1993
Col	PW-15	11/5/91	pH	ALI	5.7			Duffield Report - Aug, 1993
Col	PW-15	1/29/92	IRON (TOTAL)	ALI	1.22		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/29/92	MANGANESE (TOTAL)	ALI	0.21		MG/L	Duffield Report - Aug, 1993
Col	PW-15	1/29/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-15	3/18/92	IRON (TOTAL)	ALI	1.38		MG/L	Duffield Report - Aug, 1993
Col	PW-15	3/18/92	MANGANESE (TOTAL)	ALI	0.28		MG/L	Duffield Report - Aug, 1993
Col	PW-15	3/18/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-15	5/20/92	IRON (TOTAL)	ALI	1.03		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-15	5/20/92	MANGANESE (TOTAL)	ALI	0.3		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/20/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-15	7/8/92	IRON (TOTAL)	ALI	1.03		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/8/92	MANGANESE (TOTAL)	ALI	0.22		MG/L	Duffield Report - Aug, 1993
Col	PW-15	7/8/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-15	10/7/92	IRON (TOTAL)	ALI	0.88		MG/L	Duffield Report - Aug, 1993
Col	PW-15	10/7/92	MANGANESE (TOTAL)	ALI	0.15		MG/L	Duffield Report - Aug, 1993
Col	PW-15	10/7/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-15	5/14/93	IRON (TOTAL)	ALI	0.44		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/14/93	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Col	PW-15	5/14/93	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-15	5/14/93	TURBIDITY	ALI	1.2		NTU	Duffield Report - Aug, 1993
Col	PW-15	8/16/93	DO	LLI	4.2		MG/L	Duffield Report - June, 1994
Col	PW-15	8/16/93	Eh	LLI	272		mV	Duffield Report - June, 1994
Col	PW-15	8/16/93	IRON (TOTAL)	LLI	0.25		MG/L	Duffield Report - Oct, 1993
Col	PW-15	8/16/93	MANGANESE (TOTAL)	LLI	0.027		MG/L	Duffield Report - Oct, 1993
Col	PW-15	8/16/93	pH	LLI	5.6			Duffield Report - Oct, 1993
Col	PW-15	9/9/93	DO	LLI	4		MG/L	Duffield Report - June, 1994
Col	PW-15	9/9/93	Eh	LLI	187		mV	Duffield Report - June, 1994
Col	PW-15	9/9/93	IRON (TOTAL)	LLI	0.2		MG/L	Duffield Report - Oct, 1993
Col	PW-15	9/9/93	MANGANESE (TOTAL)	LLI	0.027		MG/L	Duffield Report - Oct, 1993
Col	PW-15	9/9/93	pH	LLI	6.85			Duffield Report - Oct, 1993
Col	PW-15	4/26/94	DO	LLI	6.9		MG/L	Duffield Report - June, 1994
Col	PW-15	4/26/94	Eh	LLI	278		mV	Duffield Report - June, 1994
Col	PW-15	4/26/94	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - June, 1994
Col	PW-15	4/26/94	MANGANESE (TOTAL)	LLI	0.064		MG/L	Duffield Report - June, 1994
Col	PW-15	3/17/95	DO		6.2		MG/L	Report dated 4/4/95
Col	PW-15	3/17/95	IRON (TOTAL)		0.03		MG/L	Report dated 4/4/95
Col	PW-15	3/17/95	MANGANESE (TOTAL)		0.054		MG/L	Report dated 4/4/95
Col	PW-15	3/17/95	pH		5.2			Report dated 4/4/95
Col	PW-15	5/23/95	IRON (TOTAL)	DPH	0	U	MG/L	DPH Sheets 5/95 sampling
Col	PW-15	5/23/95	MANGANESE (TOTAL)	DPH	0.02		MG/L	DPH Sheets 5/95 sampling
Col	PW-15	5/23/95	pH	DPH	5.5			DPH Sheets 5/95 sampling
Col	PW-15	5/23/95	TDS	DPH	102	U	MG/L	DPH Sheets 5/95 sampling
Col	PW-15	8/15/95	IRON (TOTAL)		0.05		MG/L	Tetra Tech report 10/4/95
Col	PW-15	8/15/95	MANGANESE (TOTAL)		0.07		MG/L	Tetra Tech report 10/4/95
Col	PW-15	8/17/95	DO		3.58		MG/L	Tetra Tech XLS table
Col	PW-15	8/17/95	Eh		-1092		mV	Tetra Tech XLS table
Col	PW-15	8/17/95	IRON (TOTAL)		0.087		MG/L	Tetra Tech XLS table
Col	PW-15	8/17/95	pH		5.13			Tetra Tech XLS table
Col	PW-15	9/5/95	DO		3.31		MG/L	Tetra Tech XLS table
Col	PW-15	9/5/95	Eh		28		mV	Tetra Tech XLS table
Col	PW-15	9/5/95	pH		4.71			Tetra Tech XLS table
Col	PW-15	9/12/95	DO		4.01		MG/L	Tetra Tech XLS table
Col	PW-15	9/12/95	pH		5.34			Tetra Tech XLS table
Col	PW-15	9/19/95	DO		4.73		MG/L	Tetra Tech report 10/4/95
Col	PW-15	9/19/95	Eh		7		mV	Tetra Tech report 10/4/95
Col	PW-15	9/19/95	IRON (TOTAL)		0	U	MG/L	Tetra Tech report 10/4/95
Col	PW-15	9/19/95	MANGANESE (TOTAL)		0.085		MG/L	Tetra Tech report 10/4/95
Col	PW-15	9/19/95	pH		5.36			Tetra Tech report 10/4/95
Col	PW-15	10/10/95	DO		3.75		MG/L	Tetra Tech report 11/9/95
Col	PW-15	10/10/95	Eh		200		mV	Tetra Tech report 11/9/95
Col	PW-15	10/10/95	pH		5.26			Tetra Tech report 11/9/95
Col	PW-15	10/17/95	DO		4.75		MG/L	Tetra Tech report 11/9/95
Col	PW-15	10/17/95	Eh		197		mV	Tetra Tech report 11/9/95
Col	PW-15	10/17/95	IRON (TOTAL)		1.82		MG/L	Tetra Tech report 11/9/95
Col	PW-15	10/17/95	MANGANESE (TOTAL)		0.049		MG/L	Tetra Tech report 11/9/95
Col	PW-15	10/17/95	pH		5.75			Tetra Tech report 11/9/95
Col	PW-15	11/13/95(1025)	DO		4.16		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(1025)	IRON (TOTAL)		0.114		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(1025)	MANGANESE (TOTAL)		0.042		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(1025)	pH		5.61			Newark Pump Test 11/95
Col	PW-15	11/13/95(1525)	DO		4.71		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(1525)	IRON (TOTAL)		0.184		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(1525)	MANGANESE (TOTAL)		0.054		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(1525)	pH		5.61			Newark Pump Test 11/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-15	11/13/95(2215)	DO		6.76		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(2215)	IRON (TOTAL)		0.091		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(2215)	MANGANESE (TOTAL)		0.068		MG/L	Newark Pump Test 11/95
Col	PW-15	11/13/95(2215)	pH		5.46			Newark Pump Test 11/95
Col	PW-15	11/14/95(0835)	DO		5.31		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(0835)	IRON (TOTAL)		0.022		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(0835)	MANGANESE (TOTAL)		0.079		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(0835)	pH		5.42			Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	DO		3.91		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	Eh		244		mV	Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	IRON (TOTAL)		0	U	MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	MANGANESE (TOTAL)		0.078		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(1545)	pH		5.42			Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	DO		3.95		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	Eh		288		mV	Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	IRON (TOTAL)		0	U	MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	MANGANESE (TOTAL)		0.08		MG/L	Newark Pump Test 11/95
Col	PW-15	11/14/95(2215)	pH		5.42			Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	DO		5.31		MG/L	Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	Eh		629		mV	Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	IRON (TOTAL)		0.039		MG/L	Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	MANGANESE (TOTAL)		0.097		MG/L	Newark Pump Test 11/95
Col	PW-15	11/15/95(0820)	pH		5.3			Newark Pump Test 11/95
Col	PW-15	11/15/95(1500)	DO		5.54		MG/L	Newark Pump Test 11/95
Col	PW-15	11/15/95(1500)	Eh		224		mV	Newark Pump Test 11/95
Col	PW-15	11/15/95(1500)	pH		5.38			Newark Pump Test 11/95
Col	PW-15	11/16/95(1602)	DO		4.68		MG/L	Newark Pump Test 11/95
Col	PW-15	11/16/95(1602)	pH		5.46			Newark Pump Test 11/95
Col	PW-15	11/17/95(0855)	DO		4.19		MG/L	Newark Pump Test 11/95
Col	PW-15	11/17/95(0855)	pH		5.56			Newark Pump Test 11/95
Pot	PW-16	8/19/68	IRON (TOTAL)	BGB	0.42		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	8/19/68	MANGANESE (TOTAL)	BGB	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-16	8/19/68	pH	BGB	5.7			Duffield Report - Aug, 1993
Pot	PW-16	2/13/70	IRON (TOTAL)	BGB	0.72		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/13/70	MANGANESE (TOTAL)	BGB	0.02		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/13/70	pH	BGB	5.7			Duffield Report - Aug, 1993
Pot	PW-16	3/4/70	IRON (TOTAL)	BGB	0.26		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/4/70	MANGANESE (TOTAL)	BGB	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/4/70	pH	BGB	5.8			Duffield Report - Aug, 1993
Pot	PW-16	2/23/78	IRON (TOTAL)	BGB	0.56		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/23/78	MANGANESE (TOTAL)	BGB	0.01		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/23/78	pH	BGB	5.1			Duffield Report - Aug, 1993
Pot	PW-16	9/11/79	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	9/11/79	pH	DPH	5.6			Duffield Report - Aug, 1993
Pot	PW-16	7/10/80	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/80	pH	DPH	5.3			Duffield Report - Aug, 1993
Pot	PW-16	7/10/80	TDS	DPH	76		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/14/82	IRON (TOTAL)	DPH	0.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/14/82	pH	DPH	5			Duffield Report - Aug, 1993
Pot	PW-16	6/14/82	TDS	DPH	81		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/29/83	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/29/83	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-16	6/29/83	TDS	DPH	74		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/20/84	IRON (TOTAL)	DPH	0.25		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/20/84	pH	DPH	5.1			Duffield Report - Aug, 1993
Pot	PW-16	6/20/84	TDS	DPH	52		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/12/85	IRON (TOTAL)	DPH	0.65		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/12/85	pH	DPH	5			Duffield Report - Aug, 1993
Pot	PW-16	6/12/85	TDS	DPH	74		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/30/86	IRON (TOTAL)	DPH	0.55		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/30/86	pH	DPH	4.5			Duffield Report - Aug, 1993
Pot	PW-16	6/30/86	TDS	DPH	62		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/10/87	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/10/87	pH	DPH	5.5			Duffield Report - Aug, 1993
Pot	PW-16	6/10/87	TDS	DPH	75		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/29/88	IRON (TOTAL)	DPH	0.4		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-16	6/29/88	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-16	6/29/88	TDS	DPH	64		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/31/89	pH	DPH	5.2			Duffield Report - Aug, 1993
Pot	PW-16	5/31/89	TDS	DPH	77		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	12/1/89	IRON (TOTAL)	ALI	1.3		MG/L	Tetra Tech fax 12/95
Pot	PW-16	1/1/90	IRON (TOTAL)	ALI	0.98		MG/L	Tetra Tech fax 12/95
Pot	PW-16	2/2/90	IRON (TOTAL)	ALI	7.3		MG/L	Tetra Tech fax 12/95
Pot	PW-16	4/1/90	IRON (TOTAL)	ALI	3.5		MG/L	Tetra Tech fax 12/95
Pot	PW-16	5/1/90	IRON (TOTAL)	ALI	2.4		MG/L	Tetra Tech fax 12/95
Pot	PW-16	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/6/90	pH	DPH	5.3			Duffield Report - Aug, 1993
Pot	PW-16	6/11/90	IRON (TOTAL)	ALI	2.7		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/11/90	MANGANESE (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	6/11/90	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-16	6/11/90	TDS	ALI	72		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/90	IRON (TOTAL)	ALI	3.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/90	MANGANESE (TOTAL)	ALI	0.07		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/22/91	IRON (TOTAL)	ALI	6.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/22/91	MANGANESE (TOTAL)	ALI	0.11		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/22/91	pH	ALI	4.8			Duffield Report - Aug, 1993
Pot	PW-16	2/13/91	IRON (TOTAL)	ALI	3.17		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/13/91	MANGANESE (TOTAL)	ALI	0.07		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	2/13/91	pH	ALI	4.5			Duffield Report - Aug, 1993
Pot	PW-16	3/11/91	IRON (TOTAL)	ALI	6		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/11/91	MANGANESE (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/11/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-16	4/11/91	IRON (TOTAL)	ALI	8.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	4/11/91	MANGANESE (TOTAL)	ALI	0.16		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	4/11/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Pot	PW-16	5/15/91	IRON (TOTAL)	ALI	8.9		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/15/91	MANGANESE (TOTAL)	ALI	0.17		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/15/91	pH	ALI	4.6			Duffield Report - Aug, 1993
Pot	PW-16	7/10/91	IRON (TOTAL)	ALI	12.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/91	MANGANESE (TOTAL)	ALI	0.19		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/10/91	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-16	9/16/91	IRON (TOTAL)	ALI	13.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	9/16/91	MANGANESE (TOTAL)	ALI	0.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	9/16/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-16	11/5/91	IRON (TOTAL)	ALI	16.8		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	11/5/91	MANGANESE (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	11/5/91	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-16	1/29/92	IRON (TOTAL)	ALI	16.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/29/92	MANGANESE (TOTAL)	ALI	0.19		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	1/29/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Pot	PW-16	3/18/92	IRON (TOTAL)	ALI	16.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/18/92	MANGANESE (TOTAL)	ALI	0.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	3/18/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-16	5/20/92	IRON (TOTAL)	ALI	15.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/20/92	MANGANESE (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/20/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-16	7/8/92	IRON (TOTAL)	ALI	16.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/8/92	MANGANESE (TOTAL)	ALI	0.22		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	7/8/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-16	10/7/92	IRON (TOTAL)	ALI	20		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	10/7/92	MANGANESE (TOTAL)	ALI	0.26		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	10/7/92	pH	ALI	5.3			Duffield Report - Aug, 1993
Pot	PW-16	5/14/93	IRON (TOTAL)	ALI	5.53		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/14/93	MANGANESE (TOTAL)	ALI	0.09		MG/L	Duffield Report - Aug, 1993
Pot	PW-16	5/14/93	pH	ALI	4.9			Duffield Report - Aug, 1993
Pot	PW-16	5/14/93	TURBIDITY	ALI	2.5		NTU	Duffield Report - Aug, 1993
Pot	PW-16	9/9/93	DO	LLI	0.6		MG/L	Duffield Report - June, 1994
Pot	PW-16	9/9/93	Eh	LLI	207		mV	Duffield Report - June, 1994
Pot	PW-16	9/9/93	IRON (TOTAL)	LLI	6.98		MG/L	Duffield Report - Oct, 1993
Pot	PW-16	9/9/93	MANGANESE (TOTAL)	LLI	0.168		MG/L	Duffield Report - Oct, 1993
Pot	PW-16	9/9/93	pH	LLI	5.5			Duffield Report - Oct, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-16	4/26/94	DO	LLI	0.3		MG/L	Duffield Report - June, 1994
Pot	PW-16	4/26/94	Eh	LLI	141		mV	Duffield Report - June, 1994
Pot	PW-16	4/26/94	IRON (TOTAL)	LLI	14.2		MG/L	Duffield Report - June, 1994
Pot	PW-16	4/26/94	MANGANESE (TOTAL)	LLI	0.207		MG/L	Duffield Report - June, 1994
Pot	PW-16	3/17/95	DO		2.7		MG/L	Report dated 4/4/95
Pot	PW-16	3/17/95	IRON (TOTAL)		5.1		MG/L	Report dated 4/4/95
Pot	PW-16	3/17/95	MANGANESE (TOTAL)		0.1		MG/L	Report dated 4/4/95
Pot	PW-16	3/17/95	pH		4.8			Report dated 4/4/95
Pot	PW-16	5/23/95	IRON (TOTAL)	DPH	5.5		MG/L	DPH Sheets 5/95 sampling
Pot	PW-16	5/23/95	MANGANESE (TOTAL)	DPH	0.11		MG/L	DPH Sheets 5/95 sampling
Pot	PW-16	5/23/95	pH	DPH	5.3			DPH Sheets 5/95 sampling
Pot	PW-16	5/23/95	TDS	DPH	68		MG/L	DPH Sheets 5/95 sampling
Pot	PW-16	8/15/95	IRON (TOTAL)		12		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	8/15/95	MANGANESE (TOTAL)		0.22		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	8/16/95	DO		1.08		MG/L	Tetra Tech XLS table
Pot	PW-16	8/16/95	Eh		-102		mV	Tetra Tech XLS table
Pot	PW-16	8/16/95	IRON (TOTAL)		12.8		MG/L	Tetra Tech XLS table
Pot	PW-16	8/16/95	pH		5.33			Tetra Tech XLS table
Pot	PW-16	9/19/95	DO		2.16		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	9/19/95	Eh		40		mV	Tetra Tech report 10/4/95
Pot	PW-16	9/19/95	IRON (TOTAL)		11		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	9/19/95	MANGANESE (TOTAL)		0.195		MG/L	Tetra Tech report 10/4/95
Pot	PW-16	9/19/95	pH		4.88			Tetra Tech report 10/4/95
Pot	PW-16	10/17/95	DO		0.65		MG/L	Tetra Tech report 11/9/95
Pot	PW-16	10/17/95	Eh		-30		mV	Tetra Tech report 11/9/95
Pot	PW-16	10/17/95	IRON (TOTAL)		9.27		MG/L	Tetra Tech report 11/9/95
Pot	PW-16	10/17/95	MANGANESE (TOTAL)		0.146		MG/L	Tetra Tech report 11/9/95
Pot	PW-16	10/17/95	pH		6.68			Tetra Tech report 11/9/95
Pot	PW-16	11/13/1995(1105)	DO		1.79		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1105)	IRON (TOTAL)		6.86		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1105)	MANGANESE (TOTAL)		0.114		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1105)	pH		5.31			Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1540)	DO		1.69		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1540)	IRON (TOTAL)		5.32		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1540)	MANGANESE (TOTAL)		0.118		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(1540)	pH		5.18			Newark Pump Test 11/95
Pot	PW-16	11/13/1995(2230)	DO		3.03		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(2230)	IRON (TOTAL)		4.67		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(2230)	MANGANESE (TOTAL)		0.119		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/13/1995(2230)	pH		5.17			Newark Pump Test 11/95
Pot	PW-16	11/14/1995(0850)	DO		1.07		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(0850)	IRON (TOTAL)		4.32		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(0850)	MANGANESE (TOTAL)		0.113		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(0850)	pH		4.89			Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	DO		1.35		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	Eh		243		mV	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	IRON (TOTAL)		3.9		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	MANGANESE (TOTAL)		0.103		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(1605)	pH		4.85			Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	DO		1.9		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	Eh		248		mV	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	IRON (TOTAL)		1.8		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	MANGANESE (TOTAL)		0.097		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/14/1995(2230)	pH		4.92			Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	DO		1.58		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	Eh		268		mV	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	IRON (TOTAL)		3.73		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	MANGANESE (TOTAL)		0.099		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(0830)	pH		4.82			Newark Pump Test 11/95
Pot	PW-16	11/15/1995(1515)	DO		2.08		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(1515)	Eh		196		mV	Newark Pump Test 11/95
Pot	PW-16	11/15/1995(1515)	pH		4.77			Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1032)	DO		1.81		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1032)	Eh		273		mV	Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1032)	pH		5.04			Newark Pump Test 11/95
Pot	PW-16	11/16/1995(1630)	DO		1.04		MG/L	Newark Pump Test 11/95

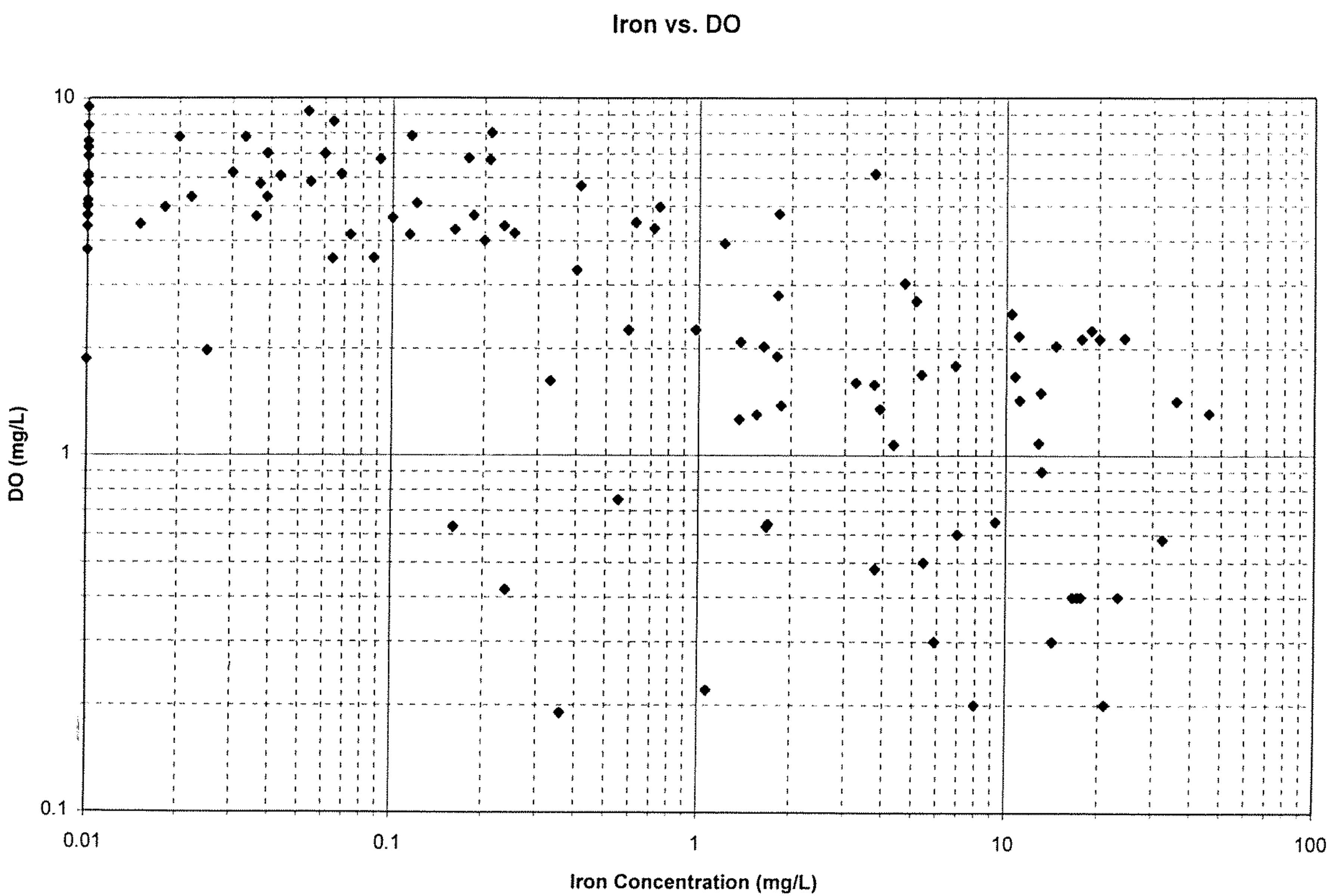
AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-16	11/16/1995(1630)	pH		5.03			Newark Pump Test 11/95
Pot	PW-16	11/17/1995(0920)	DO		0.75		MG/L	Newark Pump Test 11/95
Pot	PW-16	11/17/1995(0920)	pH		5.05			Newark Pump Test 11/95
Col	PW-17	9/11/79	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	9/11/79	pH	DPH	7			Duffield Report - Aug, 1993
Col	PW-17	7/10/80	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/10/80	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-17	7/10/80	TDS	DPH	15		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/14/82	IRON (TOTAL)	DPH	0.35		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/14/82	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-17	6/14/82	TDS	DPH	116		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/20/84	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/20/84	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-17	6/20/84	TDS	DPH	87		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/12/85	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/12/85	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-17	6/12/85	TDS	DPH	77		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/30/86	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/30/86	pH	DPH	5.7			Duffield Report - Aug, 1993
Col	PW-17	6/30/86	TDS	DPH	112		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/10/87	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/10/87	pH	DPH	6.4			Duffield Report - Aug, 1993
Col	PW-17	6/10/87	TDS	DPH	111		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/29/88	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/29/88	pH	DPH	6.5			Duffield Report - Aug, 1993
Col	PW-17	6/29/88	TDS	DPH	107		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/31/89	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/31/89	pH	DPH	6			Duffield Report - Aug, 1993
Col	PW-17	5/31/89	TDS	DPH	62		MG/L	Duffield Report - Aug, 1993
Col	PW-17	12/1/89	IRON (TOTAL)	ALI	0.06		MG/L	Tetra Tech fax 12/95
Col	PW-17	6/1/90	MANGANESE (TOTAL)	ALI	0	U	MG/L	Tetra Tech fax 12/95
Col	PW-17	6/6/90	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/6/90	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-17	6/11/90	IRON (TOTAL)	ALI	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-17	6/11/90	pH	ALI	5.7			Duffield Report - Aug, 1993
Col	PW-17	6/11/90	TDS	DPH	120		MG/L	Duffield Report - Aug, 1993
Col	PW-17	1/10/91	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-17	1/10/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	1/10/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-17	2/13/91	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-17	2/13/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-17	2/13/91	pH	ALI	5			Duffield Report - Aug, 1993
Col	PW-17	3/11/91	IRON (TOTAL)	ALI	0.06		MG/L	Duffield Report - Aug, 1993
Col	PW-17	3/11/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	3/11/91	pH	ALI	5.3			Duffield Report - Aug, 1993
Col	PW-17	4/11/91	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Col	PW-17	4/11/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-17	4/11/91	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-17	5/15/91	IRON (TOTAL)	ALI	0.08		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/15/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/15/91	pH	ALI	5.1			Duffield Report - Aug, 1993
Col	PW-17	7/10/91	IRON (TOTAL)	ALI	0.25		MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/10/91	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/10/91	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-17	9/16/91	IRON (TOTAL)	ALI	0.21		MG/L	Duffield Report - Aug, 1993
Col	PW-17	9/16/91	pH	ALI	5.8			Duffield Report - Aug, 1993
Col	PW-17	11/5/91	IRON (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Col	PW-17	11/5/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	11/5/91	pH	ALI	5.8			Duffield Report - Aug, 1993
Col	PW-17	1/29/92	IRON (TOTAL)	ALI	0.35		MG/L	Duffield Report - Aug, 1993
Col	PW-17	1/29/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	1/29/92	pH	ALI	5.2			Duffield Report - Aug, 1993
Col	PW-17	3/18/92	IRON (TOTAL)	ALI	0.18		MG/L	Duffield Report - Aug, 1993
Col	PW-17	3/18/92	MANGANESE (TOTAL)	ALI	0.01		MG/L	Duffield Report - Aug, 1993
Col	PW-17	3/18/92	pH	ALI	5.6			Duffield Report - Aug, 1993
Col	PW-17	5/20/92	IRON (TOTAL)	ALI	0.21		MG/L	Duffield Report - Aug, 1993

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	PW-17	5/20/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/20/92	pH	ALI	5.7			Duffield Report - Aug, 1993
Col	PW-17	7/8/92	IRON (TOTAL)	ALI	0.12		MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/8/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	7/8/92	pH	ALI	5.7			Duffield Report - Aug, 1993
Col	PW-17	10/7/92	IRON (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Col	PW-17	10/7/92	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-17	10/7/92	pH	ALI	5.5			Duffield Report - Aug, 1993
Col	PW-17	5/14/93	IRON (TOTAL)	ALI	0.23		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/14/93	MANGANESE (TOTAL)	ALI	0.03		MG/L	Duffield Report - Aug, 1993
Col	PW-17	5/14/93	pH	ALI	5.4			Duffield Report - Aug, 1993
Col	PW-17	5/14/93	TURBIDITY	ALI	0.9		NTU	Duffield Report - Aug, 1993
Col	PW-17	8/16/93	DO	LLI	4.4		MG/L	Duffield Report - June, 1994
Col	PW-17	8/16/93	Eh	LLI	254		mV	Duffield Report - June, 1994
Col	PW-17	8/16/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Col	PW-17	8/16/93	MANGANESE (TOTAL)	LLI	0.029		MG/L	Duffield Report - Oct, 1993
Col	PW-17	8/16/93	pH	LLI	5.95			Duffield Report - Oct, 1993
Col	PW-17	9/9/93	DO	LLI	5		MG/L	Duffield Report - June, 1994
Col	PW-17	9/9/93	Eh	LLI	375		mV	Duffield Report - June, 1994
Col	PW-17	9/9/93	IRON (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Col	PW-17	9/9/93	MANGANESE (TOTAL)	LLI	0	U	MG/L	Duffield Report - Oct, 1993
Col	PW-17	9/9/93	pH	LLI	5.95			Duffield Report - Oct, 1993
Col	PW-18	6/13/72	IRON (TOTAL)	BAI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-18	6/13/72	MANGANESE (TOTAL)	BAI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-18	6/13/72	pH	BAI	6.7			Duffield Report - Aug, 1993
Col	PW-18	12/2/76	IRON (TOTAL)	BAI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-18	12/2/76	MANGANESE (TOTAL)	BAI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-18	12/2/76	pH	BAI	7.6			Duffield Report - Aug, 1993
Col	PW-18	12/7/76	IRON (TOTAL)	DPH	0.15		MG/L	Duffield Report - Aug, 1993
Col	PW-18	12/7/76	pH	DPH	6			Duffield Report - Aug, 1993
Col	PW-18	9/9/93	DO	LLI	8		MG/L	Duffield Report - June, 1994
Col	PW-18	9/9/93	Eh	LLI	236		mV	Duffield Report - June, 1994
Col	PW-18	9/9/93	IRON (TOTAL)	LLI	0.21		MG/L	Duffield Report - Oct, 1993
Col	PW-18	9/9/93	MANGANESE (TOTAL)	LLI	0.02		MG/L	Duffield Report - Oct, 1993
Col	PW-18	9/9/93	pH	LLI	7.6			Duffield Report - Oct, 1993
Pot	PW-19	6/13/72	IRON (TOTAL)	BAI	5.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/13/72	MANGANESE (TOTAL)	BAI	0.1		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/13/72	pH	BAI	6.2			Duffield Report - Aug, 1993
Pot	PW-19	12/6/76	IRON (TOTAL)	BAI	3.6		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	12/6/76	MANGANESE (TOTAL)	BAI	0.14		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	12/6/76	pH	BAI	6.5			Duffield Report - Aug, 1993
Pot	PW-19	12/7/76	IRON (TOTAL)	DPH	4.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	12/7/76	pH	DPH	6.1			Duffield Report - Aug, 1993
Pot	PW-19	10/11/78	IRON (TOTAL)	DPH	3.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	10/11/78	pH	DPH	5.3			Duffield Report - Aug, 1993
Pot	PW-19	7/10/80	IRON (TOTAL)	DPH	0.8		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	7/10/80	pH	DPH	6			Duffield Report - Aug, 1993
Pot	PW-19	7/10/80	TDS	DPH	79		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/14/82	IRON (TOTAL)	DPH	2.2		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/14/82	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-19	6/14/82	TDS	DPH	363		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/29/83	IRON (TOTAL)	DPH	0.55		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/29/83	pH	DPH	6.3			Duffield Report - Aug, 1993
Pot	PW-19	6/29/83	TDS	DPH	74		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/20/84	IRON (TOTAL)	DPH	2.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/20/84	pH	DPH	5.7			Duffield Report - Aug, 1993
Pot	PW-19	6/20/84	TDS	DPH	73		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/12/85	IRON (TOTAL)	DPH	2.6		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/12/85	pH	DPH	5.7			Duffield Report - Aug, 1993
Pot	PW-19	6/12/85	TDS	DPH	79		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/30/86	IRON (TOTAL)	DPH	4.4		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/30/86	pH	DPH	5.9			Duffield Report - Aug, 1993
Pot	PW-19	6/30/86	TDS	DPH	56		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/10/87	IRON (TOTAL)	DPH	4.3		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	6/10/87	pH	DPH	6.8			Duffield Report - Aug, 1993
Pot	PW-19	6/10/87	TDS	DPH	72		MG/L	Duffield Report - Aug, 1993

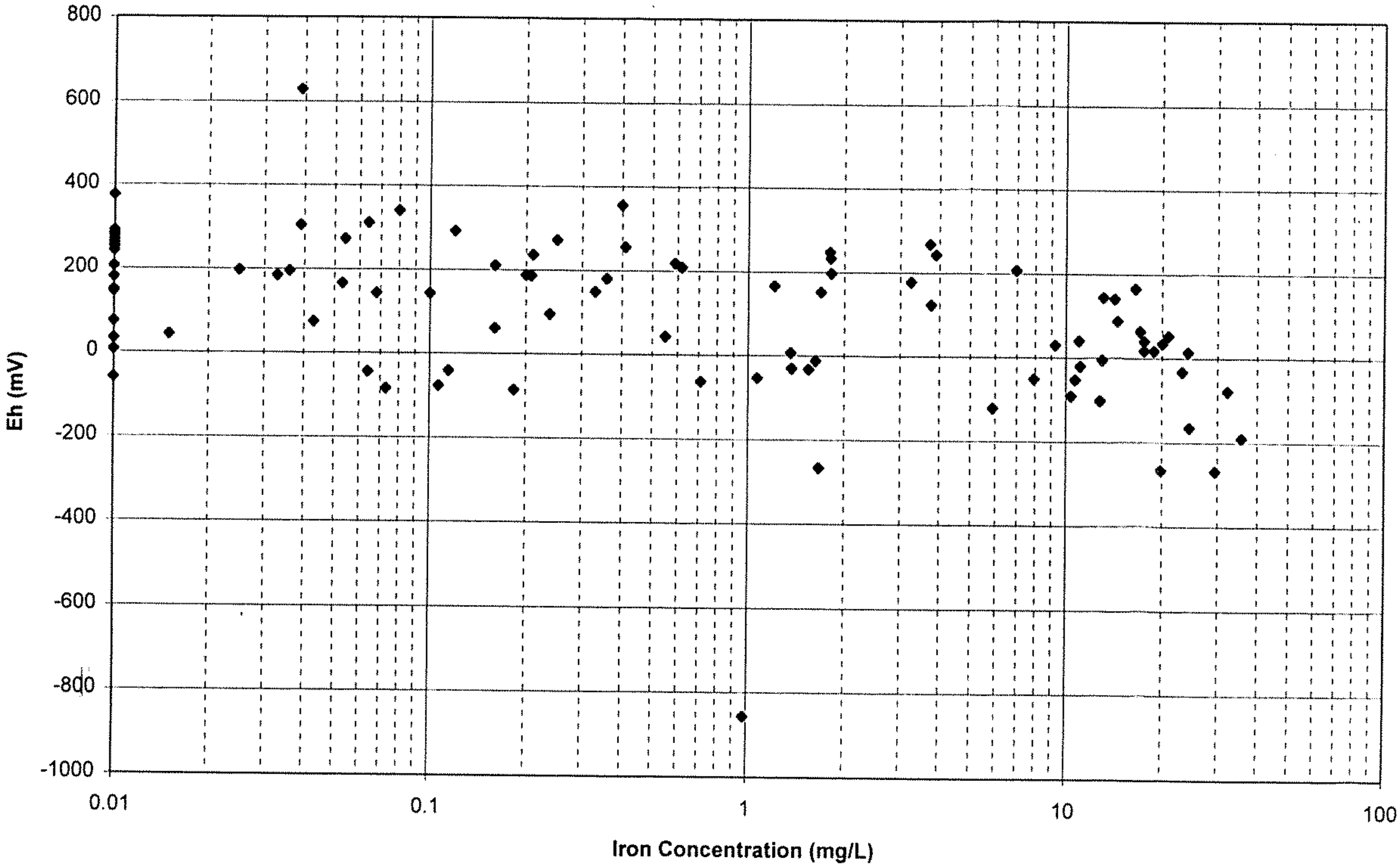
AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Pot	PW-19	6/29/88	pH	DPH	6.5			Duffield Report - Aug, 1993
Pot	PW-19	6/29/88	TDS	DPH	108		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	5/31/89	IRON (TOTAL)	DPH	6.5		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	9/16/91	MANGANESE (TOTAL)	ALI	0	U	MG/L	Duffield Report - Aug, 1993
Pot	PW-19	5/20/92	IRON (TOTAL)	ALI	4		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	5/20/92	MANGANESE (TOTAL)	ALI	0.13		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	5/20/92	pH	ALI	5.8			Duffield Report - Aug, 1993
Pot	PW-19	10/7/92	IRON (TOTAL)	ALI	3.78		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	10/7/92	MANGANESE (TOTAL)	ALI	0.11		MG/L	Duffield Report - Aug, 1993
Pot	PW-19	10/7/92	pH	ALI	5.4			Duffield Report - Aug, 1993
Pot	PW-19	9/9/93	DO	LLI	1.6		MG/L	Duffield Report - June, 1994
Pot	PW-19	9/9/93	Eh	LLI	177		mV	Duffield Report - June, 1994
Pot	PW-19	9/9/93	IRON (TOTAL)	LLI	3.25		MG/L	Duffield Report - Oct, 1993
Pot	PW-19	9/9/93	MANGANESE (TOTAL)	LLI	0.153		MG/L	Duffield Report - Oct, 1993
Pot	PW-19	9/9/93	pH	LLI	5.7			Duffield Report - Oct, 1993
Pot	PW-19	4/26/94	DO	LLI	0.2		MG/L	Duffield Report - June, 1994
Pot	PW-19	4/26/94	Eh	LLI	-51		mV	Duffield Report - June, 1994
Pot	PW-19	4/26/94	IRON (TOTAL)	LLI	7.95		MG/L	Duffield Report - June, 1994
Pot	PW-19	4/26/94	MANGANESE (TOTAL)	LLI	0.151		MG/L	Duffield Report - June, 1994
Pot	PW-19	5/23/95	IRON (TOTAL)	DPH	7		MG/L	DPH Sheets 5/95 sampling
Pot	PW-19	5/23/95	MANGANESE (TOTAL)	DPH	0.16		MG/L	DPH Sheets 5/95 sampling
Pot	PW-19	5/23/95	pH	DPH	6.3			DPH Sheets 5/95 sampling
Pot	PW-19	5/23/95	TDS	DPH	60		MG/L	DPH Sheets 5/95 sampling
Pot	PW-19	8/15/95	IRON (TOTAL)		7.9		MG/L	Tetra Tech report 11/9/95
Pot	PW-19	8/15/95	MANGANESE (TOTAL)		0.18		MG/L	Tetra Tech report 11/9/95
Col	PW-8	10/13/66	IRON (TOTAL)	OLI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	10/13/66	MANGANESE (TOTAL)	OLI	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	10/13/66	pH	OLI	6.6			Duffield Report - Aug, 1993
Col	PW-8	10/13/66	TDS	OLI	120		MG/L	Duffield Report - Aug, 1993
Col	PW-8	9/11/79	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	9/11/79	pH	DPH	5.9			Duffield Report - Aug, 1993
Col	PW-8	9/11/79	TURBIDITY	DPH	0.2		NTU	Duffield Report - Aug, 1993
Col	PW-8	7/10/80	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	7/10/80	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-8	7/10/80	TDS	DPH	207		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/14/82	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/14/82	pH	DPH	5.6			Duffield Report - Aug, 1993
Col	PW-8	6/14/82	TDS	DPH	217		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/29/83	IRON (TOTAL)	DPH	0	U	MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/29/83	pH	DPH	6.2			Duffield Report - Aug, 1993
Col	PW-8	6/29/83	TDS	DPH	166		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/20/84	IRON (TOTAL)	DPH	0.25		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/20/84	pH	DPH	5.4			Duffield Report - Aug, 1993
Col	PW-8	6/20/84	TDS	DPH	214		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/12/85	IRON (TOTAL)	DPH	0.1		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/12/85	pH	DPH	5.5			Duffield Report - Aug, 1993
Col	PW-8	6/12/85	TDS	DPH	115		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/30/86	IRON (TOTAL)	DPH	0.55		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/30/86	pH	DPH	6.3			Duffield Report - Aug, 1993
Col	PW-8	6/30/86	TDS	DPH	171		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/10/87	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/10/87	pH	DPH	6.1			Duffield Report - Aug, 1993
Col	PW-8	6/10/87	TDS	DPH	170		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/29/88	IRON (TOTAL)	DPH	0.05		MG/L	Duffield Report - Aug, 1993
Col	PW-8	6/29/88	pH	DPH	6.5			Duffield Report - Aug, 1993
Col	PW-8	6/29/88	TDS	DPH	185		MG/L	Duffield Report - Aug, 1993
Col	PW-8	9/5/95	DO		0.54		MG/L	Tetra Tech XLS table
Col	PW-8	9/5/95	Eh		45		mV	Tetra Tech XLS table
Col	PW-8	9/5/95	pH		5.36			Tetra Tech XLS table
Col	WIP-2	3/8/91	Eh		340		mV	Tetra Tech XLS table
Col	WIP-2	3/8/91	IRON (DISSOLVED)		0.08		MG/L	Tetra Tech XLS table
Col	WIP-2	3/8/91	pH		5.71			Tetra Tech XLS table
Col	WIP-2	9/20/95	DO		0.42		MG/L	Tetra Tech report 10/4/95
Col	WIP-2	9/20/95	Eh		95			Tetra Tech report 10/4/95
Col	WIP-2	9/20/95	IRON (DISSOLVED)		0.238		MG/L	Tetra Tech report 10/4/95
Col	WIP-2	9/20/95	MANGANESE (DISSOLVED)		0.025		MG/L	Tetra Tech report 10/4/95

AQUIFER	WELL	SAMP_DATE	PARAMETER	LAB	VALUE	QUALIFIER	UNITS	REFERENCE
Col	WIP-2	9/20/95	pH		5.02			Tetra Tech report 10/4/95
Col	WIP-2	10/18/95	DO		1.97		MG/L	Tetra Tech report 11/9/95
Col	WIP-2	10/18/95	Eh		286		mV	Tetra Tech report 11/9/95
Col	WIP-2	10/18/95	IRON (DISSOLVED)		0.559		MG/L	Tetra Tech report 11/9/95
Col	WIP-2	10/18/95	MANGANESE (DISSOLVED)		0.011		MG/L	Tetra Tech report 11/9/95
Col	WIP-2	10/18/95	pH		5.45			Tetra Tech report 11/9/95
Col	WIP-2	11/13/95	DO		4.97		MG/L	Newark Pump Test 11/95
Col	WIP-2	11/13/95	IRON (DISSOLVED)		0.018		MG/L	Newark Pump Test 11/95
Col	WIP-2	11/13/95	MANGANESE (DISSOLVED)		0.014		MG/L	Newark Pump Test 11/95
Col	WIP-2	11/13/95	pH		5.55			Newark Pump Test 11/95

ATTACHMENT 5
Water Quality Correlation Plots

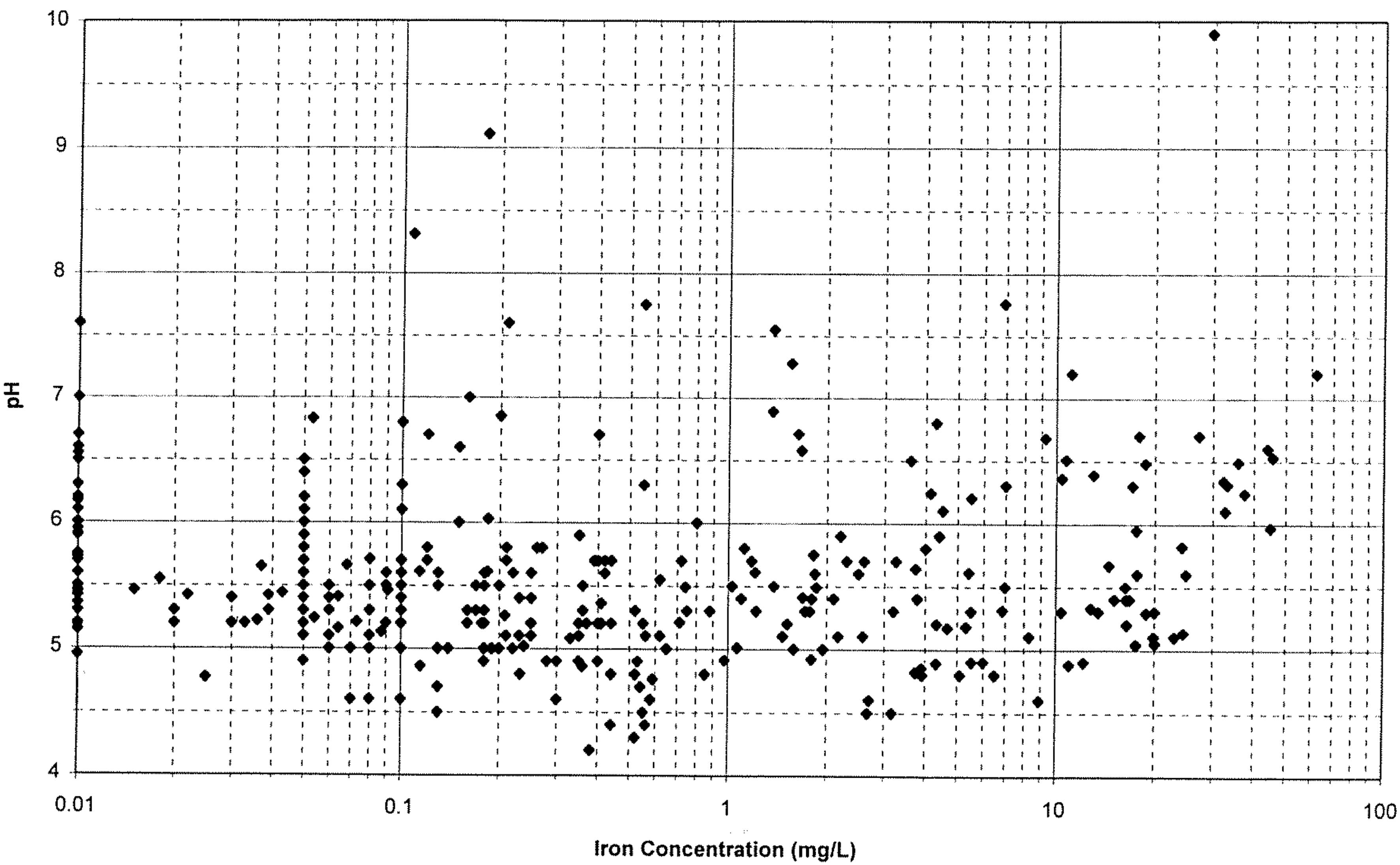

Iron vs. DO
DO (mg/L)
10
1
0.1
0.01
0.1
1
10
100
Iron Concentration (mg/L)

Iron vs. Eh

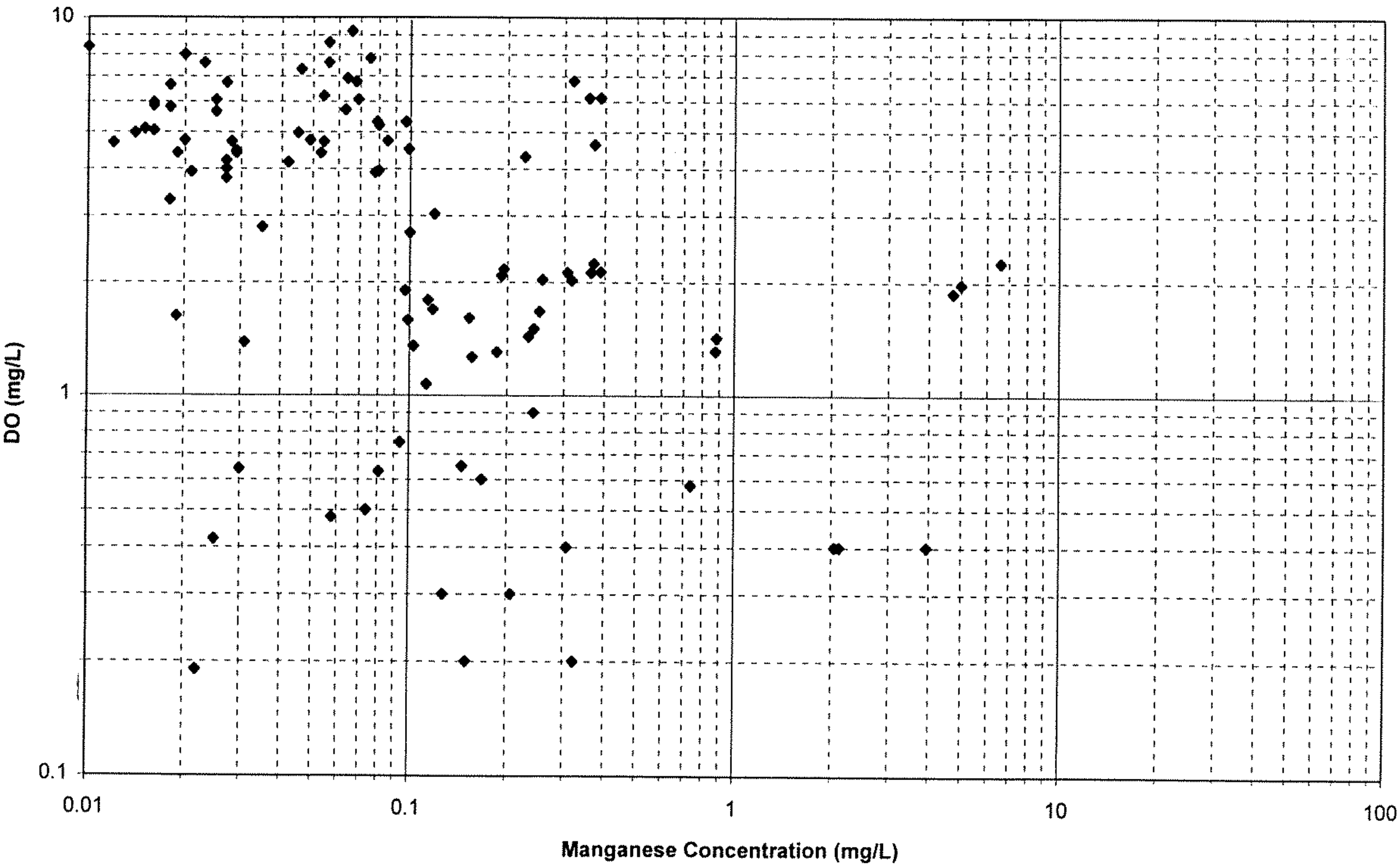


Eh (mV)
800
600
400
200
0
-200
-400
-600
-800
-1000
0.01
0.1
1
10
100
Iron Concentration (mg/L)

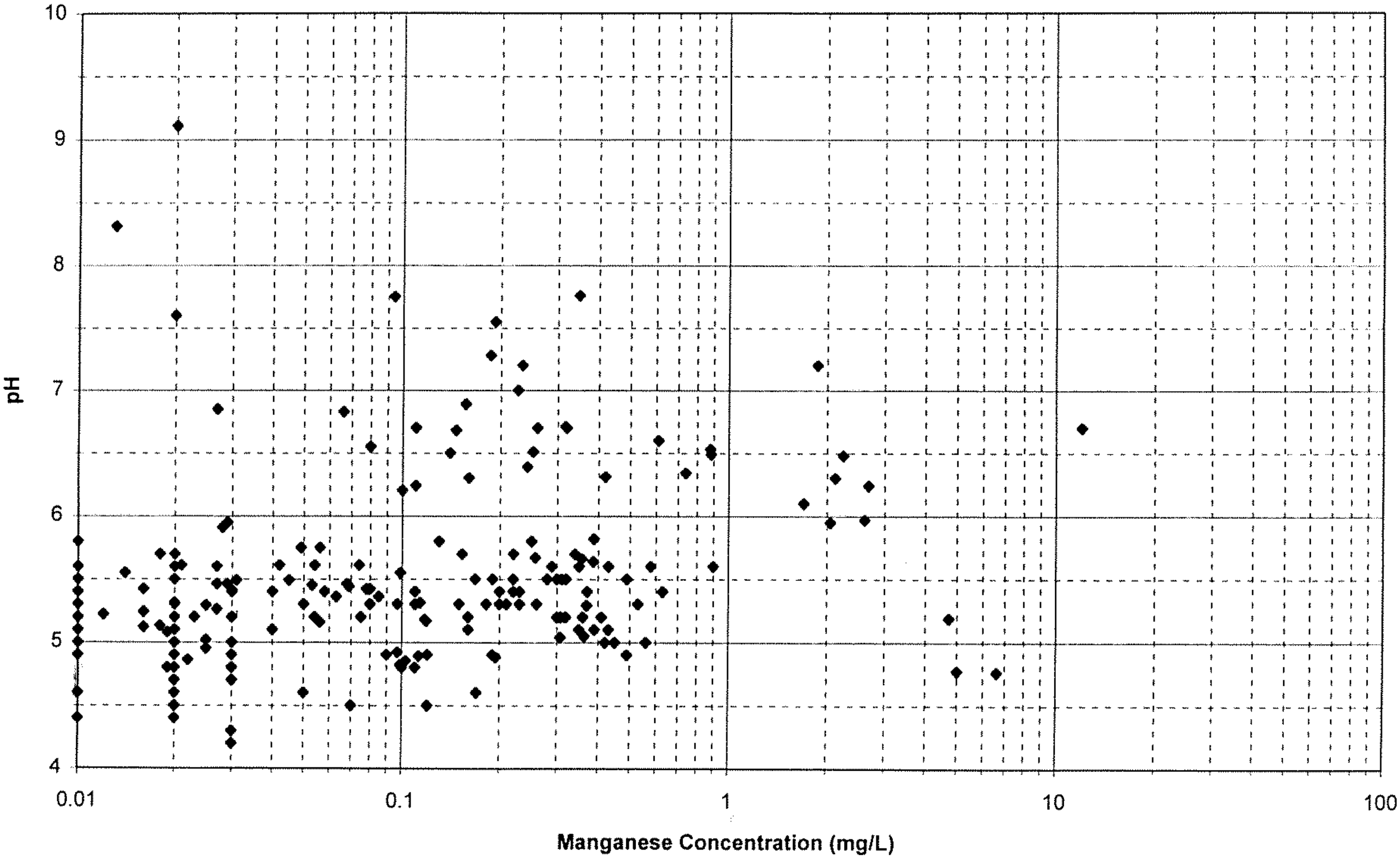
Iron vs. pH



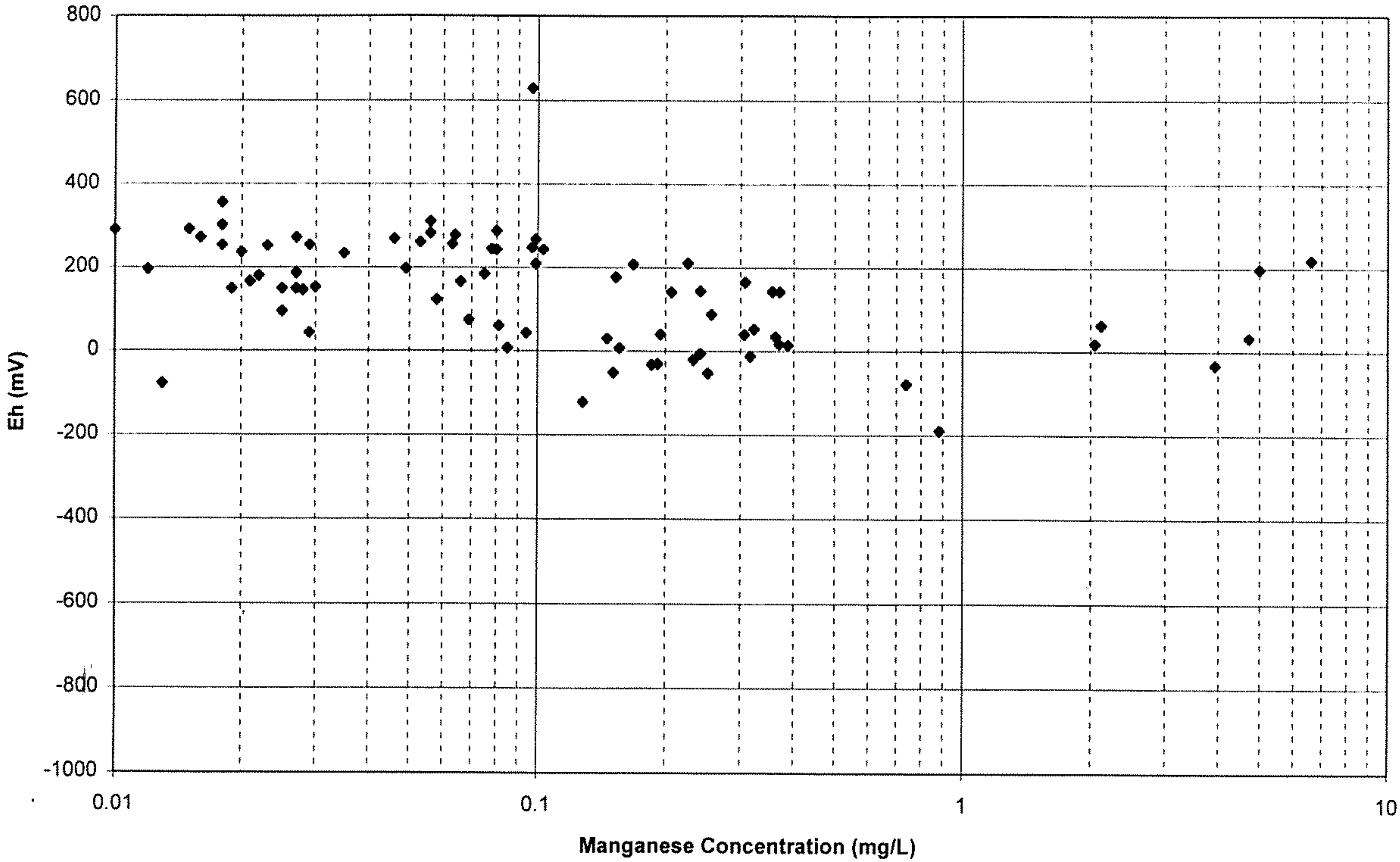
Manganese vs. DO



Manganese vs. pH



Manganese vs. Eh



ATTACHMENT 6
Tabular Water Level Data - 1968 - 1995

City of Newark South Wellfield Well Summary Table

WELL	M.P. ELEVATION	DIAMETER (in.)	SCREEN INTERVAL	AQUIFER	INSTALL DATE	DEPTH	ELEVATION UNCERTAINITY (ft.)	DNREC ALLOCATION RATE
PW-10	75.00	4.00		Potomac		153.00	5	60
PW-11	67.00	10.00	34 to 5	Columbia	1956	63.00	5	150
PW-12	80.00	10.00	-65 to -90	Potomac	1956	175.00	5	75
PW-13	75.00	10.00	29 to 8.5	Columbia	1956	63.00	5	180
PW-14	70.00	10.00	-36 to -59	Potomac	1965	129.00	5	325
PW-15	62.00	10.00	18 to 3	Columbia	1965	59.00	5	425
PW-16	65.00	10.00	-70 to -85; -89 to -102	Potomac	1968	165.00	5	475
PW-17	46.00	8.00		Columbia	1971	69.00	5	150
PW-18	64.00	6.00		Columbia		89.00	10	
PW-19	67.00	6.00	-53 to -68	Potomac	1971	133.00	5	75
PW-8	105.00	16.00		Columbia		63.00	10	
CH-1	62.00	4.00	-29 to -38	Potomac	1994	100.00	5	
CH-2	83.00	4.00	-38 to -48	Potomac	1994	132.00	5	
CH-1A	62.06	4.00	-5 to -15	Columbia	1994	77.00	5	
CH-2A	83.05	4.00	29 to 19	Columbia	1994	66.00	5	
OW-11	67.10	4.00		Columbia		36.00	5/0.01	
OW-14	69.44	12.00		Potomac		70.00	5/0.01	
OW-15	62.63	4.00		Columbia		52.00	5/0.01	
OW-16A	64.87	10.00		Potomac		119.00	5/0.01	
OW-16B	59.05	4.00		Potomac			5/0.01	
NLW-10	105.62	4.00		Potomac		135.00	0.01	
NLW-11	105.59	4.00		Columbia		34.50	0.01	
WIP-2	57.25	2.00		Columbia		20.00	0.01	
SYN-6D	71.64	4.00		Columbia		28.00	0.01	
DTP-2	99.46	2.00		Columbia		45.00	0.01	
DTP-4	105.98	2.00		Columbia		26.40	0.01	

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP ELEV	ELEVATION	COMMENTS
		Col	#206	6/12/95	-9999	-9999.00	7.50	87.00	79.50	Tetra Tech transmittal - 11/95
		Col	#302	10/24/94	-9999	-9999.00	5.70	72.50	66.80	Tetra Tech transmittal - 11/95
		Col	#332	6/22/95	-9999	-9999.00	14.00	84.00	70.00	Tetra Tech transmittal - 11/95
		Col	#360	12/31/94	-9999	-9999.00	-9999.00	-9999.00	60.50	Tetra Tech transmittal - 11/95
		Pot	CH-1	8/11/95	-9999	-9999.00	4.70	62.00	57.30	TT update 10/6/95
		Pot	CH-1	8/16/95	-9999	-9999.00	5.59	62.00	56.41	TT update 10/6/95
		Pot	CH-1	8/24/95	-9999	-9999.00	6.63	62.00	55.37	TT update 10/6/95
		Pot	CH-1	8/28/95	-9999	-9999.00	7.18	62.00	54.82	TT update 10/6/95
		Pot	CH-1	9/5/95	-9999	-9999.00	7.98	62.00	54.02	TT update 10/6/95
		Pot	CH-1	9/12/95	-9999	-9999.00	12.70	62.00	49.30	TT update 10/6/95
		Pot	CH-1	9/20/95	-9999	-9999.00	10.59	62.00	51.41	TT update 10/6/95
		Pot	CH-1	9/27/95	-9999	-9999.00	8.22	62.00	53.78	TT update 10/6/95
		Pot	CH-1	10/2/95	-9999	-9999.00	6.92	62.00	55.08	TT update 10/6/95
		Pot	CH-1	10/10/95	-9999	-9999.00	9.01	62.00	52.99	TT Update 11/2/95
		Pot	CH-1	10/18/95	-9999	-9999.00	7.12	62.00	54.88	TT Update 11/2/95
		Pot	CH-1	10/25/95	-9999	-9999.00	4.92	62.00	57.08	TT Update 11/2/95
		Pot	CH-1	11/1/95	-9999	-9999.00	4.59	62.00	57.41	TT Update 11/2/95
		Pot	CH-1	11/7/95	-9999	-9999.00	4.18	62.00	57.82	TT Update 11/9/95
		Pot	CH-1	11/13/1995(0730-0830)	-9999	-9999.00	3.83	62.00	58.17	TT Pump test data - 11/95
		Pot	CH-1	11/13/1995(0945-1100)	-9999	-9999.00	-9999	62.00	-9999.00	TT Pump test data - 11/95
		Pot	CH-1	11/13/1995(1400-1600)	-9999	-9999.00	3.84	62.00	58.16	TT Pump test data - 11/95
		Pot	CH-1	11/13/1995(2200-2230)	-9999	-9999.00	-9999	62.00	-9999.00	TT Pump test data - 11/95
		Pot	CH-1	11/14/1995(0730-0850)	-9999	-9999.00	4.27	62.00	57.73	TT Pump test data - 11/95
		Pot	CH-1	11/14/1995(1440-1540)	-9999	-9999.00	4.58	62.00	57.42	TT Pump test data - 11/95
		Pot	CH-1	11/14/1995(2200-2230)	-9999	-9999.00	-9999	62.00	-9999.00	TT Pump test data - 11/95
		Pot	CH-1	11/15/1995(0730-0830)	-9999	-9999.00	5.46	62.00	56.54	TT Pump test data - 11/95
		Pot	CH-1	11/15/1995(1430-1530)	-9999	-9999.00	5.46	62.00	56.54	TT Pump test data - 11/95
		Pot	CH-1	11/16/1995(0800-1032)	-9999	-9999.00	6.9	62.00	55.10	TT Pump test data - 11/95
		Pot	CH-1	11/16/1995(1450-1630)	-9999	-9999.00	7.18	62.00	54.82	TT Pump test data - 11/95
		Pot	CH-1	11/17/1995(0730-0920)	-9999	-9999.00	7.81	62.00	54.19	TT Pump test data - 11/95
		Pot	CH-1	11/17/1995(1435-1610)	-9999	-9999.00	8	62.00	54.00	TT Pump test data - 11/95
		Col	CH-1A	8/11/95	-9999	-9999.00	6.84	62.06	55.22	TT update 10/6/95
		Col	CH-1A	8/16/95	-9999	-9999.00	7.56	62.06	54.50	TT update 10/6/95
		Col	CH-1A	8/24/95	-9999	-9999.00	8.33	62.06	53.73	TT update 10/6/95
		Col	CH-1A	8/28/95	-9999	-9999.00	8.65	62.06	53.41	TT update 10/6/95
		Col	CH-1A	9/5/95	-9999	-9999.00	9.16	62.06	52.90	TT update 10/6/95
		Col	CH-1A	9/12/95	-9999	-9999.00	9.78	62.06	52.28	TT update 10/6/95
		Col	CH-1A	9/20/95	-9999	-9999.00	9.78	62.06	52.28	TT update 10/6/95
		Col	CH-1A	9/27/95	-9999	-9999.00	8.43	62.06	53.63	TT update 10/6/95
		Col	CH-1A	10/2/95	-9999	-9999.00	7.63	62.06	54.43	TT update 10/6/95
		Col	CH-1A	10/10/95	-9999	-9999.00	8.14	62.06	53.92	TT Update 11/2/95
		Col	CH-1A	10/18/95	-9999	-9999.00	6.75	62.06	55.31	TT Update 11/2/95
		Col	CH-1A	10/25/95	-9999	-9999.00	7.29	62.06	54.77	TT Update 11/2/95
		Col	CH-1A	11/1/95	-9999	-9999.00	9.94	62.06	52.12	TT Update 11/2/95
		Col	CH-1A	11/7/95	-9999	-9999.00	5.64	62.06	56.42	TT Update 11/9/95
		Col	CH-1A	11/13/1995(0730-0830)	-9999	-9999.00	5.24	62.06	56.82	TT Pump test data - 11/95
		Col	CH-1A	11/13/1995(0945-1100)	-9999	-9999.00	-9999	62.06	-9999.00	TT Pump test data - 11/95
		Col	CH-1A	11/13/1995(1400-1600)	-9999	-9999.00	5.66	62.06	56.40	TT Pump test data - 11/95
		Col	CH-1A	11/13/1995(2200-2230)	-9999	-9999.00	-9999	62.06	-9999.00	TT Pump test data - 11/95
		Col	CH-1A	11/14/1995(0730-0850)	-9999	-9999.00	5.99	62.06	56.07	TT Pump test data - 11/95
		Col	CH-1A	11/14/1995(1440-1540)	-9999	-9999.00	5.99	62.06	56.07	TT Pump test data - 11/95
		Col	CH-1A	11/14/1995(2200-2230)	-9999	-9999.00	-9999	62.06	-9999.00	TT Pump test data - 11/95
		Col	CH-1A	11/15/1995(0730-0830)	-9999	-9999.00	6.22	62.06	55.84	TT Pump test data - 11/95
		Col	CH-1A	11/15/1995(1430-1530)	-9999	-9999.00	6.48	62.06	55.58	TT Pump test data - 11/95
		Col	CH-1A	11/16/1995(0800-1032)	-9999	-9999.00	6.79	62.06	55.27	TT Pump test data - 11/95
		Col	CH-1A	11/16/1995(1450-1630)	-9999	-9999.00	6.8	62.06	55.26	TT Pump test data - 11/95
		Col	CH-1A	11/17/1995(0730-0920)	-9999	-9999.00	6.97	62.06	55.09	TT Pump test data - 11/95
		Col	CH-1A	11/17/1995(1435-1610)	-9999	-9999.00	6.56	62.06	55.50	TT Pump test data - 11/95
		Pot	CH-2	8/11/95	-9999	-9999.00	21.10	83.00	61.90	TT update 10/6/95
		Pot	CH-2	8/16/95	-9999	-9999.00	21.31	83.00	61.69	TT update 10/6/95
		Pot	CH-2	8/24/95	-9999	-9999.00	22.31	83.00	60.69	TT update 10/6/95
		Pot	CH-2	8/28/95	-9999	-9999.00	22.58	83.00	60.42	TT update 10/6/95
		Pot	CH-2	9/5/95	-9999	-9999.00	23.41	83.00	59.59	TT update 10/6/95
		Pot	CH-2	9/12/95	-9999	-9999.00	24.16	83.00	58.84	TT update 10/6/95
		Pot	CH-2	9/19/95	-9999	-9999.00	26.00	83.00	57.00	TT update 10/6/95
		Pot	CH-2	9/27/95	-9999	-9999.00	24.07	83.00	58.93	TT update 10/6/95
		Pot	CH-2	10/2/95	-9999	-9999.00	22.98	83.00	60.02	TT update 10/6/95
		Pot	CH-2	10/10/95	-9999	-9999.00	21.73	83.00	61.27	TT Update 11/2/95
		Pot	CH-2	10/17/95	-9999	-9999.00	22.48	83.00	60.52	TT Update 11/2/95
		Pot	CH-2	10/25/95	-9999	-9999.00	20.72	83.00	62.28	TT Update 11/2/95
		Pot	CH-2	11/1/95	-9999	-9999.00	20.34	83.00	62.66	TT Update 11/2/95
		Pot	CH-2	11/7/95	-9999	-9999.00	20.07	83.00	62.93	TT Update 11/9/95
		Pot	CH-2	11/13/1995(0730-0830)	-9999	-9999.00	19.87	83.00	63.13	TT Pump test data - 11/95
		Pot	CH-2	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	83.00	-9999.00	TT Pump test data - 11/95
		Pot	CH-2	11/13/1995(1400-1600)	-9999	-9999.00	19.82	83.00	63.18	TT Pump test data - 11/95
		Pot	CH-2	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	83.00	-9999.00	TT Pump test data - 11/95
		Pot	CH-2	11/14/1995(0730-0850)	-9999	-9999.00	19.79	83.00	63.21	TT Pump test data - 11/95
		Pot	CH-2	11/14/1995(1440-1540)	-9999	-9999.00	19.70	83.00	63.30	TT Pump test data - 11/95
		Pot	CH-2	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	83.00	-9999.00	TT Pump test data - 11/95
		Pot	CH-2	11/15/1995(0730-0830)	-9999	-9999.00	19.73	83.00	63.27	TT Pump test data - 11/95
		Pot	CH-2	11/15/1995(1430-1530)	-9999	-9999.00	-9999.00	83.00	-9999.00	TT Pump test data - 11/95
		Pot	CH-2	11/16/1995(0800-1032)	-9999	-9999.00	20.00	83.00	63.00	TT Pump test data - 11/95
		Pot	CH-2	11/16/1995(1450-1630)	-9999	-9999.00	20.04	83.00	62.96	TT Pump test data - 11/95
		Pot	CH-2	11/17/1995(0730-0920)	-9999	-9999.00	20.22	83.00	62.78	TT Pump test data - 11/95
		Pot	CH-2	11/17/1995(1435-1610)	-9999	-9999.00	20.28	83.00	62.72	TT Pump test data - 11/95
		Col	CH-2A	8/11/95	-9999	-9999.00	19.46	83.05	63.59	TT update 10/6/95
		Col	CH-2A	8/16/95	-9999	-9999.00	19.56	83.05	63.49	TT update 10/6/95
		Col	CH-2A	8/24/95	-9999	-9999.00	19.68	83.05	63.37	TT update 10/6/95
		Col	CH-2A	8/28/95	-9999	-9999.00	20.00	83.05	63.05	TT update 10/6/95
		Col	CH-2A	9/5/95	-9999	-9999.00	19.93	83.05	63.12	TT update 10/6/95
		Col	CH-2A	9/12/95	-9999	-9999.00	20.08	83.05	62.97	TT update 10/6/95

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
		Col	CH-2A	9/19/95	-9999	-9999.00	20.22	83.05	62.83	TT update 10/6/95
		Col	CH-2A	9/27/95	-9999	-9999.00	20.38	83.05	62.67	TT update 10/6/95
		Col	CH-2A	10/2/95	-9999	-9999.00	22.43	83.05	60.62	TT update 10/6/95
		Col	CH-2A	10/10/95	-9999	-9999.00	20.51	83.05	62.54	TT Update 11/2/95
		Col	CH-2A	10/17/95	-9999	-9999.00	20.83	83.05	62.22	TT Update 11/2/95
		Col	CH-2A	10/25/95	-9999	-9999.00	20.58	83.05	62.47	TT Update 11/2/95
		Col	CH-2A	11/1/95	-9999	-9999.00	20.35	83.05	62.70	TT Update 11/2/95
		Col	CH-2A	11/7/95	-9999	-9999.00	20.10	83.05	62.95	TT Update 11/9/95
		Col	CH-2A	11/13/1995(0730-0830)	-9999	-9999.00	20.18	83.05	62.87	TT Pump test data - 11/95
		Col	CH-2A	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	83.05	-9999.00	TT Pump test data - 11/95
		Col	CH-2A	11/13/1995(1400-1600)	-9999	-9999.00	20.11	83.05	62.94	TT Pump test data - 11/95
		Col	CH-2A	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	83.05	-9999.00	TT Pump test data - 11/95
		Col	CH-2A	11/14/1995(0730-0850)	-9999	-9999.00	20.02	83.05	63.03	TT Pump test data - 11/95
		Col	CH-2A	11/14/1995(1440-1540)	-9999	-9999.00	19.94	83.05	63.11	TT Pump test data - 11/95
		Col	CH-2A	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	83.05	-9999.00	TT Pump test data - 11/95
		Col	CH-2A	11/15/1995(0730-0830)	-9999	-9999.00	20.07	83.05	62.98	TT Pump test data - 11/95
		Col	CH-2A	11/15/1995(1430-1530)	-9999	-9999.00	-9999.00	83.05	-9999.00	TT Pump test data - 11/95
		Col	CH-2A	11/16/1995(0800-1032)	-9999	-9999.00	20.07	83.05	62.98	TT Pump test data - 11/95
		Col	CH-2A	11/16/1995(1450-1630)	-9999	-9999.00	20.03	83.05	63.02	TT Pump test data - 11/95
		Col	CH-2A	11/17/1995(0730-0920)	-9999	-9999.00	20.03	83.05	63.02	TT Pump test data - 11/95
		Col	CH-2A	11/17/1995(1435-1610)	-9999	-9999.00	19.98	83.05	63.07	TT Pump test data - 11/95
		Col	DTP-2	8/24/95	-9999	-9999.00	21.17	99.46	78.29	TT update 10/6/95
		Col	DTP-2	8/28/95	-9999	-9999.00	21.21	99.46	78.25	TT update 10/6/95
		Col	DTP-2	9/5/95	-9999	-9999.00	21.38	99.46	78.08	TT update 10/6/95
		Col	DTP-2	9/12/95	-9999	-9999.00	21.46	99.46	78.00	TT update 10/6/95
		Col	DTP-2	9/20/95	-9999	-9999.00	21.38	99.46	78.08	TT Update 10/6/95
		Col	DTP-2	9/27/95	-9999	-9999.00	21.30	99.46	78.16	TT Update 10/6/95
		Col	DTP-2	10/2/95	-9999	-9999.00	21.46	99.46	78.00	TT Update 10/6/95
		Col	DTP-2	10/10/95	-9999	-9999.00	21.28	99.46	78.18	TT Update 11/2/95
		Col	DTP-2	10/18/95	-9999	-9999.00	21.23	99.46	78.23	TT Update 11/2/95
		Col	DTP-2	10/25/95	-9999	-9999.00	21.09	99.46	78.37	TT Update 11/2/95
		Col	DTP-2	11/1/95	-9999	-9999.00	20.08	99.46	79.38	TT Update 11/2/95
		Col	DTP-2	11/7/95	-9999	-9999.00	20.75	99.46	78.71	TT Update 11/9/95
		Col	DTP-2	11/13/1995(0730-0830)	-9999	-9999.00	-9999.00	99.46	-9999.00	TT Pump test data - 11/95
		Col	DTP-2	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	99.46	-9999.00	TT Pump test data - 11/95
		Col	DTP-2	11/13/1995(1400-1600)	-9999	-9999.00	20.49	99.46	78.97	TT Pump test data - 11/95
		Col	DTP-2	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	99.46	-9999.00	TT Pump test data - 11/95
		Col	DTP-2	11/14/1995(0730-0850)	-9999	-9999.00	-9999.00	99.46	-9999.00	TT Pump test data - 11/95
		Col	DTP-2	11/14/1995(1440-1540)	-9999	-9999.00	-9999.00	99.46	-9999.00	TT Pump test data - 11/95
		Col	DTP-2	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	99.46	-9999.00	TT Pump test data - 11/95
		Col	DTP-2	11/15/1995(0730-0830)	-9999	-9999.00	-9999.00	99.46	-9999.00	TT Pump test data - 11/95
		Col	DTP-2	11/15/1995(1430-1530)	-9999	-9999.00	20.30	99.46	79.16	TT Pump test data - 11/95
		Col	DTP-2	11/16/1995(0800-1032)	-9999	-9999.00	20.28	99.46	79.18	TT Pump test data - 11/95
		Col	DTP-2	11/16/1995(1450-1630)	-9999	-9999.00	20.27	99.46	79.19	TT Pump test data - 11/95
		Col	DTP-2	11/17/1995(0730-0920)	-9999	-9999.00	20.25	99.46	79.21	TT Pump test data - 11/95
		Col	DTP-2	11/17/1995(1435-1610)	-9999	-9999.00	20.25	99.46	79.21	TT Pump test data - 11/95
		Col	DTP-4	8/24/95	-9999	-9999.00	15.30	105.98	90.68	TT update 10/6/95
		Col	DTP-4	8/28/95	-9999	-9999.00	15.08	105.98	90.90	TT update 10/6/95
		Col	DTP-4	9/5/95	-9999	-9999.00	15.20	105.98	90.78	TT update 10/6/95
		Col	DTP-4	9/12/95	-9999	-9999.00	15.26	105.98	90.72	TT update 10/6/95
		Col	DTP-4	9/20/95	-9999	-9999.00	15.33	105.98	90.65	TT Update 10/6/95
		Col	DTP-4	9/27/95	-9999	-9999.00	15.35	105.98	90.63	TT Update 10/6/95
		Col	DTP-4	10/2/95	-9999	-9999.00	15.35	105.98	90.63	TT Update 10/6/95
		Col	DTP-4	10/10/95	-9999	-9999.00	15.29	105.98	90.69	TT Update 11/2/95
		Col	DTP-4	10/18/95	-9999	-9999.00	16.25	105.98	89.73	TT Update 11/2/95
		Col	DTP-4	10/25/95	-9999	-9999.00	15.10	105.98	90.88	TT Update 11/2/95
		Col	DTP-4	11/1/95	-9999	-9999.00	14.83	105.98	91.15	TT Update 11/2/95
		Col	DTP-4	11/7/95	-9999	-9999.00	14.67	105.98	91.31	TT Update 11/9/95
		Col	DTP-4	11/13/1995(0730-0830)	-9999	-9999.00	-9999.00	105.98	-9999.00	TT Pump test data - 11/95
		Col	DTP-4	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	105.98	-9999.00	TT Pump test data - 11/95
		Col	DTP-4	11/13/1995(1400-1600)	-9999	-9999.00	-9999.00	105.98	-9999.00	TT Pump test data - 11/95
		Col	DTP-4	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	105.98	-9999.00	TT Pump test data - 11/95
		Col	DTP-4	11/14/1995(0730-0850)	-9999	-9999.00	-9999.00	105.98	-9999.00	TT Pump test data - 11/95
		Col	DTP-4	11/14/1995(1440-1540)	-9999	-9999.00	-9999.00	105.98	-9999.00	TT Pump test data - 11/95
		Col	DTP-4	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	105.98	-9999.00	TT Pump test data - 11/95
		Col	DTP-4	11/15/1995(0730-0830)	-9999	-9999.00	-9999.00	105.98	-9999.00	TT Pump test data - 11/95
		Col	DTP-4	11/15/1995(1430-1530)	-9999	-9999.00	14.47	105.98	91.51	TT Pump test data - 11/95
		Col	DTP-4	11/16/1995(0800-1032)	-9999	-9999.00	14.49	105.98	91.49	TT Pump test data - 11/95
		Col	DTP-4	11/16/1995(1450-1630)	-9999	-9999.00	14.45	105.98	91.53	TT Pump test data - 11/95
		Col	DTP-4	11/17/1995(0730-0920)	-9999	-9999.00	14.43	105.98	91.55	TT Pump test data - 11/95
		Col	DTP-4	11/17/1995(1435-1610)	-9999	-9999.00	14.40	105.98	91.58	TT Pump test data - 11/95
		Pot	NLW-10	8/17/95	-9999	-9999.00	16.42	105.62	89.20	TT update 10/6/95
		Pot	NLW-10	8/24/95	-9999	-9999.00	16.83	105.62	88.79	TT update 10/6/95
		Pot	NLW-10	8/28/95	-9999	-9999.00	17.33	105.62	88.29	TT update 10/6/95
		Pot	NLW-10	9/5/95	-9999	-9999.00	17.07	105.62	88.55	TT update 10/6/95
		Pot	NLW-10	9/12/95	-9999	-9999.00	17.19	105.62	88.43	TT update 10/6/95
		Pot	NLW-10	9/19/95	-9999	-9999.00	17.15	105.62	88.47	TT update 10/6/95
		Pot	NLW-10	9/27/95	-9999	-9999.00	16.84	105.62	88.78	TT update 10/6/95
		Pot	NLW-10	10/2/95	-9999	-9999.00	16.83	105.62	88.79	TT update 10/6/95
		Pot	NLW-10	10/10/95	-9999	-9999.00	16.84	105.62	88.78	TT Update 11/2/95
		Pot	NLW-10	10/17/95	-9999	-9999.00	16.80	105.62	88.82	TT Update 11/2/95
		Pot	NLW-10	10/25/95	-9999	-9999.00	16.63	105.62	88.99	TT Update 11/2/95
		Pot	NLW-10	11/1/95	-9999	-9999.00	16.40	105.62	89.22	TT Update 11/2/95
		Pot	NLW-10	11/7/95	-9999	-9999.00	16.24	105.62	89.38	TT Update 11/9/95
		Pot	NLW-10	11/13/1995(0730-0830)	-9999	-9999.00	-9999.00	105.62	-9999.00	TT Pump test data - 11/95
		Pot	NLW-10	11/13/1995(0945-1100)	-9999	-9999.00	16.10	105.62	89.52	TT Pump test data - 11/95
		Pot	NLW-10	11/13/1995(1400-1600)	-9999	-9999.00	-9999.00	105.62	-9999.00	TT Pump test data - 11/95
		Pot	NLW-10	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	105.62	-9999.00	TT Pump test data - 11/95
		Pot	NLW-10	11/14/1995(0730-0850)	-9999	-9999.00	-9999.00	105.62	-9999.00	TT Pump test data - 11/95
		Pot	NLW-10	11/14/1995(1440-1540)	-9999	-9999.00	-9999.00	105.62	-9999.00	TT Pump test data - 11/95
		Pot	NLW-10	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	105.62	-9999.00	TT Pump test data - 11/95

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
		Pot	NLW-10	11/15/1995(0730-0830)	-9999	-9999.00	-9999.00	105.62	-9999.00	TT Pump test data - 11/95
		Pot	NLW-10	11/15/1995(1430-1530)	-9999	-9999.00	15.89	105.62	89.73	TT Pump test data - 11/95
		Pot	NLW-10	11/16/1995(0800-1032)	-9999	-9999.00	16.09	105.62	89.53	TT Pump test data - 11/95
		Pot	NLW-10	11/16/1995(1450-1630)	-9999	-9999.00	16.08	105.62	89.54	TT Pump test data - 11/95
		Pot	NLW-10	11/17/1995(0730-0920)	-9999	-9999.00	16.12	105.62	89.50	TT Pump test data - 11/95
		Pot	NLW-10	11/17/1995(1435-1610)	-9999	-9999.00	16.12	105.62	89.50	TT Pump test data - 11/95
		Col	NLW-11	8/17/95	-9999	-9999.00	16.42	105.59	89.17	TT Update 10/6/95
		Col	NLW-11	8/24/95	-9999	-9999.00	16.95	105.59	88.64	TT Update 10/6/95
		Col	NLW-11	8/28/95	-9999	-9999.00	17.28	105.59	88.31	TT Update 10/6/95
		Col	NLW-11	9/5/95	-9999	-9999.00	16.68	105.59	88.91	TT Update 10/6/95
		Col	NLW-11	9/12/95	-9999	-9999.00	17.14	105.59	88.45	TT Update 10/6/95
		Col	NLW-11	9/19/95	-9999	-9999.00	17.18	105.59	88.41	TT Update 10/6/95
		Col	NLW-11	9/27/95	-9999	-9999.00	16.90	105.59	88.69	TT Update 10/6/95
		Col	NLW-11	10/2/95	-9999	-9999.00	16.88	105.59	88.71	TT Update 10/6/95
		Col	NLW-11	10/10/95	-9999	-9999.00	16.81	105.59	88.78	TT Update 11/2/95
		Col	NLW-11	10/17/95	-9999	-9999.00	16.86	105.59	88.73	TT Update 11/2/95
		Col	NLW-11	10/25/95	-9999	-9999.00	16.64	105.59	88.95	TT Update 11/2/95
		Col	NLW-11	11/1/95	-9999	-9999.00	16.40	105.59	89.19	TT Update 11/2/95
		Col	NLW-11	11/7/95	-9999	-9999.00	16.25	105.59	89.34	TT Update 11/9/95
		Col	NLW-11	11/13/1995(0730-0830)	-9999	-9999.00	-9999.00	105.59	-9999.00	TT Pump test data - 11/95
		Col	NLW-11	11/13/1995(0945-1100)	-9999	-9999.00	16.12	105.59	89.47	TT Pump test data - 11/95
		Col	NLW-11	11/13/1995(1400-1600)	-9999	-9999.00	-9999.00	105.59	-9999.00	TT Pump test data - 11/95
		Col	NLW-11	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	105.59	-9999.00	TT Pump test data - 11/95
		Col	NLW-11	11/14/1995(0730-0850)	-9999	-9999.00	-9999.00	105.59	-9999.00	TT Pump test data - 11/95
		Col	NLW-11	11/14/1995(1440-1540)	-9999	-9999.00	-9999.00	105.59	-9999.00	TT Pump test data - 11/95
		Col	NLW-11	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	105.59	-9999.00	TT Pump test data - 11/95
		Col	NLW-11	11/15/1995(0730-0830)	-9999	-9999.00	-9999.00	105.59	-9999.00	TT Pump test data - 11/95
		Col	NLW-11	11/15/1995(1430-1530)	-9999	-9999.00	16.03	105.59	89.56	TT Pump test data - 11/95
		Col	NLW-11	11/16/1995(0800-1032)	-9999	-9999.00	16.12	105.59	89.47	TT Pump test data - 11/95
		Col	NLW-11	11/16/1995(1450-1630)	-9999	-9999.00	16.06	105.59	89.53	TT Pump test data - 11/95
		Col	NLW-11	11/17/1995(0730-0920)	-9999	-9999.00	16.15	105.59	89.44	TT Pump test data - 11/95
		Col	NLW-11	11/17/1995(1435-1610)	-9999	-9999.00	16.08	105.59	89.51	TT Pump test data - 11/95
Db22-49	010094		OB 16	5/31/54	1726	-9999.00	-9999.00	60.00	-9999.00	Diskette - WRAUSE1.LST
Db22-49	010094		OB 16	6/30/54	4693	-9999.00	-9999.00	60.00	-9999.00	Diskette - WRAUSE1.LST
Db22-49	010094		OB 16	7/31/54	3175	-9999.00	-9999.00	60.00	-9999.00	Diskette - WRAUSE1.LST
Db22-49	010094		OB 16	8/31/54	4622	-9999.00	-9999.00	60.00	-9999.00	Diskette - WRAUSE1.LST
Db22-49	010094		OB 16	9/30/54	4231	-9999.00	-9999.00	60.00	-9999.00	Diskette - WRAUSE1.LST
Db22-49	010094		OB 16	10/31/54	4195	-9999.00	-9999.00	60.00	-9999.00	Diskette - WRAUSE1.LST.
		Col	OW-11	8/11/95	-9999	-9999.00	8.67	67.10	58.43	TT update 10/6/95
		Col	OW-11	8/16/95	-9999	-9999.00	9.20	67.10	57.90	TT update 10/6/95
		Col	OW-11	8/24/95	-9999	-9999.00	9.95	67.10	57.15	TT update 10/6/95
		Col	OW-11	8/28/95	-9999	-9999.00	10.28	67.10	56.82	TT update 10/6/95
		Col	OW-11	9/5/95	-9999	-9999.00	10.81	67.10	56.29	TT update 10/6/95
		Col	OW-11	9/12/95	-9999	-9999.00	11.12	67.10	55.98	TT update 10/6/95
		Col	OW-11	9/20/95	-9999	-9999.00	11.39	67.10	55.71	TT Update 10/6/95
		Col	OW-11	9/27/95	-9999	-9999.00	11.00	67.10	56.10	TT Update 10/6/95
		Col	OW-11	10/2/95	-9999	-9999.00	10.63	67.10	56.47	TT Update 10/6/95
		Col	OW-11	10/10/95	-9999	-9999.00	10.38	67.10	56.72	TT Update 11/2/95
		Col	OW-11	10/18/95	-9999	-9999.00	9.92	67.10	57.18	TT Update 11/2/95
		Col	OW-11	10/25/95	-9999	-9999.00	9.74	67.10	57.36	TT Update 11/2/95
		Col	OW-11	11/1/95	-9999	-9999.00	9.30	67.10	57.80	TT Update 11/2/95
		Col	OW-11	11/7/95	-9999	-9999.00	8.86	67.10	58.24	TT Update 11/9/95
		Col	OW-11	11/13/1995(0730-0830)	-9999	-9999.00	8.56	67.10	58.54	TT Pump test data - 11/95
		Col	OW-11	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	67.10	-9999.00	TT Pump test data - 11/95
		Col	OW-11	11/13/1995(1400-1600)	-9999	-9999.00	8.42	67.10	58.68	TT Pump test data - 11/95
		Col	OW-11	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	67.10	-9999.00	TT Pump test data - 11/95
		Col	OW-11	11/14/1995(0730-0850)	-9999	-9999.00	8.41	67.10	58.69	TT Pump test data - 11/95
		Col	OW-11	11/14/1995(1440-1540)	-9999	-9999.00	5.22	67.10	61.88	TT Pump test data - 11/95
		Col	OW-11	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	67.10	-9999.00	TT Pump test data - 11/95
		Col	OW-11	11/15/1995(0730-0830)	-9999	-9999.00	8.38	67.10	58.72	TT Pump test data - 11/95
		Col	OW-11	11/15/1995(1430-1530)	-9999	-9999.00	8.55	67.10	58.55	TT Pump test data - 11/95
		Col	OW-11	11/16/1995(0800-1032)	-9999	-9999.00	8.69	67.10	58.41	TT Pump test data - 11/95
		Col	OW-11	11/16/1995(1450-1630)	-9999	-9999.00	8.67	67.10	58.43	TT Pump test data - 11/95
		Col	OW-11	11/17/1995(0730-0920)	-9999	-9999.00	8.87	67.10	58.23	TT Pump test data - 11/95
		Col	OW-11	11/17/1995(1435-1610)	-9999	-9999.00	8.82	67.10	58.28	TT Pump test data - 11/95
			OW-14	8/11/95	-9999	-9999.00	14.42	69.44	55.02	TT update 10/6/95
			OW-14	8/17/95	-9999	-9999.00	15.25	69.44	54.19	TT update 10/6/95
			OW-14	8/24/95	-9999	-9999.00	27.86	69.44	41.58	TT update 10/6/95
			OW-14	8/28/95	-9999	-9999.00	28.20	69.44	41.24	TT update 10/6/95
			OW-14	9/5/95	-9999	-9999.00	28.50	69.44	40.94	TT update 10/6/95
			OW-14	9/12/95	-9999	-9999.00	28.79	69.44	40.65	TT update 10/6/95
			OW-14	9/20/95	-9999	-9999.00	28.94	69.44	40.50	TT Update 10/6/95
			OW-14	9/27/95	-9999	-9999.00	14.75	69.44	54.69	TT Update 10/6/95
			OW-14	10/2/95	-9999	-9999.00	13.77	69.44	55.67	TT Update 10/6/95
			OW-14	10/10/95	-9999	-9999.00	13.33	69.44	56.11	TT Update 11/2/95
			OW-14	10/18/95	-9999	-9999.00	13.41	69.44	56.03	TT Update 11/2/95
			OW-14	10/25/95	-9999	-9999.00	12.98	69.44	56.46	TT Update 11/2/95
			OW-14	11/1/95	-9999	-9999.00	12.73	69.44	56.71	TT Update 11/2/95
			OW-14	11/7/95	-9999	-9999.00	12.71	69.44	56.73	TT Update 11/9/95
			OW-14	11/13/1995(0730-0830)	-9999	-9999.00	12.20	69.44	57.24	TT Pump test data - 11/95
			OW-14	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	69.44	-9999.00	TT Pump test data - 11/95
			OW-14	11/13/1995(1400-1600)	-9999	-9999.00	12.20	69.44	57.24	TT Pump test data - 11/95
			OW-14	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	69.44	-9999.00	TT Pump test data - 11/95
			OW-14	11/14/1995(0730-0850)	-9999	-9999.00	12.33	69.44	57.11	TT Pump test data - 11/95
			OW-14	11/14/1995(1440-1540)	-9999	-9999.00	12.36	69.44	57.08	TT Pump test data - 11/95
			OW-14	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	69.44	-9999.00	TT Pump test data - 11/95
			OW-14	11/15/1995(0730-0830)	-9999	-9999.00	12.39	69.44	57.05	TT Pump test data - 11/95
			OW-14	11/15/1995(1430-1530)	-9999	-9999.00	12.40	69.44	57.04	TT Pump test data - 11/95
			OW-14	11/16/1995(0800-1032)	-9999	-9999.00	12.43	69.44	57.01	TT Pump test data - 11/95
			OW-14	11/16/1995(1450-1630)	-9999	-9999.00	12.43	69.44	57.01	TT Pump test data - 11/95
			OW-14	11/17/1995(0730-0920)	-9999	-9999.00	12.47	69.44	56.97	TT Pump test data - 11/95

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
			OW-14	11/17/1995(1435-1610)	-9999	-9999.00	12.44	69.44	57.00	TT Pump test data - 11/95
		Col	OW-15	8/11/95	-9999	-9999.00	11.56	62.63	51.07	TT update 10/6/95
		Col	OW-15	8/17/95	-9999	-9999.00	12.50	62.63	50.13	TT update 10/6/95
		Col	OW-15	8/24/95	-9999	-9999.00	13.18	62.63	49.45	TT update 10/6/95
		Col	OW-15	8/28/95	-9999	-9999.00	14.48	62.63	48.15	TT update 10/6/95
		Col	OW-15	9/5/95	-9999	-9999.00	14.00	62.63	48.63	TT update 10/6/95
		Col	OW-15	9/12/95	-9999	-9999.00	14.18	62.63	48.45	TT update 10/6/95
		Col	OW-15	9/19/95	-9999	-9999.00	14.27	62.63	48.36	TT Update 10/6/95
		Col	OW-15	9/27/95	-9999	-9999.00	11.59	62.63	51.04	TT Update 10/6/95
		Col	OW-15	10/2/95	-9999	-9999.00	10.76	62.63	51.87	TT Update 10/6/95
		Col	OW-15	10/10/95	-9999	-9999.00	12.90	62.63	49.73	TT Update 11/2/95
		Col	OW-15	10/17/95	-9999	-9999.00	10.29	62.63	52.34	TT Update 11/2/95
		Col	OW-15	10/25/95	-9999	-9999.00	11.13	62.63	51.50	TT Update 11/2/95
		Col	OW-15	11/1/95	-9999	-9999.00	9.94	62.63	52.69	TT Update 11/2/95
		Col	OW-15	11/7/95	-9999	-9999.00	8.94	62.63	53.69	TT Update 11/9/95
		Col	OW-15	11/13/1995(0730-0830)	-9999	-9999.00	8.56	62.63	54.07	TT Pump test data - 11/95
		Col	OW-15	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	62.63	-9999.00	TT Pump test data - 11/95
		Col	OW-15	11/13/1995(1400-1600)	-9999	-9999.00	10.12	62.63	52.51	TT Pump test data - 11/95
		Col	OW-15	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	62.63	-9999.00	TT Pump test data - 11/95
		Col	OW-15	11/14/1995(0730-0850)	-9999	-9999.00	10.40	62.63	52.23	TT Pump test data - 11/95
		Col	OW-15	11/14/1995(1440-1540)	-9999	-9999.00	10.38	62.63	52.25	TT Pump test data - 11/95
		Col	OW-15	11/14/1995(2200-2230)	-9999	-9999.00	10.23	62.63	52.40	TT Pump test data - 11/95
		Col	OW-15	11/15/1995(0730-0830)	-9999	-9999.00	10.54	62.63	52.09	TT Pump test data - 11/95
		Col	OW-15	11/15/1995(1430-1530)	-9999	-9999.00	10.75	62.63	51.88	TT Pump test data - 11/95
		Col	OW-15	11/16/1995(0800-1032)	-9999	-9999.00	11.02	62.63	51.61	TT Pump test data - 11/95
		Col	OW-15	11/16/1995(1450-1630)	-9999	-9999.00	11.04	62.63	51.59	TT Pump test data - 11/95
		Col	OW-15	11/17/1995(0730-0920)	-9999	-9999.00	11.04	62.63	51.59	TT Pump test data - 11/95
		Col	OW-15	11/17/1995(1435-1610)	-9999	-9999.00	9.76	62.63	52.87	TT Pump test data - 11/95
		Pot	OW-16A	8/11/95	-9999	-9999.00	18.20	64.87	46.67	TT update 10/6/95
		Pot	OW-16A	8/16/95	-9999	-9999.00	31.00	64.87	33.87	TT update 10/6/95
		Pot	OW-16A	8/24/95	-9999	-9999.00	30.30	64.87	34.57	TT update 10/6/95
		Pot	OW-16A	8/28/95	-9999	-9999.00	21.52	64.87	43.35	TT update 10/6/95
		Pot	OW-16A	9/5/95	-9999	-9999.00	21.96	64.87	42.91	TT update 10/6/95
		Pot	OW-16A	9/12/95	-9999	-9999.00	30.23	64.87	34.64	TT update 10/6/95
		Pot	OW-16A	9/19/95	-9999	-9999.00	22.98	64.87	41.89	TT Update 10/6/95
		Pot	OW-16A	9/27/95	-9999	-9999.00	19.08	64.87	45.79	TT Update 10/6/95
		Pot	OW-16A	10/2/95	-9999	-9999.00	18.00	64.87	46.87	TT Update 10/6/95
		Pot	OW-16A	10/10/95	-9999	-9999.00	17.43	64.87	47.44	TT Update 11/2/95
		Pot	OW-16A	10/17/95	-9999	-9999.00	17.02	64.87	47.85	TT Update 11/2/95
		Pot	OW-16A	10/25/95	-9999	-9999.00	16.60	64.87	48.27	TT Update 11/2/95
		Pot	OW-16A	11/1/95	-9999	-9999.00	16.40	64.87	48.47	TT Update 11/2/95
		Pot	OW-16A	11/7/95	-9999	-9999.00	15.90	64.87	48.97	TT Update 11/9/95
		Pot	OW-16A	11/13/1995(0730-0830)	-9999	-9999.00	15.65	64.87	49.22	TT Pump test data - 11/95
		Pot	OW-16A	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	64.87	-9999.00	TT Pump test data - 11/95
		Pot	OW-16A	11/13/1995(1400-1600)	-9999	-9999.00	34.71	64.87	30.16	TT Pump test data - 11/95
		Pot	OW-16A	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	64.87	-9999.00	TT Pump test data - 11/95
		Pot	OW-16A	11/14/1995(0730-0850)	-9999	-9999.00	42.80	64.87	22.07	TT Pump test data - 11/95
		Pot	OW-16A	11/14/1995(1440-1540)	-9999	-9999.00	44.18	64.87	20.69	TT Pump test data - 11/95
		Pot	OW-16A	11/14/1995(2200-2230)	-9999	-9999.00	45.18	64.87	19.69	TT Pump test data - 11/95
		Pot	OW-16A	11/15/1995(0730-0830)	-9999	-9999.00	46.44	64.87	18.43	TT Pump test data - 11/95
		Pot	OW-16A	11/15/1995(1430-1530)	-9999	-9999.00	46.90	64.87	17.97	TT Pump test data - 11/95
		Pot	OW-16A	11/16/1995(0800-1032)	-9999	-9999.00	48.24	64.87	16.63	TT Pump test data - 11/95
		Pot	OW-16A	11/16/1995(1450-1630)	-9999	-9999.00	48.52	64.87	16.35	TT Pump test data - 11/95
		Pot	OW-16A	11/17/1995(0730-0920)	-9999	-9999.00	49.30	64.87	15.57	TT Pump test data - 11/95
		Pot	OW-16A	11/17/1995(1435-1610)	-9999	-9999.00	29.42	64.87	35.45	TT Pump test data - 11/95
		Pot	OW-16B	8/11/95	-9999	-9999.00	13.31	59.05	45.74	TT update 10/6/95
		Pot	OW-16B	8/17/95	-9999	-9999.00	15.10	59.05	43.95	TT update 10/6/95
		Pot	OW-16B	8/24/95	-9999	-9999.00	15.18	59.05	43.87	TT update 10/6/95
		Pot	OW-16B	8/28/95	-9999	-9999.00	16.50	59.05	42.55	TT update 10/6/95
		Pot	OW-16B	9/5/95	-9999	-9999.00	16.87	59.05	42.18	TT update 10/6/95
		Pot	OW-16B	9/12/95	-9999	-9999.00	28.35	59.05	30.70	TT update 10/6/95
		Pot	OW-16B	9/19/95	-9999	-9999.00	19.36	59.05	39.69	TT Update 10/6/95
		Pot	OW-16B	9/27/95	-9999	-9999.00	13.98	59.05	45.07	TT Update 10/6/95
		Pot	OW-16B	10/10/95	-9999	-9999.00	11.93	59.05	47.12	TT Update 11/2/95
		Pot	OW-16B	10/17/95	-9999	-9999.00	11.77	59.05	47.28	TT Update 11/2/95
		Pot	OW-16B	10/25/95	-9999	-9999.00	10.98	59.05	48.07	TT Update 11/2/95
		Pot	OW-16B	11/1/95	-9999	-9999.00	10.81	59.05	48.24	TT Update 11/2/95
		Pot	OW-16B	11/7/95	-9999	-9999.00	10.27	59.05	48.78	TT Update 11/9/95
		Pot	OW-16B	11/13/1995(0730-0830)	-9999	-9999.00	10.02	59.05	49.03	TT Pump test data - 11/95
9010622	010622	Pot	PW-10	11/1/87	2217	49.60	90.00	75.00	-15.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	12/1/87	2132.9	49.40	90.00	75.00	-15.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	1/1/88	2182.8	48.90	90.00	75.00	-15.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	2/1/88	2183.4	48.90	92.00	75.00	-17.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	3/1/88	2054.6	49.20	96.00	75.00	-21.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	4/1/88	2080	46.60	95.00	75.00	-20.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	5/1/88	2038	47.20	96.00	75.00	-21.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	6/1/88	2125.1	47.60	94.00	75.00	-19.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	7/1/88	1598.2	37.00	97.00	75.00	-22.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	8/1/88	1612.5	36.10	93.00	75.00	-18.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	9/1/88	1697.3	38.00	93.00	75.00	-18.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	10/1/88	1618	37.50	95.00	75.00	-20.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	10/30/89	1473.2	33.00	75.00	75.00	0.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	11/30/89	1381.9	32.00	80.00	75.00	-5.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	12/31/89	1415.9	31.70	90.00	75.00	-15.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	2/1/90	1268.8	28.40	91.00	75.00	-16.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	3/1/90	1244	30.90	100.00	75.00	-25.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	4/1/90	1365.7	30.60	100.00	75.00	-25.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	5/1/90	1512	35.00	85.00	75.00	-10.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	6/1/90	1332.5	29.80	100.00	75.00	-25.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	7/1/90	1304.6	30.20	99.00	75.00	-24.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	8/1/90	1350.9	30.30	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
9010622	010622	Pot	PW-10	9/1/90	1314.8	30.40	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	10/1/90	1245.2	28.80	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	11/1/90	1318.7	29.50	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	12/1/90	1204.3	27.90	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	1/1/91	1224	27.40	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	2/1/91	1222.9	27.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	3/1/91	1111	27.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	4/1/91	1227.7	27.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	5/1/91	1188.5	27.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	6/1/91	1233.3	27.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	7/1/91	1199	27.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	8/1/91	1235.1	27.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	9/1/91	1217	27.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	10/1/91	629	14.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	1/1/92	0	0	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	2/1/92	0	0	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	3/1/92	0	0	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	4/1/92	6283.7	145.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	6/1/92	1209.6	70.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	7/1/92	3007.9	69.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	8/1/92	3033.3	67.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	9/1/92	3036.9	70.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	10/1/92	2847.3	65.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	11/1/92	2862.6	64.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	12/1/92	2586	59.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	12/31/92	2966.3	66.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
9010622	010622	Pot	PW-10	2/1/93	2583.5	57.87	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	3/1/93	2243	55.63	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	4/1/93	2485.6	55.68	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	5/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	6/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	7/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	8/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	9/1/93	93.6	2.10	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	10/1/93	1310.4	30.33	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	11/1/93	79.3	1.78	40.00	75.00	35.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	12/1/93	203.4	4.71	41.00	75.00	34.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	1/1/94	238.2	5.34	42.00	75.00	33.00	Printout - DNREC SYS. SUP. LIST 93
9010622	010622	Pot	PW-10	2/1/94	0	0.00	35.00	75.00	40.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	3/1/94	0	0.00	35.00	75.00	40.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	4/1/94	0	0.00	35.00	75.00	40.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	5/1/94	318.6	7.38	36.00	75.00	39.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	6/1/94	238	5.33	42.00	75.00	33.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	7/1/94	979.5	22.67	38.00	75.00	37.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	8/1/94	554.1	12.41	41.00	75.00	34.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	9/1/94	327.1	7.33	42.00	75.00	33.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	10/1/94	0	0.00	30.00	75.00	45.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	11/1/94	15	0.34	30.00	75.00	45.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	12/1/94	0	0	30.00	75.00	45.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	1/1/95	0	0	30.00	75.00	45.00	Printout - DNREC SYS. SUP. LIST 94
9010622	010622	Pot	PW-10	2/1/95	0	0	30.00	75.00	45.00	Additional Water Use Reports from Tt - 11/95
9010622	010622	Pot	PW-10	3/1/95	0	0	30.00	75.00	45.00	Additional Water Use Reports from Tt - 11/95
9010622	010622	Pot	PW-10	4/1/95	0	0	30.00	75.00	45.00	Additional Water Use Reports from Tt - 11/95
9010622	010622	Pot	PW-10	5/1/95	0	0	31.00	75.00	44.00	Additional Water Use Reports from Tt - 11/95
9010622	010622	Pot	PW-10	6/1/95	0	0	31.00	75.00	44.00	Additional Water Use Reports from Tt - 11/95
9010622	010622	Pot	PW-10	7/1/95	0	0	31.00	75.00	44.00	Additional Water Use Reports from Tt - 11/95
9010622	010622	Pot	PW-10	8/1/95	12.2	0.27	32.00	75.00	43.00	Additional Water Use Reports from Tt - 11/95
9010622	010622	Pot	PW-10	9/1/95	998.7	23.1	34.00	75.00	41.00	Additional Water Use Reports from Tt - 11/95
9010622	010622	Pot	PW-10	9/20/95	-9999	72.00	-9999.00	75.00	-9999.00	TT Update - Daily Production Well Data 10/6/95
9010622	010622	Pot	PW-10	10/2/95	-9999	0.00	-9999.00	75.00	-9999.00	TT Update - Daily Production Well Data 10/6/95
9010622	010622	Pot	PW-10	10/10/95	-9999	0.00	-9999.00	75.00	-9999.00	TT Update 11/2/95
9010622	010622	Pot	PW-10	10/18/95	-9999	73.00	-9999.00	75.00	-9999.00	TT Update 11/2/95
Db11-28	010003	Col	PW-11	7/11/77	5275	118.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/18/77	3807	85.00	37.00	67.00	30.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/20/77	5572	128.00	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/22/77	4338	100.00	44.00	67.00	23.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/3/77	376	52.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/25/78	3540	79.00	39.00	67.00	28.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/12/78	5509	136.00	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/16/78	5642	126.00	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/24/78	2651	131.00	32.00	67.00	35.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/29/78	7894	182.00	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/19/78	8223	184.00	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/7/78	8295	185.00	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/4/78	8790	203.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/29/78	7588.8	170.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/22/78	7588.8	170.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/19/78	7588.8	170.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/20/79	7588.8	170.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/7/79	7660.8	190.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/18/79	7099.2	170.00	31.00	67.00	36.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/7/79	8208	190.00	32.00	67.00	35.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/16/79	8481.6	190.00	30.00	67.00	37.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/12/79	6808	157.00	31.00	67.00	36.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/8/79	7408	165.00	29.00	67.00	38.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/10/79	9363	209.00	30.00	67.00	37.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/11/79	9543	220.00	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/20/79	9326	170.00	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/11/79	9172	170.00	32.00	67.00	35.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/14/79	8950	200.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/3/80	7988	170.00	31.00	67.00	36.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-28	010003	Col	PW-11	2/21/80	7181	170.00	31.00	67.00	36.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/4/80	7359	170.00	31.00	67.00	36.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/23/80	5110	170.00	31.00	67.00	36.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/8/80	7215	170.00	30.00	67.00	37.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/26/80	6406	170.00	28.00	67.00	39.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/10/80	8135	170.00	31.00	67.00	36.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/20/80	8809	170.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/6/80	8220	225.00	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/22/80	7407	165.50	32.00	67.00	35.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/19/80	8012	185.50	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/6/80	7644	171.20	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/21/81	5517	123.60	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/11/81	3873	96.10	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/11/81	4937	110.60	31.00	67.00	36.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/18/81	6131	141.90	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/11/81	6389	143.10	32.00	67.00	35.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/3/81	6987	161.70	33.50	67.00	33.50	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/15/81	6183	138.50	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/5/81	5195	120.30	36.00	67.00	31.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/23/81	6501	150.50	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/11/81	6293	145.00	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/30/81	5737	140.00	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/21/81	6035	140.00	44.00	67.00	23.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/17/82	4888	140.00	44.00	67.00	23.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/19/82	3895	140.00	44.00	67.00	23.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/10/82	5680	140.00	44.00	67.00	23.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/25/82	4740	130.00	44.00	67.00	23.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/8/82	6536	130.00	44.00	67.00	23.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/19/82	5327	140.00	44.00	67.00	23.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/24/82	5739	145.00	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/1/82	6101	145.00	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/1/82	5207	130.00	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/15/82	6060	135.00	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/15/82	3176	74.00	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/17/83	4032	100.00	45.00	67.00	22.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/17/83	4240.8	95.00	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/14/83	3576	83.00	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/17/83	5408	121.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/17/83	5326	119.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/21/83	5755	129.00	37.00	67.00	30.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/30/83	5666	127.00	37.00	67.00	30.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/19/83	5809	135.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/20/83	6310	141.00	39.00	67.00	28.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/17/83	5545	128.00	39.00	67.00	28.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/23/83	5840	131.00	39.00	67.00	28.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/13/84	5786	129.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/28/84	5289	127.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/25/84	5703	128.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/7/84	5659	130.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/22/84	5805	130.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/19/84	5680	132.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/4/84	5892	132.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/17/84	5746	129.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/8/84	5791	134.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/15/84	5940	135.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/15/84	5673	135.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/15/84	6066	135.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/15/85	6047	135.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/15/85	5391	135.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/15/85	5807	135.00	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/15/85	5604	135.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/15/85	3334	135.00	36.00	67.00	31.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/15/85	2595	140.00	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/15/85	2747	130.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/15/85	1497.6	130.00	35.00	67.00	32.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/15/85	1978	100.00	38.00	67.00	29.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/31/85	554	12.00	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/30/85	2002	45.00	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/31/85	1837	41.00	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/31/86	3905	88.00	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/28/86	3008	75.00	39.00	67.00	28.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/31/86	3345	75.00	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/30/86	3257	75.00	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/31/86	3323	74.00	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/30/86	2456	57.00	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/31/86	3370	76.00	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/31/86	1545	35.00	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/30/86	3632.5	84.00	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/1/87	4979	111.50	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/1/87	4861	112.50	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/1/88	4849	108.60	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/1/88	5016	112.40	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/1/88	4621	110.70	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/1/88	4906	110.00	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/1/88	4740	109.70	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/1/88	4981	111.60	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/1/88	4941	114.40	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/1/88	4322	96.80	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/1/88	4621	103.50	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/1/88	3939	91.20	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/31/88	4889	109.50	42.00	67.00	25.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-28	010003	Col	PW-11	11/30/88	45557	105.50	42.00	67.00	25.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/31/88	4849	108.40	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/31/89	4979	111.50	43.00	67.00	24.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/28/89	2662	66.00	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/31/89	3543	79.40	41.00	67.00	26.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/30/89	4354	100.80	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/31/89	4461	99.90	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/30/89	4373	101.20	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/31/89	4381	98.10	40.00	67.00	27.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/31/89	4411	98.80	33.00	67.00	34.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/30/89	4289	99.20	34.00	67.00	33.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/31/89	4282	95.90	32.00	67.00	35.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/30/89	4289	99.30	32.00	67.00	35.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/31/89	4411	98.80	30.00	67.00	37.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/1/90	5580	125.00	30.00	67.00	37.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/1/90	4435.2	110.00	25.00	67.00	42.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/1/90	3484.8	78.10	25.00	67.00	42.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/1/90	1612.8	36.10	27.00	67.00	40.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/1/90	6132.7	141.90	27.00	67.00	40.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/1/90	6026.4	135.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/1/90	6022.9	139.40	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/1/90	6048.5	140.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/1/90	6371.5	142.70	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/1/90	6129.9	141.90	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/1/91	6357.4	142.40	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/1/91	6438.8	144.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/1/91	5785.4	143.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/1/91	6370	142.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/1/91	6227.2	144.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/1/91	6405.9	25.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/1/91	6194.8	143.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/1/91	5986.1	134.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/1/91	6480	145.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/1/91	6105	141.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/1/91	6336.9	141.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/1/91	6142.1	142.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/1/92	6300.5	141.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	1/2/92	6314	141.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	3/1/92	5838.3	139.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	4/1/92	6275.9	140.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	5/1/92	6283.7	145.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	6/1/92	4715.8	105.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	7/1/92	6292.9	145.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	8/1/92	5190.8	116.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	9/1/92	6361	147.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	10/1/92	6022.4	139.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	11/1/92	6275.3	140.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/1/92	5888.8	136.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	12/31/92	2597.6	58.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db11-28	010003	Col	PW-11	2/1/93	3472.6	77.79	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	3/1/93	2649.42	65.71	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	4/1/93	4132.9	92.58	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	5/1/93	4616.7	106.87	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	6/1/93	4616.7	103.42	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	7/1/93	1315.7	30.46	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	8/1/93	276.48	6.19	23.00	67.00	44.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	9/1/93	3038.4	68.06	22.00	67.00	45.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	10/1/93	5992.1	138.71	22.00	67.00	45.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	11/1/93	2273	50.92	41.00	67.00	26.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	12/1/93	6413	148.45	31.00	67.00	36.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	1/1/94	6522.1	146.10	31.00	67.00	36.00	Printout - DNREC SYS. SUP. LIST 93
Db11-28	010003	Col	PW-11	2/1/94	3929.3	88.02	5.00	67.00	62.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	3/1/94	3376.5	83.74	30.00	67.00	37.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	4/1/94	3063	68.62	29.00	67.00	38.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	5/1/94	5813	134.56	33.00	67.00	34.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	6/1/94	6002.6	134.47	33.00	67.00	34.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	7/1/94	5509.4	127.53	32.00	67.00	35.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	8/1/94	5740.1	128.59	31.00	67.00	36.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	9/1/94	5342.6	119.68	30.00	67.00	37.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	10/1/94	5184	120.00	30.00	67.00	37.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	11/1/94	5673.6	127.10	30.00	67.00	37.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	12/1/94	0	0.00	30.00	67.00	37.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	1/1/95	7704.32	172.59	30.00	67.00	37.00	Printout - DNREC SYS. SUP. LIST 94
Db11-28	010003	Col	PW-11	2/1/95	5713.92	132.20	32.00	67.00	35.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	3/1/95	6353.4	157.57	32.00	67.00	35.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	4/1/95	7404.3	165.80	33.00	67.00	34.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	5/1/95	7070.7	163.67	30.00	67.00	37.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	6/1/95	6896.3	154.50	30.00	67.00	37.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	7/1/95	6869.2	159.00	30.00	67.00	37.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	8/1/95	6904.3	154.60	30.00	67.00	37.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	8/11/95	-9999.00	-9999.00	34.00	67.00	33.00	TT update 10/6/95
Db11-28	010003	Col	PW-11	8/16/95	-9999.00	112.00	33.00	67.00	34.00	TT update 10/6/95
Db11-28	010003	Col	PW-11	8/24/95	-9999.00	108.00	28.00	67.00	39.00	TT update 10/6/95
Db11-28	010003	Col	PW-11	8/28/95	-9999.00	107.00	33.00	67.00	34.00	TT update 10/6/95
Db11-28	010003	Col	PW-11	9/1/95	6103.60	136.70	28.00	67.00	39.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	9/5/95	-9999.00	106.00	33.00	67.00	34.00	TT update 10/6/95
Db11-28	010003	Col	PW-11	9/12/95	-9999.00	106.00	27.00	67.00	40.00	TT update 10/6/95
Db11-28	010003	Col	PW-11	9/20/95	-9999.00	105.00	28.00	67.00	39.00	TT update 10/6/95
Db11-28	010003	Col	PW-11	9/27/95	-9999.00	112.00	29.00	67.00	38.00	TT update 10/6/95
Db11-28	010003	Col	PW-11	10/1/95	6245.20	144.56	32.00	67.00	35.00	Additional Water Use Reports from Tt - 11/95
Db11-28	010003	Col	PW-11	10/2/95	-9999.00	115.00	32.00	67.00	35.00	TT update 10/6/95

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-28	010003	Col	PW-11	10/10/95	-9999	112	28.00	67.00	39.00	TT Update 11/2/95
Db11-28	010003	Col	PW-11	10/18/95	-9999	115.19	28.00	67.00	39.00	TT Update 11/2/95
Db11-28	010003	Col	PW-11	10/25/95	-9999	114.44	32.00	67.00	35.00	TT Update 11/2/95
Db11-28	010003	Col	PW-11	11/1/95	-9999	115.94	28.00	67.00	39.00	TT Update 11/2/95
Db11-28	010003	Col	PW-11	11/7/95	-9999	115.19	27.00	67.00	40.00	TT Update 11/9/95
Db11-28	010003	Col	PW-11	11/13/1995(0730-0830)	-9999	113.70	27	67.00	40.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/13/1995(0945-1100)	-9999	113.70	27	67.00	40.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/13/1995(1400-1600)	-9999	-9999	27	67.00	40.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/13/1995(2200-2230)	-9999	-9999	-9999	67.00	-9999.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/14/1995(0730-0850)	-9999	108.46	25	67.00	42.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/14/1995(1440-1540)	-9999	106.22	25	67.00	42.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/14/1995(2200-2230)	-9999	-9999	-9999	67.00	-9999.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/15/1995(0730-0830)	-9999	108.46	25	67.00	42.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/15/1995(1430-1530)	-9999	106.96	25	67.00	42.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/16/1995(0800-1032)	-9999	106.22	25	67.00	42.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/16/1995(1450-1630)	-9999	106.96	26	67.00	41.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/17/1995(0730-0920)	-9999	112.20	27	67.00	40.00	TT Pump test data - 11/95
Db11-28	010003	Col	PW-11	11/17/1995(1435-1610)	-9999	-9999	-9999	67.00	-9999.00	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	7/21/77	1857.8	41.00	87.00	80.00	-7.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/9/77	2322.8	52.00	88.00	80.00	-8.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/12/77	2397.2	55.00	80.00	80.00	0.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/6/77	2888.5	64.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/24/77	2925.3	67.00	98.00	80.00	-18.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/21/77	3071.5	68.00	95.00	80.00	-15.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/21/78	3079.2	68.00	100.00	80.00	-20.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/13/78	2937.6	72.00	100.00	80.00	-20.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/1/78	3113.4	69.00	97.00	80.00	-17.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/1/78	2917.4	67.00	97.00	80.00	-17.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/1/78	2965.8	66.00	97.00	80.00	-17.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/30/78	2893.6	66.00	97.00	80.00	-17.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/14/78	2933.6	65.00	95.00	80.00	-15.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/8/78	2758.5	61.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/6/78	2617	60.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/24/78	2812.3	63.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/14/78	2894.4	67.00	76.00	80.00	4.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/16/78	2812.3	63.00	94.00	80.00	-14.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/18/79	2678.4	60.00	100.00	80.00	-20.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/9/79	2419.2	60.00	92.00	80.00	-12.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/15/79	2505.6	60.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/28/79	2246.4	52.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/18/79	2321.2	52.00	95.00	80.00	-15.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/3/79	2634.9	60.00	95.00	80.00	-15.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/3/79	1305	29.00	95.00	80.00	-15.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/7/79	750	16.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/9/79	2592	60.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/18/79	2678.4	52.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/25/79	2592	52.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/7/79	2678.4	52.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/26/80	2678.4	52.00	94.00	80.00	-14.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/21/80	2505.6	52.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/9/80	2238.6	52.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/25/80	2109	52.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/4/80	1298.7	52.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/26/80	664.9	36.00	83.00	80.00	-3.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/2/80	2678.4	40.00	84.00	80.00	-4.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/24/80	2678.4	40.00	80.00	80.00	0.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/8/80	2592	35.00	87.00	80.00	-7.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/22/80	2678.4	60.00	81.00	80.00	-1.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/16/80	1671.8	38.70	88.00	80.00	-8.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/8/80	1920.8	43.00	94.00	80.00	-14.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/9/81	1897	42.60	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/9/81	1672	41.50	95.00	80.00	-15.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/11/81	1777.8	39.80	86.00	80.00	-6.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/26/81	1778.1	41.20	85.00	80.00	-5.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/17/81	1791.2	40.10	84.00	80.00	-4.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/3/81	1689.1	39.10	83.00	80.00	-3.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/19/81	1723.9	38.60	84.00	80.00	-4.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/21/81	1682.5	39.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/20/81	3378.5	78.20	97.00	80.00	-17.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/25/81	2897	70.00	110.00	80.00	-30.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/23/81	2802.4	65.00	84.00	80.00	-4.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/16/81	2840.8	65.00	84.00	80.00	-4.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/15/82	2502.5	60.00	87.00	80.00	-7.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/19/82	2600.6	70.00	74.00	80.00	6.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/10/82	2825.6	70.00	74.00	80.00	6.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/25/82	2698.4	60.00	74.00	80.00	6.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/8/82	2737.5	60.00	92.00	80.00	-12.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/19/82	2513.6	60.00	84.00	80.00	-4.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/24/82	2781.2	60.00	55.00	80.00	25.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/1/82	2697.5	60.00	55.00	80.00	25.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/1/82	2406.3	60.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/13/82	2117	47.00	58.00	80.00	22.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/13/82	2021.2	47.00	60.00	80.00	20.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/21/82	1789.3	40.00	84.00	80.00	-4.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/20/83	2188.5	49.00	83.00	80.00	-3.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/18/83	1985.2	49.00	83.00	80.00	-3.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/25/83	2344	53.00	83.00	80.00	-3.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/16/83	2241.4	52.00	85.00	80.00	-5.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/26/83	2209.9	50.00	85.00	80.00	-5.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/28/83	2180	49.00	98.00	80.00	-18.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/12/83	2267.7	51.00	85.00	80.00	-5.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db12-27	010002	Pot	PW-12	8/7/83	2515.2	56.00	85.00	80.00	-5.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/21/83	2199.9	51.00	80.00	80.00	0.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/19/83	2108.9	47.00	78.00	80.00	2.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/14/83	1949.4	45.00	98.00	80.00	-18.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/1/83	2315	52.00	100.00	80.00	-20.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/23/84	2247.6	50.00	83.00	80.00	-3.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/4/84	2010.5	48.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/22/84	2393.7	54.00	92.00	80.00	-12.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/12/84	2252.1	52.00	92.00	80.00	-12.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/12/84	2135.3	48.00	94.00	80.00	-14.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/25/84	1892.6	44.00	104.00	80.00	-24.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/1/84	2068.2	47.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/17/84	1960.5	44.00	118.00	80.00	-38.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/29/84	2512.8	58.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/15/84	2012.6	46.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/15/84	1721.9	45.00	88.00	80.00	-8.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/15/84	2048.1	48.00	87.00	80.00	-7.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/15/85	2058	50.00	86.00	80.00	-6.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/15/85	1608.5	52.00	89.00	80.00	-9.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/15/85	2772.7	53.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/15/85	2251.1	58.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/15/85	2800.8	55.00	92.00	80.00	-12.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/15/85	2718.7	60.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/15/85	2858.3	60.00	89.00	80.00	-9.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/15/85	2777.3	60.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/15/85	2729.9	60.00	95.00	80.00	-15.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/31/85	2713.7	61.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/30/85	2695.4	60.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/31/85	2576.9	58.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/31/86	2480.9	56.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/28/86	2154.8	53.00	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/31/86	2545.4	57.00	89.00	80.00	-9.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/30/86	2159.3	50.00	85.00	80.00	-5.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/31/86	2003.6	45.00	94.00	80.00	-14.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/30/86	2623	61.00	93.00	80.00	-13.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/31/86	2515.9	56.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/31/86	2268	51.00	89.00	80.00	-9.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/30/86	2287.8	53.00	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/1/87	1986.3	44.50	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/1/87	1648.9	38.20	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/1/88	1538.4	34.50	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/1/88	1863.1	41.70	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/1/88	1537.9	36.80	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/1/88	1489	33.40	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/1/88	1301.4	30.10	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/1/88	1505	33.70	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/1/88	1548.3	35.80	90.00	80.00	-10.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/1/88	2604.1	58.30	91.00	80.00	-11.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/1/88	2899.7	65.00	117.00	80.00	-37.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/1/88	2734.1	63.30	117.00	80.00	-37.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/31/88	2817	63.10	117.00	80.00	-37.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/30/88	2595.1	60.00	117.00	80.00	-37.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/31/88	2358.5	52.80	111.00	80.00	-31.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/31/89	2697.7	60.40	116.00	80.00	-36.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/28/89	2361.1	58.50	114.00	80.00	-34.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/31/89	2551.3	57.10	112.00	80.00	-32.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/30/89	2354.1	54.40	114.00	80.00	-34.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/31/89	2473.2	55.40	114.00	80.00	-34.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/30/89	2530.8	58.50	114.00	80.00	-34.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/31/89	2870.9	59.80	114.00	80.00	-34.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/31/89	2621.3	58.70	114.00	80.00	-34.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/30/89	2430.9	56.20	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/31/89	2391.8	53.60	110.00	80.00	-30.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/30/89	2201	50.90	110.00	80.00	-30.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/31/89	1816.4	40.70	106.00	80.00	-26.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/1/90	2476.2	55.50	106.00	80.00	-26.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/1/90	2552.9	36.30	110.00	80.00	-30.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/1/90	3053	68.40	110.00	80.00	-30.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/1/90	2919.4	67.60	114.00	80.00	-34.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/1/90	2807.2	62.90	110.00	80.00	-30.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/1/90	2313.3	53.50	114.00	80.00	-34.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/1/90	2386	53.40	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/1/90	2521.4	58.40	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/1/90	2215.6	51.30	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/1/90	554.4	55.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/1/90	705.6	16.30	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/1/91	2300.2	51.50	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/2/91	3319.1	74.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/1/91	2994.4	74.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	4/1/91	1998.2	44.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/1/91	2806.9	64.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/1/91	2874.1	64.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/1/91	2714.9	62.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/1/91	2704.1	60.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/1/91	2618.3	58.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/1/91	2549.2	59.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/1/91	2744.6	61.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/1/91	2533.2	58.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/1/92	2534.6	56.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	1/2/92	2230	49.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	3/1/92	2296.8	55.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db12-27	010002	Pot	PW-12	4/1/92	2455.2	55.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	5/1/92	2510.4	58.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	6/1/92	2218	49.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	7/1/92	2376	55.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	8/1/92	1783	39.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	9/1/92	1894	43.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	10/1/92	1719.9	39.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	11/1/92	2388.8	53.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/1/92	1961.2	45.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	12/31/92	1187.2	4.00	-9999.00	80.00	-9999.00	Diskette - WRAUSE1.LST
Db12-27	010002	Pot	PW-12	2/1/93	926.1	20.75	-9999.00	80.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	3/1/93	2649.42	65.71	-9999.00	80.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	4/1/93	0	0.00	-9999.00	80.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	5/1/93	0	0.00	-9999.00	80.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	6/1/93	0	0.00	-9999.00	80.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	7/1/93	0	0.00	-9999.00	80.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	8/1/93	0	0.00	-9999.00	80.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	9/1/93	1296	29.03	109.00	80.00	-29.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	10/1/93	1808	41.85	87.00	80.00	-7.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	11/1/93	86	1.93	52.00	80.00	28.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	12/1/93	814.6	18.86	57.00	80.00	23.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	1/1/94	216.8	4.86	59.00	80.00	21.00	Printout - DNREC SYS. SUP. LIST 93
Db12-27	010002	Pot	PW-12	2/1/94	120.4	2.70	90.00	80.00	-10.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	3/1/94	1725.1	42.79	80.00	80.00	0.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	4/1/94	2211.9	49.55	75.00	80.00	5.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	5/1/94	691	16.00	89.00	80.00	-9.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	6/1/94	719.7	16.12	80.00	80.00	0.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	7/1/94	1239	28.68	77.00	80.00	3.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	8/1/94	500.6	11.21	77.00	80.00	3.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	9/1/94	298.8	6.69	77.00	80.00	3.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	10/1/94	0	0.00	75.00	80.00	5.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	11/1/94	40.7	0.91	75.00	80.00	5.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	12/1/94	0	0.00	77.00	80.00	3.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	1/1/95	0	0.00	71.00	80.00	9.00	Printout - DNREC SYS. SUP. LIST 94
Db12-27	010002	Pot	PW-12	2/1/95	417.2	9.34	80.00	80.00	0.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	3/1/95	0	0.00	85.00	80.00	-5.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	4/1/95	758.5	16.99	80.00	80.00	0.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	5/1/95	0	0.00	77.00	80.00	3.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	6/1/95	184.5	4.13	81.00	80.00	-1.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	7/1/95	0	0.00	81.00	80.00	-1.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	8/1/95	9.31	2.09	79.00	80.00	1.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	8/11/95	-9999	-9999.00	25.18	80.00	54.82	TT update 10/6/95
Db12-27	010002	Pot	PW-12	8/16/95	-9999	-9999.00	80.30	80.00	-0.30	TT update 10/6/95
Db12-27	010002	Pot	PW-12	8/24/95	-9999	-9999.00	21.17	80.00	58.83	TT update 10/6/95
Db12-27	010002	Pot	PW-12	8/28/95	-9999	64.00	81.00	80.00	-1.00	TT update 10/6/95
Db12-27	010002	Pot	PW-12	9/1/95	1149.3	25.74	80.00	80.00	0.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	9/5/95	-9999	62.00	79.23	80.00	0.77	TT update 10/6/95
Db12-27	010002	Pot	PW-12	9/12/95	-9999	59.00	-9999.00	80.00	-9999.00	TT update 10/6/95
Db12-27	010002	Pot	PW-12	9/20/95	-9999	58.00	150.00	80.00	-70.00	TT Update 10/6/95
Db12-27	010002	Pot	PW-12	9/27/95	-9999	0.00	-9999.00	80.00	-9999.00	TT Update 10/6/95
Db12-27	010002	Pot	PW-12	10/1/95	1896.2	43.90	80.00	80.00	0.00	Additional Water Use Reports from Tt - 11/95
Db12-27	010002	Pot	PW-12	10/2/95	-9999	0.00	-9999.00	80.00	-9999.00	TT Update 10/6/95
Db12-27	010002	Pot	PW-12	10/10/95	-9999	0.00	-9999.00	80.00	-9999.00	TT Update 11/2/95
Db12-27	010002	Pot	PW-12	10/18/95	-9999	88.00	-9999.00	80.00	-9999.00	TT Update 11/2/95
Db12-27	010002	Pot	PW-12	11/13/1995(0730-0830)	-9999	-9999.00	19.12	80.00	60.88	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/13/1995(0945-1100)	-9999	-9999.00	22.11	80.00	57.89	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/13/1995(1400-1600)	-9999	-9999.00	26.93	80.00	53.07	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/13/1995(2200-2230)	-9999	-9999.00	-9999	80.00	-9999.00	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/14/1995(0730-0850)	-9999	-9999.00	26.93	80.00	53.07	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/14/1995(1440-1540)	-9999	-9999.00	27.88	80.00	52.12	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/14/1995(2200-2230)	-9999	-9999.00	-9999	80.00	-9999.00	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/15/1995(0730-0830)	-9999	-9999.00	29.64	80.00	50.36	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/15/1995(1430-1530)	-9999	-9999.00	29.85	80.00	50.15	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/16/1995(0800-1032)	-9999	-9999.00	29.84	80.00	50.16	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/16/1995(1450-1630)	-9999	-9999.00	30.01	80.00	49.99	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/17/1995(0730-0920)	-9999	-9999.00	30.43	80.00	49.57	TT Pump test data - 11/95
Db12-27	010002	Pot	PW-12	11/17/1995(1435-1610)	-9999	-9999.00	27.79	80.00	52.21	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	7/27/77	5866	131.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/8/77	5203	116.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/12/77	7243	167.00	54.00	75.00	21.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/9/77	6362	142.00	54.00	75.00	21.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/22/77	4560	105.00	54.00	75.00	21.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/9/77	3785	84.00	54.00	75.00	21.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/20/78	6566	147.00	53.00	75.00	22.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/28/78	2263	56.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/10/78	5812	130.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/12/78	5577	129.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/21/78	5980	133.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/30/78	6719	155.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/7/78	6353	142.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/1/78	5502	123.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/2/78	5875	136.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/15/78	7588.8	170.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/3/78	5616	130.00	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/10/78	4285.4	96.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/20/79	7142.4	160.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/16/79	7257.6	180.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/3/79	5846.4	140.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/17/79	5803.2	130.00	46.00	75.00	29.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/11/79	6375	147.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/1/79	6280	140.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999 No measurement/not recorded

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-27	010004	Col	PW-13	8/6/79	5361	120.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/1/79	6649	153.00	46.00	75.00	29.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/27/79	5646	130.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/8/79	6103	170.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/30/79	6762	150.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/11/80	5301	150.00	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/21/80	5115	140.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/25/80	4882	140.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/5/80	6119	140.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/29/80	5357	130.00	46.00	75.00	29.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/26/80	4631	145.00	46.00	75.00	29.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/16/80	4250	170.00	46.00	75.00	29.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/5/80	3833	140.00	45.00	75.00	30.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/4/80	5537	150.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/8/80	4450	99.70	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/19/80	4492	103.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/13/80	3331	74.60	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/14/81	4264	95.50	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/11/81	4693	93.90	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/11/81	4195	93.90	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/8/81	4601	106.50	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/10/81	4442	99.50	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/17/81	3826	88.60	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/15/81	1091	73.30	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/19/81	5300	122.70	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/16/81	5388	124.70	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/27/81	5666	130.00	53.00	75.00	22.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/13/81	2569	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/16/81	4145	130.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/18/82	2238	100.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/17/82	7683	130.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/10/82	4000	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/25/82	7364	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/8/82	9556	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/19/82	2730	100.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/24/82	2678.4	80.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/1/82	4464	100.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/1/82	5616	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/13/82	5803.2	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/25/82	6220.8	144.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/12/82	10079	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/13/83	5803	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/25/83	5486	136.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/11/83	7014.2	157.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/18/83	5616	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/5/83	5803.2	130.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/19/83	5803.2	130.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/26/83	6348	142.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/20/83	5054.1	113.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/18/83	5184	120.00	45.00	75.00	30.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/28/83	3679	130.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/21/83	6929	160.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/1/83	6571	147.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/25/84	8136	182.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/4/84	4174	100.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/15/84	6696	150.00	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/7/84	6480	150.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/31/84	7063.6	159.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/1/84	6806.6	158.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/19/84	7142.4	160.00	46.00	75.00	29.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/15/84	7062	158.00	45.00	75.00	30.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/8/84	6749.4	156.00	46.00	75.00	29.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/15/84	6880.4	155.00	46.00	75.00	29.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/15/84	6565.5	155.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/15/84	6964.1	155.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/15/85	6872.6	155.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/15/85	6107.5	155.00	47.00	75.00	28.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/15/85	6553.7	151.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/15/85	6432.6	151.00	48.00	75.00	27.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/15/85	7003.3	160.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/15/85	4569.7	130.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/15/85	4791.1	125.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/15/85	5192.3	138.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/15/85	6110	140.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/31/85	6477.5	145.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/30/85	6217.3	139.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/31/85	6019.4	135.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/31/86	5860.9	131.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/28/86	5612	139.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/31/86	6345.9	142.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/30/86	2130.3	135.00	57.00	75.00	18.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/31/86	6559.7	147.00	49.00	75.00	26.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/30/86	7322.3	170.00	52.00	75.00	23.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/31/86	6417.7	144.00	50.00	75.00	25.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/31/86	6363.6	143.00	51.00	75.00	24.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/30/86	6088.5	141.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/31/86	6972.6	156.20	34.00	75.00	41.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/30/86	6769	156.70	35.00	75.00	40.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/31/86	7482.2	167.60	35.00	75.00	40.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/31/87	7753.4	173.70	35.00	75.00	40.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/28/87	7718	176.50	34.00	75.00	41.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-27	010004	Col	PW-13	3/31/89	7883.9	176.60	34.00	75.00	41.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/30/89	7557.7	174.90	34.00	75.00	41.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/31/89	7901.3	177.00	34.00	75.00	41.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/30/89	7864.6	182.00	34.00	75.00	41.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/31/89	7951.7	178.10	34.00	75.00	41.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/31/89	7716.9	172.90	34.00	75.00	41.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/30/89	7669.2	177.50	34.00	75.00	41.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/31/89	7225.3	161.90	30.00	75.00	45.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/30/89	6513.2	150.80	25.00	75.00	50.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/31/89	8248.7	184.80	25.00	75.00	50.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/1/90	6960.4	155.90	25.00	75.00	50.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/1/90	6840.1	169.60	25.00	75.00	50.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/1/90	6916.9	154.00	35.00	75.00	40.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/1/90	7265.8	168.20	35.00	75.00	40.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/1/90	7160.2	160.40	35.00	75.00	40.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/1/90	7226.8	167.30	24.00	75.00	51.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/1/90	7556	169.30	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/1/90	7612.9	176.20	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/1/90	7154.4	165.60	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/1/90	7015.8	157.20	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/1/90	7071.7	96.60	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/1/91	6897	154.50	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/1/91	6181.1	138.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/1/91	6061.9	150.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/1/91	6375.9	142.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/1/91	6335.2	146.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/1/91	5698.2	127.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/1/91	5510.4	127.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/1/91	4999.7	112.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/1/91	6561.7	146.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/1/91	7819.8	181.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/1/91	7390.1	165.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/1/91	7520.1	174.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/1/92	7761	173.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	1/2/92	7765.7	173.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	3/1/92	6688.4	160.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	4/1/92	6322	141.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	5/1/92	6623.9	153.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	6/1/92	7608.8	170.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	7/1/92	4923.9	113.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	8/1/92	4249.2	95.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	9/1/92	7281.6	168.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	10/1/92	6701.3	155.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	11/1/92	5740.1	128.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	12/1/92	5376.6	124.00	-9999.00	75.00	-9999.00	Diskette - WRAUSE1.LST
Db11-27	010004	Col	PW-13	2/1/93	88.6	1.98	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	3/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	4/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	5/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	6/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	7/1/93	0	0.00	-9999.00	75.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	8/1/93	32.4	0.73	26.00	75.00	49.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	9/1/93	1371.8	30.73	28.00	75.00	47.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	10/1/93	2905.9	67.27	28.00	75.00	47.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	11/1/93	207.4	4.65	12.00	75.00	63.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	12/1/93	452.6	10.48	15.00	75.00	60.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	1/1/94	2246.9	50.33	31.00	75.00	44.00	Printout - DNREC SYS. SUP. LIST 93
Db11-27	010004	Col	PW-13	2/1/94	1496.5	33.52	22.00	75.00	53.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	3/1/94	4437.7	110.06	30.00	75.00	45.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	4/1/94	5054.7	113.23	18.00	75.00	57.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	5/1/94	1599.6	37.03	29.00	75.00	46.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	6/1/94	1326	29.70	13.00	75.00	62.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	7/1/94	3651	84.51	16.00	75.00	59.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	8/1/94	1180.3	26.44	27.00	75.00	48.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	9/1/94	785.6	17.60	15.00	75.00	60.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	10/1/94	341.1	7.90	20.00	75.00	55.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	11/1/94	90.2	2.02	15.00	75.00	60.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	12/1/94	0	0.00	15.00	75.00	60.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	1/1/95	12.4	0.28	15.00	75.00	60.00	Printout - DNREC SYS. SUP. LIST 94
Db11-27	010004	Col	PW-13	2/1/95	1078.4	24.15	17.00	75.00	58.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	3/1/95	0	0.00	16.00	75.00	59.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	4/1/95	3125.8	70.00	19.00	75.00	56.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	5/1/95	493.3	11.40	15.00	75.00	60.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	6/1/95	462.7	10.36	21.00	75.00	54.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	7/1/95	426	9.86	21.00	75.00	54.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	8/1/95	4178.6	93.60	26.00	75.00	49.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	8/11/95	-9999	-9999.00	30.05	75.00	44.95	TT update 10/6/95
Db11-27	010004	Col	PW-13	8/16/95	-9999	160.00	30.00	75.00	45.00	TT update 10/6/95
Db11-27	010004	Col	PW-13	8/24/95	-9999	160.00	31.00	75.00	44.00	TT update 10/6/95
Db11-27	010004	Col	PW-13	8/28/95	-9999	160.00	31.00	75.00	44.00	TT update 10/6/95
Db11-27	010004	Col	PW-13	9/1/95	6939.5	155.45	30.00	75.00	45.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	9/5/95	-9999	160.00	32.00	75.00	43.00	TT update 10/6/95
Db11-27	010004	Col	PW-13	9/12/95	-9999	158.00	32.00	75.00	43.00	TT update 10/6/95
Db11-27	010004	Col	PW-13	9/20/95	-9999	157.00	33.00	75.00	42.00	TT Update 10/6/95
Db11-27	010004	Col	PW-13	9/27/95	-9999	0.00	28.00	75.00	47.00	TT Update 10/6/95
Db11-27	010004	Col	PW-13	10/1/95	5001.3	115.70	33.00	75.00	42.00	Additional Water Use Reports from Tt - 11/95
Db11-27	010004	Col	PW-13	10/2/95	-9999	0.00	18.00	75.00	57.00	TT Update 10/6/95
Db11-27	010004	Col	PW-13	10/10/95	-9999	165.00	32.00	75.00	43.00	TT Update 11/2/95
Db11-27	010004	Col	PW-13	10/17/95	-9999	-9999.00	-9999	75.00	-9999.00	TT Update 11/2/95
Db11-27	010004	Col	PW-13	10/18/95	-9999	167.00	34.00	75.00	41.00	TT Update 11/2/95
Db11-27	010004	Col	PW-13	10/25/95	-9999	-9999.00	17.00	75.00	58.00	TT Update 11/2/95

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-27	010004	Col	PW-13	11/1/95	-9999	170.00	32.00	75.00	43.00	TT Update 11/2/95
Db11-27	010004	Col	PW-13	11/7/95	-9999	-9999.00	17.00	75.00	58.00	TT Update 11/9/95
Db11-27	010004	Col	PW-13	11/13/1995(0730-0830)	-9999	170	26	75.00	49.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/13/1995(0945-1100)	-9999	-9999	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/13/1995(1400-1600)	-9999	162	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/13/1995(2200-2230)	-9999	162	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/14/1995(0730-0850)	-9999	162	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/14/1995(1440-1540)	-9999	161	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/14/1995(2200-2230)	-9999	162	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/15/1995(0730-0830)	-9999	162	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/15/1995(1430-1530)	-9999	162	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/16/1995(0800-1032)	-9999	162	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/16/1995(1450-1630)	-9999	162	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/17/1995(0730-0920)	-9999	170	31	75.00	44.00	TT Pump test data - 11/95
Db11-27	010004	Col	PW-13	11/17/1995(1435-1610)	-9999	-9999	-9999	75.00	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	7/16/77	15129	338.00	55.00	70.00	15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/20/77	14455	323.00	44.00	70.00	26.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/18/77	14613	338.00	87.00	70.00	-17.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/23/77	15160	339.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/15/77	12889	296.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/22/77	13382	299.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/25/78	13812	309.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/26/78	11945	296.00	87.00	70.00	-17.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/18/78	13127	294.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/10/78	13683	316.00	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/7/78	13537	303.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/16/78	13612	315.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/11/78	13364	299.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/13/78	12851	287.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/3/78	12979	300.00	79.00	70.00	-9.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/18/78	13392	300.00	79.00	70.00	-9.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/2/78	12960	300.00	78.00	70.00	-8.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/12/78	13392	300.00	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/20/79	15624	350.00	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/17/79	11289.6	280.00	75.00	70.00	-5.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/5/79	12528	300.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/15/79	15553	360.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/21/79	14731.2	330.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/3/79	13374	309.00	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/7/79	1504.7	337.00	75.00	70.00	-5.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/8/79	13793	308.00	78.00	70.00	-8.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/6/79	14782	342.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/27/79	15050	300.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/11/79	14494	320.00	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/20/79	16775	380.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/4/80	15942	330.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/29/80	13406	360.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/2/80	15017	330.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/13/80	14547	300.00	78.00	70.00	-8.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/28/80	15308	350.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/24/80	15496	350.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/2/80	14620	350.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/12/80	15196	350.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/4/80	14625	375.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/15/80	15477	358.30	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/17/80	15904	356.30	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/14/81	15536	348.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/18/81	14411	357.40	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/15/81	14824	332.10	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/15/81	14374	332.70	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/15/81	15370	344.30	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/10/81	14462	334.80	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/15/81	15875	355.60	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/12/81	14637	338.80	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/16/81	13001	300.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/23/81	13680	320.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/21/81	13909	330.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/21/81	13658	330.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010006	Pot	PW-14	1/12/82	14541	325.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/17/82	13038	300.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/10/82	15183	330.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/25/82	14212	330.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/8/82	16926	330.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/19/82	10849	300.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/24/82	14731.2	330.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/1/82	14731.2	330.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/1/82	14256	330.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/20/82	14731.2	330.00	88.00	70.00	-18.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/5/82	13606	315.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/29/82	13706	307.00	79.00	70.00	-9.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/25/83	15335	344.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/20/83	11917	296.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/24/83	13147.8	295.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/24/83	12312	285.00	74.00	70.00	-4.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/26/83	14731.2	330.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/14/83	14731.2	330.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/21/83	14731.2	330.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/13/83	13521.4	303.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/18/83	12960	300.00	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/1/83	13392	300.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/6/83	12960	300.00	79.00	70.00	-9.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-49	010005	Pot	PW-14	12/5/83	13392	300.00	89.00	70.00	-19.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/1/84	12276	275.00	88.00	70.00	-18.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/10/84	13392	321.00	88.00	70.00	-18.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/11/84	13392	300.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/1/84	12960	300.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/7/84	12960	300.00	86.00	70.00	-16.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/7/84	11232	300.00	85.00	70.00	-15.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/24/84	9504	300.00	68.00	70.00	2.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/23/84	14114	316.00	68.00	70.00	2.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/5/84	14306	331.00	65.00	70.00	5.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/15/84	13545	301.00	70.00	70.00	0.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/15/84	12985	321.00	77.00	70.00	-7.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/15/84	12967	313.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/15/85	10575	293.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/15/85	11761	296.00	79.00	70.00	-9.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/15/85	13669	314.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/15/85	11256	264.00	79.00	70.00	-9.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/15/85	14011	320.00	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/15/85	10256	325.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/15/85	9406	215.00	70.00	70.00	0.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/15/85	9660	215.00	70.00	70.00	0.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/15/85	10276	240.00	74.00	70.00	-4.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/31/85	13958	313.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/30/85	13243	297.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/31/85	12239	274.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/31/86	12983	291.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/28/86	11765	292.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/31/86	13241	297.00	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/30/86	13106	303.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/31/86	13953	313.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/30/86	13143	304.00	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/31/86	11656	261.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/31/86	12603	282.00	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/30/86	11986.2	278.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/1/87	12351	275.70	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/1/87	11969	277.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/1/88	11791	264.10	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/1/88	10300	230.70	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/1/88	988	235.10	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/1/88	10462	234.40	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/1/88	10475	242.50	83.00	70.00	-13.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/1/88	11967	268.10	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/1/88	11448	265.00	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/1/88	12145	272.10	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/1/88	12624	282.80	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/1/88	12096	280.00	94.00	70.00	-24.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/31/88	12347	276.60	84.00	70.00	-14.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/30/88	11497	266.10	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/31/88	10690	239.50	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/31/89	10603	82.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/28/89	10765.4	267.10	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/31/89	11926	267.10	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/30/89	11974	277.10	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/31/89	12755	285.70	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/30/89	12624	292.20	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/31/89	12855	288.00	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/31/89	12702	284.50	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/30/89	12136	280.90	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/31/89	12710	284.70	78.00	70.00	-8.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/30/89	12077	279.60	78.00	70.00	-8.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/31/89	11965	268.50	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/1/90	11817	264.70	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/1/90	11841	293.70	80.00	70.00	-10.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/1/90	13175	295.10	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/1/90	12469	288.60	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/1/90	12566	281.50	81.00	70.00	-11.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/1/90	13209	305.60	82.00	70.00	-12.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/1/90	14672	328.70	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/1/90	14342	332.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/1/90	13715	317.50	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/1/90	14628	327.70	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/1/90	14047	325.20	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/1/91	14024	314.20	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/1/91	14011	313.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/1/91	12692	314.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/1/91	13893	311.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/1/91	13298	307.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/1/91	13648	305.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/1/91	13052	302.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	8/1/91	13277	297.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/1/91	13210	295.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/1/91	12651	292.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/1/91	13226	296.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/1/91	12641	292.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	1/1/92	12850	287.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/1/92	13392	300.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	3/1/92	10937	261.90	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	4/1/92	12557	281.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	5/1/92	12347	285.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	6/1/92	12224	273.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	7/1/92	11664	270.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-49	010005	Pot	PW-14	8/1/92	12568	281.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	9/1/92	11878	274.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	10/1/92	11123	257.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	11/1/92	11834	265.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/1/92	11107	257.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	12/31/92	2783	62.00	-9999.00	70.00	-9999.00	Diskette - WRAUSE1.LST
Db11-49	010005	Pot	PW-14	2/1/93	0	0.00	-9999.00	70.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	3/1/93	0	0.00	-9999.00	70.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	4/1/93	0	0.00	-9999.00	70.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	5/1/93	0	0.00	-9999.00	70.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	6/1/93	0	0.00	-9999.00	70.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	7/1/93	0	0.00	-9999.00	70.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	8/1/93	0	0.00	-9999.00	70.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	9/1/93	1482	33.20	83.00	70.00	-13.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	10/1/93	3915	90.63	81.00	70.00	-11.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	11/1/93	314	7.03	75.00	70.00	-5.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	12/1/93	670	15.51	77.00	70.00	-7.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	1/1/94	3155	70.68	76.00	70.00	-6.00	Printout - DNREC SYS. SUP. LIST 93
Db11-49	010005	Pot	PW-14	2/1/94	1927	43.17	80.00	70.00	-10.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	3/1/94	6270	155.51	70.00	70.00	0.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	4/1/94	7602	170.30	74.00	70.00	-4.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	5/1/94	2579	59.70	84.00	70.00	-14.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	6/1/94	2156	48.30	73.00	70.00	-3.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	7/1/94	5619	130.07	85.00	70.00	-15.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	8/1/94	1852	41.49	88.00	70.00	-18.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	9/1/94	1293	28.97	88.00	70.00	-18.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010006	Pot	PW-14	10/1/94	573	13.26	80.00	70.00	-10.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	11/1/94	177	3.97	80.00	70.00	-10.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	12/1/94	0	0.00	73.00	70.00	-3.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	1/1/95	0	0.00	73.00	70.00	-3.00	Printout - DNREC SYS. SUP. LIST 94
Db11-49	010005	Pot	PW-14	2/1/95	1682	37.67	74.00	70.00	-4.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010005	Pot	PW-14	3/1/95	0	0.00	81.00	70.00	-11.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010005	Pot	PW-14	4/1/95	2443	54.72	85.00	70.00	-15.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010005	Pot	PW-14	5/1/95	0	0.00	82.00	70.00	-12.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010005	Pot	PW-14	6/1/95	731	16.38	76.00	70.00	-6.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010006	Pot	PW-14	7/1/95	71	1.64	76.00	70.00	-6.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010005	Pot	PW-14	8/1/95	6277	140.60	75.00	70.00	-5.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010005	Pot	PW-14	8/11/95	-9999	-9999.00	76.00	70.00	-6.00	TT update 10/6/95
Db11-49	010005	Pot	PW-14	8/17/95	-9999	220.00	75.00	70.00	-5.00	TT update 10/6/95
Db11-49	010005	Pot	PW-14	8/24/95	-9999	270.00	76.00	70.00	-6.00	TT update 10/6/95
Db11-49	010005	Pot	PW-14	8/28/95	-9999	230.00	76.00	70.00	-6.00	TT update 10/6/95
Db11-49	010005	Pot	PW-14	9/1/95	9515	213.00	74.00	70.00	-4.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010005	Pot	PW-14	9/5/95	-9999	230.00	74.00	70.00	-4.00	TT update 10/6/95
Db11-49	010005	Pot	PW-14	9/12/95	-9999	210.00	76.00	70.00	-6.00	TT update 10/6/95
Db11-49	010005	Pot	PW-14	9/20/95	-9999	410.00	76.00	70.00	-6.00	TT Update 10/6/95
Db11-49	010005	Pot	PW-14	9/27/95	-9999	0.00	83.00	70.00	-13.00	TT Update 10/6/95
Db11-49	010005	Pot	PW-14	10/1/95	7005	162.15	76.00	70.00	-6.00	Additional Water Use Reports from Tt - 11/95
Db11-49	010005	Pot	PW-14	10/2/95	-9999	0.00	67.00	70.00	3.00	TT Update 10/6/95
Db11-49	010005	Pot	PW-14	10/10/95	-9999	0.00	70.00	70.00	0.00	TT Update 11/2/95
Db11-49	010005	Pot	PW-14	10/18/95	-9999	290.00	74.00	70.00	-4.00	TT Update 11/2/95
Db11-49	010005	Pot	PW-14	10/25/95	-9999	-9999.00	72.00	70.00	-2.00	TT Update 11/2/95
Db11-49	010005	Pot	PW-14	11/1/95	-9999	-9999.00	73.00	70.00	-3.00	TT Update 11/2/95
Db11-49	010005	Pot	PW-14	11/7/95	-9999	-9999.00	74.00	70.00	-4.00	TT Update 11/9/95
Db11-49	010005	Pot	PW-14	11/13/1995(0730-0830)	-9999	250	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/13/1995(0945-1100)	-9999	260	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/13/1995(1400-1600)	-9999	-9999	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/13/1995(2200-2230)	-9999	-9999	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/14/1995(0730-0850)	-9999	260	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/14/1995(1440-1540)	-9999	260	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/14/1995(2200-2230)	-9999	-9999	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/15/1995(0730-0830)	-9999	230	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/15/1995(1430-1530)	-9999	230	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/16/1995(0800-1032)	-9999	240	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/16/1995(1450-1630)	-9999	230	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/17/1995(0730-0920)	-9999	260	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-49	010005	Pot	PW-14	11/17/1995(1435-1610)	-9999	-9999	-9999	70	-9999.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	7/7/77	16587	371.00	39.00	62.00	23.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/7/77	17055	382.00	40.00	62.00	22.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/11/77	16485	381.00	38.00	62.00	24.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/13/77	17135	383.00	40.00	62.00	22.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/12/77	14461	334.00	38.00	62.00	24.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/17/77	16424	367.00	38.00	62.00	24.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/16/78	16420	367.00	38.00	62.00	24.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/15/78	14335	355.00	37.00	62.00	25.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/31/78	15836	354.00	36.00	62.00	26.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/17/78	15808	365.00	38.00	62.00	24.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/9/78	15531	347.00	38.00	62.00	24.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/8/78	14189	328.00	31.00	62.00	31.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/13/78	15582	349.00	35.00	62.00	27.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/20/78	15927	356.00	35.00	62.00	27.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/1/78	16393	379.00	36.00	62.00	26.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/20/78	15624	350.00	36.00	62.00	26.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/22/78	15120	350.00	37.00	62.00	25.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/8/78	15624	350.00	36.00	62.00	26.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/3/79	15120	350.00	37.00	62.00	25.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/29/79	15868.8	380.00	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/7/79	14688	340.00	23.00	62.00	39.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/23/79	15624	350.00	24.00	62.00	38.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/7/79	14767	341.00	24.00	62.00	38.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/4/79	15347	343.00	24.00	62.00	38.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/11/79	15236	341.00	27.00	62.00	35.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-48	000182	Col	PW-15	9/5/79	14205	328.00	27.00	62.00	35.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/26/79	14948	340.00	28.00	62.00	34.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/9/79	14408	340.00	28.00	62.00	34.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/26/79	14167	360.00	27.00	62.00	35.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/6/80	13729	360.00	27.00	62.00	35.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/22/80	13338	325.00	27.00	62.00	35.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/2/80	12392	360.00	29.00	62.00	33.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/23/80	12701	300.00	26.00	62.00	36.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/5/80	11666	350.00	24.00	62.00	38.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/26/80	13347	330.00	26.00	62.00	36.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/4/80	13347	330.00	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/29/80	15015	325.00	26.00	62.00	36.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/6/80	14145	375.00	28.00	62.00	34.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/15/80	12901	289.00	28.00	62.00	34.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/12/80	12356	286.00	28.00	62.00	34.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/9/80	13710	307.10	28.00	62.00	34.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/15/81	11892	266.40	28.00	62.00	34.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/11/81	10549	261.60	28.00	62.00	34.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/11/81	15752	352.90	29.00	62.00	33.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/19/81	13604	314.90	27.00	62.00	35.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/10/81	15662	349.00	27.00	62.00	35.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/8/81	15659	362.50	24.00	62.00	38.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/19/81	15075	337.70	22.00	62.00	40.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/23/81	16060	371.80	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/15/81	14787	342.30	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/23/81	15521	350.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/12/81	14879	350.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/12/81	14820	350.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/17/82	18178	350.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/12/82	12967	350.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/10/82	15943	350.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/25/82	14548	350.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/8/82	15985	350.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/19/82	15605	325.00	19.00	62.00	43.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/24/82	15020	350.00	19.00	62.00	43.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/1/82	14814	350.00	19.00	62.00	43.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/1/82	14242	300.00	18.00	62.00	44.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/25/82	16527	370.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/10/82	14256	330.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/22/82	17539	393.00	23.00	62.00	39.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/29/83	18165	407.00	23.00	62.00	39.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/20/83	16405	407.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/26/83	18452.3	413.00	22.00	62.00	40.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/22/83	18062	418.00	22.00	62.00	40.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/20/83	18649	418.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/21/83	17933	402.00	18.00	62.00	44.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/4/83	18617	417.00	18.00	62.00	44.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/25/83	18971	425.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/13/83	19123	443.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/1/83	19569	438.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/1/83	18481	428.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/10/83	19356	434.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/25/84	17750	398.00	17.00	62.00	45.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/1/84	17166	411.00	19.00	62.00	43.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/6/84	19614	439.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/1/84	17491	405.00	15.00	62.00	47.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/1/84	18267	409.00	15.00	62.00	47.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/1/84	17464	404.00	17.00	62.00	45.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/1/84	17771	398.00	15.00	62.00	47.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/1/84	18116	406.00	17.00	62.00	45.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/8/84	17601	407.00	16.00	62.00	46.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/15/84	17810	410.00	15.00	62.00	47.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/15/84	16836	410.00	17.00	62.00	45.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/15/84	17086	395.00	17.00	62.00	45.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/15/85	17074	400.00	17.00	62.00	45.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/15/85	14195	400.00	18.00	62.00	44.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/15/85	16514	375.00	17.00	62.00	45.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/15/85	16074	379.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/15/85	16756	375.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/15/85	13580	385.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/15/85	17192	385.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/15/85	17642	395.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/15/85	15723	385.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/31/85	16780	376.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/30/85	16155	362.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/31/85	16708	374.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/31/86	14782	395.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/28/86	14717	365.00	22.00	62.00	40.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/31/86	16518	370.00	22.00	62.00	40.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/30/86	16362	379.00	22.00	62.00	40.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/31/86	17076	383.00	23.00	62.00	39.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/30/86	15634	362.00	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/31/86	16369	367.00	26.00	62.00	36.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/31/86	16507	370.00	26.00	62.00	36.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/30/86	15877.7	368.00	27.00	62.00	35.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/1/87	16497	369.60	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/1/87	15903	368.10	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/1/88	16257	364.20	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/1/88	16082	360.30	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/1/88	15024	359.80	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/1/88	15878	355.70	25.00	62.00	37.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db11-48	000182	Col	PW-15	5/1/88	15222	352.40	25.00	62.00	37.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/1/88	15479	346.80	22.00	62.00	40.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/1/88	15327	354.80	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/1/88	16070	360.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/1/88	16117	361.00	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/1/88	15356	355.50	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/31/88	15281	342.30	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/30/88	14093	326.20	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/31/88	14055	314.90	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	1/31/89	11674	261.50	22.00	62.00	40.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/28/89	9664	239.70	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/31/89	10492	235.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/30/89	9944	230.10	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/31/89	9636	215.90	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/30/89	9241	213.90	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/31/89	9553	214.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/31/89	10090	226.00	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	9/30/89	10162	235.20	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	10/31/89	12294	275.40	15.00	62.00	47.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	11/30/89	12102	280.10	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	12/31/89	13484	302.10	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/1/90	11613	260.10	20.00	62.00	42.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	3/1/90	11397	282.70	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	4/1/90	12629	282.90	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	5/1/90	12051	278.90	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	6/1/90	12358	276.80	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	7/1/90	5776	133.70	21.00	62.00	41.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	8/1/90	81	1.80	-9999.00	62.00	-9999.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/1/91	0	0.00	-9999.00	62.00	-9999.00	Diskette - WRAUSE1.LST
Db11-48	000182	Col	PW-15	2/1/93	0	0.00	-9999.00	62.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	3/1/93	0	0.00	-9999.00	62.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	4/1/93	0	0.00	-9999.00	62.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	5/1/93	0	0.00	-9999.00	62.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	6/1/93	0	0.00	-9999.00	62.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	7/1/93	0	0.00	-9999.00	62.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	8/1/93	0	0.00	5.00	62.00	57.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	9/1/93	0	0.00	5.00	62.00	57.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	10/1/93	0	0.00	5.00	62.00	57.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	11/1/93	0	0.00	7.00	62.00	55.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	12/1/93	935	21.64	11.00	62.00	51.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	1/1/94	0	0.00	9.00	62.00	53.00	Printout - DNREC SYS. SUP. LIST 93
Db11-48	000182	Col	PW-15	2/1/94	7612	170.52	3.00	62.00	59.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	3/1/94	10029	248.74	15.00	62.00	47.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	4/1/94	12104	271.15	4.00	62.00	58.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	5/1/94	3859	89.33	12.00	62.00	50.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	6/1/94	3233	72.42	5.00	62.00	57.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	7/1/94	8436	67.20	26.00	62.00	36.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	8/1/94	2903	65.03	7.00	62.00	55.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	9/1/94	2176	48.75	8.00	62.00	54.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	10/1/94	832	19.26	3.00	62.00	59.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	11/1/94	191	4.28	10.00	62.00	52.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	12/1/94	0	0.00	2.00	62.00	60.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	1/1/95	0	0.00	5.00	62.00	57.00	Printout - DNREC SYS. SUP. LIST 94
Db11-48	000182	Col	PW-15	2/1/95	1931	43.26	3.00	62.00	59.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	3/1/95	664	16.40	2.00	62.00	60.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	4/1/95	6202	138.93	5.00	62.00	57.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	5/1/95	337	7.80	4.00	62.00	58.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	6/1/95	1145	25.64	4.00	62.00	58.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	7/1/95	239	5.53	6.00	62.00	56.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	8/1/95	7412	166.00	13.00	62.00	49.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	8/11/95	-9999	-9999.00	16.00	62.00	46.00	TT update 10/6/95
Db11-48	000182	Col	PW-15	8/17/95	-9999	380.00	15.00	62.00	47.00	TT update 10/6/95
Db11-48	000182	Col	PW-15	8/24/95	-9999	375.00	16.00	62.00	46.00	TT update 10/6/95
Db11-48	000182	Col	PW-15	8/28/95	-9999	270.00	16.00	62.00	46.00	TT update 10/6/95
Db11-48	000182	Col	PW-15	9/1/95	15815	354.27	15.00	62.00	47.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	9/5/95	-9999	370.00	16.00	62.00	46.00	TT update 10/6/95
Db11-48	000182	Col	PW-15	9/12/95	-9999	470.00	16.00	62.00	46.00	TT update 10/6/95
Db11-48	000182	Col	PW-15	9/19/95	-9999	360.00	17.50	62.00	44.50	TT Update 10/6/95
Db11-48	000182	Col	PW-15	9/27/95	-9999	0.00	9.00	62.00	53.00	TT Update 10/6/95
Db11-48	000182	Col	PW-15	10/1/95	11833	273.90	12.00	62.00	50.00	Additional Water Use Reports from Tt - 11/95
Db11-48	000182	Col	PW-15	10/2/95	-9999	0.00	10.00	62.00	52.00	TT Update 10/6/95
Db11-48	000182	Col	PW-15	10/10/95	-9999	400.00	16.00	62.00	46.00	TT Update 11/2/95
Db11-48	000182	Col	PW-15	10/17/95	-9999	100.00	16.00	62.00	46.00	TT Update 11/2/95
Db11-48	000182	Col	PW-15	10/18/96	-9999	290.00	-9999.00	62.00	-9999.00	TT Update 11/2/95
Db11-48	000182	Col	PW-15	11/13/1995(0730-0830)	-9999	390	-9999.00	62.00	-9999.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/13/1995(0945-1100)	-9999	390	-9999.00	62.00	-9999.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/13/1995(1400-1600)	-9999	390	12	62.00	50.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/13/1995(2200-2230)	-9999	400	12	62.00	50.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/14/1995(0730-0850)	-9999	370	13	62.00	49.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/14/1995(1440-1540)	-9999	380	13	62.00	49.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/14/1995(2200-2230)	-9999	370	13	62.00	49.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/15/1995(0730-0830)	-9999	380	13	62.00	49.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/15/1995(1430-1530)	-9999	370	13	62.00	49.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/16/1995(0800-1032)	-9999	370	13	62.00	49.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/16/1995(1450-1630)	-9999	380	13	62.00	49.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/17/1995(0730-0920)	-9999	400	13	62.00	49.00	TT Pump test data - 11/95
Db11-48	000182	Col	PW-15	11/17/1995(1435-1610)	-9999	-9999	-9999	62.00	-9999.00	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	7/13/77	14411	322.00	91.00	65.00	-26.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/20/77	10734	240.00	79.00	65.00	-14.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/14/77	7243	167.00	67.00	65.00	-2.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/16/77	4447	134.00	66.00	65.00	-1.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db22-42	000181	Pot	PW-16	11/9/77	13907	321.00	54.00	65.00	11.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/12/77	15643	350.00	103.00	65.00	-38.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/13/78	16397	367.00	102.00	65.00	-37.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/16/78	14476	359.00	100.00	65.00	-35.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/13/78	16796	376.00	98.00	65.00	-33.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/12/78	15566.2	360.00	96.00	65.00	-31.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/17/78	13392	300.00	95.00	65.00	-30.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/23/78	13929	322.00	95.00	65.00	-30.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/12/78	14999	336.00	93.00	65.00	-28.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/4/78	15078	337.00	93.00	65.00	-28.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/5/78	14928	345.00	93.00	65.00	-28.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/18/78	14508	325.00	94.00	65.00	-29.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/16/78	14508	350.00	94.00	65.00	-29.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/25/78	14508	350.00	94.00	65.00	-29.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/20/79	16070.4	360.00	93.00	65.00	-28.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/2/79	14515.2	360.00	92.00	65.00	-27.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/9/79	15660	375.00	90.00	65.00	-25.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/9/79	16200	375.00	85.00	65.00	-20.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/2/79	16740	375.00	86.00	65.00	-21.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/13/79	17030	394.00	84.00	65.00	-19.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/25/79	17216	385.00	84.00	65.00	-19.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/10/79	16380	366.00	84.00	65.00	-19.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/1/79	15443	357.00	80.00	65.00	-15.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/16/79	15955	350.00	81.00	65.00	-16.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/5/79	13045	325.00	80.00	65.00	-15.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/28/80	5080	350.00	95.00	65.00	-30.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/23/80	14665	330.00	98.00	65.00	-33.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/30/80	15745	330.00	98.00	65.00	-33.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/5/80	15112	330.00	98.00	65.00	-33.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/13/80	15810	330.00	95.00	65.00	-30.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/30/80	14456	330.00	93.00	65.00	-28.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/19/80	15712	330.00	92.00	65.00	-27.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/24/80	15186	330.00	87.00	65.00	-22.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/6/80	12460	330.00	90.00	65.00	-25.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/8/80	16016	358.80	91.00	65.00	-26.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/15/80	15311	354.40	90.00	65.00	-25.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/7/80	15061	337.40	91.00	65.00	-26.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/15/81	15491	347.00	90.00	65.00	-25.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/18/81	13968	346.40	90.00	65.00	-25.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/15/81	15613	349.80	90.00	65.00	-25.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/15/81	14953	348.10	90.00	65.00	-25.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/20/81	15249	341.60	87.00	65.00	-22.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/10/81	14490	335.40	86.00	65.00	-21.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/13/81	14355	321.60	86.00	65.00	-21.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/12/81	13756	318.40	85.00	65.00	-20.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/16/81	13403	310.30	84.00	65.00	-19.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/23/81	15046	330.00	88.00	65.00	-23.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/20/81	14759	330.00	86.00	65.00	-21.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/24/81	15581	300.00	94.00	65.00	-29.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/17/82	13576	300.00	84.00	65.00	-19.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/12/82	12694	320.00	90.00	65.00	-25.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/10/82	13685	300.00	86.00	65.00	-21.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/25/82	11546	250.00	79.00	65.00	-14.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/8/82	10225	235.00	81.00	65.00	-16.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/19/82	11666	325.00	100.00	65.00	-35.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/24/82	16024	350.00	109.00	65.00	-44.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/1/82	13709	350.00	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/1/82	14143	290.00	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/9/82	15760	353.00	115.00	65.00	-50.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/13/82	14983	347.00	115.00	65.00	-50.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/15/82	15808	354.00	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/24/83	15786	354.00	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/11/83	13399	332.00	107.00	65.00	-42.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/22/83	14530.7	328.00	99.00	65.00	-34.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/24/83	14747	341.00	102.00	65.00	-37.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/24/83	15191	340.00	100.00	65.00	-35.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/14/83	14727	330.00	105.00	65.00	-40.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/4/83	14980	336.00	101.00	65.00	-36.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/18/83	13655	306.00	94.00	65.00	-29.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/23/83	13444	311.00	99.00	65.00	-34.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/9/83	13774	309.00	101.00	65.00	-36.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/10/83	9876	229.00	88.00	65.00	-23.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/14/83	14199	318.00	88.00	65.00	-23.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/19/84	13879	311.00	86.00	65.00	-21.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/1/84	15183	364.00	88.00	65.00	-23.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/1/84	7603	352.00	96.00	65.00	-31.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/7/84	15075	349.00	99.00	65.00	-34.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/1/84	14948	335.00	105.00	65.00	-40.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/14/84	15700	363.00	112.00	65.00	-47.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/1/84	16231	364.00	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/1/84	14839	332.00	96.00	65.00	-31.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/1/84	13952	323.00	98.00	65.00	-33.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/15/84	14011	300.00	96.00	65.00	-31.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/15/84	13735	300.00	95.00	65.00	-30.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/15/84	14349	300.00	93.00	65.00	-28.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/15/85	13559	298.00	92.00	65.00	-27.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/15/85	12449	303.00	95.00	65.00	-30.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/15/85	14259	304.00	97.00	65.00	-32.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/15/85	13492	300.00	101.00	65.00	-36.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/15/85	13230	290.00	100.00	65.00	-35.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/15/85	11962	295.00	110.00	65.00	-45.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db22-42	000181	Pot	PW-16	7/15/85	12154	295.00	105.00	65.00	-40.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/15/85	13181	310.00	98.00	65.00	-33.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/15/85	13728	300.00	104.00	65.00	-39.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/31/85	13681	307.00	103.00	65.00	-38.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/30/85	13279	298.00	104.00	65.00	-39.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/31/85	13549	304.00	104.00	65.00	-39.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/31/86	13197	296.00	109.00	65.00	-44.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/28/86	11464	284.00	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/31/86	13329	299.00	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/30/86	12581	291.00	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/31/86	4254	246.00	107.00	65.00	-42.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/30/86	8815	204.00	89.00	65.00	-24.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/31/86	14224	319.00	94.00	65.00	-29.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/31/86	14604	327.00	100.00	65.00	-35.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/30/86	14698.2	340.00	97.00	65.00	-32.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/1/87	19326	432.90	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/1/87	19508	451.60	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/1/88	20825	466.50	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/1/88	20564	460.70	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/1/88	18482	442.60	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/1/88	20829	466.60	107.00	65.00	-42.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/1/88	20194	467.50	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/1/88	20906	468.30	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/1/88	17853	413.30	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/1/88	18121	405.90	109.00	65.00	-44.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/1/88	19047	426.70	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/1/88	19523	451.90	108.00	65.00	-43.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/31/88	20031	448.70	109.00	65.00	-44.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/30/88	19308	446.90	109.00	65.00	-44.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/31/88	20474	458.70	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	1/31/89	20899	468.10	112.00	65.00	-47.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/28/89	19895	493.40	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/31/89	22794	510.60	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/30/89	20800	481.40	116.00	65.00	-51.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/31/89	19983	447.60	116.00	65.00	-51.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/30/89	17595	407.20	111.00	65.00	-46.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/31/89	18287	409.70	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/31/89	18987	425.30	110.00	65.00	-45.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	9/30/89	18768	434.40	-9999.00	65.00	-9999.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	10/31/89	19897	445.70	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	11/30/89	19266	445.90	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	12/31/89	20967	469.70	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/1/90	19577	438.50	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	3/1/90	18862	467.50	104.00	65.00	-39.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	4/1/90	20101	450.30	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	5/1/90	21030	486.80	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	6/1/90	20870	467.50	106.00	65.00	-41.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	7/1/90	7786	180.20	102.00	65.00	-37.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	8/1/90	127	2.80	-9999.00	65.00	-9999.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/1/91	0	0.00	-9999.00	65.00	-9999.00	Diskette - WRAUSE1.LST
Db22-42	000181	Pot	PW-16	2/1/93	0	0.00	-9999.00	65.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	3/1/93	0	0.00	-9999.00	65.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	4/1/93	0	0.00	-9999.00	65.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	5/1/93	0	0.00	-9999.00	65.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	6/1/93	0	0.00	-9999.00	65.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	7/1/93	0	0.00	-9999.00	65.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	8/1/93	0	0.00	21.00	65.00	44.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	9/1/93	0	0.00	20.00	65.00	45.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	10/1/93	0	0.00	20.00	65.00	45.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	11/1/93	0	0.00	22.00	65.00	43.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	12/1/93	0	0.00	15.00	65.00	50.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	1/1/94	0	0.00	17.00	65.00	48.00	Printout - DNREC SYS. SUP. LIST 93
Db22-42	000181	Pot	PW-16	2/1/94	0	0.00	25.00	65.00	40.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	3/1/94	0	0.00	19.00	65.00	46.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	4/1/94	0	0.00	16.00	65.00	49.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	5/1/94	0	0.00	7.00	65.00	58.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	6/1/94	0	0.00	5.00	65.00	60.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	7/1/94	0	0.00	18.00	65.00	47.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	8/1/94	0	0.00	20.00	65.00	45.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	9/1/94	0	0.00	7.00	65.00	58.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	10/1/94	0	0.00	15.00	65.00	50.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	11/1/94	143	3.20	15.00	65.00	50.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	12/1/94	0	0.00	15.00	65.00	50.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	1/1/95	0	0.00	15.00	65.00	50.00	Printout - DNREC SYS. SUP. LIST 94
Db22-42	000181	Pot	PW-16	2/1/95	0	0.00	16.00	65.00	49.00	Additional Water Use Reports from Tt - 11/95
Db22-42	000181	Pot	PW-16	3/1/95	0	0.00	16.00	65.00	49.00	Additional Water Use Reports from Tt - 11/95
Db22-42	000181	Pot	PW-16	4/1/95	69	1.54	20.00	65.00	45.00	Additional Water Use Reports from Tt - 11/95
Db22-42	000181	Pot	PW-16	5/1/95	0	0.00	17.00	65.00	48.00	Additional Water Use Reports from Tt - 11/95
Db22-42	000181	Pot	PW-16	6/1/95	0	0.00	16.00	65.00	49.00	Additional Water Use Reports from Tt - 11/95
Db22-42	000181	Pot	PW-16	7/1/95	0	0.00	17.00	65.00	48.00	Additional Water Use Reports from Tt - 11/95
Db22-42	000181	Pot	PW-16	8/1/95	0	0.00	18.00	65.00	47.00	Additional Water Use Reports from Tt - 11/95
Db22-42	000181	Pot	PW-16	8/11/95	-9999	0.00	19.38	65.00	45.62	TT update 10/6/95
Db22-42	000181	Pot	PW-16	8/16/95	-9999	475.00	20.90	65.00	44.10	TT update 10/6/95
Db22-42	000181	Pot	PW-16	8/24/95	-9999	0.00	21.10	65.00	43.90	TT update 10/6/95
Db22-42	000181	Pot	PW-16	8/28/95	-9999	0.00	22.63	65.00	42.37	TT update 10/6/95
Db22-42	000181	Pot	PW-16	9/1/95	0	0.00	15.00	65.00	50.00	Additional Water Use Reports from Tt - 11/95
Db22-42	000181	Pot	PW-16	9/5/95	-9999	0.00	22.98	65.00	42.02	TT update 10/6/95
Db22-42	000181	Pot	PW-16	9/12/95	-9999	0.00	34.64	65.00	30.36	TT update 10/6/95
Db22-42	000181	Pot	PW-16	9/19/95	-9999.00	0.00	25.60	65.00	39.40	TT Update 10/6/95
Db22-42	000181	Pot	PW-16	9/27/95	-9999.00	0.00	20.12	65.00	44.88	TT Update 10/6/95
Db22-42	000181	Pot	PW-16	10/1/95	0.00	0.00	29.00	65.00	36.00	Additional Water Use Reports from Tt - 11/95

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db22-42	000181	Pot	PW-16	10/2/95	-9999.00	0.00	18.67	65.00	46.33	TT Update 10/6/95
Db22-42	000181	Pot	PW-16	10/10/95	-9999	0.00	18.03	65.00	46.97	TT Update 11/2/95
Db22-42	000181	Pot	PW-16	10/17/95	-9999	500.00	17.86	65.00	47.14	TT Update 11/2/95
Db22-42	000181	Pot	PW-16	10/25/95	-9999	-9999.00	17.06	65.00	47.94	TT Update 11/2/95
Db22-42	000181	Pot	PW-16	11/1/95	-9999	-9999.00	16.94	65.00	48.06	TT Update 11/2/95
Db22-42	000181	Pot	PW-16	11/7/95	-9999	-9999.00	16.38	65.00	48.62	TT Update 11/9/95
Db22-42	000181	Pot	PW-16	11/13/1995(0730-0830)	-9999	300.00	16.28	65.00	48.72	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/13/1995(0945-1100)	-9999	300.00	-9999	65.00	-9999.00	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/13/1995(1400-1600)	-9999	298.00	54.22	65.00	10.78	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/13/1995(2200-2230)	-9999	295.00	59.72	65.00	5.28	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/14/1995(0730-0850)	-9999	292.00	63.7	65.00	1.30	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/14/1995(1440-1540)	-9999	290.00	65.35	65.00	-0.35	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/14/1995(2200-2230)	-9999	292.00	66.6	65.00	-1.60	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/15/1995(0730-0830)	-9999	290.00	67.98	65.00	-2.98	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/15/1995(1430-1530)	-9999	288.00	68.84	65.00	-3.84	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/16/1995(0800-1032)	-9999	288.00	70.4	65.00	-5.40	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/16/1995(1450-1630)	-9999	288.00	70.7	65.00	-5.70	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/17/1995(0730-0920)	-9999	286.00	71.53	65.00	-6.53	TT Pump test data - 11/95
Db22-42	000181	Pot	PW-16	11/17/1995(1435-1610)	-9999	-9999.00	-9999	65.00	-9999.00	TT Pump test data - 11/95
Db31-51	001508	Col	PW-17	7/17/77	8187.5	183.00	40.00	46.00	6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/19/77	8104.8	181.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/21/77	8761.5	202.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/25/77	8526.7	191.00	42.00	46.00	4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/17/77	7955.9	184.00	44.00	46.00	2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/7/77	8457.8	189.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/14/78	7599.3	170.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/18/78	6750.7	167.00	47.00	46.00	-1.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/10/78	7956	178.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/11/78	8202.6	189.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/17/78	8620.4	193.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/15/78	6411.6	148.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/13/78	8077.5	180.00	38.00	46.00	8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/11/78	7658.1	171.00	42.00	46.00	4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/5/78	7777.4	180.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/19/78	8035.2	180.00	40.00	46.00	6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/17/78	8035.2	180.00	42.00	46.00	4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/6/78	8035.2	180.00	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/23/79	8928	200.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/2/79	8064	200.00	47.00	46.00	-1.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/4/79	8352	200.00	40.00	46.00	6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/23/79	8208	190.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/6/79	8481.6	190.00	47.00	46.00	-1.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/9/79	8424	195.00	48.00	46.00	-2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/8/79	8704.8	195.00	40.00	46.00	6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/13/79	7842.6	175.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/13/79	7490	173.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/9/79	6570	160.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/25/79	7448.9	190.00	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/12/79	8205.2	190.00	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/21/80	6897.7	190.00	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/8/80	6700.8	160.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/24/80	8009	200.00	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/13/80	7813.8	180.00	41.00	46.00	5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/24/80	6508.8	170.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/26/80	5874.8	150.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/4/80	7004.8	150.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/19/80	6932.4	120.00	45.00	46.00	1.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/8/80	6581.8	180.00	42.00	46.00	4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/7/80	6879.9	154.10	47.00	46.00	-1.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/15/80	7088.6	164.10	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/24/80	7771.5	174.10	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/17/81	7206.7	161.50	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/11/81	6439.8	159.70	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/22/81	6947.3	155.60	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/17/81	1903.5	44.10	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/15/81	6246.4	139.90	56.00	46.00	-10.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/14/81	6467.6	149.70	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/13/81	6430.6	144.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/12/81	6637.6	153.70	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/13/81	7150	165.50	48.00	46.00	-2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/23/81	6556.6	150.00	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/23/81	6818	150.00	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/14/81	6594.8	155.00	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/18/82	6156.3	160.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/19/82	5580.6	165.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/10/82	6546.4	160.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/25/82	6812.3	150.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/8/82	7469.1	150.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/19/82	7002.6	130.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/24/82	6944.7	160.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/1/82	7049.1	160.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/1/82	6912	165.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/22/82	7142.4	160.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/13/82	7052	163.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/15/82	7142.4	160.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/9/83	7038	158.00	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/21/83	6535	162.00	41.00	46.00	5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/14/83	7183	160.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/23/83	6928	160.00	37.00	46.00	9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/26/83	7136	160.00	44.00	46.00	2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/17/83	6631	149.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db31-51	001508	Col	PW-17	7/17/83	6832	153.00	43.00	46.00	3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/9/83	5560	125.00	43.00	46.00	3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/19/83	6851	159.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/1/83	6952	156.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/8/83	6609	153.00	37.00	46.00	9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/14/83	6881	154.00	36.00	46.00	10.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/1/84	6928	155.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/20/84	6369	153.00	39.00	46.00	7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/1/84	7226	162.00	48.00	46.00	-2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/16/84	6457	150.00	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/1/84	6465	145.00	41.00	46.00	5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/11/84	6772	157.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/1/84	6730	151.00	39.00	46.00	7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/23/84	6436	144.00	49.00	46.00	-3.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/2/84	6879	159.00	47.00	46.00	-1.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/15/84	7172	150.00	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/15/84	7010	150.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/15/84	4555	150.00	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/15/85	6773	163.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/15/85	5678	160.00	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/15/85	6634	150.00	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/15/85	6163	150.00	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/15/85	4337	140.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/15/85	3439	150.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/15/85	2344	125.00	48.00	46.00	-2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/15/85	2115	125.00	48.00	46.00	-2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/15/85	4415	125.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/31/85	5373	120.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/30/85	5314	119.00	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/31/85	5917	133.00	48.00	46.00	-2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/31/86	5622	126.00	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/28/86	5155	128.00	48.00	46.00	-2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/31/86	5901	132.00	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/30/86	5599	130.00	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/31/86	5033	135.00	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/30/86	5537	128.00	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/31/86	4757	107.00	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/31/86	3818	86.00	57.00	46.00	-11.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/30/86	5244.8	121.00	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/1/87	4781	107.10	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/1/87	4611	106.70	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/1/88	5805	130.00	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/31/88	5521.2	123.70	53.00	46.00	-7.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/1/88	5209	116.70	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/1/88	5128	122.80	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/1/88	5440	121.90	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/1/88	5504	127.40	56.00	46.00	-10.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/1/88	5707	127.80	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/1/88	5184	120.00	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/1/88	6026.4	135.00	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/1/88	6026.4	135.00	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/1/88	5316.8	123.00	54.00	46.00	-8.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/31/88	5760.6	129.00	52.00	46.00	-6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/30/88	4839.6	112.00	55.00	46.00	-9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/31/88	5390.7	120.80	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/28/89	5188.5	128.70	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/31/89	5564.6	124.70	51.00	46.00	-5.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/30/89	4432.8	102.60	47.00	46.00	-1.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/31/89	5616.3	125.80	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/30/89	5617.1	130.00	48.00	46.00	-2.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/31/89	5466	122.40	46.00	46.00	0.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/31/89	5783.6	129.60	50.00	46.00	-4.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/30/89	2826.1	65.40	47.00	46.00	-1.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/31/89	903.1	20.20	40.00	46.00	6.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/30/89	4015.2	92.90	31.00	46.00	15.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/31/89	4947.7	110.80	31.00	46.00	15.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/1/90	3846.9	86.20	34.00	46.00	12.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/1/90	3908.1	96.90	31.00	46.00	15.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	4/1/90	4622.9	103.60	34.00	46.00	12.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/1/90	4274.3	98.90	35.00	46.00	11.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/1/90	4567.1	102.30	37.00	46.00	9.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/1/90	4196	97.10	34.00	46.00	12.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/1/90	4961.7	111.10	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/1/90	5081.7	117.60	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/1/90	4901.2	113.40	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/1/90	5201.9	116.50	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/1/90	4766.3	110.30	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/1/91	5010.6	112.20	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/1/91	4986.5	111.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/1/91	4930.2	110.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/1/91	4744.4	109.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/1/91	4854.8	108.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/1/91	9237.8	213.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/1/91	4499	100.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/1/91	4711.9	105.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/1/91	4568.1	105.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/1/91	4707.8	105.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/1/91	4548.1	105.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	1/1/92	4684.5	104.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/1/92	4651.8	104.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	3/1/92	4176	100.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db31-51	001508	Col	PW-17	4/1/92	4668.7	104.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	5/1/92	4463.1	103.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	6/1/92	4533.9	101.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	7/1/92	4147.7	96.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	8/1/92	4338.7	97.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	9/1/92	4440.5	102.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	10/1/92	4212.1	97.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	11/1/92	4290.4	96.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/1/92	4203.3	97.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	12/31/92	4910.4	110.00	-9999.00	46.00	-9999.00	Diskette - WRAUSE1.LST
Db31-51	001508	Col	PW-17	2/1/93	4484.5	100.46	-9999.00	46.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	3/1/93	2153.41	53.41	-9999.00	46.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	4/1/93	1050.2	23.53	-9999.00	46.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	5/1/93	224.3	5.19	-9999.00	46.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	6/1/93	224.3	5.02	-9999.00	46.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	7/1/93	2950.4	68.30	-9999.00	46.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	8/1/93	4163.5	93.27	45.00	46.00	1.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	9/1/93	1601.5	35.88	47.00	46.00	-1.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	10/1/93	4756.32	110.10	41.00	46.00	5.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	11/1/93	3256.1	72.94	22.00	46.00	24.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	12/1/93	295	6.83	41.00	46.00	5.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	1/1/94	1147	25.69	41.00	46.00	5.00	Printout - DNREC SYS. SUP. LIST 93
Db31-51	001508	Col	PW-17	2/1/94	158.4	3.55	25.00	46.00	21.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	3/1/94	0	0.00	25.00	46.00	21.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	4/1/94	0	0.00	25.00	46.00	21.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	5/1/94	0	0.00	15.00	46.00	31.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	6/1/94	0	0.00	10.00	46.00	36.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	7/1/94	0	0.00	12.00	46.00	34.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	8/1/94	0	0.00	26.00	46.00	20.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	9/1/94	0	0.00	25.00	46.00	21.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	10/1/94	0	0.00	21.00	46.00	25.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	11/1/94	0	0.00	21.00	46.00	25.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	12/1/94	0	0.00	21.00	46.00	25.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	1/1/95	0	0.00	21.00	46.00	25.00	Printout - DNREC SYS. SUP. LIST 94
Db31-51	001508	Col	PW-17	2/1/95	0	0.00	23.00	46.00	23.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	3/1/95	0	0.00	22.00	46.00	24.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	4/1/95	0	0.00	23.00	46.00	23.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	5/1/95	0	0.00	22.00	46.00	24.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	6/1/95	0	0.00	23.00	46.00	23.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	7/1/95	0	0.00	23.00	46.00	23.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	8/1/95	0	0.00	24.00	46.00	22.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	8/11/95	-9999	0.00	28.59	46.00	17.41	TT update 10/6/95
Db31-51	001508	Col	PW-17	8/16/95	-9999	0.00	-9999.00	46.00	-9999.00	TT update 10/6/95
Db31-51	001508	Col	PW-17	8/17/95	-9999	0.00	-9999.00	46.00	-9999.00	TT update 10/6/95
Db31-51	001508	Col	PW-17	8/24/95	-9999	0.00	21.03	46.00	24.97	TT update 10/6/95
Db31-51	001508	Col	PW-17	8/28/95	-9999	0.00	22.00	46.00	24.00	TT update 10/6/95
Db31-51	001508	Col	PW-17	9/1/95	0	0.00	27.00	46.00	19.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	9/12/95	-9999	0.00	29.68	46.00	16.32	TT update 10/6/95
Db31-51	001508	Col	PW-17	9/19/95	-9999	0.00	-9999.00	46.00	-9999.00	TT update 10/6/95
Db31-51	001508	Col	PW-17	9/27/95	-9999	0.00	30.60	46.00	15.40	TT update 10/6/95
Db31-51	001508	Col	PW-17	10/1/95	0	0.00	27.00	46.00	19.00	Additional Water Use Reports from Tt - 11/95
Db31-51	001508	Col	PW-17	10/10/95	-9999	0.00	31.35	46.00	14.65	TT Update 11/2/95
Db31-51	001508	Col	PW-17	10/25/95	-9999	-9999.00	22.77	46.00	23.23	TT Update 11/2/95
Db31-51	001508	Col	PW-17	11/7/95	-9999	-9999.00	31.60	46.00	14.40	TT Update 11/9/95
Db31-43	031429	Col	PW-18	8/11/95	-9999	0.00	32.97	64.00	31.03	TT update 10/6/95
Db31-43	031429	Col	PW-18	8/16/95	-9999	0.00	-9999.00	64.00	-9999.00	TT update 10/6/95
Db31-43	031429	Col	PW-18	8/17/95	-9999	0.00	-9999.00	64.00	-9999.00	TT update 10/6/95
Db31-43	031429	Col	PW-18	8/24/95	-9999	0.00	34.00	64.00	30.00	TT update 10/6/95
Db31-43	031429	Col	PW-18	8/28/95	-9999	0.00	34.04	64.00	29.96	TT update 10/6/95
Db31-43	031429	Col	PW-18	9/5/95	-9999	0.00	32.27	64.00	31.73	TT update 10/6/95
Db31-43	031429	Col	PW-18	9/12/95	-9999	0.00	35.72	64.00	28.28	TT update 10/6/95
Db31-43	031429	Col	PW-18	9/19/95	-9999	0.00	-9999.00	64.00	-9999.00	tt update 10/6/95
Db31-43	031429	Col	PW-18	9/27/95	-9999	0.00	33.96	64.00	-9999.00	tt update 10/6/95
Db31-43	031429	Col	PW-18	10/10/95	-9999	0.00	33.13	64.00	30.87	TT Update 11/2/95
Db31-43	031429	Col	PW-18	10/25/95	-9999	-9999.00	23.91	64.00	40.09	TT Update 11/2/95
Db31-43	031429	Col	PW-18	11/7/95	-9999	-9999.00	33.20	64.00	30.80	TT Update 11/9/95
Db32-16	031430	Pot	PW-19	7/18/77	1275.4	28.00	65.00	67.00	2.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/12/77	1871.9	41.00	94.00	67.00	-27.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/4/77	410.4	40.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/9/78	2232	50.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	1/9/79	1785.6	40.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/28/79	1612.8	40.00	88.00	67.00	-21.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	3/17/79	1670.4	40.00	93.00	67.00	-26.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	4/5/79	1944	45.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/18/79	2008.8	45.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/3/79	225.9	5.00	91.00	67.00	-24.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/30/79	233.5	5.00	80.00	67.00	-13.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/2/79	148.3	3.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/8/79	843.1	19.00	93.00	67.00	-26.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	10/16/79	1841	45.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	11/25/79	1757.8	45.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/3/79	2034.5	40.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	1/28/80	1981	48.00	100.00	67.00	-33.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/22/80	1964	45.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	3/9/80	2184.6	45.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	4/27/80	2067.6	50.00	99.00	67.00	-32.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/16/80	2006.8	50.00	99.00	67.00	-32.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/26/80	1752.4	50.00	99.00	67.00	-32.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/8/80	2246.9	48.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/24/80	2294.3	45.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/9/80	2043.8	45.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db32-16	031430	Pot	PW-19	10/6/80	1818.1	40.70	99.00	67.00	-32.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	11/19/80	2191.4	50.70	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/16/80	2391.3	53.60	100.00	67.00	-33.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	1/13/81	2484.1	55.70	99.00	67.00	-32.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/16/81	2109	52.30	100.00	67.00	-33.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	3/15/81	2454	54.00	101.00	67.00	-34.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	4/15/81	2409.4	55.80	101.00	67.00	-34.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/26/81	2385.3	53.40	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/18/81	2016.2	46.70	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/14/81	2018	46.60	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/12/81	935.3	21.70	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/19/81	518.4	40.00	110.00	67.00	-43.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	10/23/81	921.6	43.00	95.00	67.00	-28.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	11/22/81	1777.9	43.00	87.00	67.00	-20.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/21/81	1974.1	43.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	1/26/82	1635.5	43.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/19/82	2008.8	45.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	3/10/82	2008.8	55.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	4/25/82	2525.2	55.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/8/82	1610.2	50.00	107.00	67.00	-40.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/19/82	1905.7	40.00	96.00	67.00	-29.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/24/82	2025.1	40.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/1/82	2072.9	55.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/1/82	1852.9	46.00	96.00	67.00	-29.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	10/22/82	2085.9	48.00	90.00	67.00	-23.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	11/12/82	1964	48.00	90.00	67.00	-23.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/2/82	2069.5	48.00	95.00	67.00	-28.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	1/13/83	2070.3	48.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/24/83	1864.2	46.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	3/24/83	1855.2	42.00	96.00	67.00	-29.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	4/22/83	1682	39.00	94.00	67.00	-27.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/25/83	1679.9	38.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/1/83	1636.1	37.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/22/83	1743.3	39.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/8/83	2345.9	53.00	90.00	67.00	-23.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/13/83	1669.5	39.00	109.00	67.00	-42.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	10/9/83	1958.2	44.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	11/18/83	1797.8	42.00	97.00	67.00	-30.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/1/83	1659.2	37.00	91.00	67.00	-24.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	1/13/84	1672.5	38.00	91.00	67.00	-24.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/1/84	1503.9	36.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	3/21/84	1583	36.00	99.00	67.00	-32.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	4/1/84	1645.4	38.00	92.00	67.00	-25.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/9/84	2082.9	47.00	94.00	67.00	-27.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/1/84	1884.8	44.00	98.00	67.00	-31.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/22/84	1178.1	41.00	94.00	67.00	-27.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/10/84	743	74.00	78.00	67.00	-11.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/29/84	2618.9	61.00	83.00	67.00	-16.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	10/15/84	2867.1	50.00	86.00	67.00	-19.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	11/15/84	2450.1	49.00	85.00	67.00	-18.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/15/84	2232	50.00	90.00	67.00	-23.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	1/15/85	2008.8	45.00	88.00	67.00	-21.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/15/85	1814.4	46.00	90.00	67.00	-23.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	3/15/85	1903.2	45.00	87.00	67.00	-20.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	4/15/85	1982.7	45.00	90.00	67.00	-23.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/15/85	1737.4	47.00	89.00	67.00	-22.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/15/85	1874.6	48.00	94.00	67.00	-27.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/15/85	2145.5	48.00	95.00	67.00	-28.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/15/85	657	57.00	89.00	67.00	-22.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/15/85	1922.7	60.00	95.00	67.00	-28.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	10/31/85	577.8	13.00	90.00	67.00	-23.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	11/30/85	899.7	37.00	91.00	67.00	-24.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/31/85	1805.1	42.00	94.00	67.00	-27.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	1/31/86	2362.2	53.00	96.00	67.00	-29.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/28/86	2648.3	66.00	92.00	67.00	-25.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	3/31/86	1706.7	38.00	92.00	67.00	-25.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	4/30/86	1825.6	42.00	94.00	67.00	-27.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/31/86	3900.6	87.00	90.00	67.00	-23.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/30/86	1023.8	24.00	80.00	67.00	-13.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/31/86	1110.1	25.00	87.00	67.00	-20.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/31/86	960.1	22.00	94.00	67.00	-27.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/30/86	460.1	53.00	87.00	67.00	-20.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	5/1/92	264.8	6.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	6/1/92	2678.4	60.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	7/1/92	195.2	4.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	8/1/92	2901.6	65.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	9/1/92	2490	57.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	10/1/92	2067.3	47.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	11/1/92	3318.1	74.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/1/92	2592	60.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	12/31/92	2901.6	65.00	-9999.00	67.00	-9999.00	Diskette - WRAUSE1.LST
Db32-16	031430	Pot	PW-19	2/1/93	1191.1	26.68	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	3/1/93	1740.61	43.17	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	4/1/93	2154.9	48.27	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	5/1/93	0	0.00	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	6/1/93	0	0.00	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	7/1/93	0	0.00	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	8/1/93	0	0.00	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	9/1/93	403.2	9.03	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	10/1/93	1160.64	26.87	-9999.00	67.00	-9999.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	11/1/93	0	0.00	44.00	67.00	23.00	Printout - DNREC SYS. SUP. LIST 93

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Db32-16	031430	Pot	PW-19	12/1/93	2.5	0.06	46.00	67.00	21.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	1/1/94	530.2	11.88	48.00	67.00	19.00	Printout - DNREC SYS. SUP. LIST 93
Db32-16	031430	Pot	PW-19	2/1/94	0	0.00	45.00	67.00	22.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	3/1/94	0	0.00	46.00	67.00	21.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	4/1/94	0	0.00	45.00	67.00	22.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	5/1/94	0	0.00	44.00	67.00	23.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	6/1/94	0	0.00	45.00	67.00	22.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	7/1/94	0	0.00	44.00	67.00	23.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	8/1/94	0	0.00	46.00	67.00	21.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	9/1/94	0	0.00	45.00	67.00	22.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	10/1/94	0	0.00	47.00	67.00	20.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	11/1/94	78.1	1.75	47.00	67.00	20.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	12/1/94	0	0.00	47.00	67.00	20.00	Printout - DNREC SYS. SUP. LIST 94
Db32-16	031430	Pot	PW-19	1/1/95	0	0.00	47.00	67.00	20.00	Printout - DNREC SYS. SUP. LIST 94
Ca55-03	010000		PW-5	7/22/77	2803.8	62.00	37.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	8/22/77	2772.6	62.00	36.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	9/17/77	2681.5	62.00	38.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	10/12/77	3001.4	67.00	37.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	11/12/77	2791	64.00	38.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	12/13/77	2539.2	56.00	39.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	1/12/78	2653.5	59.00	38.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	2/11/78	2096.6	52.00	35.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	3/22/78	2901.6	65.00	36.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	4/11/78	2721.6	63.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	5/11/78	2901.6	65.00	35.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	6/9/78	2808	65.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	7/4/78	2812.3	63.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	8/11/78	2812.3	63.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	9/10/78	2721.6	63.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	10/10/78	2812.3	63.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	11/17/78	2721.6	63.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	12/14/78	2812.3	63.00	35.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	1/23/79	2812.3	63.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	2/5/79	2419.2	60.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	3/27/79	2505.6	60.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	4/3/79	2592	60.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	5/9/79	2678.4	60.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	6/1/79	2160	50.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	7/5/79	2678.4	60.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	8/1/79	2678.4	60.00	32.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	9/8/79	2592	60.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	10/31/79	2678.4	52.00	33.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	11/6/79	2592	52.00	33.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	12/26/79	2678.4	52.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	1/24/80	2678.4	52.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	2/8/80	2505.6	52.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	3/17/80	2678.4	52.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	4/24/80	2592	52.00	32.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	5/16/80	2678.4	50.00	32.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	6/21/80	2592	50.00	30.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	7/10/80	2678.4	55.00	33.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	8/16/80	2678.4	50.00	30.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	9/6/80	2592	50.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	10/15/80	2678.4	60.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	11/15/80	2592	60.00	31.50	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	12/10/80	2232	50.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	1/21/81	2592	60.00	32.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	2/11/81	2419.2	60.00	32.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	3/11/81	2419.2	60.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	4/15/81	2419.2	60.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	5/6/81	2419.2	60.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	6/10/81	2592	60.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	7/8/81	2232	50.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	8/12/81	2232	51.70	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	9/9/81	2232	51.70	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	10/16/81	2678.4	60.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	11/17/81	2232	50.00	32.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	12/21/81	2678.4	50.00	30.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	1/23/82	2678.4	50.00	34.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	2/19/82	2419.2	50.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	3/10/82	2678.4	50.00	31.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	4/1/82	2419.2	50.00	32.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	5/8/82	1898.4	50.00	32.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	10/1/82	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	9/30/83	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	10/15/84	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-03	010000		PW-5	9/15/85	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/8/77	3111.3	69.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/18/77	2490.7	55.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/17/77	1563.3	36.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/20/77	1448.5	32.00	26.00	105.00	79.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/14/77	1526.7	35.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/18/77	2188.4	49.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/26/78	2615.1	58.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/13/78	2806.7	69.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/14/78	2741.6	61.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/14/78	3174.6	73.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/4/78	3138.3	70.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/6/78	2981.4	69.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/10/78	2111.9	47.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/7/78	2786.4	62.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Ca55-05	010001	Col	PW-8	9/12/78	2814.6	65.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/20/78	4464	100.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/10/78	4320	100.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/13/78	4320	100.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/17/79	4464	100.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/10/79	4032	100.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/5/79	4176	100.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/23/79	4104	95.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/8/79	4240.8	95.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/8/79	3455	79.00	25.00	105.00	80.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/1/79	2989.7	66.00	25.00	105.00	80.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/31/79	1336.3	29.00	21.00	105.00	84.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/5/79	3328.5	77.00	24.00	105.00	81.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/12/79	4168	85.00	25.00	105.00	80.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/30/79	3711.5	100.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/6/79	3625.5	105.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/24/80	3305.6	100.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/19/80	3459.3	100.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/10/80	3888.7	100.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/24/80	3076.3	97.00	25.00	105.00	80.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/16/80	1787.1	50.00	25.00	105.00	80.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/26/80	1833.3	60.00	25.00	105.00	80.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/27/80	3493.8	100.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/21/80	3299.3	100.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/6/80	3944.8	100.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/22/80	3894.6	87.20	26.00	105.00	79.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/12/80	3506.1	81.20	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/8/80	2663.2	59.70	27.50	105.00	77.50	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/14/81	3014	67.50	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/11/81	2118.1	52.50	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/11/81	2449.8	54.90	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/22/81	2432.1	56.30	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/13/81	3639.3	81.50	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/3/81	2484.3	57.50	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/8/81	1389.7	84.40	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/12/81	1905.4	81.40	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/9/81	2412	55.80	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/7/81	2405.4	95.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/28/81	1777.9	90.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/16/81	1130.4	90.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/23/82	2609.4	95.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/19/82	1972.2	92.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/10/82	2142.8	95.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/25/82	2271.3	90.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/8/82	1898.4	95.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/19/82	1650.9	95.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/24/82	2129.2	95.00	25.00	105.00	80.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/1/82	952.4	95.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/1/82	3081.6	95.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/19/82	2276.1	95.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/4/82	1395	95.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/15/82	974	100.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/18/83	3562.7	100.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/26/83	5178.6	118.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/14/83	5004.3	118.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/17/83	5803.2	130.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/17/83	6472.8	145.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/26/83	6472.8	145.00	47.00	105.00	58.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/9/83	5889.5	133.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/18/83	5878.5	135.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/1/83	4707.5	108.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/18/83	6099.2	141.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/24/83	5571.9	125.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/8/84	5731.7	128.00	27.00	105.00	78.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/15/84	5841.3	135.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/7/84	6167.5	138.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/18/84	5991.3	139.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/1/84	6092	137.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/27/84	5936.5	137.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/13/84	5998.2	134.00	28.00	105.00	77.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/1/84	6117.1	137.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/28/84	6657.3	154.00	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/15/84	5236.4	144.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/15/84	6436.3	150.00	33.00	105.00	72.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/15/84	5520.4	150.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/15/85	6646.6	150.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/15/85	5957.8	153.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/15/85	5427.3	151.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/15/85	5862.7	141.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/15/85	6064.9	139.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/15/85	5777.8	138.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/15/85	5288.4	138.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/15/85	6047.7	138.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/15/85	5367.5	135.00	35.00	105.00	70.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/31/85	5979.1	134.00	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/30/85	5802.6	130.00	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/31/85	6057.7	136.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/31/86	6041.7	135.00	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/28/86	5337.4	132.00	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/31/86	6000.1	134.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/30/86	4884.6	131.00	33.00	105.00	72.00	Diskette - WRAUSE1.LST

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

City of Newark South Wellfield Water Level/Pumping Database

DGSID	DNRECID	AQUIFER	WELL	DATE	USE	RATE	DTW	MP_ELEV	ELEVATION	REFERENCE
Ca55-05	010001	Col	PW-8	5/31/86	6327.3	142.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/30/86	5805.4	134.00	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/31/86	5579.3	125.00	31.00	105.00	74.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/31/86	5579.3	125.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/30/86	6048	140.00	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/31/87	5960.6	133.50	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/30/87	5144.6	119.10	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/31/87	4886.3	109.50	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/1/88	4886.3	109.50	29.00	105.00	76.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/1/88	5588	125.20	30.00	105.00	75.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/1/88	5625.8	134.70	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	4/1/88	5895.4	132.10	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	5/1/88	5621.9	130.10	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	6/1/88	5544.9	124.20	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	7/1/88	5544.9	124.30	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/1/88	5529.2	123.90	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	9/1/88	5719.7	128.10	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/1/88	5494.6	127.20	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	10/30/88	5658.2	126.80	32.00	105.00	73.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	11/30/88	55437	128.30	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	12/31/88	5676.5	127.10	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	1/31/89	5803.2	130.00	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	2/28/89	5542.5	137.00	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	3/31/89	4276.8	95.80	34.00	105.00	71.00	Diskette - WRAUSE1.LST
Ca55-05	010001	Col	PW-8	8/24/95	-9999	-9999.00	18.00	105.00	87.00	TT update 10/6/95
Ca55-05	010001	Col	PW-8	9/5/95	-9999	-9999.00	18.00	105.00	87.00	TT update 10/6/95
Ca55-05	010001	Col	PW-8	9/12/95	-9999	-9999.00	17.00	105.00	88.00	TT update 10/6/95
Ca55-05	010001	Col	PW-8	9/20/95	-9999	-9999.00	17.00	105.00	88.00	TT update 10/6/95
Ca55-05	010001	Col	PW-8	9/27/95	-9999	-9999.00	33.00	105.00	72.00	TT update 10/6/95
Ca55-05	010001	Col	PW-8	10/2/95	-9999	-9999.00	32.00	105.00	73.00	TT update 10/6/95
Ca55-05	010001	Col	PW-8	10/10/95	-9999	-9999.00	17.00	105.00	88.00	TT Update 11/2/95
Ca55-05	010001	Col	PW-8	10/17/95	-9999	-9999.00	17.00	105.00	88.00	TT Update 11/2/95
Ca55-05	010001	Col	PW-8	10/25/95	-9999	-9999.00	17.00	105.00	88.00	TT Update 11/2/95
Ca55-05	010001	Col	PW-8	11/1/95	-9999	-9999.00	17.00	105.00	88.00	TT Update 11/2/95
Ca55-05	010001	Col	PW-8	11/7/95	-9999	-9999.00	16.00	105.00	89.00	TT Update 11/9/95
Ca45-21	010006		PW23	1/1/70	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	10/31/85	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	7/1/90	5983.6	138.50	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	8/1/90	9072	203.20	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	9/1/90	9504	220.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	12/1/90	1817.8	42.10	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	1/1/91	3578.4	80.20	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	2/1/91	3024	67.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	3/1/91	3456	85.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-21	010006		PW23	4/1/91	1440	32.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	1/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	2/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	3/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	4/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	5/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	6/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	7/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	8/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	9/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	10/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	11/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
9095929	010006		PW23	12/1/92	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-23	010007		PW25	1/1/70	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-23	010007		PW25	10/31/85	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
Ca45-23	010007		PW25	1/1/91	0	0.00	-9999.00	-9999.00	-9999.00	Diskette - WRAUSE1.LST
		Col	SYN-6D	8/24/95	-9999	-9999.00	13.22	71.64	58.42	TT update 10/6/95
		Col	SYN-6D	8/28/95	-9999	-9999.00	13.20	71.64	58.44	TT update 10/6/95
		Col	SYN-6D	9/20/95	-9999	-9999.00	13.99	71.64	57.65	TT Update 10/6/95
		Col	SYN-6D	9/27/95	-9999	-9999.00	13.87	71.64	57.77	TT Update 10/6/95
		Col	SYN-6D	10/2/95	-9999	-9999.00	13.67	71.64	57.97	TT Update 10/6/95
		Col	WIP-2	8/24/95	-9999	-9999.00	7.63	57.25	49.62	TT update 10/6/95
		Col	WIP-2	8/28/95	-9999	-9999.00	7.98	57.25	49.27	TT update 10/6/95
		Col	WIP-2	9/5/95	-9999	-9999.00	8.63	57.25	48.62	TT update 10/6/95
		Col	WIP-2	9/12/95	-9999	-9999.00	8.02	57.25	49.23	TT update 10/6/95
		Col	WIP-2	9/20/95	-9999	-9999.00	7.31	57.25	49.94	TT Update 10/6/95
		Col	WIP-2	9/27/95	-9999	-9999.00	6.12	57.25	51.13	TT Update 10/6/95
		Col	WIP-2	10/2/95	-9999	-9999.00	6.08	57.25	51.17	TT Update 10/6/95
		Col	WIP-2	10/10/95	-9999	-9999.00	5.18	57.25	52.07	TT Update 11/2/95
		Col	WIP-2	10/18/95	-9999	-9999.00	4.55	57.25	52.70	TT Update 11/2/95
		Col	WIP-2	10/25/95	-9999	-9999.00	4.27	57.25	52.98	TT Update 11/2/95
		Col	WIP-2	11/1/95	-9999	-9999.00	4.05	57.25	53.20	TT Update 11/2/95
		Col	WIP-2	11/7/95	-9999	-9999.00	4.25	57.25	53.00	TT Update 11/9/95
		Col	WIP-2	11/13/1995(0730-0830)	-9999	-9999.00	-9999.00	57.25	-9999.00	TT Pump test data - 11/95
		Col	WIP-2	11/13/1995(0945-1100)	-9999	-9999.00	-9999.00	57.25	-9999.00	TT Pump test data - 11/95
		Col	WIP-2	11/13/1995(1400-1600)	-9999	-9999.00	3.73	57.25	53.52	TT Pump test data - 11/95
		Col	WIP-2	11/13/1995(2200-2230)	-9999	-9999.00	-9999.00	57.25	-9999.00	TT Pump test data - 11/95
		Col	WIP-2	11/14/1995(0730-0850)	-9999	-9999.00	-9999.00	57.25	-9999.00	TT Pump test data - 11/95
		Col	WIP-2	11/14/1995(1440-1540)	-9999	-9999.00	-9999.00	57.25	-9999.00	TT Pump test data - 11/95
		Col	WIP-2	11/14/1995(2200-2230)	-9999	-9999.00	-9999.00	57.25	-9999.00	TT Pump test data - 11/95
		Col	WIP-2	11/15/1995(0730-0830)	-9999	-9999.00	-9999.00	57.25	-9999.00	TT Pump test data - 11/95
		Col	WIP-2	11/15/1995(1430-1530)	-9999	-9999.00	3.36	57.25	53.89	TT Pump test data - 11/95
		Col	WIP-2	11/16/1995(0800-1032)	-9999	-9999.00	3.60	57.25	53.65	TT Pump test data - 11/95
		Col	WIP-2	11/16/1995(1450-1630)	-9999	-9999.00	3.64	57.25	53.61	TT Pump test data - 11/95
		Col	WIP-2	11/17/1995(0730-0920)	-9999	-9999.00	3.79	57.25	53.46	TT Pump test data - 11/95
		Col	WIP-2	11/17/1995(1435-1610)	-9999	-9999.00	3.80	57.25	53.45	TT Pump test data - 11/95

Use: units are 1000s of gallons
Rate: units are GPM
DTW: depth to water in feet
Elevation: feet above MSL
-9999: No measurement/not recorded

ATTACHMENT 7
Streamflow Data

Cool Run 18-Oct-95		
Distance from the bank(in.)	Depth of stream (ft)	Flow (fps)
0	0	0
6	0.7	0
12	0.9	0.01
18	0.9	0
24	0.9	0.11
30	0.8	0.13
36	0.85	0.2
42	0.85	0.36
48	0.85	0.42
54	0.85	0.38
60	0.8	0.52
66	0.75	0.39
72	0.7	0.42
78	0.6	0.4
84	0.55	0.31
90	0.45	0
96	0.35	0
102	0.25	0
108	0.2	0
114	0	0

Stream adjacent to Iron Hill Apartments 18-Oct-95		
Distance from the bank(in.)	Depth of stream (ft)	Flow (fps)
0	0	0
6	0.05	0
12	0.1	0
18	0.1	0.17
24	0.2	0.72
30	0.3	0.61
36	0.2	0.66
42	0.2	0.84
48	0.2	0.71
54	0.25	0.62
60	0.25	0.56
66	0.25	0.66
72	0.25	0.2
78	0.2	0.31
84	0	0

STREAM FLOW DATA SUMMARY
NEWARK SOUTH WELLFIELD STUDY

Stream adjacent to Diamond State Industrial Park 18-Oct-95		
Distance from the bank(in.)	Depth of stream (ft)	Flow (fps)
0	0	0
6	0.2	0.01
12	0.3	0.26
18	0.3	0.25
24	0.25	0.03

All distances were measured from the left bank facing upstream.
See Appendix B of City of Newark AMP Report for detailed description of measurement loca

WATER YEAR 1992

01478000 CHRISTINA RIVER AT COOCHS BRIDGE, DE

LOCATION.--Lat 39°38'14", long 75°43'43", New Castle County, Hydrologic Unit 02040205, on right bank 60 ft downstream from highway bridge, 0.5 mi southeast of Coochs Bridge, 3.3 mi south of Newark, 3.6 mi upstream from Belltown Run, and 22.6 mi upstream from mouth.

DRAINAGE AREA.--20.5 mi^2.

PERIOD OF RECORD.--April 1943 to current year.

REVISED RECORDS.--WDR MD-DE-79-1: 1943-70(P). WDR MD-DE-87-1: 1980-82(P).

GAGE.--Water-stage recorder. Datum of gage is 25.54 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 14, 1944, nonrecording gage on upstream side of bridge at same datum. Sept. 14, 1944, to May 13, [illegible] recording gage at site on left bank at downstream side of highway bridge at same datum. May 26, 1969, to Dec. 5, 1973, recording gage on left bank 32 ft downstream from highway bridge at same datum.

REMARKS.--Records good except those for estimated daily discharges (ice effect), which are fair. Low and medium flow regulated by mill upstream from station. Gage-height telemeter at station. Several measurements of water temperature were made during the year. Water-quality records for some prior periods have been collected at this location.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and maximum [illegible]

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 27	0045	1,210	10.67	May 8	1730	*1,250	*[illegible]

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992
MEAN DAILY VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.1	3.9	18	9.7	9.6	8.2	19	7.0	26	25	[illegible]	[illegible]
2	5.0	3.9	92	9.7	8.3	8.0	17	6.5	12	11	11	[illegible]
3	4.7	4.0	294	9.5	8.5	7.5	15	6.1	9.1	13	8.6	[illegible]
4	4.6	3.7	39	11	8.3	7.1	14	5.5	7.5	13	7.8	[illegible]
5	4.5	3.7	19	12	8.3	7.0	12	6.6	262	7.7	7.3	[illegible]
6	7.2	3.8	12	9.3	7.7	6.9	11	6.6	55	7.1	6.4	[illegible]
7	4.3	3.9	9.6	8.7	e7.5	124	10	5.3	27	6.8	5.9	[illegible]
8	4.3	4.1	8.5	8.1	e7.4	42	9.3	441	23	6.3	5.7	[illegible]
9	5.4	4.0	24	9.6	e7.2	17	9.4	125	13	6.2	6.0	[illegible]
10	5.6	4.5	150	10	6.8	48	9.3	57	14	5.9	6.2	[illegible]
11	7.3	13	22	8.4	e6.7	200	9.3	23	12	5.7	75	[illegible]
12	12	7.7	14	8.4	e6.6	29	9.3	21	11	5.4	25	[illegible]
13	8.3	7.3	15	8.6	e6.5	17	9.0	18	9.8	5.5	11	[illegible]
14	7.3	5.5	13	27	11	13	8.6	16	9.4	5.5	19	[illegible]
15	7.7	4.3	12	16	53	11	8.4	14	9.2	7.6	26	[illegible]
16	14	4.7	9.6	9.9	101	9.5	10	19	8.6	8.7	20	[illegible]
17	67	4.6	8.4	8.3	19	9.0	11	12	8.1	12	80	[illegible]
18	13	4.4	8.1	e8.0	23	9.6	9.6	12	7.8	5.7	43	[illegible]
19	4.9	4.6	7.3	e7.7	25	113	19	13	37	5.9	16	[illegible]
20	3.9	4.7	6.9	7.4	15	35	9.7	8.6	13	5.4	12	[illegible]
21	3.9	4.3	7.5	e7.3	10	17	8.7	7.3	8.9	5.1	9.7	[illegible]
22	3.7	151	7.6	e7.1	8.3	17	39	6.7	7.3	4.8	8.9	[illegible]
23	3.3	38	7.6	25	8.4	28	29	6.1	7.6	34	8.3	[illegible]
24	3.8	17	7.9	55	7.7	18	11	5.6	38	36	7.9	[illegible]
25	3.9	11	7.0	15	7.7	12	15	6.7	43	44	7.9	[illegible]
26	3.9	7.8	6.7	12	96	150	32	13	16	12	7.5	[illegible]
27	3.9	6.7	6.6	10	22	394	12	9.9	9.6	11	7.0	[illegible]
28	3.4	6.2	6.6	10	14	46	12	6.5	8.1	8.2	7.3	[illegible]
29	3.2	6.1	61	10	10	26	11	5.4	7.6	7.0	9.8	[illegible]
30	3.5	5.9	23	9.8	---	20	7.3	17	7.4	6.5	6.5	[illegible]
31	3.7	---	12	10	---	26	---	150	---	170	6.1	---
TOTAL	237.3	405.8	992.0	378.5	537.0	1475.8	407.9	1062.9	733.5	560.0	531.7	[illegible]
MEAN	7.67	13.5	32.0	12.2	18.5	47.6	13.6	34.3	24.4	18.1	17.2	[illegible]
MAX	67	151	294	55	101	394	39	441	262	170	80	[illegible]
MIN	3.2	3.7	6.6	7.1	6.5	6.9	7.3	5.4	7.4	4.8	5.7	[illegible]
CFSM	.37	.66	1.56	.60	.90	2.32	.66	1.67	1.19	.88	.84	[illegible]
IN.	.43	.74	1.80	.69	.97	2.68	.74	1.93	1.33	1.02	.96	[illegible]

e Estimated

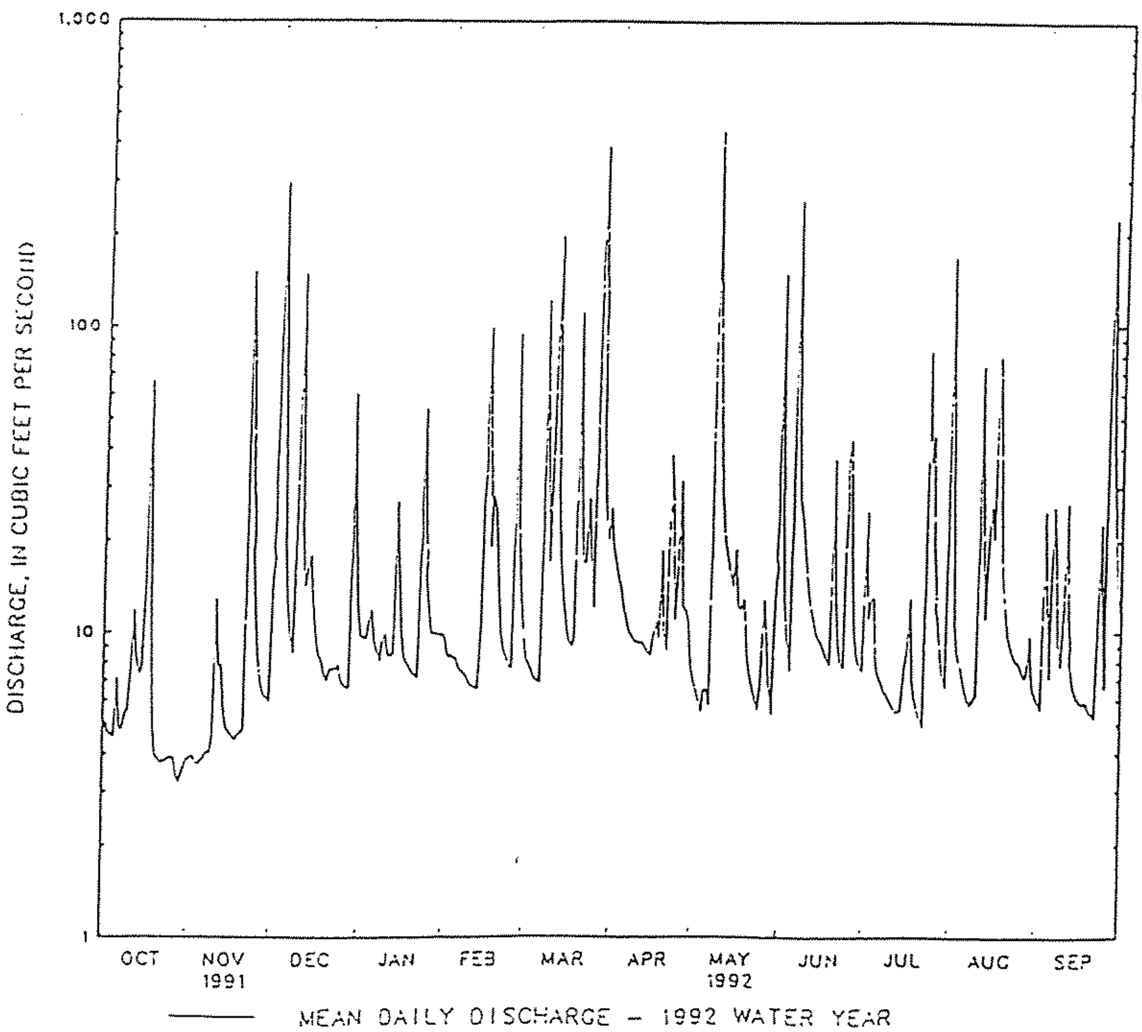
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	14.0	24.1	33.6	38.9	42.9	44.9	36.5	32.1	21.4	22.5	17.9	[illegible]
MAX	62.9	82.8	97.9	165	154	121	107	77.6	76.5	165	[illegible]	[illegible]
(WY)	1972	1973	1984	1979	1979	1978	1983	1990	1972	1989	1967	[illegible]
MIN	2.25	2.76	3.98	5.35	10.1	8.35	10.5	8.10	4.57	2.48	1.29	[illegible]
(WY)	1954	1966	1966	1981	1947	1981	1963	1965	1966	1963	1966	[illegible]

01478000 CHRISTINA RIVER AT COOCHS BRIDGE, DE--Continued

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1943 - 1992	
ANNUAL TOTAL	9135.7		7976.0			
ANNUAL MEAN	25.2		21.8		28.5	
HIGHEST ANNUAL MEAN					53.4	1973
LOWEST ANNUAL MEAN					14.2	1981
HIGHEST DAILY MEAN	553	Jan 12	441	May 3	2000	Jul 5 1989
LOWEST DAILY MEAN	2.8	Sep 13	3.2	Oct 29	.20	(a)
ANNUAL SEVEN-DAY MINIMUM	3.2	Sep 7	3.6	Oct 25	.50	Aug 25 1966
INSTANTANEOUS PEAK FLOW	1400	Jan 12	1250	May 3	5530	Jul 5 1989
INSTANTANEOUS PEAK STAGE	11.04	Jan 12	10.76	May 3	18.12	Jul 5 1989
INSTANTANEOUS LOW FLOW	2.8	(b)	3.0	Oct 23	UNKNOWN	
ANNUAL RUNOFF (CFSM)	1.23		1.06		1.39	
ANNUAL RUNOFF (INCHES)	16.67		14.49		18.93	
10 PERCENT EXCEEDS	60		41		46	
50 PERCENT EXCEEDS	12		9.1		13	
90 PERCENT EXCEEDS	4.1		5.0		4.3	

a Aug. 7, 14, 18, 21, 27, 28, 1966.
b Sept. 12-14.



01478000 CHRISTINA RIVER AT COOCHS BRIDGE, DE

LOCATION.--Lat 39°38'14", long 75°43'43", New Castle County, Hydrologic Unit 02040205, on right bank [illegible] stream from highway bridge, 0.5 mi southeast of Coochs Bridge, 3.3 mi south of Newark, 3.6 mi upstream [illegible] Belltown Run, and 22.6 mi upstream from mouth.

DRAINAGE AREA.--20.5 mi^2.

PERIOD OF RECORD.--April 1943 to current year.

REVISED RECORDS.--WDR MD-DE-79-1: 1943-70(P). WDR MD-DE-87-1: 1980-82(P).

GAGE.--Water-stage recorder. Datum of gage is 25.54 ft above sea level. Prior to Sept. 14, 1944, nonrecording gage on upstream side of bridge at same datum. Sept. 14, 1944, to May 13, 1969, recording gage at site [illegible] bank at downstream side of highway bridge at same datum. May 26, 1969, to Dec. 5, 1973, recording gage [illegible] bank 82 ft downstream from highway bridge at same datum.

REMARKS.--Records good except those for estimated daily discharges (intake lag), which are fair. Low and medium flow regulated by mill upstream from station. Gage-height telemeter at station. Several measurements of water temperature were made during the year. Water-quality records for some prior periods have been collected at [illegible] location.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and maximum (*).

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 11	0815	1,560	11.34	Apr. 10	1300	1,040	[illegible]
Jan. 5	1015	1,100	10.44	Apr. 22	0200	1,060	[illegible]
Mar. 4	2000	*1,580	*11.37	June 1	0200	1,400	[illegible]
Mar. 17	2015	1,220	10.70	Sep. 27	1630	1,140	[illegible]

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993
MEAN DAILY VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.7	8.4	14	21	18	19	319	24	377	9.0	5.4	[illegible]
2	9.3	11	14	18	16	21	157	23	33	53	5.2	[illegible]
3	8.8	161	13	17	16	25	48	21	25	40	5.2	[illegible]
4	8.4	20	12	18	17	629	38	21	20	11	5.0	[illegible]
5	8.2	20	17	396	17	e140	34	26	18	9.5	5.0	[illegible]
6	7.9	33	13	e52	17	67	33	27	18	8.9	56	[illegible]
7	7.5	14	12	e24	17	38	30	20	15	8.7	18	[illegible]
8	7.6	11	12	e21	17	33	28	18	15	8.3	7.7	14
9	e20	11	12	e24	17	30	28	17	46	8.0	10	13
10	e26	10	28	e19	16	25	405	16	43	7.8	7.8	121
11	e12	10	1030	e18	16	26	68	16	15	7.6	6.2	[illegible]
12	e10	14	e120	e30	47	24	42	18	13	12	7.2	[illegible]
13	e9.0	168	e29	e46	243	27	35	21	12	7.3	17	[illegible]
14	8.2	e24	e23	e32	e40	41	32	15	12	16	7.1	[illegible]
15	8.1	e17	e21	e28	e25	37	31	14	12	15	5.7	[illegible]
16	7.6	e14	e19	e23	178	37	145	30	11	7.6	5.5	9.9
17	7.0	e12	e62	e21	e68	455	73	20	11	6.8	7.4	129
18	7.9	e11	e54	e19	e40	e220	35	21	11	6.5	9.6	47
19	8.1	11	e29	e18	e23	e54	31	28	11	6.8	5.8	12
20	8.0	11	e40	e17	e22	e40	28	17	13	11	12	7.5
21	8.0	11	e24	18	e22	e120	58	15	52	7.2	14	14
22	7.9	38	e21	54	75	e155	313	13	33	6.5	6.0	8.6
23	7.9	189	e20	24	e45	e140	44	12	11	6.5	5.1	[illegible]
24	9.9	39	e19	24	27	521	33	12	9.5	6.3	5.1	6.7
25	10	26	e18	28	20	80	31	12	9.2	6.3	5.0	13
26	7.7	32	e17	20	20	51	76	12	9.1	6.1	4.9	121
27	7.8	48	e16	20	20	44	49	11	9.4	6.4	4.9	310
28	7.5	21	e20	19	20	46	31	11	8.8	5.9	9.3	41
29	7.6	17	e24	19	---	104	28	11	8.5	8.7	13	13
30	7.8	15	e40	18	---	54	26	10	8.6	6.3	5.2	10
31	13	---	e28	18	---	38	---	125	---	5.4	4.9	---
TOTAL	294.4	1027.4	1821	1124	1119	3341	2329	657	890.1	332.4	286.2	960.9
MEAN	9.50	34.2	58.7	36.3	40.0	108	77.6	21.2	29.7	10.7	9.23	32.0
MAX	26	189	1030	396	243	629	405	125	377	53	56	310
MIN	7.0	8.4	12	17	16	19	26	10	8.5	5.4	4.9	3.7
CFSM	.46	1.67	2.87	1.77	1.95	5.26	3.79	1.03	1.45	.52	.45	1.56
IN.	.53	1.86	3.30	2.04	2.03	6.06	4.23	1.19	1.62	.60	.52	1.74

e Estimated

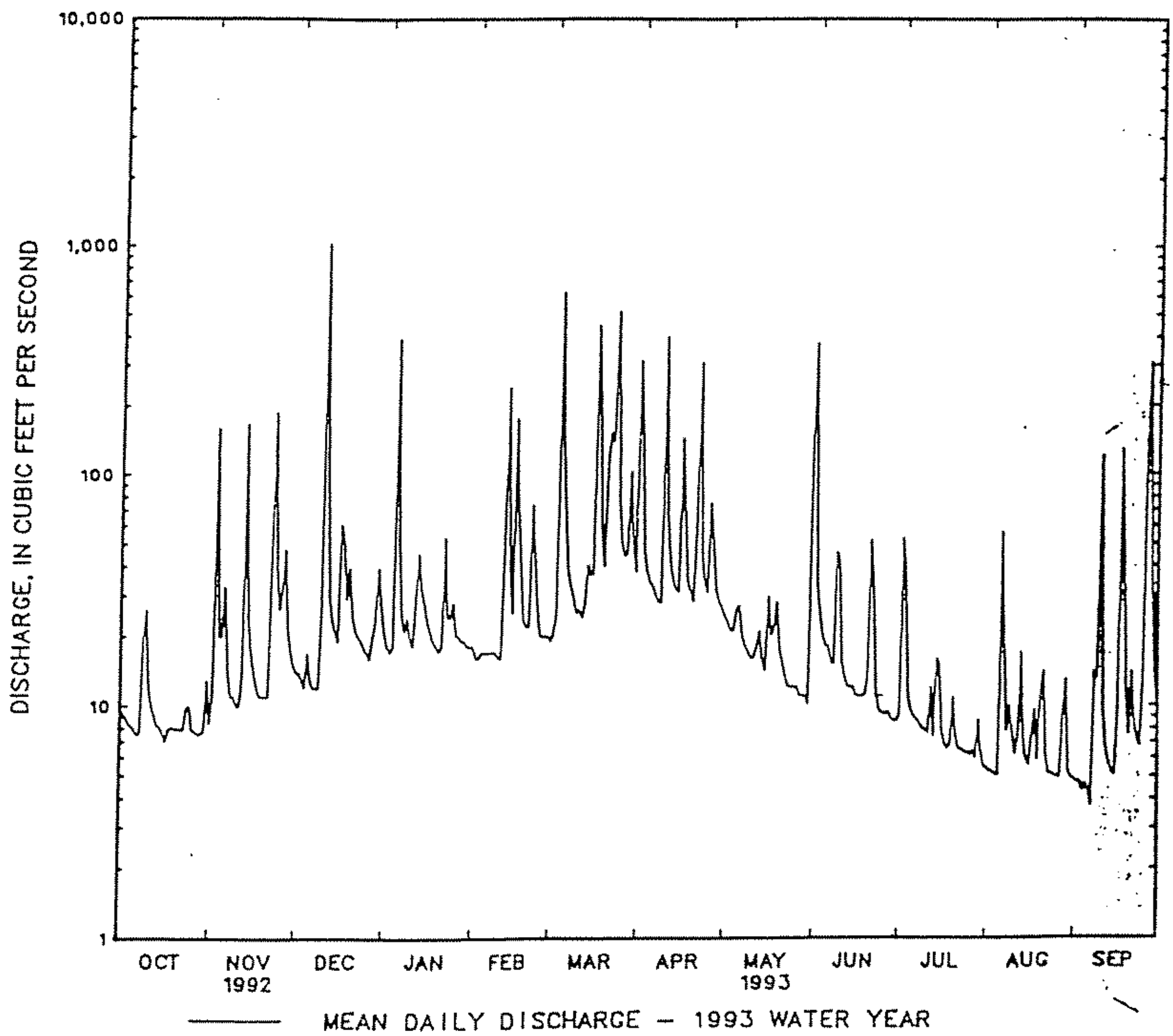
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13.9	24.3	34.1	38.9	42.8	46.1	37.3	31.9	21.6	22.3	17.7	15.3
MAX	62.9	82.8	97.9	165	154	121	107	77.6	76.5	165	117	53.6
(WY)	1972	1973	1984	1979	1979	1978	1983	1990	1972	1989	1967	1960
MIN	2.25	2.76	3.98	5.35	10.1	8.35	10.5	8.10	4.57	2.48	1.29	2.35
(WY)	1964	1966	1966	1981	1947	1981	1963	1965	1966	1963	1966	1965

01478000 CHRISTINA RIVER AT COOCHS BRIDGE, DE--Continued

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1943 - [illegible]	
ANNUAL TOTAL	9483.2		14182.4			
ANNUAL MEAN	25.9		38.9		28.8	
HIGHEST ANNUAL MEAN					53.4	1978
LOWEST ANNUAL MEAN					14.2	[illegible]
HIGHEST DAILY MEAN	1030	Dec 11	1030	Dec 11	2000	Jul 5 1989
LOWEST DAILY MEAN	4.8	Jul 22	3.7	Sep 7	.20	(a)
ANNUAL SEVEN-DAY MINIMUM	5.7	Sep 15	4.4	Sep 1	.50	Aug 25 1966
INSTANTANEOUS PEAK FLOW	1560	Dec 11	1580	Mar 4	5530	Jul 5 1989
INSTANTANEOUS PEAK STAGE	11.34	Dec 11	11.37	Mar 4	13.12	Jul 5 1989
INSTANTANEOUS LOW FLOW	(b)3.2	Feb 10	3.5	(c)	UNKNOWN	
ANNUAL RUNOFF (CFSM)	1.26		1.90		1.40	
ANNUAL RUNOFF (INCHES)	17.21		25.74		19.07	
10 PERCENT EXCEEDS	41		60		48	
50 PERCENT EXCEEDS	11		17		13	
90 PERCENT EXCEEDS	6.5		6.5		4.4	

a Aug. 7, 14, 18, 21, 27, 28, 1966.
b Result of freeze-up.
c Sept. 4-8.



01478000 CHRISTINA RIVER AT COOCHS BRIDGE, DE

LOCATION.--Lat 39°38'14", long 75°43'43", New Castle County, Hydrologic Unit 02040205, on right bank 50 ft downstream from highway bridge, 0.5 mi southeast of Coochs Bridge, 3.3 mi south of Newark, 3.6 mi upstream from Belltown Run, and 22.6 mi upstream from mouth.

DRAINAGE AREA.--20.5 mi^2.

PERIOD OF RECORD.--April 1943 to current year.

REVISED RECORDS.--WDR MD-DE-79-1: 1943-70(P). WDR MD-DE-87-1: 1980-82(P).

GAGE.--Water-stage recorder. Datum of gage is 25.54 ft above sea level. Prior to Sept. 14, 1944, nonrecording gage on upstream side of bridge at same datum. Sept. 14, 1944, to May 13, 1969, recording gage at site on left bank at downstream side of highway bridge at same datum. May 26, 1969, to Dec. 5, 1973, recording gage on left bank 82 ft downstream from highway bridge at same datum.

REMARKS.--Records good except those for estimated daily discharges (intake lag, ice effect), which are fair. Low and medium flow regulated by mill upstream from station. Gage-height telemeter at station. Several measurements of water temperature were made during the year. Water-quality records for some prior periods have been collected at this location.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 28	1130	1,570		Mar. 10	1230	1,360	10.98
Dec. 5	0700	1,480	11.36	July 3	1730	1,540	11.31
Jan. 28	1230	*2,340	11.19				
			*12.19				

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
MEAN DAILY VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.8	e26	19	12	29	21	32	20	13	6.8	14	5.6
2	8.3	e13	18	17	21	22	27	18	12	5.0	11	6.2
3	8.1	11	16	15	19	136	25	16	12	379	8.6	5.7
4	7.6	10	44	86	18	78	24	20	11	51	8.9	5.0
5	7.1	e19	714	32	18	147	22	24	11	18	22	5.0
6	6.6	e14	64	17	23	79	25	18	11	15	13	5.5
7	6.6	e11	26	27	28	134	e37	46	11	14	8.0	5.7
8	6.7	e9.9	19	83	22	126	e23	114	9.8	12	7.8	5.0
9	6.8	9.4	17	25	18	80	21	25	7.7	32	7.9	4.9
10	6.8	9.3	17	16	16	708	49	19	8.5	24	8.2	4.9
11	6.2	9.1	28	13	16	96	e35	17	8.6	13	8.1	4.8
12	42	8.9	16	73	17	47	27	20	9.6	7.5	11	4.8
13	15	8.8	15	45	18	42	190	17	9.3	9.1	7.0	4.8
14	8.6	e11	14	30	19	45	e76	15	8.4	69	23	4.9
15	7.8	e9.6	14	e20	17	43	e41	15	8.1	40	14	4.8
16	7.3	e8.5	14	15	22	37	e58	49	7.6	11	7.7	4.8
17	7.1	11	13	28	26	27	e32	17	7.7	9.0	83	4.9
18	7.3	20	12	174	37	24	e26	15	7.2	57	20	9.0
19	7.3	9.7	15	33	89	24	e24	15	6.8	13	12	4.8
20	19	9.0	13	18	239	23	e22	19	6.4	9.2	9.5	4.6
21	61	8.4	150	14	208	105	e21	15	6.2	8.3	23	4.4
22	36	8.2	31	13	150	204	e20	14	6.3	27	41	42
23	11	8.2	18	13	249	39	e20	14	5.8	37	e12	37
24	8.8	8.2	15	29	340	30	e19	14	13	22	9.4	10
25	8.2	8.1	15	37	69	32	e19	23	6.7	10	8.4	7.1
26	8.0	8.0	14	94	42	25	19	100	5.1	9.0	8.4	7.6
27	7.9	8.0	12	24	28	150	27	53	9.0	17	8.0	9.8
28	8.8	586	12	965	24	293	21	17	14	155	7.6	7.3
29	8.1	52	12	217	---	257	44	15	21	19	11	7.6
30	e35	24	12	64	---	64	30	14	24	13	8.2	5.0
31	e49	---	12	39	---	37	---	13	---	23	6.3	---
TOTAL	442.8	957.3	1411	2288	1822	3175	1056	811	297.8	1134.9	448.0	243.5
MEAN	14.3	31.9	45.5	73.8	65.1	102	35.2	26.2	9.93	36.6	14.5	8.12
MAX	61	586	714	965	340	708	190	114	24	379	83	42
MIN	6.2	8.0	12	12	16	21	19	13	5.1	5.0	6.3	4.4
CFSM	.70	1.56	2.22	3.60	3.17	5.00	1.72	1.28	.48	1.79	.70	.40
IN.	.80	1.74	2.56	4.15	3.31	5.76	1.92	1.47	.54	2.06	.81	.44

e Estimated

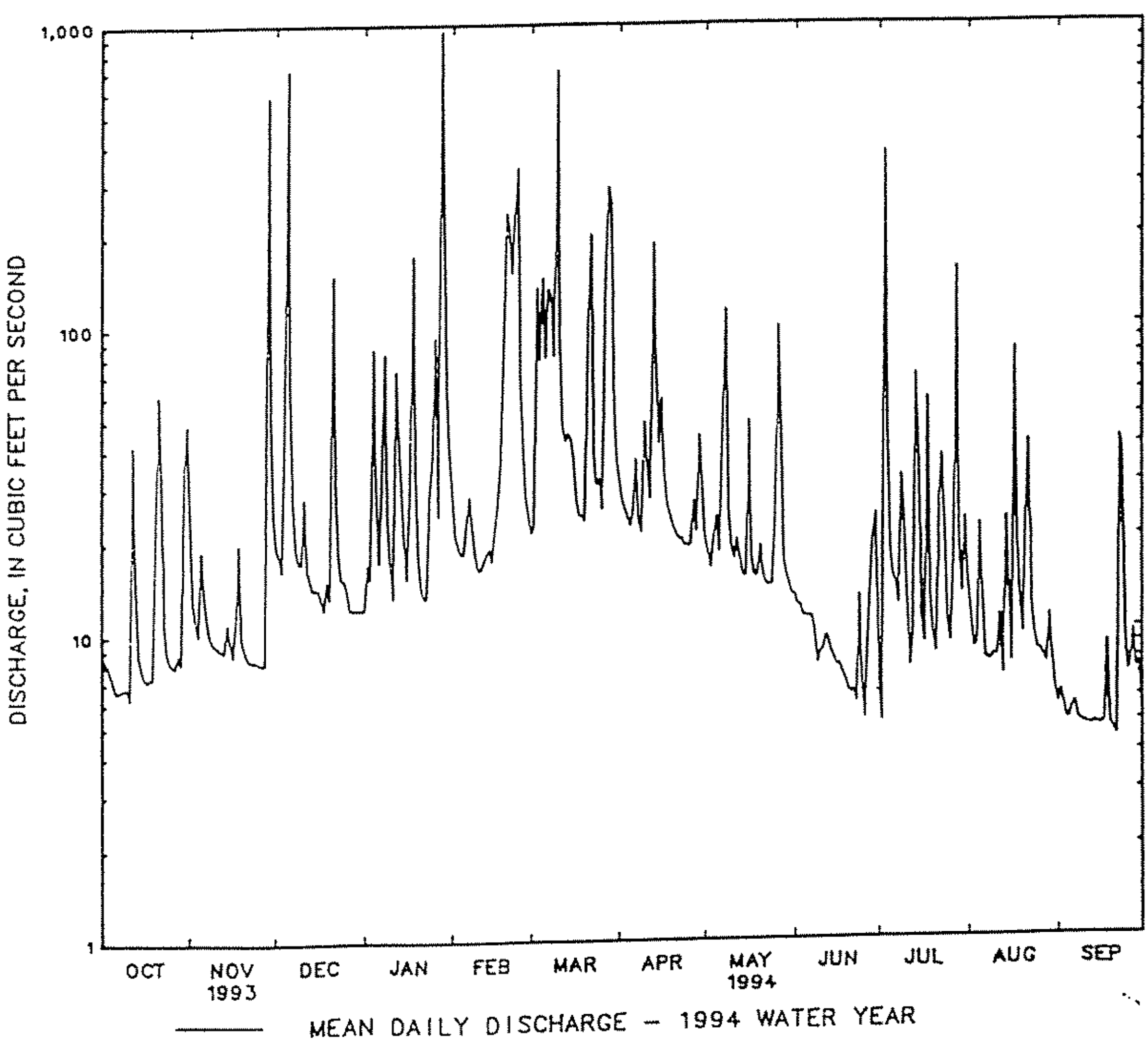
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13.9	24.5	34.3	39.5	43.3	47.3	37.3	31.8	21.3	22.6	17.6	15.2
MAX	62.9	82.8	97.9	165	154	121	107	77.6	76.5	165	117	53.6
(WY)	1972	1973	1984	1979	1979	1978	1983	1990	1972	1989	1967	1960
MIN	2.25	2.76	3.98	5.35	10.1	8.35	10.5	8.10	4.57	2.48	1.29	2.85
(WY)	1964	1966	1966	1981	1947	1981	1963	1965	1966	1963	1966	1965

01478000 CHRISTINA RIVER AT COOCHS BRIDGE, DE--Continued

SUMMARY STATISTICS	FOR 1993 CALENDAR YEAR		FOR 1994 WATER YEAR		WATER YEARS 1943 - 1994	
ANNUAL TOTAL	13850.7		14087.3			
ANNUAL MEAN	37.9		38.6		29.0	
HIGHEST ANNUAL MEAN					53.4	1978
LOWEST ANNUAL MEAN					14.2	1981
HIGHEST DAILY MEAN	714	Dec 5	965	Jan 28	2000	Jul 5 1989
LOWEST DAILY MEAN	3.7	Sep 7	4.4	Sep 21	.20	(a)
ANNUAL SEVEN-DAY MINIMUM	4.4	Sep 1	4.8	Sep 10	.50	Aug 25 1966
INSTANTANEOUS PEAK FLOW			2340	Jan 28	5530	Jul 5 1989
INSTANTANEOUS PEAK STAGE			12.19	Jan 28	13.12	Jul 5 1989
INSTANTANEOUS LOW FLOW			2.2	Jun 23	UNKNOWN	
ANNUAL RUNOFF (CFSM)	1.85		1.88		1.41	
ANNUAL RUNOFF (INCHES)	25.13		25.56		19.19	
10 PERCENT EXCEEDS	57		74		49	
50 PERCENT EXCEEDS	16		16		13	
90 PERCENT EXCEEDS	6.5		6.8		4.4	

a Aug. 7, 14, 18, 21, 27, 28, 1966.



01479000 WHITE CLAY CREEK NEAR NEWARK, DE

LOCATION.--Lat 39°41'47", long 75°40'33", New Castle County, Hydrologic Unit 02040205, on left bank 35 ft down-stream from bridge on private road at Delaware Park Race Track, 0.4 mi downstream from the Baltimore and O[illegible] Railroad bridge, 1.1 mi downstream from Pike Creek, 3.8 mi east of Newark, and 5.0 mi upstream from mouth.

DRAINAGE AREA.--89.1 mi^2.

PERIOD OF RECORD.--October 1931 to September 1936, June 1943 to September 1957, October 1959 to current year. Monthly discharge only for some periods, published in WSP 1302.

REVISED RECORDS.--WSP 1051: 1933(M). WSP 1382: 1932, 1934. WDR MD-DE-83-1: 1978-82(P).

GAGE.--Water-stage recorder. Datum of gage is 9.00 ft above National Geodetic Vertical Datum of 1929. Nov. [illegible] 1931, to Sept. 30, 1936, June 4, 1943, to Sept. 30, 1957, and Oct. 1, 1959, to Apr. 7, 1976, at site [illegible] upstream at datum 2.6 ft higher.

REMARKS.--Records good except those for estimated daily discharges (Oct. 27-Nov. 9, backwater from leaves [illegible] effect), which are fair. Slight diurnal fluctuation at low flow caused by mills upstream from station. [illegible] do not include a negligible diversion upstream from station by E. I. du Pont de Nemours & Co. Gage-height telemeter at station. Several measurements of water temperature were made during the year. Water-quality records for some periods have been collected at this location.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 23 ft, previous site and datum, in July 1937 (probab. affected by backwater from railroad bridge which has since been raised and widened), from information by Baltimore & Ohio Railroad.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,000 ft^3/s and maximum [illegible]

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 3	1945	*1,330	*10.16	No peak greater than base discharge.			

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992
MEAN DAILY VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	e31	59	52	48	57	99	63	110	62	107	[illegible]
2	28	e31	166	52	47	56	90	61	70	56	45	[illegible]
3	27	e30	582	52	46	54	82	58	61	59	40	[illegible]
4	26	e30	268	53	43	52	79	56	57	69	38	[illegible]
5	25	e30	99	58	43	51	75	57	424	50	38	[illegible]
6	33	e30	77	52	42	51	71	56	194	45	35	[illegible]
7	29	e30	66	48	42	224	69	54	103	44	32	[illegible]
8	26	e31	59	47	e41	150	68	590	149	40	32	[illegible]
9	26	e31	95	49	e40	84	66	413	88	40	33	[illegible]
10	26	38	317	55	e38	120	67	155	74	39	32	[illegible]
11	30	52	103	49	e38	353	66	102	68	36	170	[illegible]
12	40	45	77	47	e38	129	67	85	64	35	72	[illegible]
13	33	44	75	47	e39	93	63	78	62	37	42	[illegible]
14	29	38	76	88	e43	82	61	72	59	33	56	[illegible]
15	30	36	66	103	105	77	61	72	56	39	66	[illegible]
16	34	35	58	56	231	71	65	91	53	43	57	[illegible]
17	129	34	55	e46	89	69	65	75	52	52	218	[illegible]
18	77	33	54	e44	88	71	64	79	51	43	142	[illegible]
19	39	33	e53	e43	86	198	67	75	137	38	56	[illegible]
20	33	33	e52	e43	73	137	66	61	106	35	46	[illegible]
21	32	33	e52	e45	62	96	64	58	62	31	41	[illegible]
22	32	242	49	e52	57	93	145	56	55	29	38	[illegible]
23	33	257	48	88	56	103	127	54	52	142	36	[illegible]
24	33	70	48	167	54	92	76	53	99	98	34	[illegible]
25	33	50	45	74	54	80	123	56	120	174	34	[illegible]
26	32	44	43	e58	179	215	185	67	69	59	33	[illegible]
27	e32	42	43	e56	95	732	92	62	57	52	37	[illegible]
28	e32	41	42	e54	71	194	78	55	52	44	33	[illegible]
29	e31	41	136	52	63	124	70	51	48	38	42	[illegible]
30	e31	39	104	51	---	104	65	70	46	36	34	[illegible]
31	e31	---	60	50	---	122	---	364	---	383	31	---
TOTAL	1100	1554	3127	1831	1952	4134	2456	3299	2700	1981	1750	[illegible]
MEAN	35.5	51.8	101	59.1	67.3	133	81.9	106	90.0	63.9	56.5	[illegible]
MAX	129	257	582	167	231	732	185	590	424	383	218	[illegible]
MIN	25	30	42	43	38	51	61	51	46	29	31	[illegible]
CFSM	.40	.58	1.13	.66	.76	1.50	.92	1.19	1.01	.72	.63	[illegible]
IN.	.46	.65	1.31	.76	.81	1.73	1.03	1.38	1.13	.83	.73	[illegible]

e Estimated

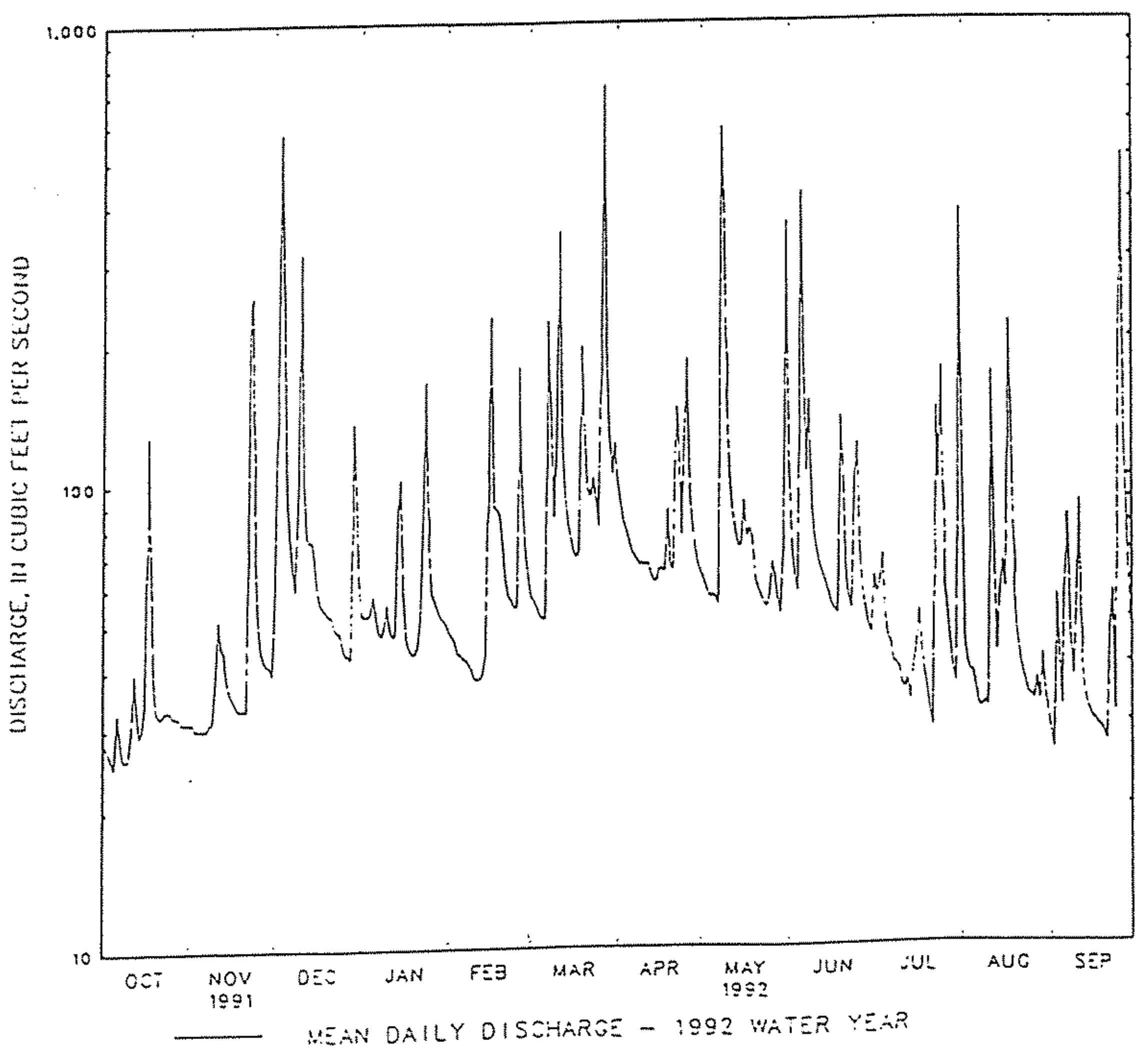
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	63.6	91.7	112	142	162	166	148	130	99.1	99.1	81.4	[illegible]
MAX	230	221	304	493	542	398	342	265	311	540	301	[illegible]
(WY)	1972	1973	1984	1979	1979	1978	1983	1989	1972	1975	1967	[illegible]
MIN	17.6	28.4	28.1	32.5	52.4	57.5	59.7	42.3	37.9	16.5	13.6	[illegible]
(WY)	1964	1966	1966	1966	1934	1981	1963	1955	1963	1963	1966	[illegible]

01479000 WHITE CLAY CREEK NEAR NEWARK, DE--Continued

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1932 - 1992	
ANNUAL TOTAL	33462		27900			
ANNUAL MEAN	91.7		76.2		114	
HIGHEST ANNUAL MEAN					193	1975
LOWEST ANNUAL MEAN					55.9	1966
HIGHEST DAILY MEAN	981	Jan 12	732	Mar 27	5220	Jan 26 1978
LOWEST DAILY MEAN	22	Sep 13	25	Oct 5	5.0	Sep 10 1966
ANNUAL SEVEN-DAY MINIMUM	25	Sep 7	27	Oct 4	5.7	Sep 7 1966
INSTANTANEOUS PEAK FLOW	1650	Jan 12	1330	May 8	a11600	Jul 5 1989
INSTANTANEOUS PEAK STAGE	11.06	Jan 12	10.16	May 8	b17.74	Jun 22 1972
INSTANTANEOUS LOW FLOW	20	(c)	20	Sep 2	4.7	Sep 11 1966
ANNUAL RUNOFF (CFSM)	1.03		.86		1.28	
ANNUAL RUNOFF (INCHES)	13.97		11.65		17.36	
10 PERCENT EXCEEDS	170		131		187	
50 PERCENT EXCEEDS	70		54		76	
90 PERCENT EXCEEDS	31		31		33	

a From rating curve extended above 6,700 ft^3/s on basis of contracted-opening and flow-over-road measurement of peak flow.
b At previous site and datum.
c Sept. 13, 14.



01479000 WHITE CLAY CREEK NEAR NEWARK, DE

LOCATION.--Lat 39°41'47", long 75°40'33", New Castle County, Hydrologic Unit 02040205, on left bank 35 ft downstream from bridge on private road at Delaware Park Race Track, 0.4 mi downstream from the Baltimore and Ohio Railroad bridge, 1.1 mi downstream from Pike Creek, 3.8 mi east of Newark, and 5.0 mi upstream from mouth.

DRAINAGE AREA.--89.1 mi^2.

PERIOD OF RECORD.--October 1931 to September 1936, June 1943 to September 1957, October 1959 to current year. Monthly discharge only for some periods, published in WSP 1302.

REVISED RECORDS.--WSP 1051: 1933(M). WSP 1382: 1932, 1934. WDR MD-DE-83-1: 1978-82(P).

GAGE.--Water-stage recorder. Datum of gage is 9.00 ft above sea level. Nov. 17, 1931, to Sept. 30, 1936, June 1943, to Sept. 30, 1957, and Oct. 1, 1959, to Apr. 7, 1976, at site 0.5 mi upstream at datum 2.6 ft higher.

REMARKS.--Records good except those for estimated daily discharges (Oct. 19-23, 27-30, backwater from leaves; ice effect), which are fair. Slight diurnal fluctuation at low flow caused by mills upstream from station. Records do not include a negligible diversion upstream from station by E. I. du Pont de Nemours & Co. Gage-height telemeter at station. Several measurements of water temperature were made during the year. Water-quality records for some periods have been collected at this location.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 23 ft, previous site and datum, in July 1937 (probably affected by backwater from railroad bridge which has since been raised and widened), from information by Baltimore & Ohio Railroad.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 11	0900	2,120	12.20	Apr. 10	1330	2,120	11.75
Mar. 4	2100	*3,660	*13.82	May 31	2330	2,350	12.16
Mar. 24	0815	2,360	12.18				

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993
MEAN DAILY VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	47	64	94	77	88	868	173	546	57	30	26
2	41	52	63	84	e76	92	464	166	129	129	30	25
3	40	498	61	82	e75	120	262	158	112	121	27	24
4	38	105	59	86	74	1380	227	156	105	68	26	23
5	38	82	69	518	e73	929	219	181	103	60	28	26
6	36	186	61	157	75	298	209	205	105	55	103	23
7	36	69	60	110	e75	213	197	163	94	54	91	22
8	36	60	58	108	e74	192	189	148	92	52	45	52
9	65	56	56	113	e72	179	185	142	136	49	40	53
10	113	54	91	97	69	160	1170	138	155	46	37	220
11	63	53	1230	91	71	155	437	135	92	45	37	36
12	61	63	475	162	119	140	258	135	86	48	50	26
13	48	358	189	211	407	158	226	149	84	42	47	25
14	43	91	134	139	184	e156	214	135	81	59	39	25
15	42	67	113	109	125	e152	207	125	79	57	33	26
16	41	61	104	99	308	e170	501	144	77	44	32	58
17	39	59	242	94	375	846	422	130	72	40	37	214
18	39	56	254	89	173	697	229	129	70	38	43	213
19	e39	55	126	83	e117	264	208	165	71	43	34	60
20	e39	54	145	80	e105	225	194	135	90	75	70	42
21	e39	53	126	81	e122	367	239	126	171	47	76	74
22	e39	91	105	195	e210	441	701	116	146	41	38	56
23	e39	521	108	116	182	420	248	110	76	38	32	42
24	45	143	101	101	e110	1530	216	109	68	36	30	39
25	47	99	88	104	e100	451	204	106	64	36	29	53
26	44	112	89	88	96	307	274	99	63	36	29	565
27	e42	133	86	85	93	257	268	95	63	38	30	630
28	e40	84	97	83	88	258	200	93	60	34	34	240
29	e40	74	110	81	---	400	187	92	58	44	39	81
30	e40	68	128	76	---	305	180	89	63	34	28	61
31	53	---	112	78	---	226	---	338	---	30	26	---
TOTAL	1407	3420	4804	3694	3725	11576	9603	4385	3211	1596	1270	3060
MEAN	45.4	114	155	119	133	373	320	141	107	51.5	41.0	102
MAX	113	521	1230	518	407	1530	1170	338	546	129	103	630
MIN	36	47	56	76	69	88	180	89	58	30	26	22
CFSM	.51	1.28	1.74	1.34	1.49	4.19	3.59	1.59	1.20	.58	.46	1.14
IN.	.59	1.43	2.01	1.54	1.56	4.83	4.01	1.83	1.34	.67	.53	1.28

e Estimated

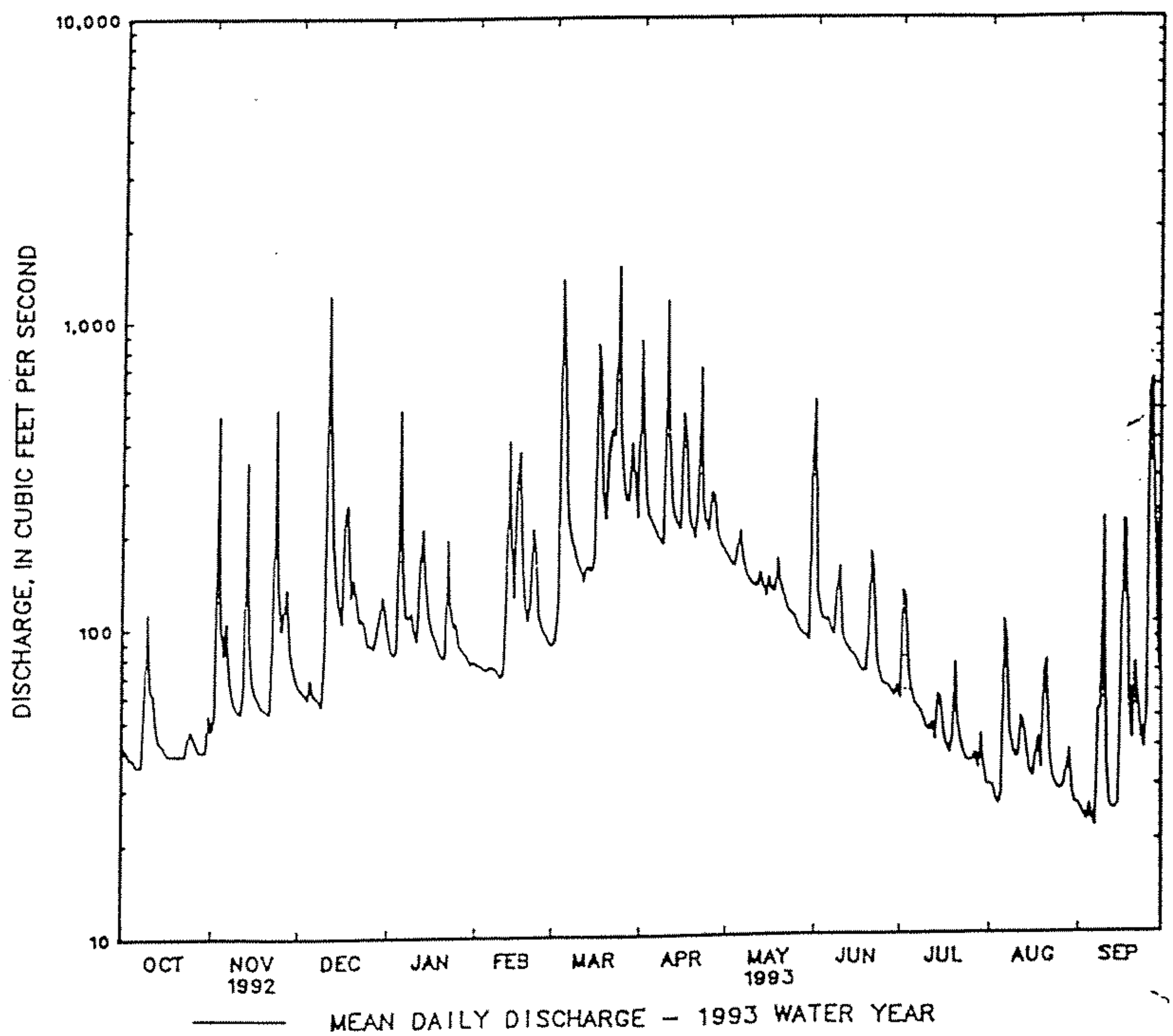
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	63.3	92.1	113	142	161	170	151	130	99.3	98.2	80.6	73.5
MAX	230	221	304	493	542	398	342	265	311	540	301	231
(WY)	1972	1973	1984	1979	1979	1978	1983	1989	1972	1975	1967	1979
MIN	17.6	28.4	28.1	32.8	52.4	57.5	59.7	42.3	37.9	16.6	13.6	15.0
(WY)	1964	1966	1966	1966	1934	1981	1963	1955	1963	1963	1966	1932

01479000 WHITE CLAY CREEK NEAR NEWARK, DE--Continued

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1932 - 1993	
ANNUAL TOTAL	31750		51751			
ANNUAL MEAN	86.7		142		114	
HIGHEST ANNUAL MEAN					193	1975
LOWEST ANNUAL MEAN					55.9	1966
HIGHEST DAILY MEAN	1230	Dec 11	1530	Mar 24	5220	Jan 26 1978
LOWEST DAILY MEAN	26	Sep 2	22	Sep 7	5.0	Sep 10 1966
ANNUAL SEVEN-DAY MINIMUM	29	Sep 15	24	Sep 1	5.7	Sep 7 1966
INSTANTANEOUS PEAK FLOW	2120	Dec 11	3660	Mar 4	(a)11600	Jul 5 1989
INSTANTANEOUS PEAK STAGE	12.20	Dec 11	13.82	Mar 4	(b)17.74	Jun 22 1972
INSTANTANEOUS LOW FLOW	20	(c)	21	(d)	4.7	Sep 11 1966
ANNUAL RUNOFF (CFSM)	.97		1.59		1.28	
ANNUAL RUNOFF (INCHES)	13.26		21.61		17.44	
10 PERCENT EXCEEDS	142		263		189	
50 PERCENT EXCEEDS	59		88		76	
90 PERCENT EXCEEDS	37		36		33	

a From rating curve extended above 6,700 ft^3/s on basis of contracted-opening and flow-over-road measurement of peak flow.
b At previous site and datum.
c Feb. 2 (result of freezeup), Sept. 2.
d Sept. 4, 6, 7, 12.



01479000 WHITE CLAY CREEK NEAR NEWARK, DE

LOCATION.--Lat 39°41'47", long 75°40'33", New Castle County, Hydrologic Unit 02040205, on left bank 35 ft downstream from bridge on private road at Delaware Park Race Track, 0.4 mi downstream from the Baltimore and Ohio Railroad bridge, 1.1 mi downstream from Pike Creek, 3.8 mi east of Newark, and 5.0 mi upstream from mouth.

DRAINAGE AREA.--69.1 mi^2.

PERIOD OF RECORD.--October 1931 to September 1936, June 1943 to September 1957, October 1959 to current year. Monthly discharge only for some periods, published in WSP 1302.

REVISED RECORDS.--WSP 1051: 1933(M). WSP 1382: 1932, 1934. WDR MD-DE-83-1: 1978-82(P).

GAGE.--Water-stage recorder. Datum of gage is 9.00 ft above sea level. Nov. 17, 1931, to Sept. 30, 1936, June 4, 1943, to Sept. 30, 1957, and Oct. 1, 1959, to Apr. 7, 1976, at site 0.5 mi upstream at datum 2.6 ft higher.

REMARKS.--Records good except those for estimated daily discharges (ice effect; intake lag), which are fair. Slight diurnal fluctuation at low flow caused by mills upstream from station. Records do not include a negligible diversion upstream from station by E. I. du Pont de Nemours & Co. Gage-height telemeter at station. Several measurements of water temperature were made during the year. Water-quality records for some periods have been collected at this location.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 23 ft, previous site and datum, in July 1937 (probably affected by backwater from railroad bridge which has since been raised and widened), from information by Baltimore & Ohio Railroad.

PEAK DISCHARGES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 28	1130	3,100	13.22	Jan. 28	2015	*6,370	*15.18
Dec. 5	0900	3,130	13.25	Mar. 10	1615	4,380	14.28

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
MEAN DAILY VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	52	135	96	•76	•140	•140	189	112	78	50	89	29
2	50	76	88	•86	•128	•141	167	108	74	45	49	27
3	51	64	82	78	•120	•229	157	99	72	203	44	26
4	46	60	120	168	•110	•160	149	105	71	59	39	26
5	43	76	1900	99	•105	281	138	122	69	42	61	25
6	41	74	324	•86	•170	319	142	102	69	39	51	25
7	42	60	156	100	236	429	180	137	70	37	37	24
8	42	55	120	187	•195	703	141	344	67	34	32	23
9	42	50	105	115	•108	445	128	•129	65	42	30	23
10	41	50	101	•100	•104	2490	172	113	63	32	29	23
11	38	49	119	•91	•100	606	•229	103	65	27	29	23
12	111	49	90	234	•98	393	•145	104	69	26	34	21
13	92	49	83	225	•97	381	363	108	67	27	31	21
14	54	63	82	123	•97	427	381	96	62	155	53	20
15	49	55	82	135	•98	365	•178	94	60	131	42	20
16	47	50	80	207	•100	•250	197	274	58	47	31	21
17	47	52	74	•187	•100	•196	168	•114	56	39	225	21
18	46	76	73	509	166	•170	141	104	55	132	112	29
19	44	54	83	•135	277	154	132	99	53	52	49	24
20	68	50	75	•102	808	160	127	111	50	39	41	20
21	240	47	413	•95	969	302	120	109	49	35	59	19
22	238	46	152	•89	765	714	116	97	51	61	118	70
23	73	47	102	•83	930	235	113	91	47	71	68	93
24	59	45	92	•150	1240	198	112	87	55	52	42	41
25	53	47	89	•220	455	184	110	98	51	37	36	30
26	50	46	83	439	262	156	107	213	49	38	37	38
27	51	47	•81	211	•200	348	117	•118	56	54	36	60
28	53	1250	•79	•2270	•160	677	113	•95	61	326	37	38
29	47	213	•78	1110	---	711	•123	88	78	69	39	28
30	91	120	•78	352	---	289	•116	84	67	52	34	25
31	170	---	•77	236	---	212	---	79	---	63	30	---
TOTAL	2171	3155	5257	8298	8338	12465	4771	3737	1857	2116	1644	913
MEAN	70.0	105	170	268	298	402	159	121	61.9	68.3	53.0	30.4
MAX	240	1250	1900	2270	1240	2490	381	344	78	326	225	93
MIN	38	45	73	76	97	140	107	79	47	26	29	19
CFSM	.79	1.18	1.90	3.00	3.34	4.51	1.78	1.35	.69	.77	.60	.34
IN.	.91	1.32	2.19	3.46	3.48	5.20	1.99	1.56	.78	.88	.69	.38

• Estimated

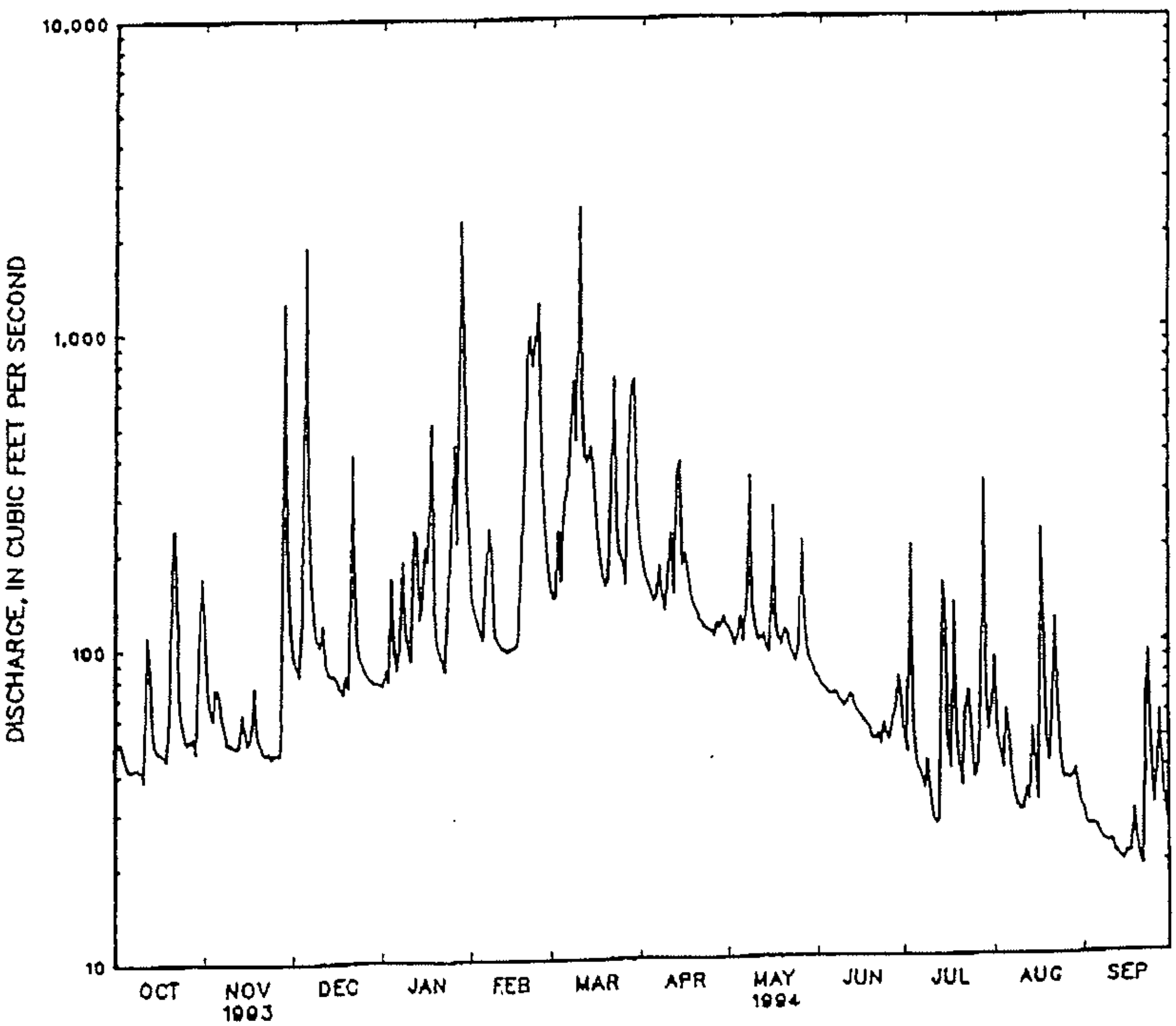
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 1994, BY WATER YEAR (WY)

MEAN	63.4	92.3	114	144	164	174	152	130	98.6	97.7	80.1	72.7

01479000 WHITE CLAY CREEK NEAR NEWARK, DE--Continued

SUMMARY STATISTICS	FOR 1993 CALENDAR YEAR		FOR 1994 WATER YEAR		WATER YEARS 1932 - 1994	
ANNUAL TOTAL	52703		54722			
ANNUAL MEAN	144		150		115	
HIGHEST ANNUAL MEAN					193	1975
LOWEST ANNUAL MEAN					55.9	1964
HIGHEST DAILY MEAN	1900	Dec 5	2490	Mar 10	5220	Jan 26 1978
LOWEST DAILY MEAN	22	Sep 7	19	Sep 21	5.0	Sep 10 1966
ANNUAL SEVEN-DAY MINIMUM	24	Sep 1	21	Sep 11	5.7	Sep 7 1966
INSTANTANEOUS PEAK FLOW			6370	Jan 28	(a)11600	Jul 5 1989
INSTANTANEOUS PEAK STAGE			15.18	Jan 28	(b)17.74	Jun 22 1972
INSTANTANEOUS LOW FLOW			18	(c)	4.7	Sep 11 1965
ANNUAL RUNOFF (CFSM)	1.62		1.68		1.29	
ANNUAL RUNOFF (INCHES)	22.00		22.85		17.54	
10 PERCENT EXCEEDS	260		279		190	
50 PERCENT EXCEEDS	84		84		77	
90 PERCENT EXCEEDS	37		34		33	

a From rating curve extended above 6,700 ft^3/s on basis of contracted-opening and flow-over-road measurement of peak flow.
b At previous site and datum.
c Sept. 21, 22.



MEAN DAILY DISCHARGE — 1994 WATER YEAR

Appendix B
Field Testing Program Summary

APPENDIX B

Field Testing Program Summary

FIELD TESTING PROGRAM SUMMARY

A field testing program was conducted during the period between July and December 1995 as part of the development of the Newark South Wellfield (SWF) Aquifer Management Plan (AMP). The field testing program included the following four major components:

A. Wellfield Inspection and Area Survey
B. Weekly Wellfield Monitoring Activities
C. Ground-Water Sampling Activities
D. Pump Test Activities
E. Miscellaneous Activities

A brief description of the field testing program is provided in the following sections.

A. WELLFIELD INSPECTION AND AREA SURVEY

The first field task entailed the identification and detailed inspection of all of the production and observation wells within the SWF. Each well was inspected for overall condition, as well as facility for water level and flow measurement, and sample collection. The following wells were identified as part of the SWF: production wells 10, 11, 12, 13, 14, 15, 16, 17 (inoperable), 18 (inoperable), and 19; observation wells CH-1, CH-1A, CH-2, CH-2A, OW-11, OW-14, OW-15, OW-16a, OW-16b, and OW-17. Former production well 8, which was part of the old City of Newark North Wellfield was also inspected. Basic specifications for these wells are provided in Appendix A (Background Data Review/Compilation Summary).

In addition to the wells associated with the SWF, other observation wells in the area were identified and evaluated for use. Permission was sought and received to conduct monitoring activities at the following additional well sites within the vicinity of the SWF (see Appendix A for well construction details):

- NLW-10 and NLW-11 are two wells located at the former City of Newark Landfill, located on the University of Delaware Farm in an area east of Rt. 896 - permission received from the University of Delaware;

- SYN-6D is one of several wells located at the former Syntech Site on Dawson Drive in the Delaware Industrial Park - permission received from DNREC;

- WIP-2 is one of several wells located in the proposed Woodlands Industrial Park which is situated in an area east of Well 16 between Old Baltimore Pike and Interstate 95 - permission received from Fusco Enterprises; and

- DTP-2 and DTP-4 are two wells located at the Delaware Technology Park which is situated in the area north of the Northeast Corridor rail line between Marrows Road and Rt. 72 - permission received from Delaware Technology Park.

It should be noted that several gasoline service station sites located in the vicinity of the SWF were also contacted in an attempt to obtain permission for monitoring access. However, none of these attempts were successful as permission to monitor during this study was denied in all cases.

General water level data, however, were obtained from many of these sites where permission for monitoring activities was denied through a Freedom of Information Act (FOIA) request to DNREC to review the files available for these sites. Valuable water level information was obtained through this file search, the results of which are presented as part of Appendix D (South Wellfield Ground-Water Model Study). A copy of the FOIA request letter for the sites of interest is included at the end of this section.

B. WEEKLY WELLFIELD MONITORING ACTIVITIES

Weekly wellfield monitoring activities commenced on August 11, 1995 and were completed on November 17, 1995. A summary of the monitoring events are presented below:

EVENT	WATER LEVEL	FLOW MEASUREMENTS	FIELD PARAMETERS	IRON MANGANESE
8/11/95	X	X		
8/16-8/17/95	X	X	X	X
8/24/95	X	X		
8/28/95	X	X		
9/5/95	X	X	X	
9/12/95	X	X	X	
9/19-9/20/95	X	X	X	X
9/27/95	X	X	X	
10/2/95	X	X	X	
10/10/95	X	X	X	
10/17-10/18/95	X	X	X	X
10/25/95	X	X	X	
11/1/95	X	X	X	
11/7/95	X	X	X	
11/13-11/17/95	X	X	X	X

In summary for the 14 week period, Tetra Tech collected data from 25 monitoring points. All of the data collected during these monitoring events are presented in Appendix A (Background Data/Compilation Summary).

General Procedures

During each weekly monitoring event, water levels were measured at each observation well by using a water level probe that was capable of measuring depth to water to the nearest .01 of a foot. This method was also used to determine the depth to water at all wells with the exception of PW-8, PW-11, PW-13, PW-14, and PW-15. Depth to water at these locations were measured using a pump activated air-line gauge that was graduated in one foot increments. In addition, no depth to water could be measured in PW-10 as the access port for this well was obstructed.

If a production well was in operation during a weekly monitoring event, other types of data would be collected, such as the measurement of flow rate and basic water quality parameters (pH, conductivity, dissolved oxygen, temperature, and oxidation/reduction potential). Water quality parameters were measured by a Horiba U-10 water quality meter and a YSI 3500 water quality system which were connected to a sealed flow-through water reservoir which ensured that water had no contact with the atmosphere during measurement. All instrumentation was calibrated following the instructions provided by the manufacture at the beginning of each event and as needed if there was any indication that the instrument had fallen out of calibration. Instantaneous flow was determined by using a stopwatch to time the rate of flow through the inline flowmeters installed at each production wellhead.

It should be noted that during the entire field testing period, there was always some uncertainty regarding the reliability and accuracy of the measurements obtained from the air-line gauges. The air-line gauges provided inconsistent data, and many of the water level measurements collected using this method are considered suspect. Further, several of the gauges became inoperable during the field testing program (wells 11, 13, 14, and 15), and as a result no additional data could be collected from those locations.

It should also be noted that there are currently no accurate vertical control survey data for most of the wells associated with the SWF. Measuring point elevations and subsequent ground-water elevations are based on estimates of land surface or well casing elevation from historical sources or topographic maps. Measuring point elevations used for this study, as well as an indication of the accuracy uncertainty for each well is presented in Appendix A.

C. GROUND-WATER SAMPLING ACTIVITIES

Four times during the field testing program a variety of wells were sampled for iron, manganese and water quality parameters. A summary of the events are as follows:

EVENT	WELLS SAMPLED	COMMENTS
8/16 - 8/17/95	PW-10, 11, 12, 13, 14, 15, 16 OW-11, 14, 15, 16A, 16B CH-1/1A, CH-2/2A, NLW-10, NLW-11	all wells unfiltered
9/19 - 9/20/95	PW-10, 11, 12, 13, 14, 15, 16 OW-15, 16A, 16B, CH-1/1A, CH-2/2A NLW-10, NLW-11, WIP-2, DTP-2	production wells unfiltered all other wells filtered
10/17 - 10/18/95	PW-10, 11, 12, 13, 14, 15, 16 OW-15, 16A, 16B, CH-1/1A, CH-2/2A NLW-10, NLW-11, WIP-2, DTP-2	production wells unfiltered all other wells filtered
11/13 - 11/17/95	PW-10, 11, 12, 13, 14, 15, 16 OW-15, 16A, CH-1/1A, CH-2/2A NLW-10, NLW-11, WIP-2, DTP-2	production wells unfiltered all other wells filtered

The following notations are presented regarding the well sampling activities:

- Wells 17, 18, and 19 were not evaluated for water quality during this study as the focus of field activities were not on these wells (as per City of Newark direction);
- Observation wells 11 and 14 were not sampled after the initial sampling event because of the relatively poor condition of these wells for monitoring purposes (i.e. poor recovery, large drawdown, high concentrations of iron and manganese);
- Wells WIP-2 and DTP-2 were not sampled during the initial sampling event because access to these wells had not been obtained at that time;
- Well OW-16B was not sampled during the 11/13 - 11/17 sampling event because it was under water from the pump test being conducted for Well 16;
- No manganese data were collected during the initial September 1995 sampling event because of a miscommunication with the laboratory (note that magnesium was analyzed in error);
- All wells were initially sampled in September 1995 for total iron (i.e. non-filtered) to be consistent with historical data, which were predominantly "total data" However, after evaluation of the initial September 1995 data, it was determined that because of the inactivity of the observation and off-site wells for monitoring purposes, filtered ground-water samples would be collected from these locations for all future sampling events. However, ground-water samples collected from production wells would continue to be unfiltered, which is consistent with the historical sampling approach for these wells.

- The Delaware Department of Health and Social Services conducted a quarterly monitoring event for the SWF on August 15, 1995 and December 12, 1995 (note that the December 1995 data has not been incorporated into this report because it is not yet available).

General Sampling Procedures

All ground-water sampling activities were performed according to Tetra Tech's standard operating procedure for ground-water sampling (see attached).

For observation wells, the depth to water and total depth was initially measured using a water level probe. Using this information, the volume of water in each well casing was determined. A 1/3rd horsepower Grundfos submersible pump was then installed using dedicated hose in each of the wells and the well was purged at a rate of 12 to 14 gpm until the water quality parameters measured in the field indicated stability, or a minimum of four well volumes. In some cases a given well would not sustain this purge rate and went dry (wells CH-1, CH-2, WIP-2, NLW-10, NLW-11); when this occurred, the well was purged dry once and allowed to recover prior to sampling. The sample was then collected with the pump at a flow rate of approximately 1 liter per minute through a .45 micron inline filter into a sample container preserved with nitric acid. The samples were immediately placed in chilled coolers, and later submitted to Artesian Laboratories for analysis for iron and manganese. After the samples were collected and processed, the pump was decontaminated according to standard operating procedures.

The production well sampling procedure were somewhat different. If the well was in operation at the time of the sampling, water quality measurements were collected and an unfiltered sample was collected from the wellhead sampling port. However, if the well was not pumping, the depth to water was measured the well was purged using the well pump for a minimum of 10 minutes. During this period, water quality parameters were measured to evaluate the status of well purging. After purging was complete, an unfiltered sample was collected from the wellhead sampling port and processed according to the SOP.

D. PUMP TEST ACTIVITIES

Near the end of the field testing program in mid-November 1995, a series of pump tests were conducted to evaluate short-term pumping and water quality responses at selected wells. Columbia aquifer wells 13 and 15 and Potomac aquifer wells 14 and 16 were selected for concurrent 96 hour pump tests.

On the morning of November 13, 1995, the pump test was started at each of the four wells. It should be noted that all wells were simply placed into operation at current pump settings (i.e. current maximum well yield), with the exception of Well 16, which was throttled down because of a flow meter problem associated with this well.

Estimated pumping rates for the duration of the pump tests were:

Columbia Aquifer wells: Well 13 @ 160 - 165 gpm and Well 15 @ 370 - 400 gpm
Potomac Aquifer wells: Well 14 @ 230 - 260 gpm and Well 16 @ 285 - 295 gpm

Throughout the pump test, water levels and water quality measurements and samples were obtained from various wells. A summary of the pump test activities are as follows:

Pumping Wells	Observation Wells	PERIOD MONITORED From	PERIOD MONITORED To	# of hours pumped	# of water level measurements	# of field measurements	# of Fe and Mn samples collected
PW-11		11/13/95(0825)	11/17/95(0845)	96	10	5	1
	PW-12	11/13/95 (0825)	11/17/95(1610)	NA	10	1	1
	OW-11	11/13/95(0825)	11/17/95(0845)	NA	10	0	0
PW-13		11/13/95(0917)	11/17/95(0830)	95	12	12	7
PW-14		11/13/95(0920)	11/17/95(0838)	95	0	9	5
	OW14	11/13/95(0920)	11/17/95(0838)	NA	10	0	0
PW-15		11/13/95(0927)	11/17/95(0900)	95.5	12	12	7
	OW15	11/13/95(0927)	11/17/95(0900)	NA	11	0	1
PW-16		11/13/95(1047)	11/17/95(0920)	95	12	12	7
	OW-16A	11/13/95(1047)	11/17/95(0920)	NA	11	1	1
	CH-1	11/13/95(0900)	11/17/95(1535)	NA	12	1	1
	CH-1A	11/13/95(0945)	11/17/95(1610)	NA	12	1	1
	CH-2	11/13/19(0945)	11/17/95(1610)	NA	9	1	1
	CH-2A	11/13/19(0945)	11/17/95(1610)	NA	9	1	1
	NLW-10	11/13/19(0945)	11/17/95(1610)	NA	6	1	1
	NLW-11	11/13/19(0945)	11/17/95(1610)	NA	6	1	1
	WIP-2	11/13/19(0945)	11/17/95(1610)	NA	6	1	1
	DTP-2	11/13/19(0945)	11/17/95(1610)	NA	6	1	1
	DTP-4	11/13/19(0945)	11/17/95(1610)	NA	6	1	1

The following notations are presented regarding the pump test program:

- Water level measurements were collected from all monitoring locations prior to the start of the pump test and then throughout the pump test and recovery periods. Water levels were recorded for a period of 7 hours after the cessation of pumping in selected observation wells.

- The initial iron and manganese samples were collected from wells 13, 14, 15, and 16 within 15 minutes of the start of pumping early in the morning of November 13, 1995. A total of three samples per day were collected for each well (with the exception of Well 14) in approximate 8 hour intervals (early morning, late afternoon, and late evening) on November 13 and 14, and once on the morning of November 15, for a total of 7 samples per well. Samples were collected at Well 14 (a total of 5 samples) only during early morning and late afternoon intervals because of well access problems related to safety during the late evening. Water quality parameters were also measured concurrently with sample collection.

- The final wellfield-wide water sampling event for all the remaining wells was conducted concurrently with the pump testing;

- Production well 11 was also pumping continuously throughout the pump test at a rate of 106 to 110 gpm, as this well is currently designated as the SWF well that pumps continuously to keep water moving through the treatment plant. No multiple iron and manganese samples were collected from this well because historic water quality monitoring at this location indicates relatively stable iron and manganese concentrations.

- All of the water pumped during the test was sent to the treatment plant with the exception of Well 16 which was pumped to waste. This resulted in minor ponding of water in the vicinity of Well 16, and rendered observation well OW-16B inaccessible because of high water. Consequently, OW-16B was not sampled for water quality parameters or monitored for water levels after the start of the pump test.

- Air-line gauges for Wells 14 and 15 became inoperable or provided suspect readings during the pump test; consequently, little to no pumping water level data were collected from these well locations.

- During the pump test, the oxidation/reduction (ORP) function on the YSI 3500 became inoperable; therefore, there are limited ORP data available for the pump test and final round of water quality sampling.

All data collected during the pump test are included in Appendix A (Background Data Evaluation/Compilation Summary).

E. MISCELLANEOUS ACTIVITIES

As part of the data collection task to support the development of the ground-water flow model, stream flow measurements were collected on October 18, 1995 from three locations:

- White Clay Creek tributary "Cool Run" - flow measured on the upstream side of the intersection of Cool Run with Rt. 273 at the Avon underpass;

- Christina River unnamed tributary in the vicinity of the Diamond State Industrial Park - flow measured approximately one quarter mile south of the intersection of Old Cooches Bridge Road and Bellevue Road at a location 100 feet north of the confluence of the tributary with the Christina River; and

- Christina River unnamed tributary located south and east of Well 16 - flow measured behind Iron Hill apartments located off Old Baltimore Pike. Actual location of measurement is approximately one-half mile south of the apartment complex where the electric powerline right-of-way crosses the tributary.

Flow measurements were obtained with a Swoffer Instruments, Inc. Model 2100 Current Velocity meter. The Model 2100 provides direct measurements in feet or meters per second, with a range of 0.1 to 25 feet per second. The measurement data are included in Appendix A (Background Data Evaluation/Compilation Summary).

LIST OF ATTACHMENTS

1. Freedom of Information Act (FOIA) Request to DNREC, dated September 14, 1995.
2. Tetra Tech Standard Operating Procedure - Ground-Water Sampling

TETRA TECH, INC.
56 WEST MAIN STREET
CHRISTIANA, DE 19702-1501
TELEPHONE (302) 738-7551

September 14, 1995
RCN 0441-01

Ms. Jenny Moen
Director's Office
DNREC
89 Kings Highway
P.O. Box 1401
Dover, DE 19903

Dear Ms. Moen:

SUBJECT: FOIA INFORMATION REQUEST

Tetra Tech is currently working with the city of Newark to develop an aquifer management plan for Newark's south well field. As part of the plan development we would like to collect any available information about water level, water quality, and pumping activities in the vicinity of the well field. We have identified 22 UST projects in the area for which this type of information may exist. Therefore, we would like to review the UST files for these sites. The attached list gives the project number, facility number, and project name for the sites.

If you have any questions please contact me or Tad Yancheski at (302) 738-7551.

Thank you,

Cheryl Ann Scanlon
Environmental Scientist

	Project Number	Facility Number	Project Name
1.	N8601005	3-000186	Chrysler Plant
2.	N9003011	3-000186	Chrysler Plant
3.	N9009072	3-000186	Chrysler Plant
4.	N8912278	3-000186	Chrysler Plant
5.	N8702016	3-000186	Chrysler Mopar
6.	N9310182	3-001452	DOT - K&S Garage
7.	N8806021	3-000083	Dupont Glascow
8.	N9304077	3-000347	Exxon 896
9.	N8506011	3-000332	Exxon Castle Mall
10.	N8501003	3-001499	Lawn Doctor
11.	N9006045	3-000360	Mobile Service Center
12.	N8907257	3-000302	Motor Lodge Gulf
13.	N8807023	3-000206	Godwins Shell
14.	N8804010	3-000208	Ogletown Shell
15.	N8903004	3-000419	Sunoco Elkton Road
16.	N203059	3-000777	Flapdoodles
17.	N9209231	3-000528	M&G Convoy
18.	N9309162	3-000528	M&G Convoy
19.	N8512026	3-001499	Public Well #15
20.	N9209220	3-000013	R&K Motors
21.	N9405113	3-000378	Texaco 896
22.	N9112312	3-000473	Wilson Beverage Co.

GROUND-WATER SAMPLING

A. PURPOSE/SCOPE:

To obtain representative ground-water samples from an aquifer.

B. EQUIPMENT/MATERIALS:

Submersible pump(s) of appropriate size (e.g., 2-inch Grundfos Rediflow pump and controller), teflon and stainless-steel bailers, generator, 5-gallon bucket, meters for water quality measurements, sample bottles and preservatives, bailing twine and rope, water level meters, filtration system with 0.45 um filters, pH paper, sample paperwork, copies of related SOPs (#101, 200 series, #402-406, #501, 507, and all relevant 600 series).

C. PROCEDURE:

1. Refer to the site Health and Safety Plan (HSP) before proceeding with any work. Describe all work in the Field Logbook (SOP#101).

2. The wells will be sampled from the least contaminated well to the most contaminated well.

3. Prior to sampling, all wells shall be measured for the presence of organic vapors per the site HSP. A Flame ionization detector (SOP#201) or a Photoionization Detector (PID; SOP#203 or 205) may be used. Any readings shall be noted in the field logbook, and activities shall proceed in accordance with the site HSP.

4. Using a clean, decontaminated measurement probe, determine the water level in the well (SOP#315); then calculate the fluid volume in the casing using the multiplier shown on the Well Sampling Log (attached) which corresponds to the well casing diameter.

5. Using a clean, decontaminated surface pump, submersible pump or stainless-steel bailer, remove water from (purge) the well until a minimum of three well volumes has been removed. It is important that during the lowering of the pump or bailer into the well, the pump tubing, electrical cords or rope do not come into contact with the ground. Equipment should be lowered into the well slowly and carefully so as to minimize aeration and aviod possible agitation of sediments in the bottom of the well.

   Measure the water level during purging to indicate well yield in relation to pruging pump rate. Measure the purging pump rate by directing the pump discharge into a bucket or container of known volume, and timing how long it takes to fill the container (e.g., 5 gallons in 30 seconds equals 10 gallons/minute). If the water level drops during purging, lower the pump deeper into the well, and note that the purge rate exceeds the well yield. If the water level remains unchanged during purging, raise and lower the pump throughout the well column to insure evacuation of the standing water column, and note that the well yield exceeds the purge rate.

During purging, field measurements of selected parameters are performed. Calibrate field equipment per SOP#207 and/or #209. Measure conductivity (SOP#404), pH (SOP#403), temperature (SOP#402) and oxidation/reduction potential (ORP; SOP#406) at the beginning and following the purging of each subsequent well volume until the measurements are stable (approximately +/-15% of the previous reading). All measurements may be made simultaneously using an in-line water quality system (SOP#207). The priority for stability is conductivity, pH, temperature and ORP, with any changes in water color, turbidity, or odor also being noted. If stability is not achieved, additional well volumes shall be purged, and readings collected, until stability is reached. As each well is purged, the data that are collected will be compared to the other wells on site and with historical data whenever possible.

If sampling is to be conducted using a bailer, refer to #6, 7, and 8 below. If sampling is to be conducted directly from a low-flow submersible pump, procede to #9.

6. Attach a new bailer line to a clean decontaminated stainless-steel bailer equipped with a single-check valve. Check the operation of the check valve assembly to confirm free operation.

7. Lower the single check valve bailer slowly into the well until it contacts the water surface. Then lower the bailer carefully to a level just below the water surface, minimizing the disturbance of the water to reduce aeration, loss of volatiles, and to avoid contacting the sediments at the bottom of the well. When filled with ground water, slowly raise the bailer to the surface. Discharge the first bailer to the ground.

8. Repeat step #7 to refill the bailer and raise it to the surface. Tip the bailer to allow the water to slowly discharge from the top and to flow gently down the side of the sample bottle with minimum entry turbulence and aeration.

9. Fill all appropriate sample bottles from the bailer or directly from the low-flow pump (refer to SOP#605 for sample volumes needed, appropriate bottleware, etc.). The first sample collected should be the sample portion that is to be analysed for volatile organic compounds, making absolutely certain that there are no bubbles adhering to the walls or the top of the sample container. Next collect the sample portions for the other organic analyses, if any. Then collect the sample for the inorganic parameter of cyanide. Finally, collect a sample for metals analysis. Sample containers must not be rinsed with sample water before final filling in case of possible presence of floating products in the well, which can adhere to the sample container wall and bias the analyses.

   All ground-water samples typically consist of a total metals portion and a dissolved metals portion. The portion for the dissolved metals analysis will be filtered in the field using 0.45-um acrylic copolymer filters in a prepackaged, disposable polypropylene in-line filter holder (Sample Pro assembly; Q.E.D. Environmental Systems, Inc.). The Grundfos pump (or other low-flow submersible pump) will be used to pump the ground-water through the in-line filter and into the sample container. To reduce the potential for redox reactions because of aeration, a very slow flow rate must be maintained (theoretically not to exceed 100 mL/minute). If sampling is being conducted using a bailer, a Q.E.D. filtration apparatus is filled with ground water, then pumped with a hand pump to slowly force the ground water through the filter assembly.

10. Ground water samples should then be preserved using the appropriate preservative (refer to SOP#607 for specific procedures). The samples for volatile organic compounds should be preserved with hydrochloric acid (HCl) to a pH of less than 2. The sample to be analyzed for cyanide should be preserved with several pellets of sodium hydroxide to a pH greater than 12. The samples to be analyzed for metals (both total and dissolved) should be preserved with nitric acid to a pH of less than 2; DO NOT ADD PRESERVATIVES PRIOR TO FILTRATION OF METALS SAMPLES!

11. After all sample containers are filled, recheck that the sample collected for the analysis of volatile organic compounds does not contain headspace or bubbles. If any air bubbles are present, the VOA sample must be recollected using a fresh sample container. All samples collected will be filled to the capacity required for analysis per SOP# 605.

12. Complete all sample labels and place the samples into a cooler with blue-ice or similar ice packs; maintain a sample temperature of 4 degrees C. Complete all relevant sample paperwork (tags, Chain-of-Custody form) per SOP#611-619 depending upon the required analyses.

13. Decontaminate all equipment (probes, beakers, bailers, pump, electrical cords, etc.) used during purging and sampling per SOP#501 and 507.

14. Once all samples have been collected, pack samples per SOP#621 for shipment to the laboratory for analysis.

D. QA/QC REQUIREMENTS:

Refer to SOP#609 for a discussion of required QA/QC samples and sampling procedures. Field check sample pH following preservation per SOP#608.

E. SPECIAL CONDITIONS:

Note that Steps #6-8 can be omitted if purging and sampling is being performed with a Grundfos Rediflow pump. In this case, after well purging is completed, reduce the discharge rate for the pump to approximately 40 ml/minute. Sampling can then proceed as described above.

E. REFERENCES:

Contract Laboratory Program Sampler's Guide (8/90); EPA Quality Assurance Directives; Air Force Center for Environmental Excellence (AFCEE) Handbook for the Installation Restoration Program (9/93).

TETRA TECH, INC. WELL SAMPLING LOG	SHEET: OF
PROJECT:	PROJECT NO:
WELL DESIGNATION:	DATE:
SAMPLE DESIGNATION:	ANALYSES:

VOLUME OF WATER TO BE REMOVED

(1) Depth to bottom of well (from TOC) ________ ft

(2) Depth to water (from TOC) ________ ft

(3) Column of water (#1 - #2) ________ ft

(4) Casing Diameter ________ in

(5) Volume Conversion (from table) ________ gal/ft

(6) Volume of Water (#3 x #5) ________ gal

(7) Number of volumes to be evacuated ________

(8) Total volume to be removed (#6 x #7) ________ gal

Method of purging (pump, bailer) ________

Purge Rate gpm

VOLUME CONVERSION:

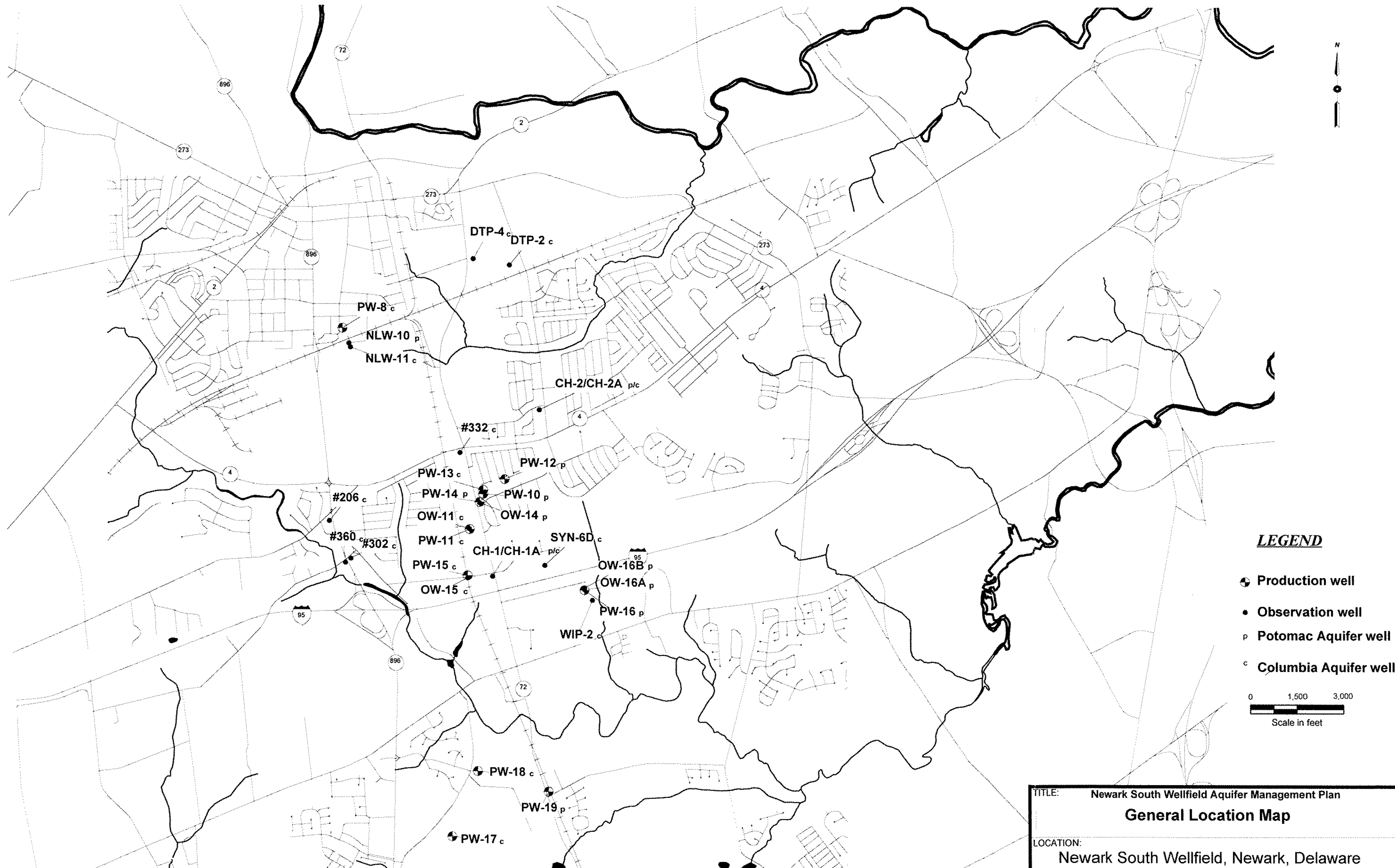
Casing Diameter	Gallons/Feet
2"	0.163
4"	0.653
6"	1.469
8"	2.611
10"	4.08

FIELD ANALYSES	START	FIRST	SECOND	THIRD	FOURTH
TIME					
ORP					
pH					
CONDUCTIVITY (SCALE ____)					
TEMPERATURE					
DESCRIPTION OF WATER					

TOTAL VOLUME PURGED: TIME:

NOTES:

LOGGED BY:



Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

p:\data-projects\newark\sitegis\report\figa1.wor

TITLE: Newark South Wellfield Aquifer Management Plan **General Location Map**			
LOCATION: Newark South Wellfield, Newark, Delaware			
TETRA TECH, INC.	CHECKED:	JJB	FIGURE: A.1
	DRAFTED:	STG	
	FILE:	FIGA1.WOR	
	DATE:	29-Dec-1995	

Appendix C
Ground-Water Model Study

APPENDIX C

South Wellfield Ground-Water Model Study

SOUTH WELLFIELD GROUND-WATER MODEL STUDY

A. INTRODUCTION

A groundwater flow model of the SWF and vicinity (see Figure C.1) was developed as part of the AMP. The reasons for constructing a groundwater flow model include the following:

- It improves the general understanding of the well field by requiring a conceptual model to be developed that describes major aquifer characteristics (parameter values, water budgets, etc.)
- It allows the conceptual model to be tested by transforming the conceptual model to a numerical model, and evaluating whether the numerical model adequately simulates observed water levels, gradients, aquifer discharges, etc.
- It provides a tool for evaluating groundwater flowlines, groundwater travel times, and well capture zones
- It provides a tool for evaluating safe yield of the aquifer, based on simulated drawdowns and water budgets

In this appendix, the hydrogeological framework and conceptual model for the SWF are presented, followed by details of model construction and model calibration. Then, analyses of well capture zones and aquifer safe yield are presented to support aspects of the AMP.

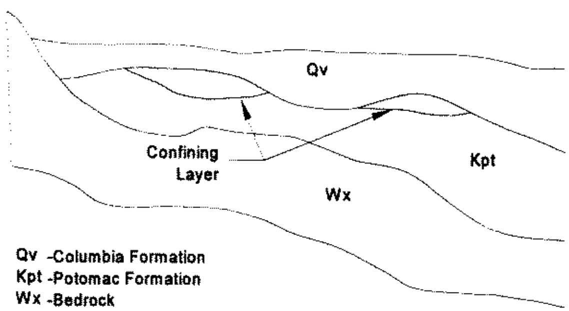
B. HYDROGEOLOGIC FRAMEWORK

B.1 Geology and Stratigraphy

The study area encompasses two distinct geologic provinces: the Appalachian Piedmont and the Atlantic Coastal Plain. The Appalachian Piedmont is characterized by very old metamorphic and igneous rocks of complex origin. The Coastal Plain is a wedge-shaped mass of sedimentary rock that overlies the Piedmont basement complex. The Coastal Plain is mainly composed of unconsolidated clays, silts, sands and gravels. The SWF well field is located in sediments of the Coastal Plain.

The crystalline rocks of the Piedmont underlie the entire region. A map illustrating the top elevation of the Piedmont rocks was presented in Figure A.4. The Piedmont rocks outcrop (little or no overlying sedimentary deposits) in the Iron and Chestnut Hill area, and in the White Clay Creek area, particularly north of the creek (see Figure A.5). In these areas, surface water features flow directly through the bedrock, which in many locations is highly weathered (Scott Andres, personal communication).

The Coastal Plain sediments that are tapped by wells of the SWF are absent in some portions of the study area and reach considerable thickness in other parts of the study area. Coastal Plain sediments in the study area are differentiated into two separate geologic formations: the Columbia Formation and the Potomac Formation, as illustrated on the following schematic:



Some wells in the SWF are screened in the Columbia and some wells in the SWF are screened in the Potomac.

The Potomac Formation is the oldest Coastal Plain unit found in the Newark area (Early to Late Cretaceous age). It consists of variegated red, gray, purple, yellow, and white, frequently lignitic silts and clays containing interbedded white, gray, and rust-brown quartz sand and gravel (Sundstrom and Pickett, 1971). The thickness of the Potomac Formation reaches several hundred feet in some areas of the study area. Layers of low-permeability clays are also present in this formation, though these beds or lenses are difficult to trace laterally between boreholes in some areas and do not exist at all in other locations. In some areas, the top of the Potomac consists of clay-silt deposits that act as confining beds. As illustrated on the schematic, these confining bed are of variable thickness and are entirely absent in some areas.

The Columbia Formation, which overlies the Potomac Formation in most of the greater Newark area, is Pleistocene in age. The Columbia Formation consists mainly of gravelly coarse and medium sands with some interbedded silts, and is fluvial in origin (Woodruff and Thompson, 1972). The thickness of the Columbia Formation varies from non-existent (in some areas around the Christina River and White Clay Creek) to more than 60 feet (previously presented in Figure A.4) . Note that the Columbia Aquifer represents that portion of the Columbia Formation that is saturated with water, such that the aquifer is less thick than the entire formation.

The Columbia aquifer forms the unconfined, local water-table aquifer overlying most of the region. It is of varying saturated thickness, and some areas have sufficient thickness and transmissivity to produce a well yield of hundreds of gallons per minute (GPM). The Potomac Formation aquifer has considerable saturated thickness in the South Well Field area and some wells screened in this unit are also capable of sustaining yields of hundreds of GPM. Near the study area, the Piedmont bedrock is also a water-bearing unit. North of White Clay Creek, municipal wells for the City of Newark are screened in the bedrock unit. A portion of the base flow to local surface water bodies, including White Clay Creek and the Christina River, is from flow through weathered portions of the bedrock (Scott Andres, personal communication).

A review of water level data indicates that flow is sometimes upward from the Potomac to the Columbia, and is sometimes downward from the Columbia to the Potomac. This is a probably the result of pumping patterns over space and time, and the presence or absence of the confining bed in specific areas.

B.2 Surface Water Features

Significant surface water features included in the groundwater flow model are illustrated in Figure C.2. The major surface water features in the SWF vicinity are the Christina River, White Clay Creek, and Cool Run. These are perennial streams that generally serve as points of groundwater discharge for the aquifer system. Other lesser creeks/streams were assigned names for the modeling study. As discussed later, some of these streams are perennial in nature, receiving base flow from groundwater discharge, while others only flow after storms due to overland flow and/or groundwater discharge resulting from a raised water table. A summary of streamflow data was provided in Appendix A, Attachment 7. The measurements made by Tetra Tech on three tributaries lead to the following estimated flow rates:

Cool Run at RT 73:	approx 1.39 cfs
South # 5 100 ft north of Christina River:	approx 0.68 cfs
South #4, ½ mile south of Iron Hill Apts:	approx 0.08 cfs

Long-term average daily flow of the Christina River near Cooches Bridge is approximately 28.6 cfs, and long-term average daily flow of White Clay Creek near Delaware Park Race Track is approximately 114.6 cfs. For the tributaries, all flow can be attributed to the SWF vicinity, whereas flow in the Christina River and White Clay Creek comes from upgradient basins as well as from the other side of the waterway.

B.3 Water Levels

The groundwater modeling utilized measured water levels at non-pumping wells, as detailed in Appendix A. This is because water level measurements at wells that are pumping are substantially impacted by well losses and do not reflect water levels in the aquifer adjacent to the well. Prior to this study, water levels were generally only measured at the pumping wells. Thus, the aquifer (non-pumping) water level data available for the modeling study are limited to the following times:

WELL	AQUIFER	TIME PERIOD
CH-1	Potomac	Aug-Nov, 1995
CH-1A	Columbia	Aug-Nov, 1995
CH-2	Potomac	Aug-Nov, 1995
CH-2A	Columbia	Aug-Nov, 1995
OW-11	Columbia	Aug-Nov, 1995
OW-14	Potomac	Aug-Nov, 1995
OW-15	Columbia	Aug-Nov, 1995
OW-16A	Potomac	Aug-Nov, 1995
OW-16B	Potomac	Aug-Nov, 1995
DTP-2	Columbia	Aug-Nov, 1995
DTP-4	Columbia	Aug-Nov, 1995
NLW-10	Potomac	Aug-Nov, 1995
NLW-11	Columbia	Aug-Nov, 1995
WIP-2	Columbia	Aug-Nov, 1995
SYN-6	Columbia	Aug-Nov, 1995
#206	Columbia	6/12/95
#302	Columbia	10/24/94
#332	Columbia	6/22/95
#360	Columbia	12/31/94

A printout of the water level database can be found in Appendix A, Attachment 6. Note that measuring point elevations, from which water elevations are calculated, have been estimated and not surveyed for most wells (i.e., there is uncertainty regarding the accuracy of the measuring point elevations).

In addition, the groundwater modeling utilized a water level contour map for 1958 ("pre-pumping") conditions, as drawn by Boggess and Adams (1963). Those water level contours were digitized into the GIS, and were presented as Figure A.2. Note on this figure that groundwater flow is generally towards the SWF from the northeast. Also note that there is a groundwater flow divide between the SWF and Cool Run, such that north of the divide groundwater flows towards Cool Run. Finally, when these contours are superimposed on topographic contours, it is observed that water levels generally coincide with topography at surface water features, indicating a good connection between the aquifer and the surface water features.

Finally, a water level contour map in the vicinity of the Chrysler plant was available, for the time period 1986-1987. This site, located north of Route 4 and west of Route 896, had water levels between 92 ft MSL and 85 ft MSL at that time.

B.4 Groundwater Pumpage

The South Well Field currently consists of nine production wells (PW-10 to PW-17 and PW-19). Wells PW-17 and PW-19 are located south of the Christina River. Wells PW-10, PW-12, PW-14, PW-16, and PW-19 are screened in the Potomac Formation and wells PW-11, PW-13, PW-15, and PW-17 are located in the Columbia Formation. DNREC allocation well rates for these wells are:

PW-10: 60 GPM
PW-11: 150 GPM
PW-12: 75 GPM
PW-13: 180 GPM
PW-14: 325 GPM
PW-15: 425 GPM
PW-16: 475 GPM
PW-17: 150 GPM
PW-19: 75 GPM

Details regarding historical pumping rates are provided in Appendix A. The well field operated continuously as a primary source of water supply for the City of Newark from the late 1960's through the end of 1992 when the White Clay Creek Water Treatment Plant came on line. The SWF currently operates as a secondary (backup) water supply source for the City of Newark. It is pumped infrequently to supplement other water supply sources. Wells in the Columbia aquifer are presently pumped more frequently than wells in the Potomac aquifer. Well 11 is pumped continuously to maintain pressure in the system and provide a consistent flow to the SWF chlorination plant. Other wells are pumped infrequently, with the exception of Wells 16 and 19, which have not been pumped for water supply purposes since the early 1990's.

During early September 1995, the SWF was pumped nearly continuously for a period of several weeks to provide additional water supply during a drought period, including Well 16 which was pumped to waste to supplement the surface water flow of the Christina River.

B.5 Hydraulic Properties

B.5.1 Net recharge

Net recharge to the aquifer system is derived from precipitation. Monthly rainfall data measured at the University of Delaware in Newark for a 30-year period (1965-1994) was presented in Attachment 1 of Appendix A. The average precipitation over this period is 43.07 inches per year. A significant amount of water is returned to the atmosphere through evapotranspiration. Overland flow is that portion of precipitation that travels directly to the drainage system of surface water bodies. The remaining precipitation infiltrates as net recharge to groundwater.

Previous estimates of net recharge in the Newark area are 7.2 in/yr (Duffield/CH2M Hill, 1994) and 11 to 15 in/yr (Cheng and Andres, 1994). For this study, net recharge was treated as a calibration parameter, using the previous estimates as guidance.

B.5.2 Hydraulic Conductivity/Transmissivity

Transmissivity calculated from pump tests in the Newark area were previously presented in Table A.2 of Appendix A. Of the six wells included in that table, four are Columbia wells (PW-11, PW-13, PW-17, PW-18) and two are Potomac wells (PW-12, PW-19). These limited measurements indicate the following transmissivity ranges:

Columbia:	2,900 to 85,000 gpd/ft
Potomac:	2,200 to 95,000 gpd/ft

Hydraulic conductivity is calculated as transmissivity divided by saturated thickness. Using these pump test results, and a typical value of saturated thickness as 30 feet for the Columbia and 100 feet for the Potomac, an approximate range of hydraulic conductivity for each aquifer is:

Columbia:	10 to 400 ft/day
Potomac:	3 to 127 ft/day

For the modeling, hydraulic conductivity in each aquifer was treated as a calibration parameter, using these pump test results as guidance.

B.5.3 Storage Coefficient

In confined aquifers, where pumped water is released from storage due to de-pressurization, storage coefficient is generally 0.005 to 0.00005 (Freeze and Cherry, 1979). In unconfined aquifers, where pumped water is obtained by actual de-watering of aquifer material, the storage coefficient is the specific yield, which is typically 0.01 to 0.30 (Freeze and Cherry, 1979). Storage coefficients calculated from pump tests in the Newark area were previously presented in Table A.2 of Appendix A. Of the four wells with storage coefficient estimated in that table, three are Columbia wells (PW-11, PW-13, PW-17) and one is a Potomac well (PW-12). These limited measurements indicate the following storage coefficient ranges:

Columbia:	0.001 to 0.030
Potomac:	0.045

In general, it is expected that shallow portions of the Columbia formation will have higher storage coefficients, and deeper portions of the Columbia will have intermediate storage coefficients. It is expected that portions of the Potomac where the confining bed is absent will have intermediate values of storage coefficient, and portions of the Potomac where the confining bed is significant will have low values of storage coefficient.

C. CONCEPTUAL MODEL OF GROUNDWATER FLOW

The development of a conceptual model of the Newark South Well Field is a critical step in the accurate representation of groundwater flow using a numerical model. The conceptual model is based on a review of regional and site-specific hydrology and geology, water levels, pumping and precipitation data, and water budget analysis. A summary of the conceptual model for groundwater flow near the SWF is presented below:

- There are three primary geologic units capable of storing and transmitting water. These are the Columbia Formation, the Potomac Formation, and the crystalline bedrock. In some areas the bedrock is highly weathered and is capable of transmitting appreciable amounts of water. This is evidenced in the White Clay Creek area where the Potomac Formation pinches out and where the Columbia Formation is very thin or non-existent. Here groundwater discharges to the creek through the weathered crystalline bedrock.

- The aquifers are of varying thickness and elevation in the study area. The Columbia Formation ranges from zero to more than 60 feet thick. It is thin or absent in some areas near White Clay Creek and the Christina River. The Columbia Aquifer represents the saturated portion of the Columbia Formation. The Potomac Formation reaches considerable thickness in the South Well Field area but pinches out along the Fall line just south of White Clay Creek and also in the vicinity of Iron and Chestnut Hill. In these areas, the Pleistocene sediments of the Columbia Formation, if present, overlie the weathered crystalline bedrock.

- Groundwater in the Columbia aquifer is recharged via infiltration from precipitation. Without pumping, the Potomac aquifer is probably recharged by vertical leakage from the Columbia aquifer, except near streams. In some areas of the Potomac Formation, there are confining units of low-permeability clays and silts. Flow is generally horizontal in the aquifers and vertical within the confining beds because of the contrast in the hydraulic conductivities of the two units.

- Rivers and streams in the area are hydraulically well connected to the water table. These water bodies receive a significant portion of their baseflow from aquifer discharge. Many of the surface water features are known or assumed to be perennial, including White Clay Creek, the Christina River, Cool Run, South #1, and South #4 (see Figure C.2 for locations). The other surface water features (North #1, South #2, South #3, and South #5) are assumed to only flow significantly when they receive overland flow after storms or when they receive aquifer discharge due to occasional rises in the water table.

- Groundwater flow is assumed not to cross the Christina River and White Clay Creek, such that groundwater discharges to these creeks from both sides.

- Without municipal pumping, the aquifer water budget is generally reduced to inflow from net recharge and outflow to streams as baseflow. Without municipal pumping, groundwater flow is generally towards the SWF from the northeast, and there is a groundwater flow divide between the SWF and Cool Run, such that north of the divide groundwater flows towards Cool Run.

- When municipal water supply wells operate, they intercept some of the water that otherwise discharges to streams. The pumping results in changes to water levels and flow directions in the vicinity of the wells, and probably affects the location of the flow divide between the SWF and Cool Run. Flow can be upward or downward between the Columbia and the Potomac, depending on pumping.

D. GROUNDWATER MODEL CONSTRUCTION AND INPUT

D.1 Modeling Approach

The goal of the groundwater flow model is to reasonably represent stratigraphy and parameter values (hydraulic conductivity, recharge) such that observed water levels and flow patterns can be simulated. Because of the complex nature of the system (varying aquifer thicknesses, surface water bodies, etc.) a numerical groundwater flow model is required. However, a "simplest is best" approach is employed, such that simple assignments of parameter values are preferred over complex assignments if they yield reasonable results.

The model is calibrated to a stressed (pumping) condition in early September 1995. This is a time period for which aquifer water levels are available and when substantial pumping had occurred for several weeks, allowing a steady-state approximation to be employed (steady-state implies that the system is not changing with respect to time). The calibrated model is then tested against the observed pre-pumping water levels by shutting all wells off. The calibrated model is also tested against the data collected during the pump test conducted as part of this study. Because this last analysis is a transient analysis (water levels are changing with respect to time) storage coefficients must be assigned. Finally, a sensitivity analysis is performed to assess the sensitivity of model results to changes in key model parameter values.

Once the model is calibrated, it can be used in a predictive mode to assess drawdowns, capture zones, and reductions to stream baseflow that result from specified pumping scenarios. Capture zone analysis utilizes the groundwater flow model in conjunction with a particle tracking code, to trace the pathlines of particles as the flow in the groundwater system.

D.2 Code Selection

MODFLOW (McDonald and Harbaugh, 1988) was used to perform all groundwater flow simulations. MODFLOW is the U.S. Geological Survey modular three-dimensional groundwater flow code. MODFLOW is widely used, well tested, extensively documented, and publicly available. MODFLOW version PC/EXT 1.3, obtained from the International Ground Water Model Center, and compiled with a Lahey FORTRAN compiler, was utilized in this study.

MODFLOW input was created using the ModelGIS software created by GeoTrans, Inc. This software allows stratigraphic data (elevations, thicknesses) to be represented as surfaces that are automatically interpolated onto model grid centers. It allows parameter zones stored as polygons to be automatically assigned to model grid centers. It allows the VCONT parameter representing vertical leakance between model layers to be automatically calculated. It also allows interpolation of stages along arcs representing streams, and allows actual length of water features in cells to be utilized when calculating conductance.

Particle tracking, which is utilized for capture zone analyses, is performed with the MODPATH Version 3.0 (Pollack, 1993) software, compiled with a Lahey FORTRAN compiler. This is the U.S. Geological Survey particle tracking code, intended for use with MODFLOW.

To analyze subregional water budgets for the safe yield analysis, we utilized ZONEBUDGET (Harbaugh, 1990), compiled with a Lahey FORTRAN compiler. This is a U.S. Geological Survey code intended for calculating sub-regional water budgets based on MODFLOW results.

D.3 Model Grid

The model grid pertains to both the areal discretization and the horizontal discretization. Each is described below.

D.3.1 Areal grid discretization

The model grid is illustrated on Figure C.3. The SWF area is discretized into 149 rows and 131 columns. The grid extends 28,900 feet in the X (horizontal) direction and 25,400 feet in the Y (vertical) direction. The maximum grid spacing used in the model is 500 feet; the minimum grid spacing is 15 feet. The fine discreitization in the area of the well field allows for accurate representation of drawdown due to pumping. Figure C.4 shows a zoom-in of the grid near the wells, illustrating the relationship between pumping wells and observation wells. The grid was designed such that grid block centers reasonably represent pumping and observation wells. The lower left hand corner of the grid, in Delaware State Coordinates (NAD 1927), is at coordinate (398948, 594229). The grid is not rotated relative to north-south-east-west in state plane coordinates

D.3.2 Vertical grid discretization and layer types

The Columbia and Potomac aquifers are explicitly represented with model layers. Model layer 1 represents the Columbia aquifer, and model layer 2 represents the Potomac aquifer, except where the Potomac aquifer is absent, in which case layer 2 represents the upper weathered portion of the crystalline bedrock. The pumping and observation wells in the South Well Field area are screened and draw water from the Columbia and Potomac aquifers only, so they are the primary units of concern for this model. Any significant flow occurring in the bedrock can be conceptualized as occurring in layer 2 of the model (i.e., if the Potomac is present, the upper portion of bedrock is lumped with the Potomac).

Layers 1 and 2 in the model are both modeled as confined aquifers (LAYCON = 0). This approach was utilized because preliminary simulations with layer 1 simulated as an unconfined layer suffered from numerous "dry nodes". For unconfined model layers, the model reads bottom elevation and hydraulic conductivity as input. If the simulated water level falls below the bottom elevation, the cell goes "dry". Because the bottom elevation of the Columbia is based on sparse data (particularly away from the well field) and is not known with great accuracy, dry nodes were probably a result of imprecise specification of bottom elevation and not due to actual dewatering of the Columbia. This problem was alleviated by specifying layer 1 as confined. For this type of layer the model reads transmissivity as input. Transmissivity was calculated by multiplying approximate Columbia aquifer thickness by hydraulic conductivity, and assigning the resulting transmissivity in the model. The model does not read a bottom elevation, and therefore never indicates dry nodes. Although the Columbia aquifer is actually unconfined (such that transmissivity in reality is a function of saturated thickness that can change due to pumping), the approximation of a confined aquifer is reasonable as long as drawdown is small relative to saturated thickness, which is generally true in the Columbia. In fact, uncertainty in the hydraulic conductivity parameter is as great or greater than any uncertainty in the saturated thickness. Given the objectives of this model, and the uncertainty in bottom elevations of the Columbia and resulting dry node problem, this commonly utilized approach was the most reasonable alternative.

The confining bed, where present, is not simulated as a model layer. Instead, the properties of the confining bed are included in the VCONT parameter, which represents resistance to flow between model layers. This is known as a "quasi-3D" approach.

Because both model layers are simulated as confined layers, bottom and top elevations are not explicitly input into the model. Instead, thicknesses of model layers are lumped in the transmissivity parameter for each layer, and thickness of the confining bed (where present) is lumped in the VCONT parameter. Therefore, the thicknesses utilized are discussed under "Hydraulic Properties".

D.4 Hydraulic Properties

Hydraulic properties assigned in the model are net recharge, transmissivity of each layer, and VCONT between model layers. When transient simulations are performed, storage coefficient must also be assigned. All length units are specified in feet, and all time units are specified in days.

As discussed previously, net recharge was treated as a calibration parameter in the model. This means the value of this parameter was varied to improve the match between simulated and observed water levels.

Transmissivity of model layer 1 was assigned as Columbia aquifer thickness (which was specified for each grid cell) multiplied by hydraulic conductivity, which was treated as a calibration parameter. The thickness of the Columbia aquifer was obtained by multiplying the thickness of the Columbia Formation by a factor of 0.75, to approximate the saturated thickness. The saturated thickness as represented in the model is presented in Figure C.5. This was developed using the contours from Woodruff and Thompson (1972) previously presented as Figure A.4, supplemented with control points in areas beyond those contours but within the model area. The control points were assigned thickness of 3.75 ft (approximately 5 ft of Columbia multiplied by 0.75). In areas where Columbia aquifer thickness was less than 3.75 feet, a thickness of 3.75 feet was used (conceptualized as flow through Potomac or weathered bedrock)

Transmissivity of model layer 2 was assigned as Potomac/Bedrock aquifer thickness (which was specified for each grid cell) multiplied by hydraulic conductivity, which was treated as a calibration parameter. The thickness of layer 2 as represented in the model is presented in Figure C.6. This was generated using approximate thickness of Potomac at points obtained from cross-sections, supplemented by control points added near the model boundary. The control points were set such that thickness of the Potomac aquifer was approximately 20 feet thick to the west, north, and south, and gradually thickening to the east. In areas where the Potomac is absent, a 20 foot thickness was used for the weathered bedrock. These areas are a good distance from the wells, such that uncertainties with the thickness or hydraulic conductivity of the weathered bedrock do not significantly impact simulations of pumping scenarios.

VCONT between model layer 1 and model layer 2 was calculated as suggested in the MODFLOW documentation for cases with a "quasi-3D" confining bed. This approach utilizes the following:

- Kv (vertical hydraulic conductivity) of layer 1, and half-thickness of layer 1
- Kv of confining bed, and thickness of confining bed
- Kv of layer 2, and half-thickness of layer 2

This lumped parameter is calculated as the harmonic mean of leakance, using these parameters. The half thicknesses of the two aquifers were calculated by multiplying aquifer thickness by 0.5. The Kv of the aquifers was calculated by multiplying the horizontal hydraulic conductivity (Kh) of each aquifer (itself a calibration parameter) by a factor. The ratio of Kh:Kv represents an anisotropy due to depositional history that generally yields more resistance to flow in the vertical than in the horizontal. This ratio is typically between 10:1 and 100:1 in sediments. The ratio was treated as a calibration parameter in the model. The thickness of the confining bed as represented in the model is presented in Figure C.7. This was generated using approximate thickness of the confining bed obtained from cross-sections, supplemented by control points added near the model boundary. The control points were set such that thickness of the confining bed was approximately 5 feet in areas with no data. Note that there are regions in the vicinity of the well field where no confining bed is assigned in the model, based on the cross-sections. Finally, the Kv of the confining bed was treated as a calibration parameter.

For transient simulations of the pump test, uniform values of storage coefficient were assigned for each model layer. Several simulations were performed with different values for each model layer, to assess the sensitivity to this parameter.

D.5 Boundary Conditions

Boundary conditions utilized in this model are no-flow (inactive) boundaries, rivers, drains, and wells. These boundary specifications are presented in Figure C.8. The inactive areas are the same in layers 1 and 2 (as described previously, where the Columbia pinches out layer 1 is assumed to represent Potomac and/or bedrock, and where the Potomac pinches out layer 2 is assumed to represent bedrock, such that the layers are not made inactive because a unit pinches out). An implicit no flow boundary is assigned along the model edge, if no other boundary is specified. All rivers and drains are assigned in layer 1. Although in some places the waterways may actually be connected to the Potomac and/or bedrock, this simplified layer specification is adequate given the objectives of this model. During model calibration and sensitivity analysis (discussed later), river conductance was varied to assess the significance of reduced connection due to flow to the rivers through bedrock.

No flow boundaries indicate that no flow crosses the boundary. Areas on the opposite side of the Christina River and White Clay Creek are considered inactive because the rivers are conceptualized as a point of discharge from both sides (such that groundwater flow does not cross these streams). The model was made large enough such that drawdown at implicit no-flow boundaries to the west, northwest, and east do not impact simulation results near the SWF (there is little simulated drawdown at these boundaries due to pumping).

River stages and drain elevations were assigned based on estimated topographic elevations. Widths of rivers and drains, used for calculating conductance, were assigned as follows:

Christina River:	20 feet
White Clay Creek:	30 feet
Others:	10 feet

For rivers, bottom elevation was estimated as stage minus 5 feet. For rivers and drains, the conductance was calculated as suggested in the MODFLOW documentation:

conductance = length * width * K/b

where K is the hydraulic conductivity of the streambed sediments and b is the thickness of the streambed sediments. The ratio K/b was treated as a calibration parameter, which was multiplied by the length of the water feature in each cell and the width of the water feature.

Wells were assigned pumping rates depending on the scenario being simulated. In MODFLOW, pumping wells are assigned a negative rate. Note that wells PW-17 and PW-19 are outside of the active model area, and cannot be evaluated with this model.

E MODEL CALIBRATION ASSESSMENT

The goal of model calibration is to determine values for model parameters such that simulation results reasonably match observed conditions. For this model, several types of observations were utilized:

- Measured aquifer water levels in early September 1995
- The 1958 "pre-pumping" water level surface provided by Boggess and Adams, 1963
- Drawdowns observed during a multi-well pump test in November 1995

The primary calibration was performed for the period of early September 1995. For that time period aquifer water levels are available and substantial pumping had occurred for several weeks. It was important to utilize a stressed (i.e. pumping) condition for model calibration, such that drawdowns due to pumping could be assessed against measured values. It was important to utilize a case where pumpage had occurred for some time, such that long-term drawdowns could be assessed. The water level data measured during the pump test indicate that water levels were still declining after four days of pumping, which indicates it takes longer than four days of pumping to reach steady state.

A steady-state approximation was utilized for this time period. This implies that the system (pumping rates, water levels) is not changing with respect to time. Although it is known that some wells were turned on and off during this period, and that water levels were not exactly constant, this period offers the most uniform set of pumping rates and aquifer water levels for model calibration. As stated earlier, prior to this study aquifer water levels are generally not available (only pumping well levels are available). A complete list of pumping rates and water levels is included in Attachment 4 of Appendix A.

Representative pumping rates for early September 1995 utilized for the calibration are:

WELL	RATE (GPM)
PW-10	0
PW-11	106
PW-12	60
PW-13	160
PW-14	220
PW-15	370
PW-16	150

The rate for PW-16 is estimated at 150 GPM because water levels measured at OW-16a and OW-16b are consistent with some pumpage, but not pumpage at historical rates (which are up to approximately 475 GPM). This well was reported to be pumping to waste at times during this time period.

As with pumping rates, representative aquifer water levels were assigned for this time period, as presented in Table C.1. As noted on the table, the four UST sites have only one water level measurement, and that measurement does not pertain to the calibration period. These water levels were nevertheless included in the model calibration because they added water level data in regions that otherwise had no observed water levels.

The calibrated hydraulic conductivities in the model have a limited zonation that is presented on Figure C.9. The hydraulic conductivity for most of layer 1 is 100 ft/day. The layer 1 zonation (K=400 ft/day) was added to reduce drawdowns in the vicinity of OW-11, OW-15, and CH-1, where water levels were otherwise simulated too low. The shape of this zone is somewhat arbitrary, but it coincides with the thickest portions of the Columbia Formation that may have been deposited by an ancient paleochannel (see high Columbia thickness region near the SWF on Figure A.4, and corresponding absence of confining bed in the same area on Figure C.1, suggesting a channel that incised the Potomac). High conductivity gravel zones might be associated with such channel deposits. The hydraulic conductivity for most of layer 2 is 15 ft/day. The zonation in layer 2 (K = 5 ft/day) was based on areas where the Potomac is absent (see Figure A.3), and flow is through weathered bedrock. All hydraulic conductivities are within the ranges suggested by past pump test results, described earlier.

Riverbed sediment leakance (K/b) was generally assigned as 1.0 per day for rivers and drains. This would correspond to a sediment K of 1 ft/day and a thickness of 1 foot, for example. This leakance was multiplied by river/drain length and width to calculate conductance. The approximate hydraulic conductivity incorporated in the leakance is less than the aquifer hydraulic conductivity, but is sufficient to provide a strong connection between the aquifer and the waterways (as was observed on the 1958 "pre-pumping" water level map described earlier). In one location, along the Christina River near Iron Hill and Chestnut Hill (columns 7 thru 17 in the model), the riverbed leakance was reduced by two orders of magnitude. In this area the river runs through bedrock, and connection of water from the sediments to the Christina River may be reduced. Without this zonation, water levels at UST sites #206, #302, and #360 were all simulated significantly too low. It is anticipated that a similar reduced connection may exist in other areas where waterways flow through bedrock, though additional zonation was not added in the model.

The calibrated value for net recharge is 12 in/yr. This value is reasonable with respect to past estimates, and with respect to the annual precipitation rate (43.07 in/yr). This calculates to net recharge as 27.9 percent of precipitation.

Calibrated water levels for the modeled area are presented in Figure C.10 (layer 1) and Figure C.11 (layer 2). Note that the resolution of the uniform grid utilized to generate these surfaces is intended to illustrated regional water levels. The uniform grid for contouring is not as fine as the model grid spacing near the wells due to technical limitations, such that near-well water levels are not illustrated with sufficient detail. A detailed and precise summary of observed versus simulated water levels, both regionally and near wells, is presented in Table C.2 Calibration residuals indicate the difference between observed and simulated head. A positive residual means the simulated head is too low, and a negative residual means the simulated heads is too high.

General "rule-of-thumb" goals for model residuals are: that they be distributed roughly even between simulated too high and too low; that mean residual be close to zero; and that mean absolute value of residuals be within 10 percent of observed water level variation. For this model, there are 19 observations, of which 9 are simulated too low and 10 are simulated too high. The mean residual is -0.332 feet (negative indicates simulated too high). The water level variation based on the observed water levels is approximately 50 feet, and the mean of absolute values of residuals is 2.45

feet, which is well within the 10 percent rule of thumb. Note that some of the larger residuals occur at the UST sites. Water levels were not available at these sites during the calibration period. Also note that measuring elevations for many of these wells are uncertain within several feet, as discussed previously. Finally, note that simulated water levels in the vicinity of the Chrysler Plant are similar to those described previously for 1986-1987 (approximately 92 to 85 feet MSL).

A plot of simulated versus observed heads is presented in Figure C.12. If the model was a perfect simulator, all points would fall along the 45-degree line where simulated water level equals observed water level. Note the residuals increase as observed water level increases. The lower observed water levels (and lower residuals) correspond to the immediate vicinity of the SWF, while higher water levels correspond to areas farther away. Again note that residuals are generally distributed evenly on both sides of the 45-degree line.

Resulting net discharges from the modeled area to rivers and drains for the calibrated model (which incorporates the representative September 1995 pumping rates) are:

Christina River:	5.76 cfs (river package)
White Clay Creek:	4.71 cfs (river package)
Cool Run:	1.88 cfs (river package)
South #1:	2.06 cfs (river package)
South #2:	0.03 cfs (drain package)
South #3:	0.20 cfs (drain package)
South #4:	0.45 cfs (river package)
South #5:	0.00 cfs (drain package)
North #1:	0.34 cfs (drain package)

These values seem very reasonable compared to the approximate discharges calculated for October 18, 1995 for Cool Run (1.39 cfs), South #4 (0.68 cfs), and South #5 (0.08 cfs). The rates that discharge into the Christina River and White Clay Creek from the modeled area (directly and from tributaries) also seem reasonable with respect to their average daily flows discussed earlier (28.6 cfs for the Christina River and 114.6 cfs for White Clay Creek), which includes water from upstream and from the other side of the waterway.

Although the model was primarily calibrated based on pumping and water levels in early September 1995, an additional simulation was performed with no pumping. The resulting model-wide water levels are presented in Figure C.13 (layer 1) and C.14 (layer 2). The layer 1 water levels can be compared to the "pre-pumping" water level surface for 1958 (see Figure A.2). The general features of that water level contour map are reproduced. This includes the bending of contours near specific waterways, the location of the flow divide between the SWF and Cool Run, and general patterns of water levels, flow directions and gradients. In this simulation flow is generally downward from layer 1 to layer 2, except near points of discharge, as would be expected.

A series of informal simulations was performed to assess potential ranges of storage coefficient, based on observed drawdowns during a four-day pump test conducted in November 1995. The results of these simulations are briefly described below.

The following combinations of storage coefficient were assigned layer-wide:

Layer 1	Layer 2
0.20	0.001
0.01	0.001
0.01	0.05
0.05	0.001
0.05	0.00001

The following representative well rates for the pump test were utilized:

WELL	RATE (GPM)
PW-10	0
PW-11	106
PW-12	0
PW-13	160
PW-14	250
PW-15	380
PW-16	290

In general, the higher the value of storage coefficient, the faster the drawdown response. None of the combinations of layer-wide storage coefficients predicted all short-term drawdowns adequately, though all short-term drawdowns were adequately represented by one or more storage coefficient combinations (with the exception of short-term drawdown observed at well PW-12, which was significantly greater during the pump test than simulated by the model, and OW-14, which was significantly less during the pump test than simulated by the model). These results suggest that the storage coefficient probably varies within each aquifer, as discussed earlier, based on the screen interval of the well and the presence of the confining bed. Because the model is generally intended to predict long-term (steady-state) responses, no further simulations with storage coefficient zones were attempted. The higher-than-simulated short-term drawdown at well PW-12 (probably a result of pumping from well PW-14) may indicate a zone of enhanced connection between the two wells. The lower-than-simulated short-term drawdown at OW-14 may result from the fact that OW-14 is screened significantly higher than PW-14, and intervening silts/clays may delay the drawdown response (note that long-term water levels at OW-14 do indicate a drawdown response to pumping, and the steady-state calibrated model predicts this quite accurately).

F. SENSITIVITY ANALYSIS

Key parameters assigned in the model were systematically varied to assess the sensitivity of the model to different values of these parameters. Table C.3 summarizes the results of the sensitivity analysis. Important considerations in evaluating the model sensitivity is change in the mean of residuals (indicating a bias towards model over prediction or under prediction) and change in the absolute value of residuals (indicating deviation from observed conditions).

The model is sensitive to changes in net recharge, based on changes in the mean of residuals. The model is more sensitive to a decrease in river conductance than an increase in river conductance. This is because the calibrated model already has a relatively high river conductance to represent good connection between the aquifer and the waterways, and making it higher only changes simulation results slightly. The model is sensitive to changes in layer 1 transmissivity. Increasing the transmissivity yields statistics generally comparable to the calibrated model, except that there is a bias towards simulating water levels too low. Removing the high-K zone in layer 1 affects the vicinity of OW-15, OW-11, and CH-1A the most. As expected, without the high-K zone there is too much drawdown in this vicinity, and simulated heads are too low. The model is very sensitive to changes in layer 2 transmissivity, particularly near the pumping wells (OW-14, OW-16A, OW-16B). The model is somewhat sensitive to changes in the Kv of the confining bed, and not sensitive to changes in the ratio of Kh to Kv in the aquifers.

G. CAPTURE ZONE ANALYSIS

Two different capture zone analyses were performed to support the AMP. The first was to determine the recharge area for each well, assuming the well pumps alone and continuously. A steady-state flow simulation is performed for each well, pumping individually, at its DNREC allocation rate. Particles are then released at the water table (top of layer 1), and tracked towards the well. Particles that reach the well from the water table in 3 months, 1 year, 3 years, and 5 years are presented for in Figures C.15 to C.19. As expected, since particles are released at the top of the water table, it takes more time for particles to reach Potomac wells, so their 5-year capture zones are smaller. The longest capture zone is for well PW-15, which pumps at a high rate and is located in an area of high hydraulic conductivity. Note that no plots are made for wells PW-10 and PW-12, because no particles reach those wells from the top of the water table within 5 years. Also, no plots are made for wells PW-17 and PW-19 because they are outside of the active model area.

The second capture zone analysis is for all wells pumping at their allocation rate. Particles were started in each cell, in the middle of layer 1 and the middle of layer 2, and tracked towards the well field. Particles that reach a well within 5 years were then plotted, to represent 5-year capture zones. Figure C.20 shows the layer 1 capture zone for each well (particles starting in the middle of layer 1), and Figure C.21 shows the layer 2 capture zone for each well (particles starting in the middle of layer 2). Note that some Columbia wells capture water from the Potomac, and some Potomac wells capture water from the Columbia.

H. SAFE YIELD ANALYSIS

An analysis was performed to determine how base flow to streams is affected by pumping at the SWF. The comparison is between the case with no wells pumping (the "pre-pumping" case) and with all wells in the model area pumping at their allocation rate (the "allocation rate" case). Simulated water levels for the allocation rate case are presented in Figure C.23 (layer 1) and C.24 (layer 2).

The model area was divided into three separate basins based on surface water drainage in the pre-pumping case. These zones are illustrated in Figure C.22 Area 1 is the main SWF area draining to the Christina River in the western and southern portion of the model area (approximately 6.1 square miles). Area 2 is the area draining to White Clay Creek in the northern portion of the model area (approximately 8.8 square miles). Area 3 is the area predominantly outside of the SWF draining to the Christina River in the eastern portion of the model area (approximately 5.2 square miles).

Using the ZONE-BUDGET application, the model calculated that during an average water year (i.e. 12 inches of recharge) under steady state pre-pumping conditions, Areas 1 and 3 contribute 5.2 cfs, and 5.1 cfs, respectively, or a total of 10.3 cfs from groundwater discharge to the baseflow of the Christina River, whereas Area 2 contributes 7.5 cfs from ground-water discharge to White Clay Creek.

Under steady-state maximum allocated pumping conditions (i.e. all wells [with the exception of wells 17 and 19 which are not in the model area] during an average water year, the model calculated that areas 1 and 3 contribute only 2.9 cfs and 4.7 cfs, respectively, or a total of 7.6 cfs from ground-water discharge to the Christina River, whereas Area 2 contributes only 6.4 cfs from ground-water discharge to the White Clay Creek.

This exercise indicates that under maximum pumping conditions, the influence of the SWF extends into the White Clay Creek drainage basin, which results in a reduction of ground-water discharge from Area 2 by 1.1 cfs, or nearly 15%. Most of this reduction is expected to be realized in the Cool Run drainage feature, due to movement (and compromise) of the groundwater divide between the SWF and Cool Run. Simulated layer 1 water levels for the allocation pumping rate case presented in Figure C.23 can be compared to the simulated layer 1 water levels for the pre-pumping case previously presented in Figure C.13. In addition, under allocated pumping rates, the ground-water contribution to baseflow of the Christina River is reduced by a total of 2.7 cfs (26% reduction), of which 2.3 cfs is from Area 1 (45% reduction) and 0.4 cfs is from Area 3 (8% reduction).

Table C.1 Representative water levels for early September, 1995.

Well	Layer	Row	Column	Observed Head
OW-11	1	82	38	56.000
OW-15	1	110	35	48.500
CH-1A	1	108	58	52.500
CH-2A	1	39	81	63.000
DTP-2	1	23	71	78.000
DTP-4	1	22	42	90.800
NLW-11	1	32	15	88.500
WIP-2	1	128	100	49.000
SYN-6D	1	101	82	58.000
#206	1	76	14	79.500
#302	1	99	15	67.000
#332	1	43	29	70.000
#360	1	100	15	60.500
OW-14	2	67	46	41.000
OW-16A	2	119	96	40.000
OW-16B	2	117	96	40.000
CH-1	2	108	58	52.000
CH-2	2	39	81	59.000
NLW-10	2	31	15	88.500

Notes:

(1) Observed head is a representative value for early September, 1995, based on measured water levels with the exception of the four UST sites (#206, #302, #332, #360) which had one water level each for an earlier time period (see Appendix A for complete water level listing)

Table C.2 Statistics for calibrated flow model.

Well	Layer	Row	Column	Observed Head	Calibration Head	Calibration Residual
OW-11	1	82	38	56.000	53.665	2.335
OW-15	1	110	35	48.500	50.651	-2.151
CH-1A	1	108	58	52.500	52.325	0.175
CH-2A	1	39	81	63.000	66.428	-3.428
DTP-2	1	23	71	78.000	81.292	-3.292
DTP-4	1	22	42	90.800	85.115	5.685
NLW-11	1	32	15	88.500	93.384	-4.884
WIP-2	1	128	100	49.000	48.274	0.726
SYN-6D	1	101	82	58.000	54.357	3.643
#206	1	76	14	79.500	77.094	2.406
#302	1	99	15	67.000	69.714	-2.714
#332	1	43	29	70.000	66.335	3.665
#360	1	100	15	60.500	69.141	-8.641
OW-14	2	67	46	41.000	42.093	-1.093
OW-16A	2	119	96	40.000	38.630	1.370
OW-16B	2	117	96	40.000	41.352	-1.352
CH-1	2	108	58	52.000	51.845	0.155
CH-2	2	39	81	59.000	65.158	-6.158
NLW-10	2	31	15	88.500	90.116	-1.616
					Sum of residuals	-6.301
					Mean of residuals	-0.332
					Sum of absolute value of residuals	46.623
					Mean of absolute values	2.454

Notes:

(1) Residual is calculated as observed minus simulated head. A positive residual means modeled too low. A negative residual means modeled too high.

(2) Observed head is a representative value for early September, 1995, based on measured water levels with the exception of the four UST sites (#206, #302, #332, #360) which had one water level each for an earlier time period (see Appendix A for complete water level listing)

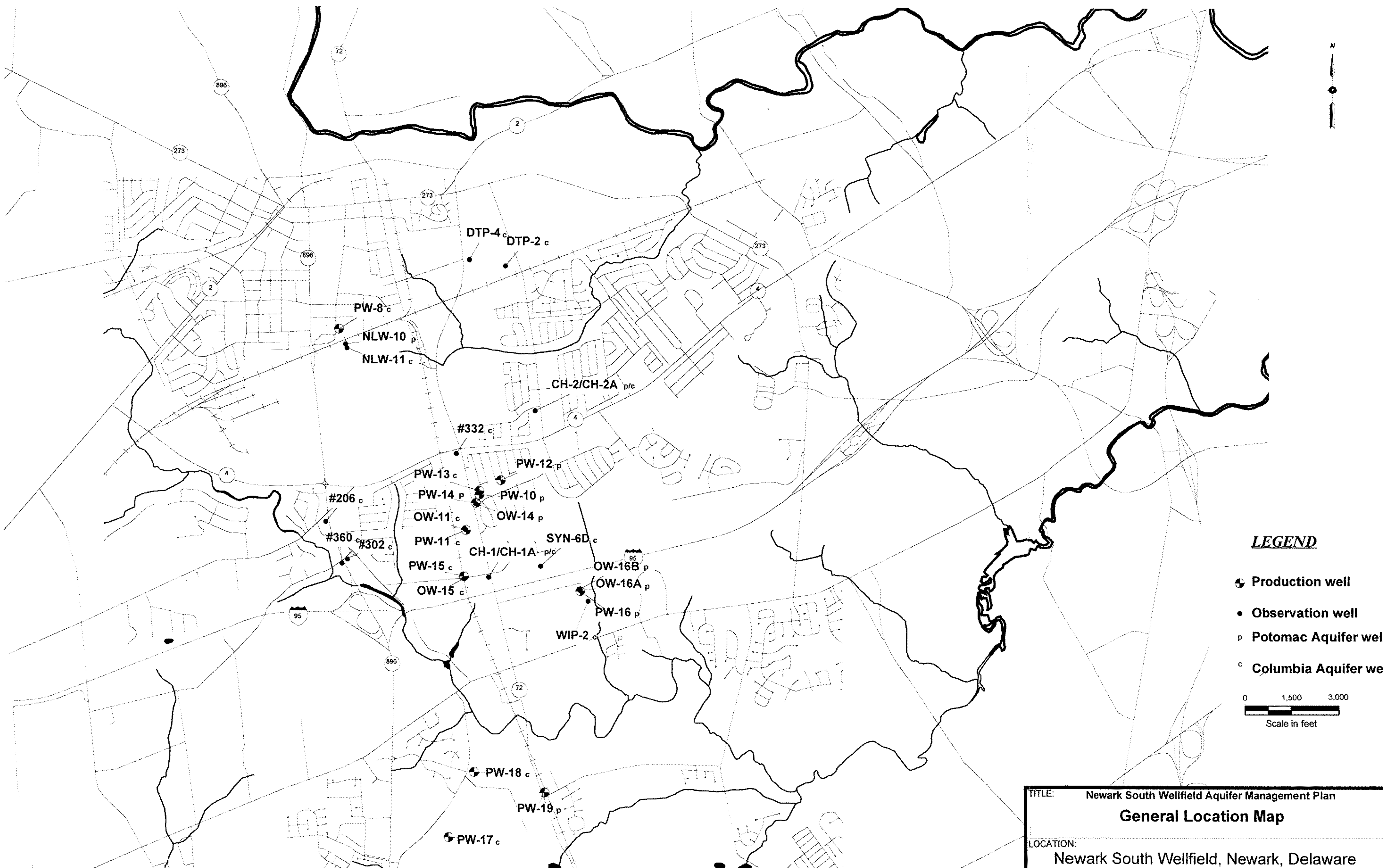
Table C.3 Summary of Sensitivity Analysis Simulations

Well	Layer	Row	Colum	Observed Head	Calibratio Head	Calibratio Residual	Run A Residual	Run B Residual	Run C Residual	Run D Residual	Run E Residual	Run F Residual	Run G Residual	Run H Residual	Run I Residual	Run J Residual	Run K Residual	Run L Residual
OW-11	1	82	38	56.000	53.665	2.335	6.280	-1.547	3.679	-2.935	1.696	3.512	3.901	1.594	3.329	1.657	3.150	2.599
OW-15	1	110	35	48.500	50.651	-2.151	1.555	-5.798	-0.883	-7.233	-3.197	0.174	3.709	-2.854	-1.250	-2.828	-1.319	-1.958
CH-1A	1	108	58	52.500	52.325	0.175	3.933	-3.522	1.431	-4.956	-0.340	0.896	2.129	-0.539	1.092	-0.546	1.062	0.421
CH-2A	1	39	81	63.000	66.428	-3.428	0.041	-6.831	-2.380	-9.467	-1.994	-6.952	-3.910	-3.179	-3.924	-4.327	-2.630	-2.995
DTP-2	1	23	71	78.000	81.292	-3.292	-0.406	-6.081	-2.925	-8.256	-0.082	-10.422	-3.322	-2.909	-3.856	-4.730	-1.113	-3.239
DTP-4	1	22	42	90.800	85.115	5.685	8.217	3.268	5.659	1.668	8.739	-0.504	5.660	6.064	5.148	4.577	7.105	5.744
NLW-11	1	32	15	88.500	93.384	-4.884	0.258	-9.904	-3.486	-10.405	0.037	-15.856	-5.039	-3.802	-6.334	-6.747	-3.782	-4.719
WIP-2	1	128	100	49.000	48.274	0.726	1.493	-0.027	1.335	-4.332	1.081	-0.141	0.788	0.611	0.903	0.543	1.307	0.803
SYN-6D	1	101	82	58.000	54.357	3.643	7.025	0.318	4.636	-1.381	4.131	1.839	3.664	3.001	4.525	2.687	5.042	4.533
#206	1	76	14	79.500	77.094	2.406	7.502	-2.603	8.593	-6.402	5.419	-4.350	2.132	2.769	1.847	0.832	3.463	2.555
#302	1	99	15	67.000	69.714	-2.714	1.473	-6.831	4.089	-12.231	-0.800	-6.853	-2.877	-2.617	-2.895	-3.717	-1.937	-2.592
#332	1	43	29	70.000	66.335	3.665	7.830	-0.427	5.132	-2.150	4.971	0.333	2.866	3.545	3.816	2.672	4.583	4.129
#360	1	100	15	60.500	69.141	-8.641	-4.587	-12.629	-1.656	-18.410	-6.859	-12.426	-8.792	-8.557	-8.803	-9.582	-7.922	-8.526
OW-14	2	67	46	41.000	42.093	-1.093	2.840	-4.959	0.270	-6.577	-0.841	-1.989	-2.074	-6.547	12.645	-1.246	-0.730	-4.532
OW-16A	2	119	96	40.000	38.630	1.370	4.635	-1.822	2.308	-3.881	2.795	-1.853	1.509	-3.364	13.865	-0.990	2.464	0.757
OW-16B	2	117	96	40.000	41.352	-1.352	1.919	-4.550	-0.414	-6.606	0.073	-4.576	-1.217	-5.192	8.476	-3.679	-0.302	-1.971
CH-1	2	108	58	52.000	51.845	0.155	3.783	-3.412	1.354	-4.997	0.022	0.053	1.520	-0.627	1.021	-0.847	0.894	-0.009
CH-2	2	39	81	59.000	65.158	-6.158	-2.872	-9.378	-5.131	-12.136	-4.764	-9.423	-6.577	-5.573	-7.174	-5.913	-6.028	-6.725
NLW-10	2	31	15	88.500	90.116	-1.616	2.723	-5.847	-0.268	-7.152	2.429	-10.524	-1.767	0.311	-4.334	4.303	-3.678	-1.702
Sum of residuals						-6.301	50.951	-62.398	26.471	-101.975	15.692	-57.126	2.724	-16.056	16.961	-25.025	10.065	-4.470
Mean of residuals						-0.332	2.682	-3.284	1.393	-5.367	0.826	-3.007	0.143	-0.845	0.893	-1.317	0.530	-0.235
Sum of absolute value of residuals						46.623	60.937	69.571	49.961	105.310	42.234	70.741	53.035	51.225	71.084	50.963	48.074	47.548
Mean of absolute values						2.454	3.207	3.662	2.630	5.543	2.223	3.723	2.791	2.696	3.741	2.682	2.530	2.503

Notes:
(1) Residual is calculated as observed minus simulated head. A positive residual means modeled too low. A negative residual means modeled too high.
(2) Observed head is a representative value for early September, 1995, based on measured water levels, with the exception of the four UST sites (#206, #302, #332, #360) which had one water level each for an earlier time period (see Appendix A for complete water level listing)

Sensitivity Runs:

A: Net recharge decreased 25 percent to 9 in/yr
B: Net recharge increased 25 percent to 15 in/yr
C: River package conductance multiplied by 10.0
D: River Package conductance multiplied by 0.10
E: Transmissivity layer 1 multiplied by 1.5
F: Transmissivity layer 1 multiplied by 0.5
G: No high-K zone in layer 1
H: Transmissivity layer 2 multiplied by 1.5
I: Transmissivity layer 2 multiplied by 0.5
J: Kv confining bed multiplied by 0.10
K: Kv confining bed multiplied by 10.0
L: Kh to Kv ratio for aquifers 10:1 instead of 100:1



Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

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TITLE: Newark South Wellfield Aquifer Management Plan

General Location Map

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

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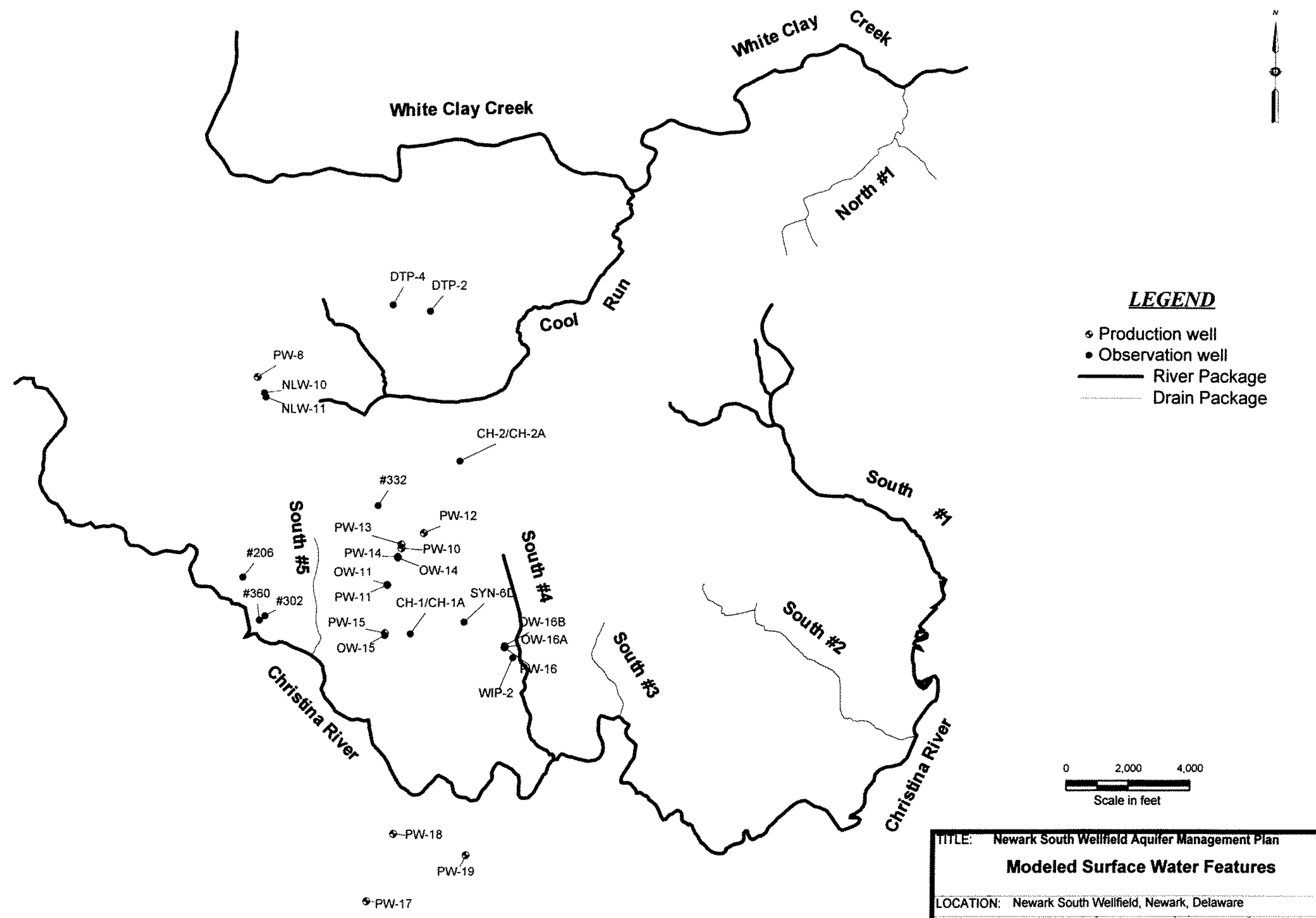
FILE:	FIGC1.WOR
DATE:	29-Dec-1995

FIGURE: C.1



TITLE:	Newark South Wellfield Aquifer Management Plan
	Modeled Surface Water Features
LOCATION:	Newark South Wellfield, Newark, Delaware

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	DRAFTED:	RMG	C.2
	FILE:	MODWAT WOR	
	DATE:	29-Dec-1995	

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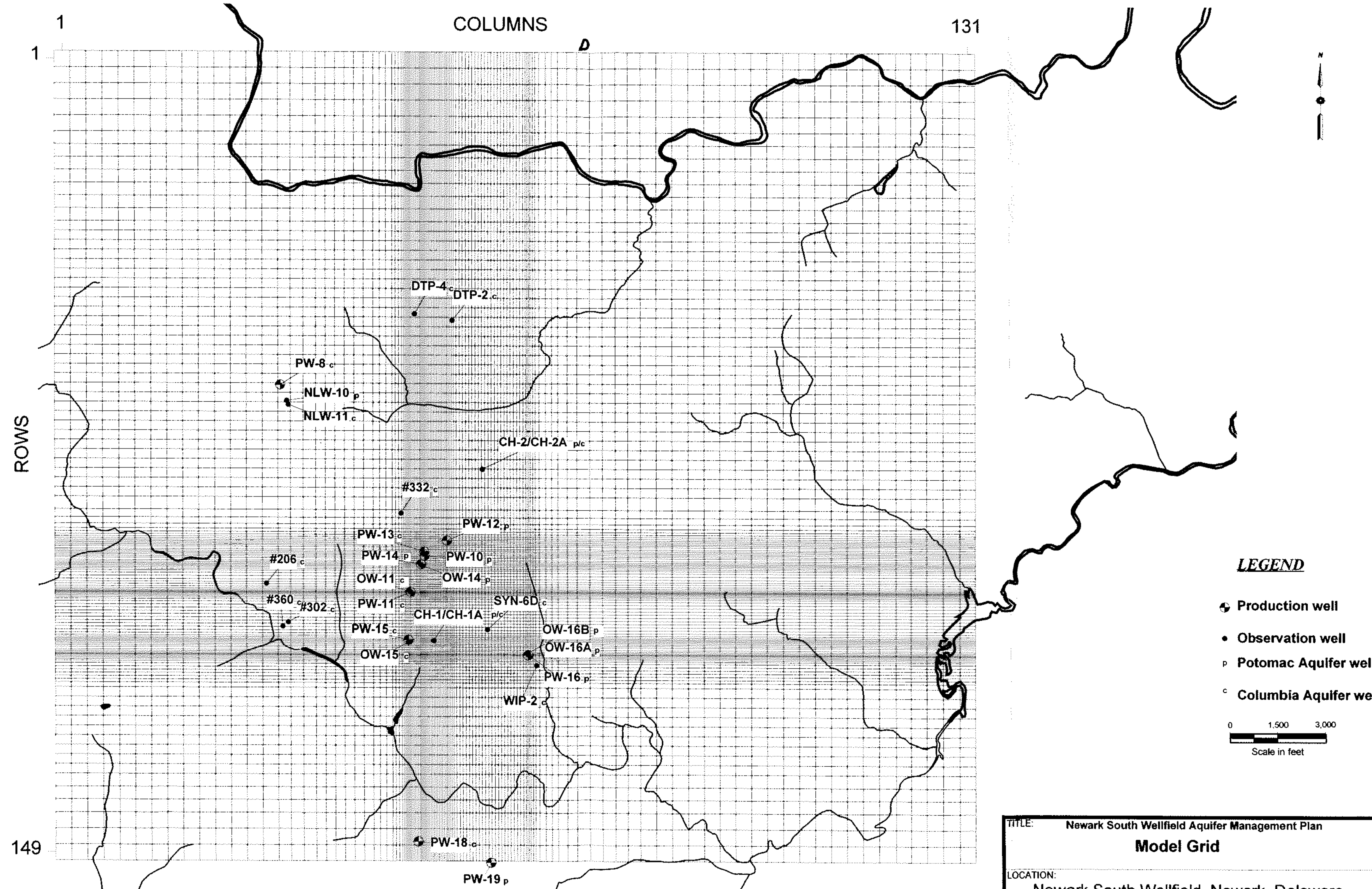

Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

TITLE: Newark South Wellfield Aquifer Management Plan **Model Grid**			
LOCATION: Newark South Wellfield, Newark, Delaware			
TETRA TECH, INC.	CHECKED: RMG	DRAFTED: STG	FIGURE: C.3
	FILE: GRID1.WOR	DATE: 29-Dec-1995	

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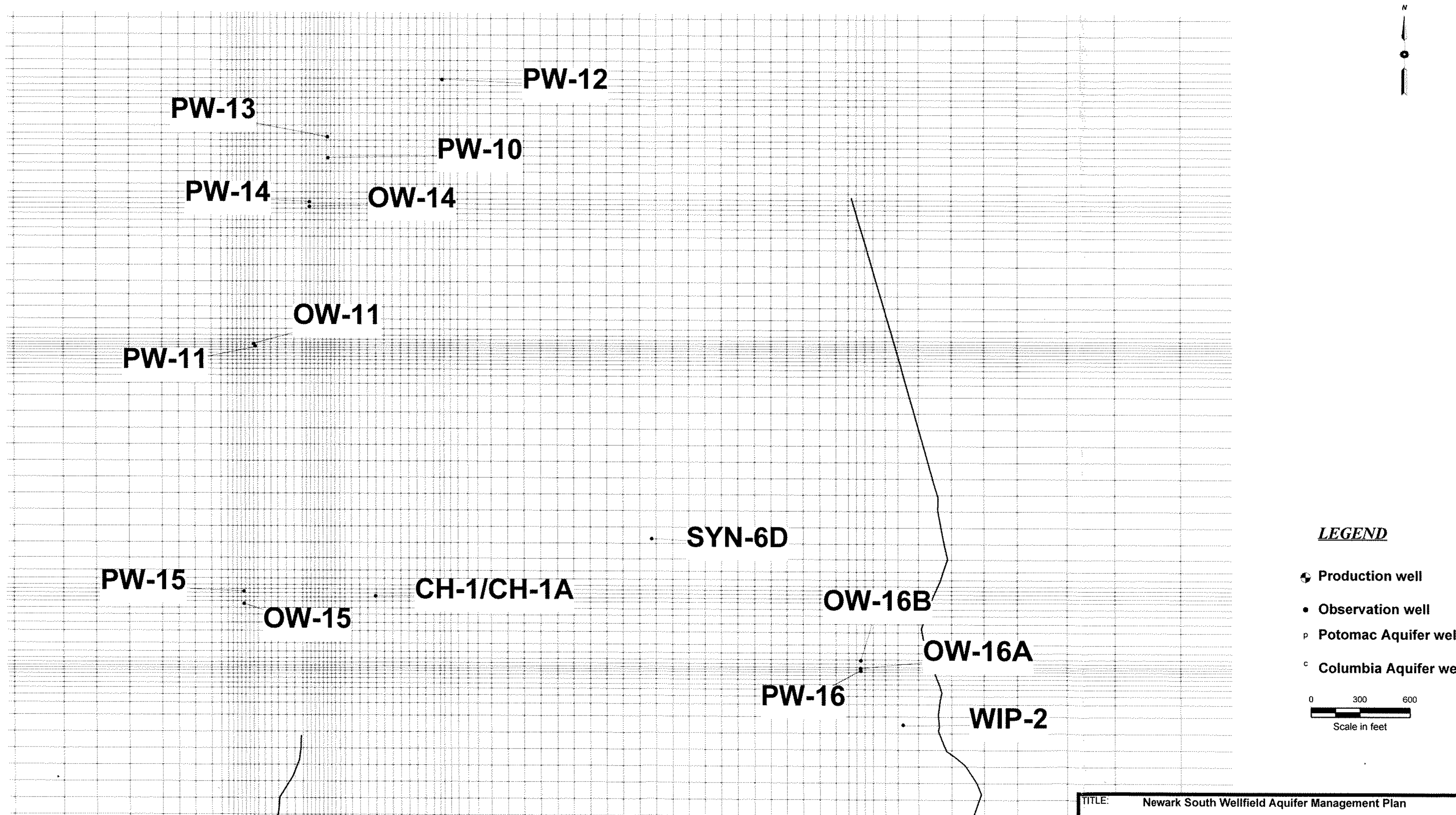

Basemap information from Water Resources Agency For New Castle County. Some creeks added from Newark East Quadrangle (7.5 Minute), 1993.
PW locations from GPS survey (Latitude/Longitude), DGS, 1993. Note: these locations differ from published WRA maps and ArcInfo coverages.
Locations of all others wells are approximate.

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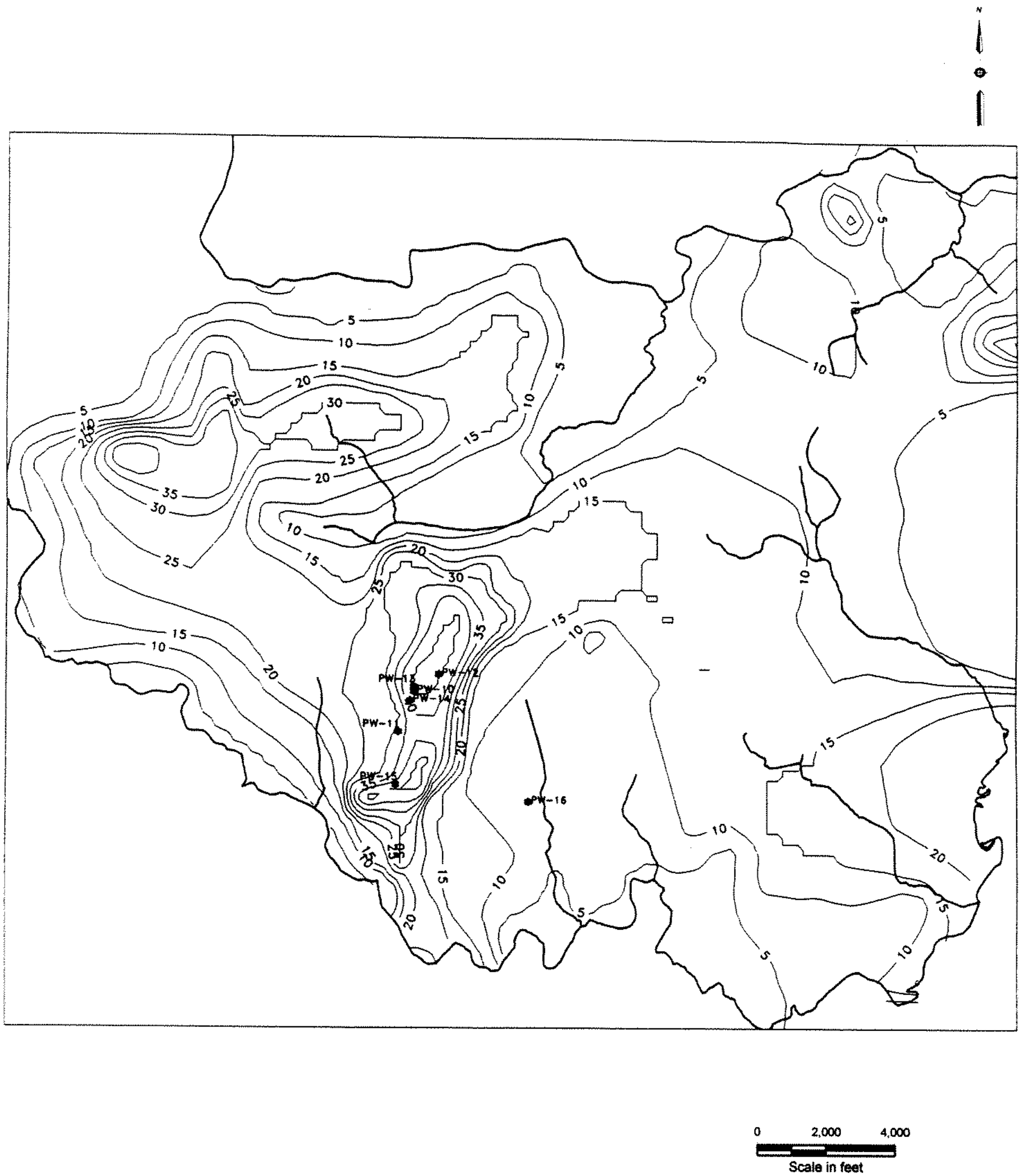
TITLE: Newark South Wellfield Aquifer Management Plan

Model Grid (Zoomed Near Well Field)

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

CHECKED:	RMG	FIGURE:
DRAFTED:	STG	C.4
FILE:	GRID2.WOR	
DATE:	29-Dec-1995	



TITLE: **Newark South Wellfield Aquifer Management Plan**

Layer 1 Thickness in Model

LOCATION: Newark South Wellfield, Newark, Delaware

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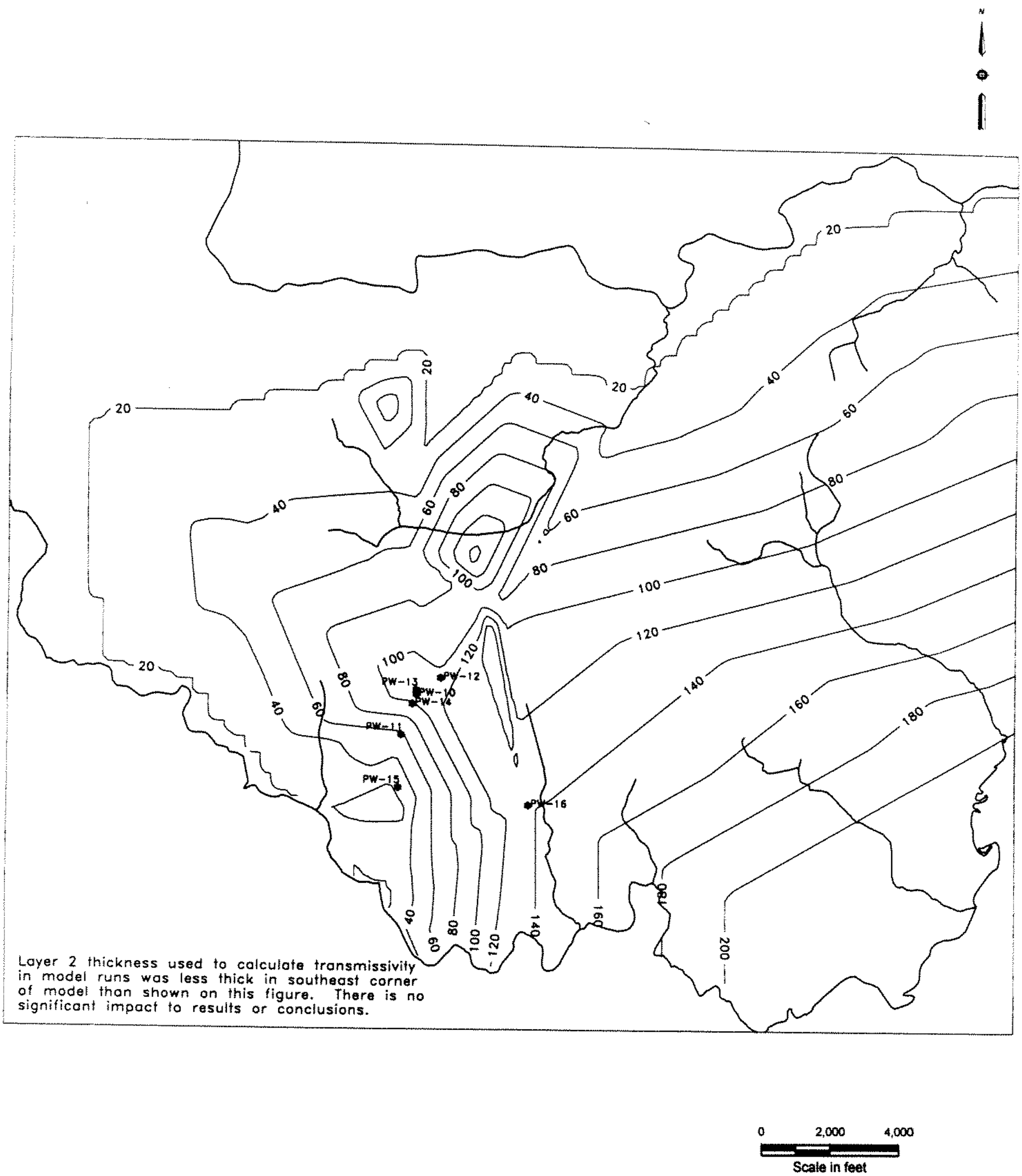

Layer 2 thickness used to calculate transmissivity in model runs was less thick in southeast corner of model than shown on this figure. There is no significant impact to results or conclusions.

TITLE: Newark South Wellfield Aquifer Management Plan

Layer 2 Thickness in Model

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

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DRAFTED:	JJB/JAW
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DATE:	4-Jan-1996

FIGURE: C.6

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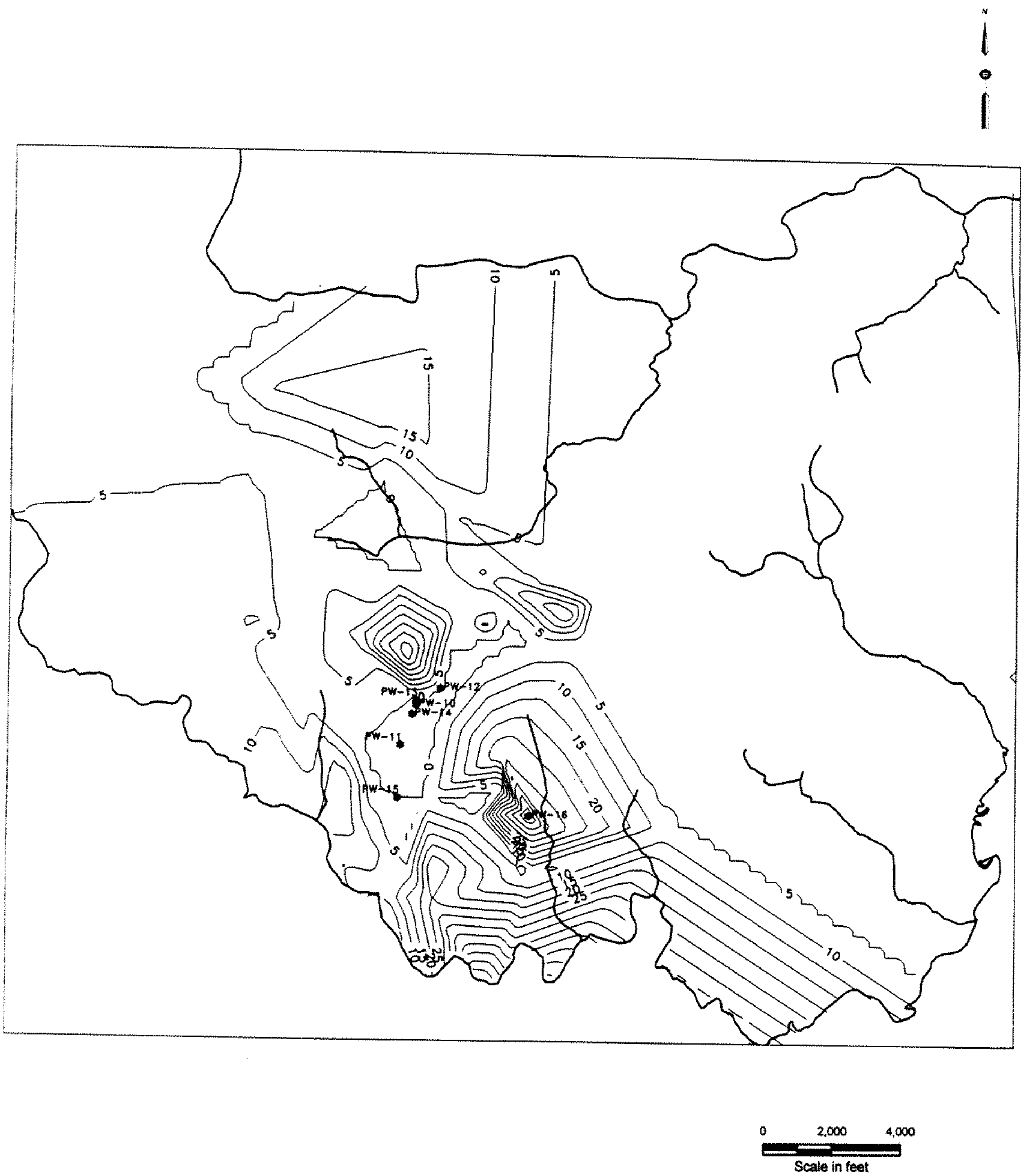

TITLE: Newark South Wellfield Aquifer Management Plan

Confining Bed Thickness in Model

LOCATION: Newark South Wellfield, Newark, Delaware

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	FILE: FigC7.WOR	DATE: 4-Jan-1996	

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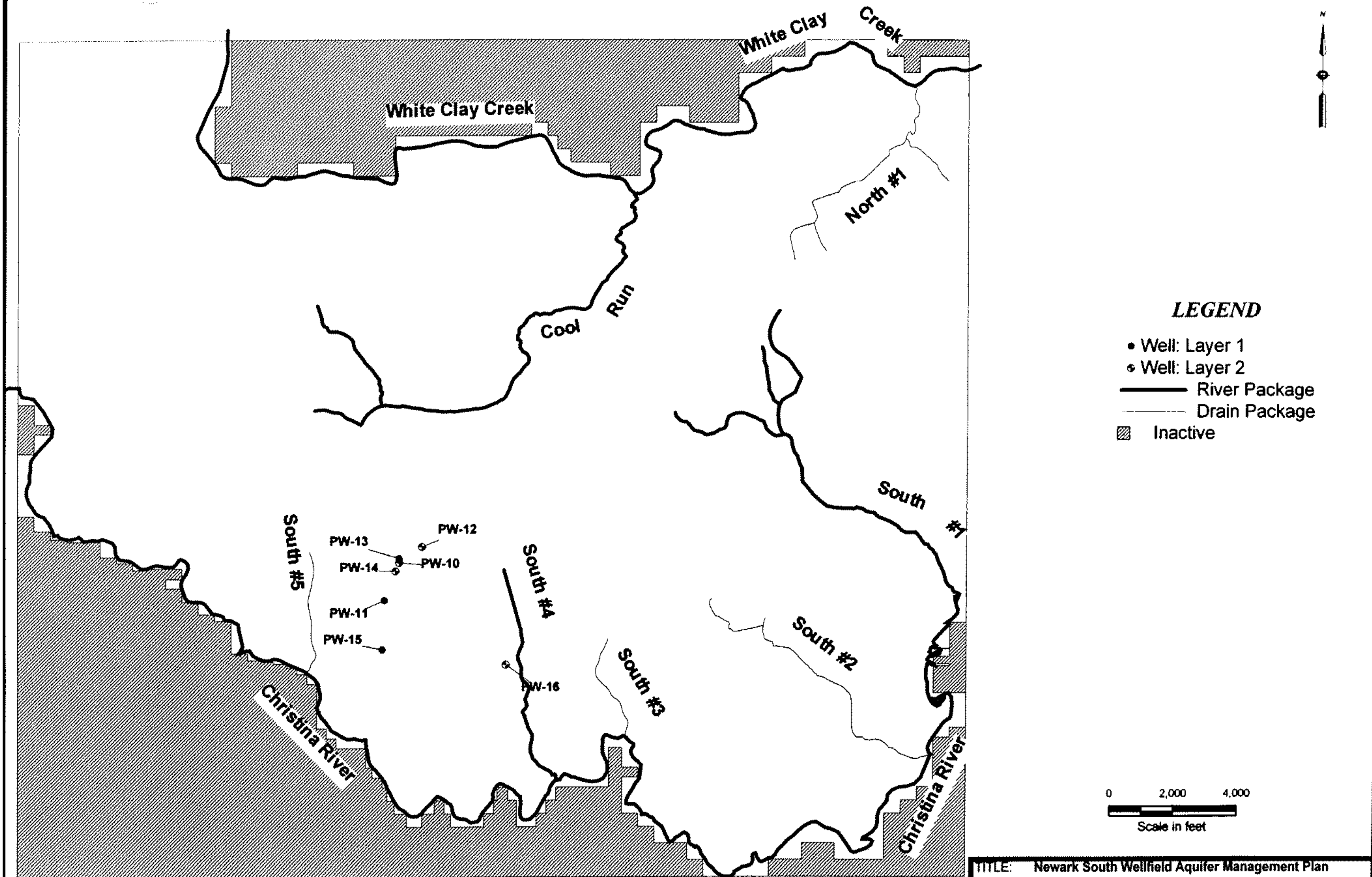

TITLE: Newark South Wellfield Aquifer Management Plan

Model Boundaries

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.	CHECKED:	RMG	FIGURE:
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	FILE:	BOUNDARY.WOR	
	DATE:	29-Dec-1995	

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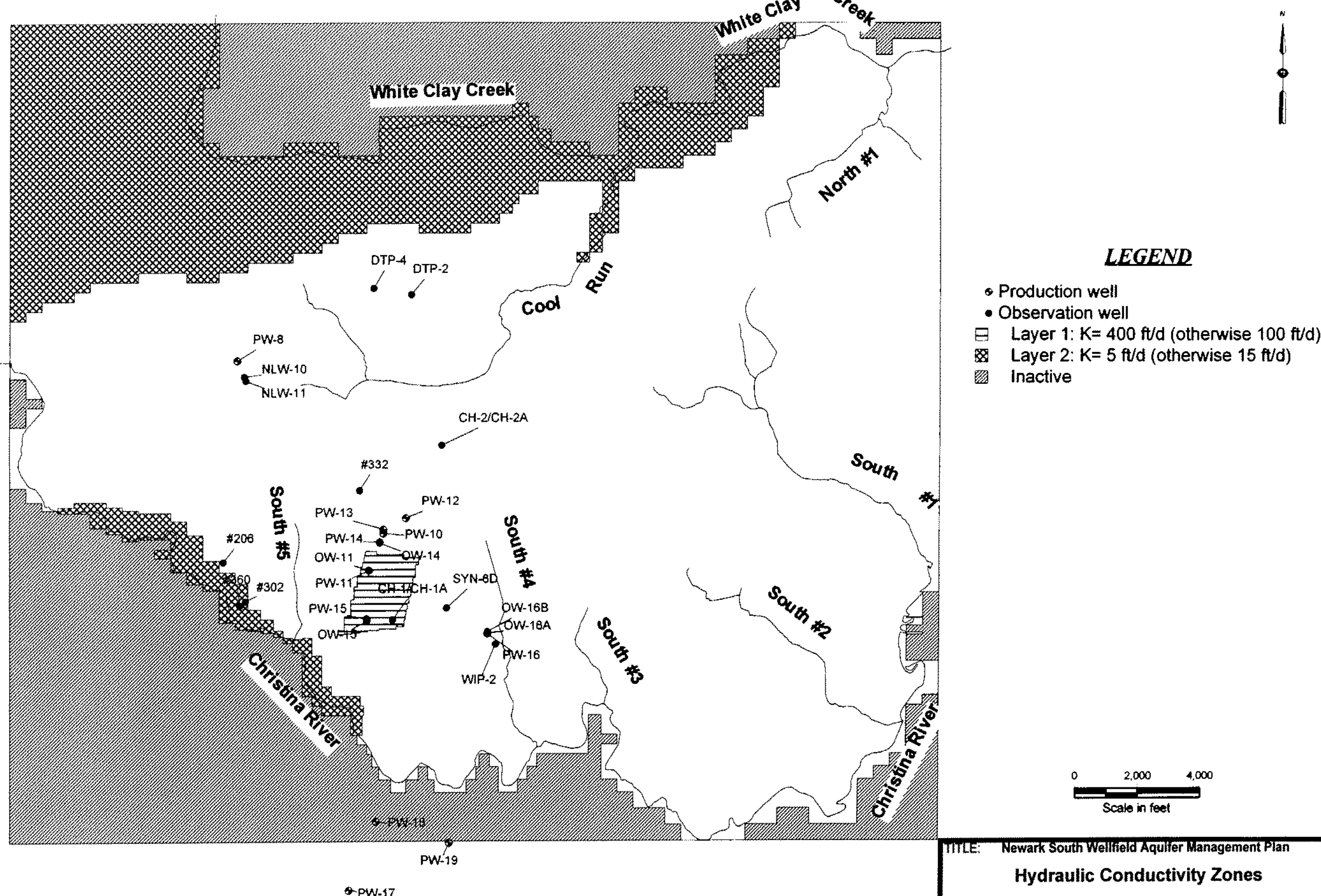

TITLE: Newark South Wellfield Aquifer Management Plan

Hydraulic Conductivity Zones

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

CHECKED:	RMG	FIGURE:
DRAFTED:	RMG	C.9
FILE:	HYCZON.WOR	
DATE:	29-Dec-1995	

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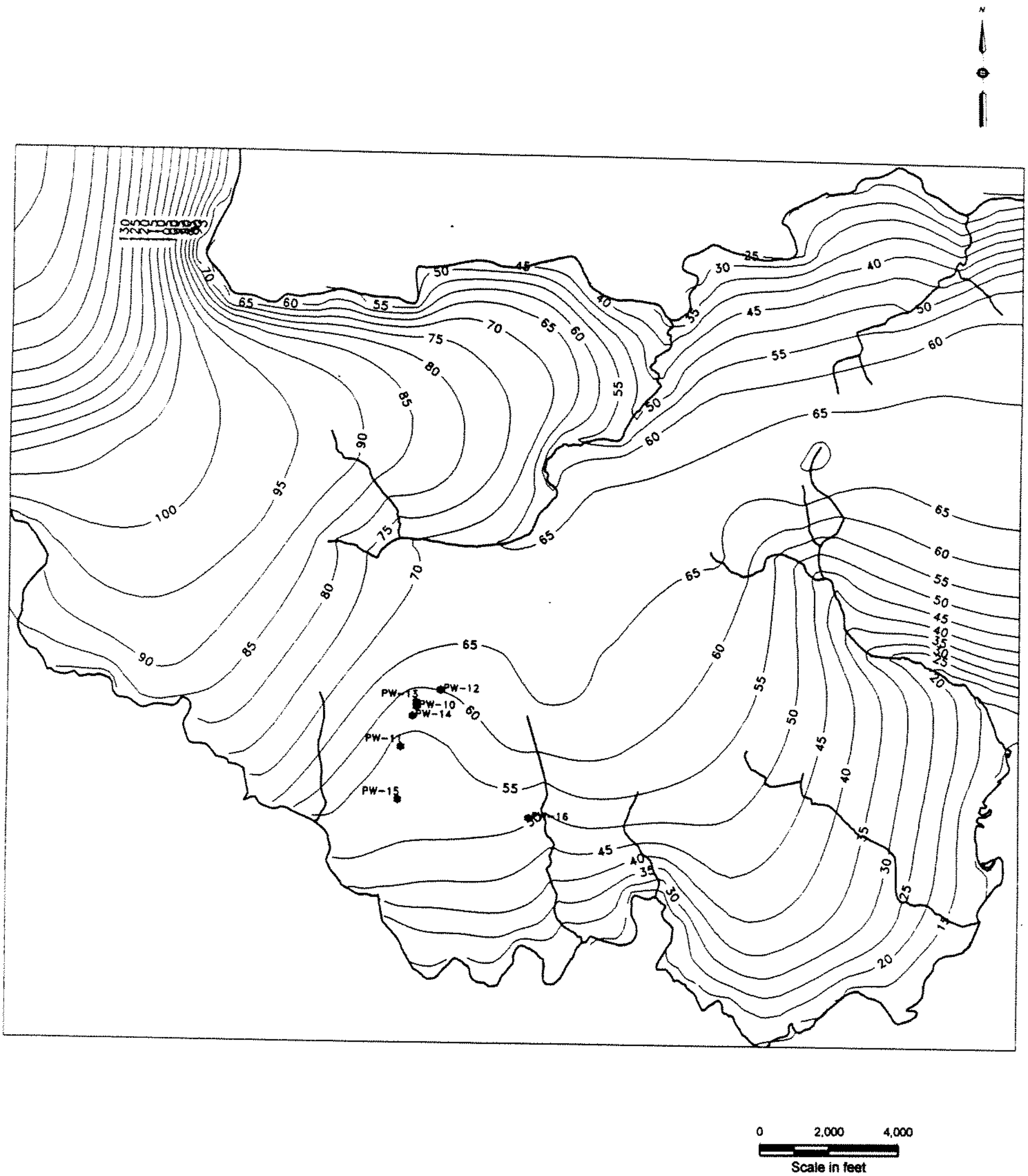

TITLE: **Newark South Wellfield Aquifer Management Plan**

Simulated Heads Layer 1
Calibration (Early September, 1995)

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

CHECKED:	RMG	FIGURE:
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FILE:	FigC10.WOR	
DATE:	4-Jan-1996	

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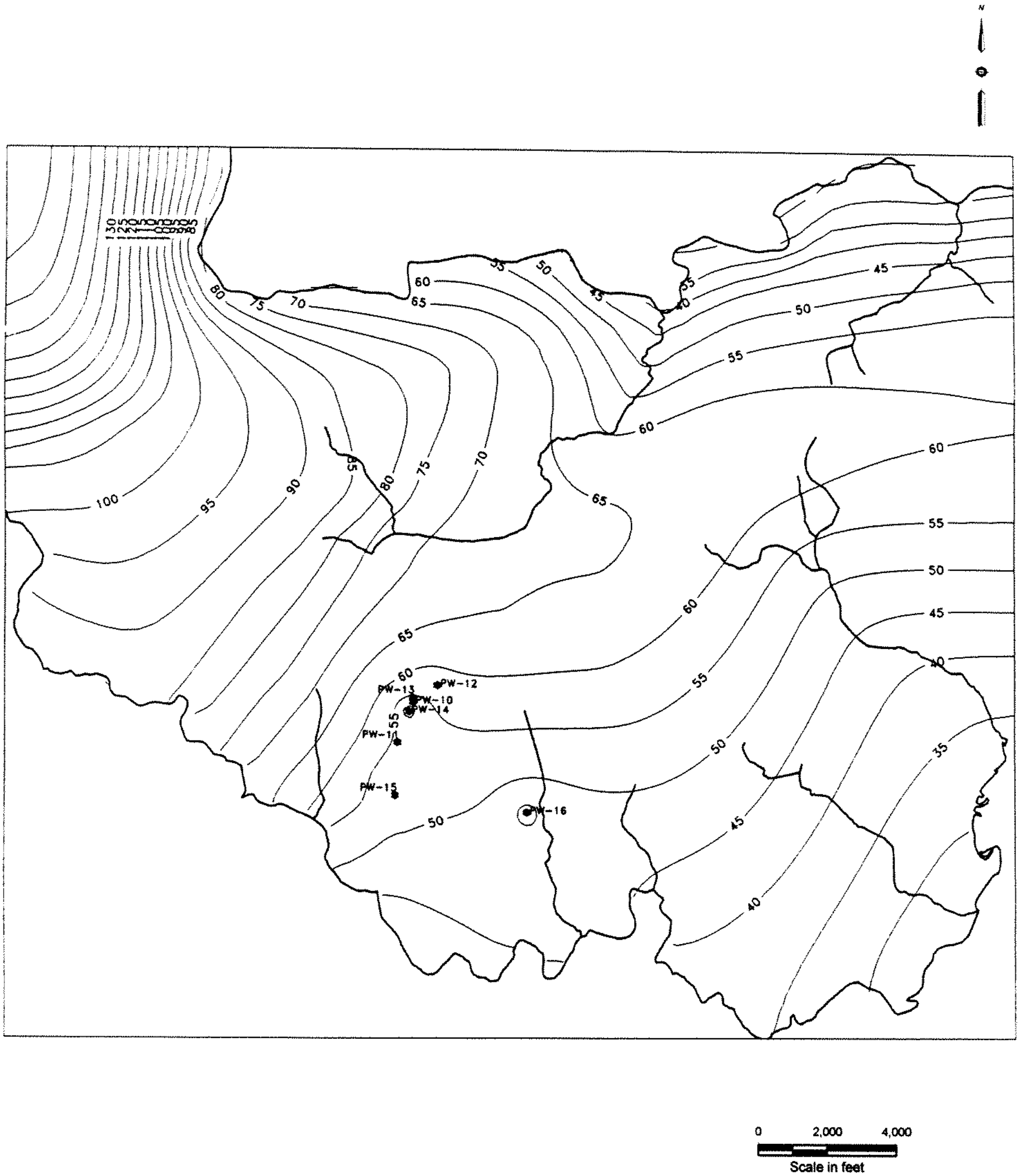

TITLE: Newark South Wellfield Aquifer Management Plan

Simulated Heads Layer 2

Calibration (Early September, 1995)

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

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FILE:	FigC11.WOR	
DATE:	4-Jan-1996	

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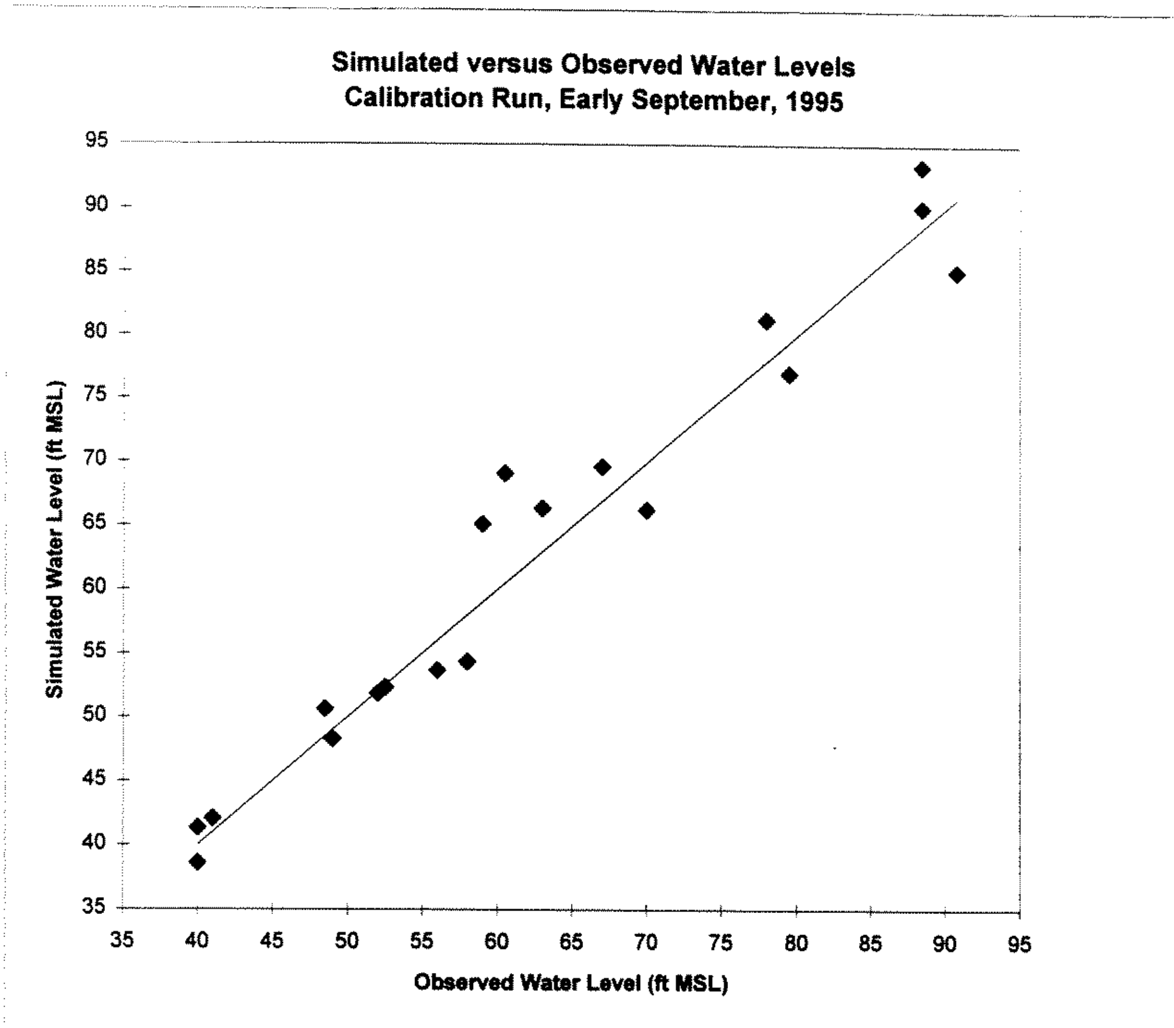

TITLE: Newark South Wellfield Aquifer Management Plan

Simulated versus Observed Water Levels Calibration (Early September, 1995)

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

CHECKED:	RMG	FIGURE:
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FILE:	FigC12.WOR	
DATE:	4-Jan-1996	

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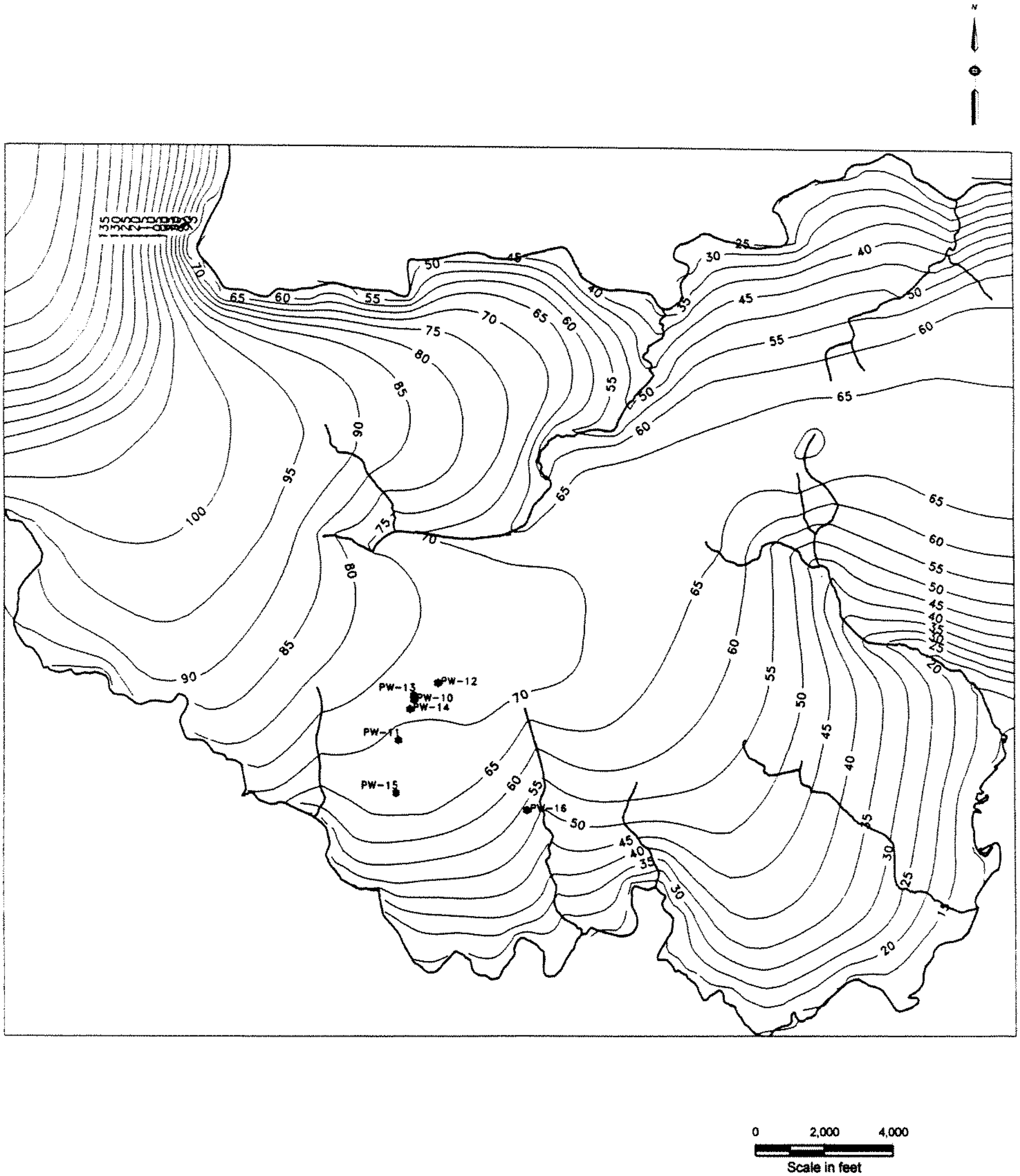

TITLE: Newark South Wellfield Aquifer Management Plan

Simulated Heads Layer 1

Pre-Pumping Conditions

LOCATION: Newark South Wellfield, Newark, Delaware

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	DATE:	4-Jan-1996	

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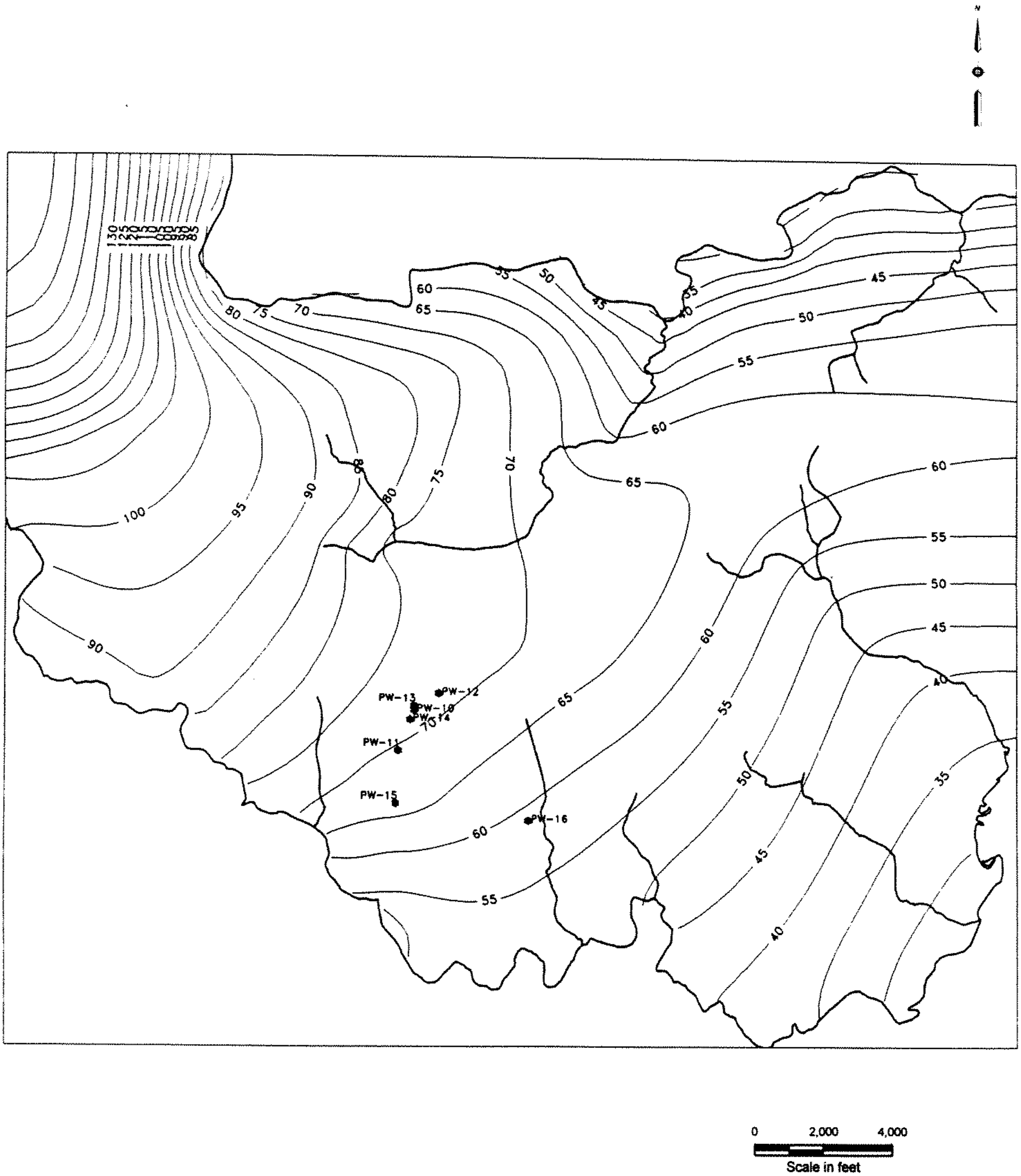

TITLE: Newark South Wellfield Aquifer Management Plan

Simulated Heads Layer 2
Pre-Pumping Conditions

LOCATION: Newark South Wellfield, Newark, Delaware

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	DATE:	4-Jan-1996	

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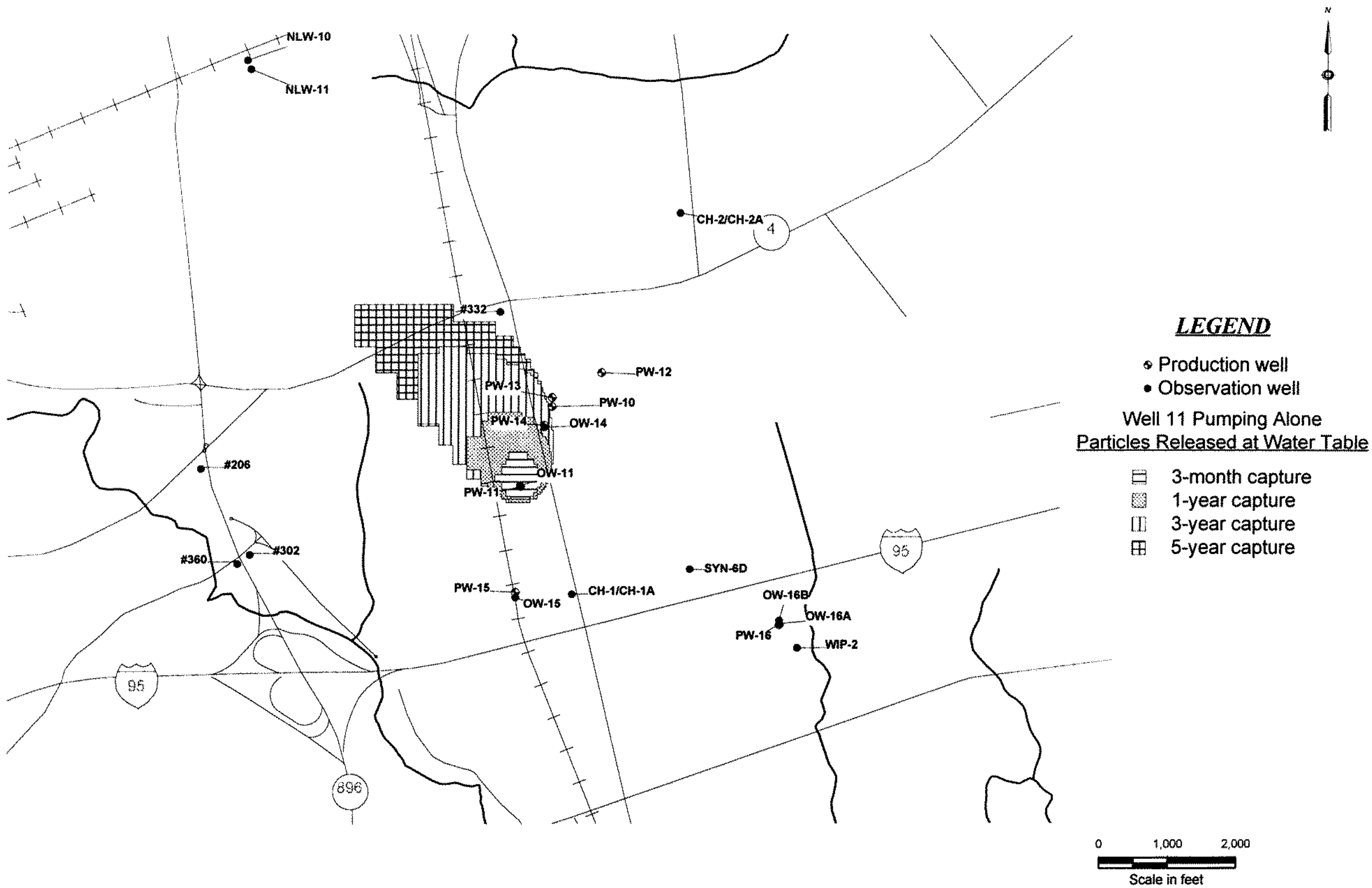

TITLE: Newark South Wellfield Aquifer Management Plan
Five Year Recharge Zone
Well 11 Pumping Alone

LOCATION: Newark South Wellfield, Newark, Delaware

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	DATE:	31-Dec-1995	

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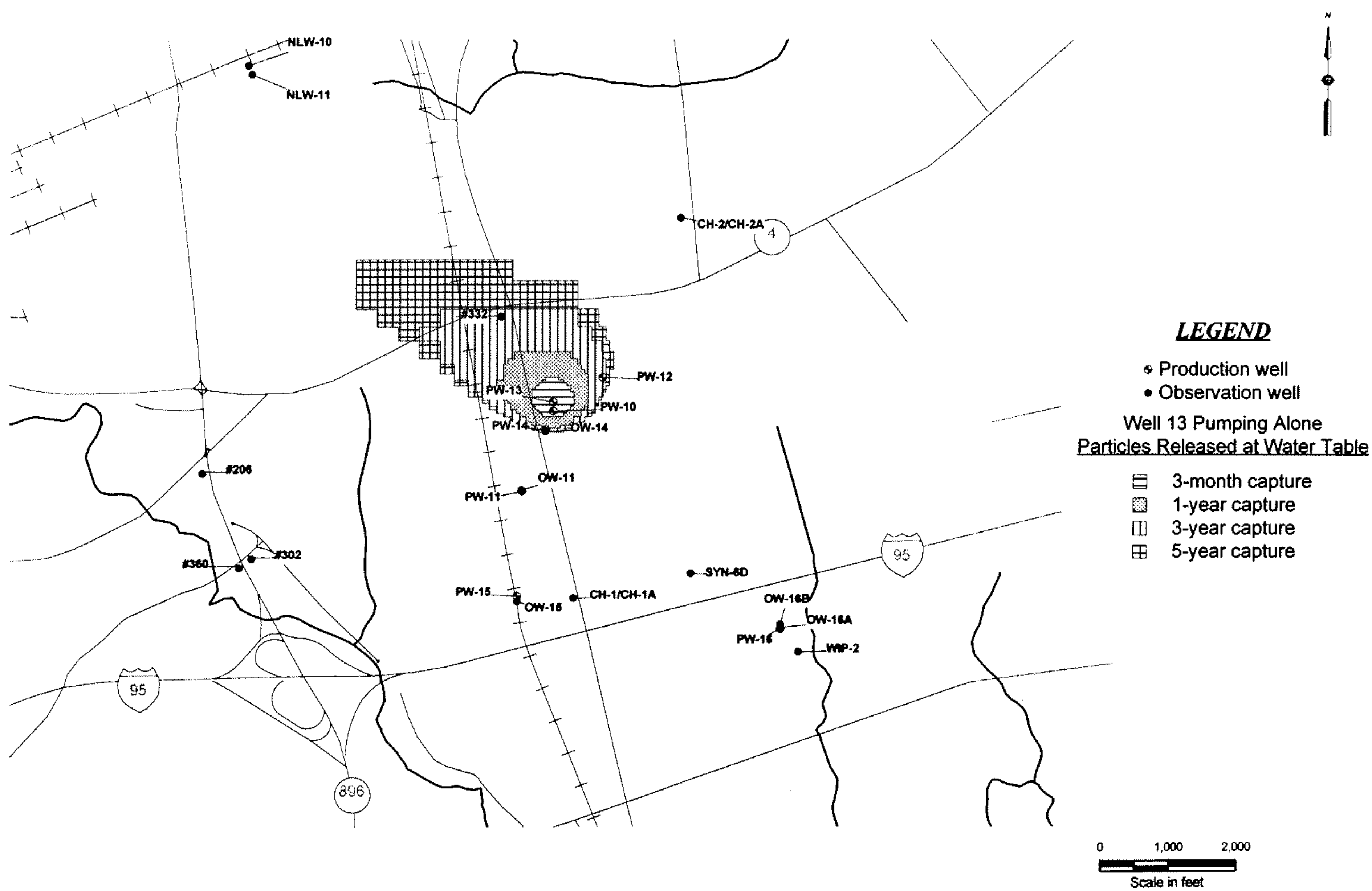

TITLE: Newark South Wellfield Aquifer Management Plan

Five Year Recharge Zone

Well 13 Pumping Alone

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

CHECKED:	RMG	FIGURE:
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FILE:	PT-13.WOR	
DATE:	31-Dec-1995	

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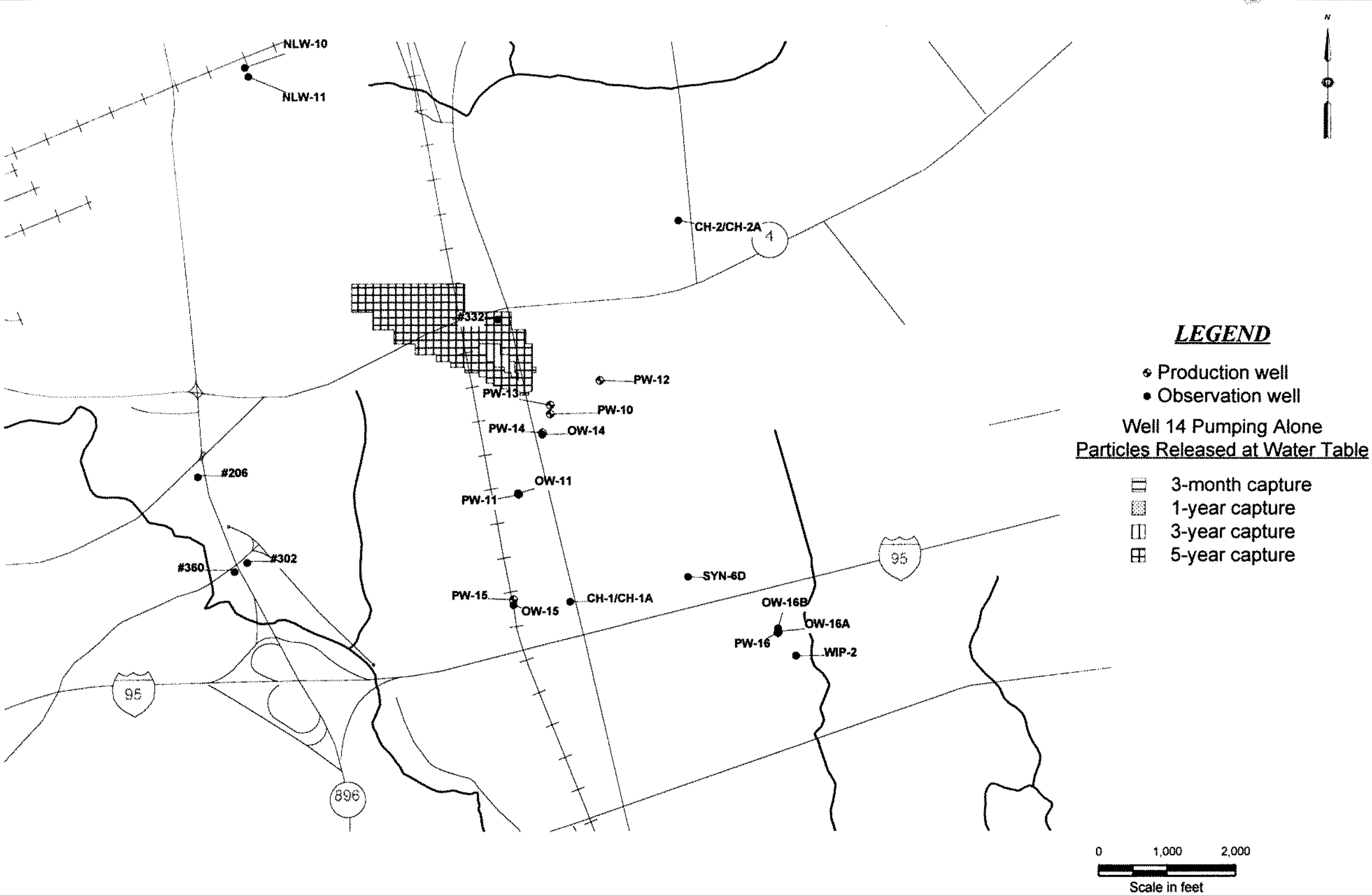

TITLE:	Newark South Wellfield Aquifer Management Plan **Five Year Recharge Zone** **Well 14 Pumping Alone**			
LOCATION:	Newark South Wellfield, Newark, Delaware			
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	FILE:	PT-14 WOR		
	DATE:	31-Dec-1995		

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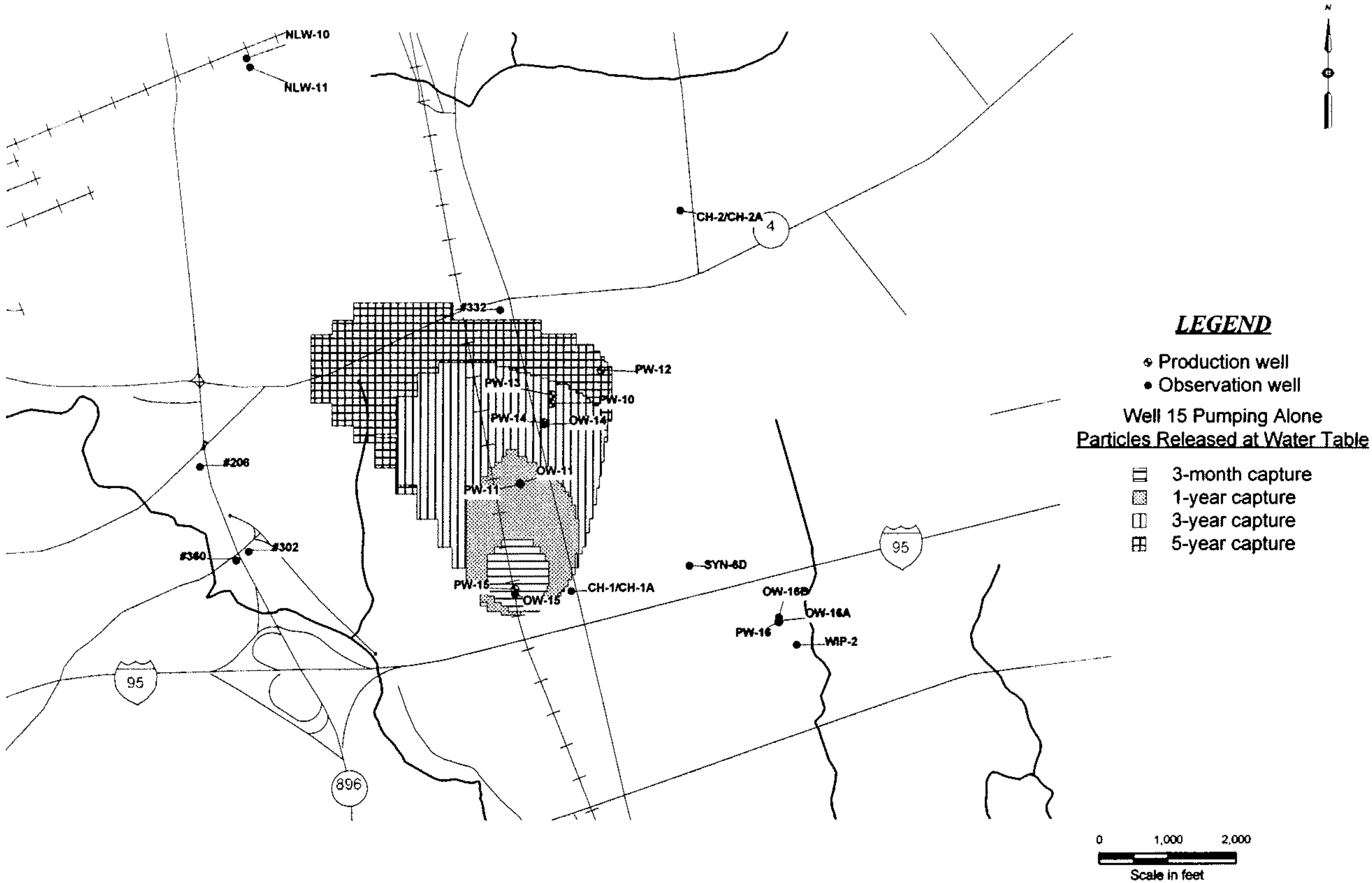

TITLE:	Newark South Wellfield Aquifer Management Plan **Five Year Recharge Zone** **Well 15 Pumping Alone**			
LOCATION:	Newark South Wellfield, Newark, Delaware			
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	DATE:	31-Dec-1995		

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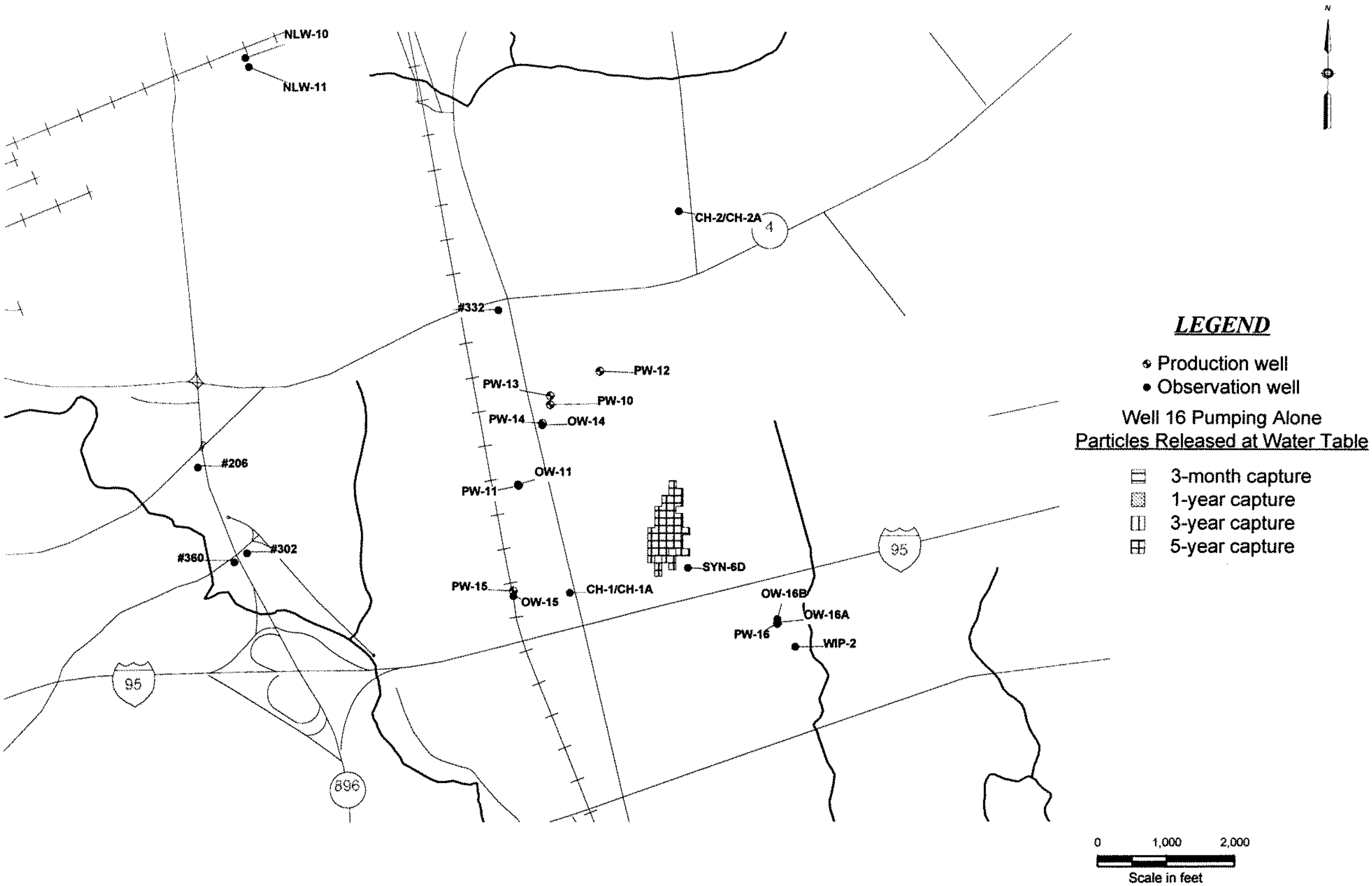

TITLE: Newark South Wellfield Aquifer Management Plan **Five Year Recharge Zone** **Well 16 Pumping Alone**			
LOCATION: Newark South Wellfield, Newark, Delaware			
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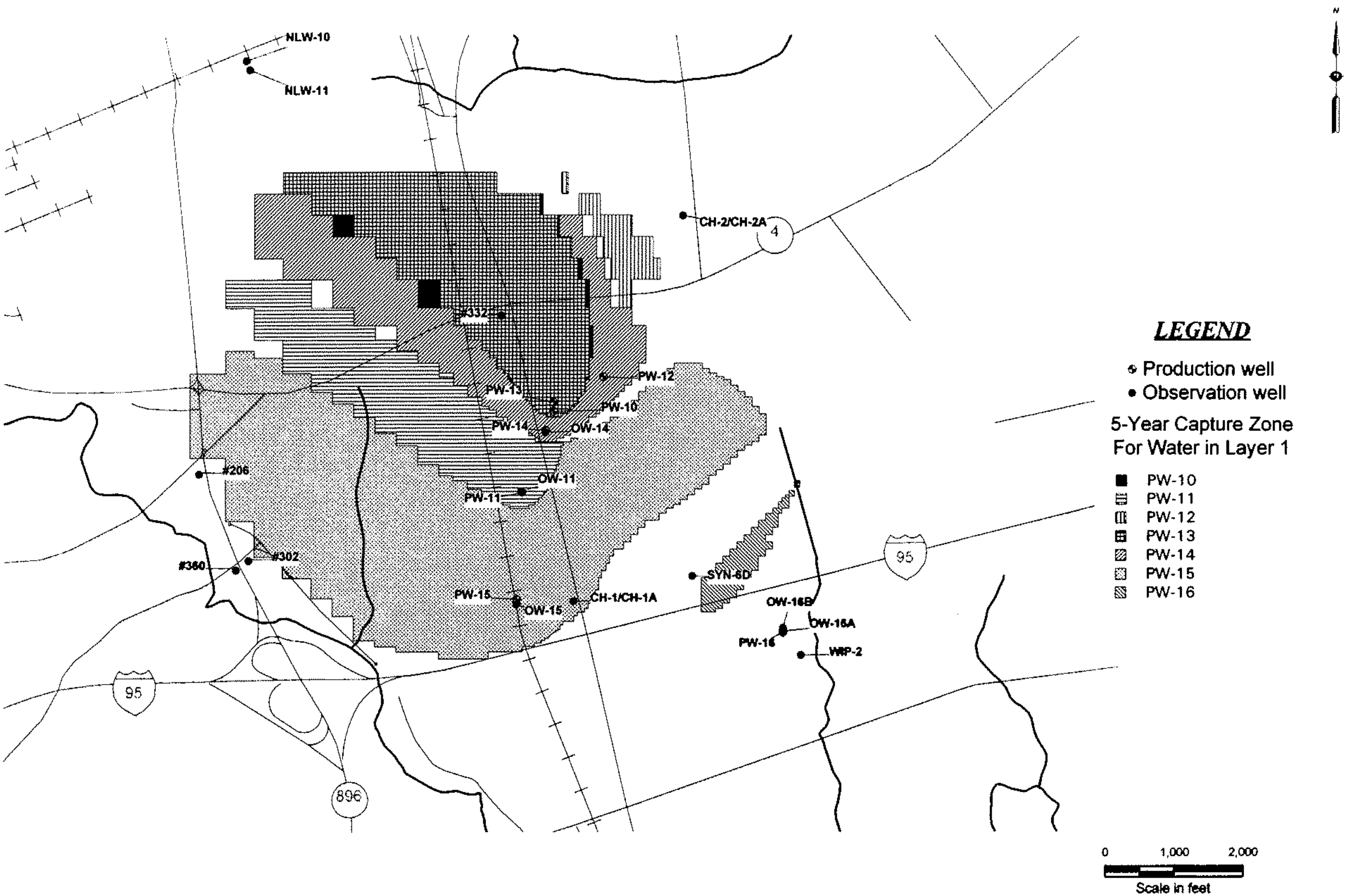

TITLE: Newark South Wellfield Aquifer Management Plan **5-Year Capture Zone, Allocation Rates** **Particles Released Middle of Layer 1**			
LOCATION: Newark South Wellfield, Newark, Delaware			
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	FILE:	PT-AL-1.WOR	
	DATE:	29-Dec-1995	

p:\data-projects\newark\sitegis\report\pt-al-1.wor

TITLE: Newark South Wellfield Aquifer Management Plan

5-Year Capture Zone, Allocation Rates Particles Released Middle of Layer 2

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.

CHECKED:	RMG	FIGURE:
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FILE:	PT-AL-2.WOR	
DATE:	29-Dec-1995	

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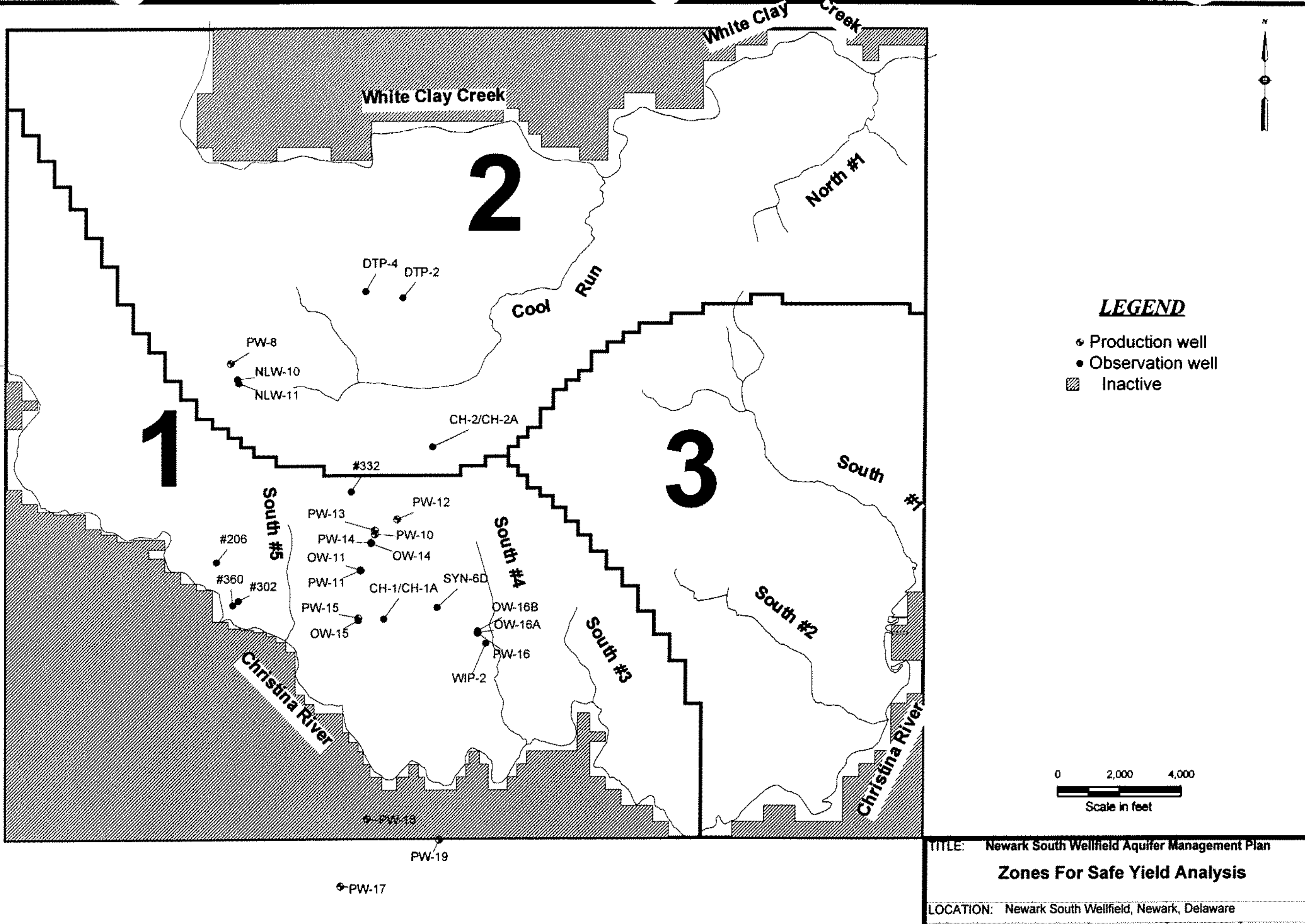

TITLE: Newark South Wellfield Aquifer Management Plan			
Zones For Safe Yield Analysis			
LOCATION: Newark South Wellfield, Newark, Delaware			
TETRA TECH, INC.	CHECKED: RMG		FIGURE:
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	FILE: BUDZON.WOR		
	DATE: 29-Dec-1995		

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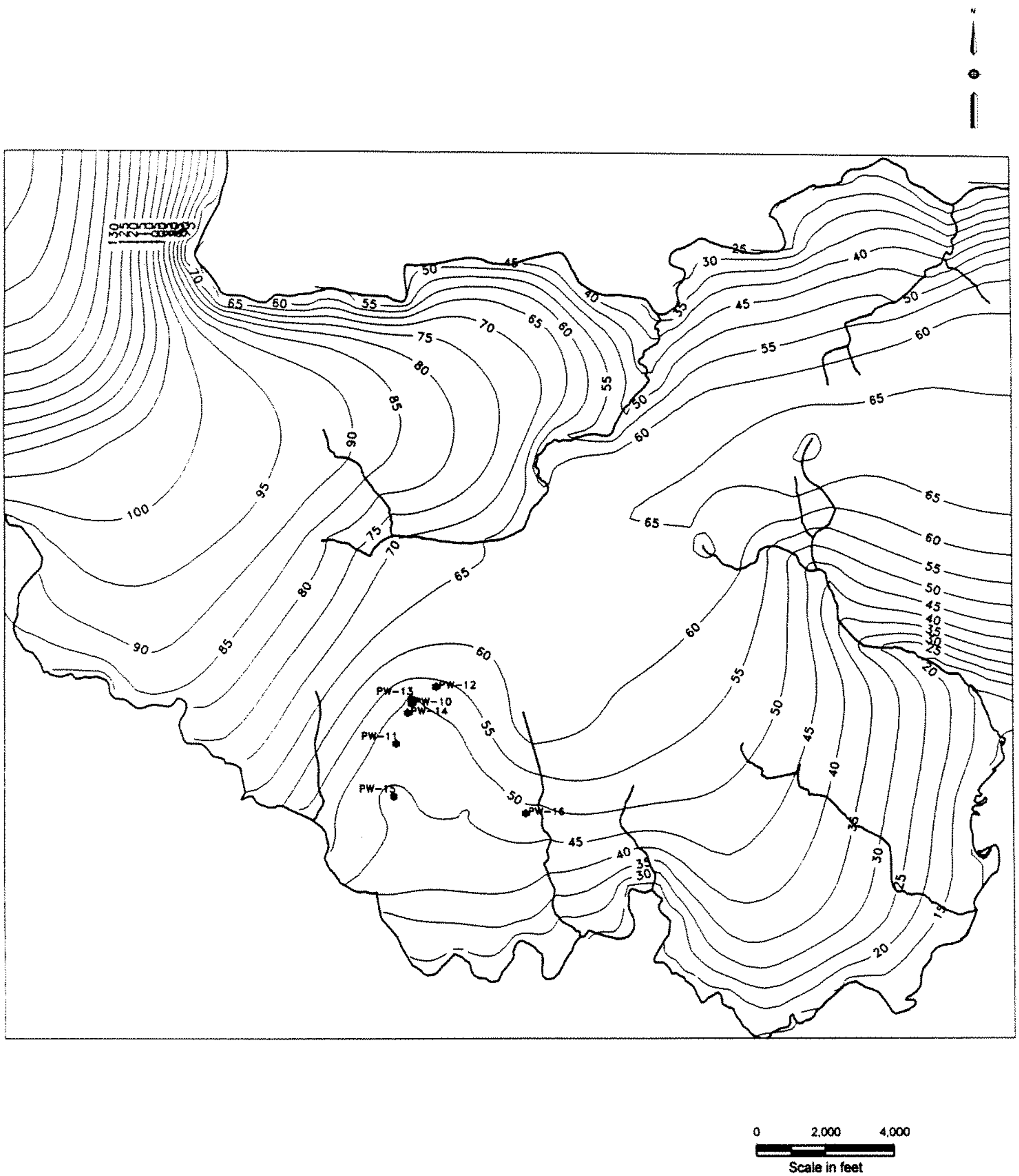

TITLE: Newark South Wellfield Aquifer Management Plan

Simulated Heads Layer 1

Allocation Rates

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.	CHECKED:	RMG	FIGURE:
	DRAFTED:	JJB/JAW	C.23
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	DATE:	4-Jan-1996	

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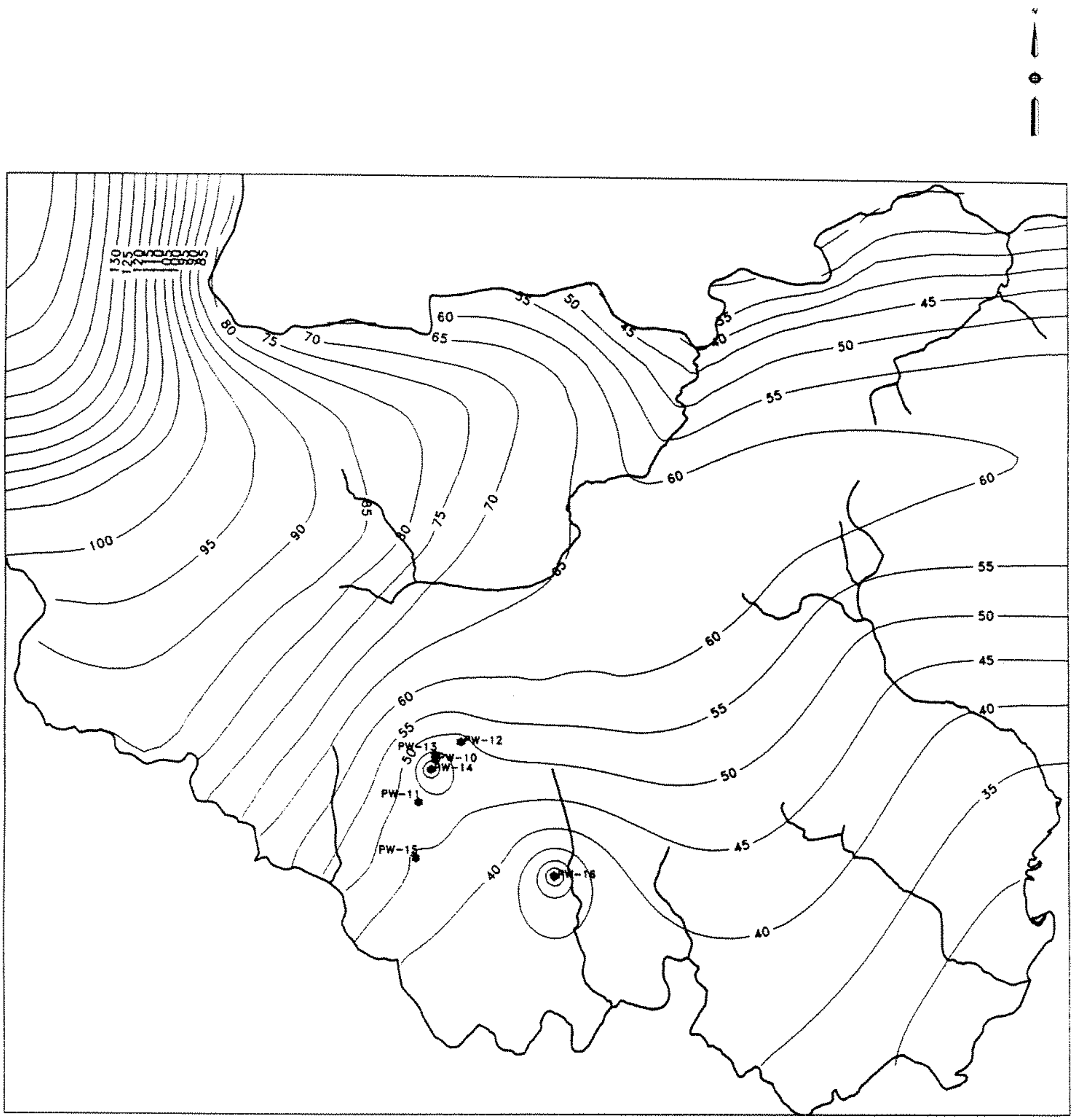

TITLE: Newark South Wellfield Aquifer Management Plan
Simulated Heads Layer 2
Allocation Rates

LOCATION: Newark South Wellfield, Newark, Delaware

TETRA TECH, INC.			FIGURE:
	CHECKED:	RMG	
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	FILE:	FigC24.WOR	
	DATE:	4-Jan-1996	

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Appendix D
Monitoring/Pumping Program Summary

APPENDIX D

South Wellfield Monitoring/Pumping Program Development Summary

SOUTH WELLFIELD MONITORING/PUMPING PROGRAM DEVELOPMENT SUMMARY

The monitoring and pumping program recommendations presented in this Aquifer Management Plan (AMP) were developed based on the evaluation of an extensive data set and a variety of analysis methods. The basis for the development of those recommendations are provided in this appendix. This appendix is organized in the following manner:

MONITORING PROGRAM DEVELOPMENT SUMMARY

A comprehensive monitoring program is necessary to collect and evaluate the primary data that are essential for effective wellfield management. An effective monitoring program requires 5 key components: a location component, a monitoring parameter component, a frequency component, a procedure component, and a data evaluation and information management component. The basis for selecting these components for the SWF is presented in the following sections.

A. MONITORING LOCATIONS

Historically, only the production wells have been monitored for various types of data (water level, pumping, and water quality) elements over the course of the operation of the SWF. Although these monitoring points have been useful in the past with providing basic information about the Columbia and Potomac aquifers of the wellfield, the data are somewhat limited in their application to the on-going evaluation of the SWF aquifer conditions. For example, water levels collected from pumping wells, although representative of actual well drawdown, are not usually representative of the surrounding aquifer conditions, given the effects of well and pump losses.

Although these pumping well data are suitable for evaluation of individual well performance, they do not provide any quantitative information regarding water levels in the aquifers. Accurate aquifer water level data are required to identify and effectively manage aquifer-wide water levels as part of the operation of the SWF.

There are numerous existing observation wells that are well suited as monitoring locations. For the Columbia aquifer, production wells 11, 13, 15, and 17, and observation wells CH-1A, CH-2A, OW-11, OW-14, OW-15, OW-17, are well positioned for monitoring. For the Potomac aquifer, production wells 12, 14, 16, and 19, and observation wells CH-1, CH-2, OW-16A, and well 10 (which is recommended to be abandoned as a production well and used as a monitoring well in the future) meet the monitoring objective. The benefit of the selection of these locations for monitoring is that they are equally distributed throughout the wellfield and are of a sufficient number to effectively monitor the Columbia and Potomac aquifers for the purposes of managing the SWF.

There are currently no vertical control survey data available for any of the primary monitoring points. For the current study, estimated vertical elevation values were used for each monitoring location, often with an elevation accuracy uncertainty of up to 5 to 10 feet in some cases. This potential of measurement error is generally too large given that the difference in water level elevations of inches or less can be an important factor in determining ground-water flow direction or rate. The benefit of obtaining accurate vertical control for all of the monitoring locations is the elimination of one element of uncertainty regarding water level data that presently exists, which will allow for a more accurate evaluation of water level conditions at the SWF. The estimated cost to complete an survey for the monitoring locations ranges from $3000 to $5000.

In summary, it is recommended that at a minimum, all production wells (wells 11, 12, 13, 14, 15, 16, 17, and 19) and associated observation wells (wells 10 [see section 4.1.2 regarding the recommendation to modify this well to an observation well], OW-11, OW-14, OW-15, OW-16a, OW-17) be specified for monitoring. Observation wells CH-1A, CH-2A (Columbia aquifer wells), CH-1 and CH-2 (Potomac aquifer wells) should also be specified for monitoring. It is further recommended that all designated monitoring locations be surveyed, at minimum, for vertical control (i.e. elevation) to ensure that all data collected can be accurately compared in the future.

B. MONITORING PARAMETERS

The basic data required to assess the effectiveness and overall operations of any wellfield are water level data, pumping rate data, and water quality data.

With regard to water level data, data collected from the pumping wells will be useful for the long-term evaluation of well efficiency, which will be used to determine when well rehabilitation should be considered. Water-level data collected from the observation well network will allow for a better long-term understanding of the hydrologic relationships within and between the Columbia and Potomac aquifers. With regard to pumping data, these data are required to be collected as part of DNREC reporting requirements.

The overall benefit of the selection of these monitoring parameters is that they include several items which are currently required to be monitored (such as water level, pumping rate, and total pumpage) as well as water quality parameters which will enable the City of Newark to effectively monitor the overall water quality of the SWF.

With regard to water quality data, the iron and manganese data are essential to the management of SWF pumping operations to minimize color, taste, or appearance problems for the water users. Total iron and manganese samples (i.e. unfiltered) should be collected in the future to be consistent with the historical data record.

In addition to iron and manganese, the measurement of specific field parameters, including pH, conductivity, dissolved oxygen [DO], and temperature may also be useful for indicating aquifer changes which can result in increased iron and manganese concentrations. For example, a decrease in pH coupled with a decrease in DO would indicate that the hydrogeochemistry of the aquifer is favorable for increased iron dissolution, and subsequent higher dissolved iron concentrations). Although these field parameters have been measured only sporadically in the past, it is expected that an expanded data base for these parameters will improve the usefulness of these relatively inexpensive data for evaluation of changing water quality in the aquifers. Based on a review of the correlation plots presented in Appendix A, there are some general trends that can be observed between the various parameters, although the statistics do not demonstrate a strong correlation. However, in general, the high iron concentrations appear to be associated with reduced pH and dissolved oxygen values.

All of these field parameters can be typically measured with a single piece of equipment (such as the Horiba U-10 water quality meter), which is available locally in Newark for rent or lease (NCP Analytical), as well as purchase. Field meters such as the Horiba U-10 are relatively easy to calibrate and operate, and can provide consistent and reliable data.

It should be noted that although oxidation/reduction potential (ORP, Eh, or redox potential) would likely be a useful field measurement parameter, it is difficult to measure in the field because of equipment complexities. Consequently, given that it is uncertain if long term Eh data could be collected with an acceptable level of reliability, it is not recommended for SWF monitoring.

The estimated costs associated with conducting a single monitoring event (as described above) are: 4 to 6 hours of field effort (City Water Department or intern staff or consultant/laboratory contractor staff) - $150 - $200; field parameter/water level measurement equipment rental - $50- $100; and laboratory cost (8 production well water samples for iron and manganese analysis) - $ 140; for a total estimated cost of $340 - $440 per event.

It should be noted that the Delaware Department of Health and Social Services (DDHS), Division of Public Health conducts quarterly and annual sampling of the wells in the SWF. Parameters monitored regularly by the DDHS include basic water quality parameters (pH, alkalinity, hardness, total dissolved solids) iron, manganese, and other inorganics (nitrate, chloride) and a suite of regulated and unregulated volatile organic compounds (VOCs). The VOCs are of special interest because several of these compounds have historically (and as recently as August 1995) been detected in several of the SWF wells, including Wells 10, 13, 14, 15, and 16, typically at concentrations below maximum contaminant levels (MCLs).

For example, the results of the most recent DDHS sampling in August 1995 revealed VOCs are present in Well 10 (dichloromethane [1.05 ug/l], chloroform [0.71 ug/l], trichloroethene [0.74 ug/l], 1,2-dichloropropane [3.94 ug/l], benzene [0.78 ug/l], dichlorodifluoromethane [7.00 ug/l], chloromethane [1.60 ug/l], chloroethane [7.60 ug/l], trichlorofluoromethane [0.52 ug/l], and 1,1-dichloroethane [1.03 ug/l]), Well 14 (chloroform [0.62 ug/l] and tetrachloroethene [4.45 ug/l]), and Well 15 (chloroform [0.50 ug/l] and tetrachloroethene [2.97 ug/l]).

Although not a focus of this AMP, **organic compounds are a primary water quality concern**, and as a result, the monitoring of these compounds is a very important component of wellfield management. Consequently, the benefit of incorporating the on-going DDHS activities into the monitoring program is that it provides additional data that are an integral part of the AMP. **It is recommended that all water quality data, specifically volatile organic compound data, collected by the Delaware Department of Health and Social Services be incorporated into the proposed monitoring program.**

In summary, it is recommended that all production wells be monitored for pumping rate, total pumpage, water level, and specific water quality parameters (field analytes - pH, conductivity, dissolved oxygen, temperature; laboratory analytes - total iron and manganese), and all designated observation wells be monitored for water level.

C. MONITORING FREQUENCY

Monthly measurements are considered necessary given that the SWF can be subject to rapid changes in water quality, as was observed with the rapid increase in iron concentrations in June 1990. Monthly monitoring should be conducted indefinitely as long as the wellfield remains in operation as a water supply source, regardless of the expected operating scenario (i.e. current , expanded, or continuous). The benefit of monthly monitoring activities in the short-term is that it will ensure that a sufficient quantity of data are available to effectively support decisions regarding wellfield operation. The long term benefit is the development of a comprehensive data base that will be an important tool to further improve and refine the management of the wellfield in the future.

It should be noted that no changes in the frequency of the ongoing DDHS sampling activities (quarterly and annual sampling events) is recommended. However, City of Newark wellfield monitoring activities should be coordinated with DDHS sampling activities to minimize redundancy and limit additional sampling and analysis costs.

It is recommended that all production and observation wells be monitored monthly for the monitoring parameters specified for the SWF.

D. MONITORING PROCEDURES

An unexpected trend in the water quality data was observed during the pump testing of wells 13, 14, 15, and 16. In general, water quality improved substantially in several of these wells (see Appendix A) over the course of the 3 to 4 day pumping event. For example, iron concentrations in Wells 14 (0.741 mg/l to 0.009 mg/l), 15 (0.114 mg/l to 0.039mg/l), and 16 (6.86 mg/l to 1.8 mg/l) dropped throughout the pump test. The cause of the trend could be related to well encrustation and or the impact of the well itself on the local geochemistry of the aquifer.

Consequently, the historical data (at least those collected during extended periods of well inactivity over the last 5 years) are likely to represent worst case values for iron and manganese data which are not entirely representative of true aquifer conditions. This uncertainty regarding the accuracy of the water quality data should be mitigated to ensure that future data collected are indeed representative of the aquifers.

This trend in the data indicate that basic well purging activities employed in past as part of sample collection activities (which entailed generally 15 to 30 minutes of purging activities at a typical inactive well) are probably not sufficient to support the collection of water quality data that are representative of true aquifer conditions. Therefore, to ensure accuracy and comparability of future water quality data, standard water quality sampling procedures should be implemented as part of the monthly monitoring activities. It follows that all monitoring activities should be conducted according to specific standard operating procedures to ensure the collection of good quality data.

The following general procedure is recommended to conduct the monthly monitoring event:

1. Visit each production well location and measure and record pumping rate (if pumping) and water level. Measure and record the water level in the associated observation well as appropriate. All water level measurements should be measured at the designated survey mark.

2. If the production well is pumping, a ground-water sample should be collected from the sample port and measured for field parameters (pH, DO, conductivity, temperature). A separate ground-water sample should be collected and submitted to the laboratory for iron and manganese analysis. Water should be allowed to run from the sample port for a period of at least 5 minutes prior to the collection of any sample.

3. If the production well is not pumping, the well should be started and pumped for a period of no less than 24 hours prior to sampling activities as described in (2). This "well purging" activity will ensure that the ground-water samples collected are more representative of the actual aquifer conditions. **This is the preferred method of sample collection.**
   However, if a 24-hour purge period is not feasible, a well-purge duration of less than 24-hours (but greater than 1 hour) can also be implemented. However, iron and manganese concentrations measured using this approach could be substantially higher than actual aquifer concentrations.

Consequently, iron and manganese concentrations collected using a shorter duration well purge event would represent a "worst-case" scenario for the SWF, and the data should be recorded and used with that uncertainty understood.

Once specific AMP recommendations are adopted by the City of Newark for the SWF, Tetra Tech will develop a detailed standard operating procedure (SOP) for monitoring activities as part of the final work product of this AMP.

3.5 DATA EVALUATION AND INFORMATION MANAGEMENT

During the development of this AMP, and extensive electronic data base was developed to compile, manage, and evaluate the large amount of historic and recent SWF data. The proposed monitoring activities will provide an extensive amount of new data that will surely compliment the historical data base.

Given the effort expended to develop the electronic data base (which is currently in an Excel 5.0 format), its usefulness as an aquifer management tool should not be overlooked or under utilized. Consequently, all SWF data collected in the future should be added to the electronic data base. The benefit of using the electronic data base in the future is that it will allow for easy access to, and interpretation of, the large amount of information available regarding the SWF. Any electronic spreadsheet type application, including Excel, Foxpro, Lotus, dBase, etc. would be appropriate for maintaining the SWF data.

The primary reason for maintaining the data base is to provide a tool to conduct quarterly and annual reviews of the operation of the SWF, with respect to the effectiveness of the AMP. The benefit of the cursory quarterly and detailed annual review of the data is the ability to adjust the AMP (based on the collection of new data and identification of new trends or features) for optimal operation of the wellfield. It is anticipated that City of Newark Water Department staff can easily update the electronic data base on a monthly basis and provide the cursory quarterly data evaluation, as well as potentially conduct the annual evaluation. Alternatively, an outside designate, such as the Water Resources Agency of New Castle County, the Delaware Geological Survey, or a consultant can be retained to conduct an annual update of the AMP. The estimated cost for the annual review and update to the AMP by an outside party ranges from $4000 to $6000, depending on the level of effort required.

In summary, it is recommended that all monitoring data be entered into an electronic spreadsheet/data base (Excel, Lotus, dBase, FoxPro, etc.) on a monthly basis, given a cursory review on a quarterly basis, and given a detailed review and evaluation on an annual basis by the City of Newark or its designate (e.g. Water Resources Agency, Delaware Geological Survey, consultant, etc.) to assess the overall status of the water level and water quality conditions of the SWF.

PUMPING PROGRAM DEVELOPMENT SUMMARY

Three SWF operational scenarios were evaluated as part of the scope to develop optimum pumping program recommendations:

Scenario 1 The current operating scenario in which the SWF is only used infrequently as a secondary water source at current production rates;

Scenario 2 A future operating scenario in which the SWF continues to be used infrequently as a secondary water supply source but at improved/expanded production rates (i.e. higher than current production rates); and

Scenario 3 A future operating scenario in which the SWF is once again utilized continuously as a primary water source at the maximum allocated pumping rates.

The pumping program must consider numerous factors including safe yield (water quantity), water quality, and operational considerations. The basis for development of the pumping program (exclusive of Well 16) based on these factors is presented in the following sections (note that the basis for the development of the pumping program for Well 16 is presented in Appendix E).

It should be noted that no pumping program will be completely successful in limiting the potential for the reoccurrence of elevated iron concentrations in the SWF. Therefore, the uncertainty factor regarding future water quality, as related specifically to iron and manganese, should be considered carefully as part of the current operating scenario and any future operating scenario which includes expanded operations of the SWF. The cause of the iron problem in the early 1990's is not well understood, but appears to be related to aquifer-wide changes in hydrogeochemistry over a large area. Further, it is unlikely that another such high iron event could be predicted (or prevented) with any confidence in the future. Therefore, **it is possible that another high iron event could occur again at the SWF.**

Although uncertainty remains regarding the future water quality in the SWF with respect to iron and manganese, as well as other parameters of concern (e.g. VOCs), **the aquifer management pumping recommendations presented in this section are designed to improve the performance and overall effectiveness of the SWF, which are expected to result in the overall improvement in the quantity and quality of the water supply.** However, these procedures can only minimize the impact of elevated iron on the City of Newark water supply -- the only way to eliminate water quality uncertainty (with respect specifically to iron) under any type of SWF operation scenario is to eliminate or restrict use during periods of elevated iron or implement an iron treatment program.

A. SAFE YIELD DETERMINATION

The definition of "safe yield" for an aquifer is complex, and continues to evolve within the discipline of hydrogeology. In general, safe yield, as originally described by Conklin (1946) is an annual extraction of water that does not:

1. Exceed average annual recharge;
2. Lower the water table so that the permissible cost of pumping is exceeded; and
3. Lower the water table so as to permit intrusion of water of undesirable quality.

Frequently, this definition is interpreted as the maximum possible pumping compatible with the stability of the supply. In practice, however, safe yield has no unique or constant value, and its value at any time depends on spacing and location of wells and their influence on the dynamics of interchange between ground water and other elements of the hydrologic cycle (Domenico and Schwartz, 1990).

Freeze and Cherry (1979) consider the use of the term "optimal yield," which is determined by the selection of the most optimal ground-water management scheme from a set of possible alternative schemes. According to Freeze and Cherry,

> the optimal scheme is the one that best meets a set of economic and/or social objectives associated with the uses to which the water is put. In some cases and at some points in time, consideration of the present and future costs and benefits may lead to optimal yields that involve mining ground water, perhaps even to depletion. In other situations, optimal yields may reflect the need for complete conservation. Most often, the optimal ground-water development lies somewhat between these two extremes.

Consequently, there are several ways to evaluate the safe or optimum yield of the SWF. However, the most fundamental component of the determination of safe yield is an assessment of the amount of ground-water recharge available for the basin of interest.

Using a water budget approach, the average amount of annual precipitation available for ground-water recharge in the SWF is approximately 12 inches for the northern New Castle County area (Mather, 1978), or approximately 25% to 27% of total available precipitation (evapotranspiration and direct surface runoff account for the remainder of the precipitation). This yields an estimated ground-water recharge rate of approximately .56 MGD per square mile, which is equivalent to approximately 390 gpm per square mile. This number represents the amount water that the aquifers in the area are generally discharging to the surface water bodies, which is equivalent to the baseflow of the local streams and rivers.

An evaluation of surface water data available for the Christina River at Cooches Bridge, which drains a 20.5 square mile drainage basin (which is inclusive of most of the SWF) indicates that the total discharge from this basin (inclusive of both baseflow and direct runoff - 25 cubic feet per second

[cfs]) averages .90 MGD per square mile. Therefore, it appears that ground water discharge to this surface water body accounts for over 60% of the total flow. A similar analysis conducted for the White Clay Creek drainage basin reveals the same general trend. It follows, therefore, that if a ground water basin is developed up to its maximum yield, the potential yields of surface-water components of the hydrologic cycle would be reduced (Freeze and Cherry, 1979). Consequently, a maximum ground-water yield should be selected which considers surface water flow considerations.

Woodruff (1978) stated that the safe yield of the wells in the central portion of the SWF (presumably for Columbia aquifer wells 11, 13, and 15) to be approximately 850 gpm (1.2 MGD), and 450 gpm (0.65 MGD) for wells in the southern portion of the SWF (presumably Columbia aquifer wells 17 and 18), with safe yield defined as the pumping rate which lowers water levels to the top of the highest well screen in the well field. However, it is not clear if the Potomac aquifer wells were evaluated as part of this safe yield calculation.

The ground-water flow model was used to evaluate the contribution of the overall area influenced by the wellfield on the baseflow of the Christina River and White Clay Creek. Initially, the model area was divided into three separate basins based on surface water drainage: Area 1 is the main SWF area draining to the Christina River in the western and southern portion of the model area(approximately 6.1 square miles); Area 2 is the area draining to White Clay Creek in the northern portion of the model area (approximately 8.8 square miles); and Area 3 is the area predominantly outside of the SWF draining to the Christina River in the eastern portion of the model area (approximately 5.2 square miles).

Using the ZONEBUDGET application (a program to compute a flow budget for subregions of a model using cell-by-cell flow data from MODFLOW), the model calculated that during an average water year (i.e. 12 inches of recharge) under steady state pre-pumping conditions, Areas 1 and 3 contribute 5.2 cfs, and 5.1 cfs, respectively, or a total of 10.3 cfs from ground-water discharge to the baseflow of the Christina River along the reach of the river along the southern edge of the model area, whereas Area 2 contributes 7.5 cfs from ground-water discharge to White Clay Creek along the reach of the creek along the northern edge of the model area.

Under steady-state maximum allocated pumping conditions (i.e. all wells [with the exception of wells 17 and 19 which are not in the model area] pumping at the maximum allocated rate - 1690 gpm or 3.8 cfs) during a average water year, the model calculated that areas 1 and 3 contribute only 2.9 cfs and 4.7 cfs, respectively, or a total of 7.6 cfs from ground-water discharge to the Christina River, whereas Area 2 contributes only 6.4 cfs from ground-water discharge to the White Clay Creek.

This exercise indicates that under maximum pumping conditions, the influence of the SWF extends into the White Clay Creek drainage basin, which results in a reduction of ground-water discharge from Area 2 by 1.1 cfs, or nearly 15%. Most of this reduction is expected to be realized in the Cool Run drainage feature. Maximum pumping conditions also demonstrate that the ground-water contribution to baseflow of the Christina River is reduced by a total of 2.7 cfs (26% reduction), or 2.3 cfs (45% reduction) and .4 cfs (8% reduction) from Areas 1 and 3, respectively.

Given the long-term average daily flow of the Christina River (28.6 cfs at Cooches Bridge) and White Clay Creek (114 cfs near Delaware Park Race Track) in the vicinity of the SWF, the impact of a reduction in Christina River baseflow by 10% (2.7 cfs) and in White Clay Creek by less than 1% (1.1 cfs) as predicted by the model is likely minimal. Consequently, the 2.76 MGD allocation rate (1915 gpm) for the SWF appears to be within the "safe yield" of the area with respect to analysis of surface-water and ground-water components. However, given a low precipitation or drought year, where flows on the Christina River (3 cfs minimum 7-day average) and White Clay Creek (25 cfs minimum 7-day average) can drop significantly, the 2.76 MGD allocation rate would greatly exceed the concept of "safe yield" for the SWF, as the reduction in ground-water discharge to the surface water bodies could have a major impact.

For example, during a period of low recharge (such as water year 1995, where total precipitation was 31.25 inches and the approximate recharge rate was only 8.75 inches), the "safe yield" would only average approximately 2.0 MGD for the year, which is 30% less than the safe yield of the typical water year (note that this assumes a linear correlation between safe yield and recharge rate, which for the purposes of this study is considered reasonable and appropriate).

In summary, the "safe yield" of the SWF will vary from year to year. Although the maximum allocated pumping rates are considered to be within the safe yield in an average water year, these pumping rates could result in a substantial reduction in ground-water discharge to local stream baseflow during prolonged periods of extended drought or low recharge.

B. SAFE YIELD PUMPING CONSIDERATIONS

The concept of safe yield is only applicable to the management of the SWF during periods of extended or continuous pumping. Under the currently operating scenario, no short-term pumping activities would stress the maximum safe yield of the wellfield (i.e. maximum allocated pumping rates), even during times of drought. However, under a continuous or extended pumping scenario, the concept of safe yield would be used to develop optimum pumping rates for various short-term and long-term drought scenarios to maintain baseflow conditions in the nearby streams and aquifer water levels.

A simple approach for managing the SWF on a continuous basis using a safe yield approach is to incorporate the Water Conditions Index (WCI) for New Castle County as the indicator for safe yield. The WCI, developed by the Delaware Geological Survey (Jordan and Woodruff, 1982) and used since 1981, is a simple empirical indicator of water conditions in northern New Castle County which incorporates precipitation, Columbia aquifer ground-water level, and streamflow data. The index includes the following classifications:

Designation	Index Value
Water Shortage	0 to 3
Potential Shortage	3 to 5
Normal Conditions	5 to 10
Above Normal (Wet) Conditions	>10

Relating the WCI value to safe yield of the SWF, any WCI value greater than 5 would indicate that the SWF could be utilized at the maximum allocated rate of 2.76 MGD. On the contrary, any WCI value less than 5 would be an indicator that the safe yield for the SWF has decreased, and pumping reductions should be considered according to the following criteria:

WCI Value	Estimated Corresponding SWF Safe Yield	Pumping Rate	% Reduction
>5.0	2.76 MGD	1915	0
4.5 - 5.0	2.48 MGD	1725	10
4.0 - 4.5	2.20 MGD	1530	20
3.5 - 4.0	1.93 MGD	1340	30
3.0 - 3.5	1.65 MGD	1145	40
2.5 - 3.0	1.38 MGD	960	50

Using this approach for a continuous pumping scenario, the average SWF pumping rate for a given month should not exceed the safe yield number associated with a given WCI value. It should be noted that the monthly WCI has been 5.0 or less only 19 times from the period January 1981 through November 1995 (or 10.6% of the time). Selected periods include:

Period	Number of Occurrences WCI</= to 5.0
January 1981 - December 1985	8
January 1984 - December 1990	6 (with 5 of the 6 in 1986)
January 1991 - November 1995	5 (all in 1995)

Therefore, it appears that under continuous pumping conditions, reduction of the SWF pumping rates would only be required on a periodic basis.

C. CURRENT SWF PUMPING OPERATIONS

The current SWF operations include two major components: 1) the continuous pumping of one well (historically Well 11) to keep water moving through the South Wellfield treatment plant (chlorination and fluoridation) and maintain pressure in the water lines; and 2) the periodic, but infrequent, pumping from one or more additional wells to provide a secondary water supply to supplement the primary supply provided by the White Clay Creek water plant.

The following sections address general well maintenance issues, the single-well continuous pumping element, and the various short-term and long-term pumping scenario elements applicable to the current use and operation of the SWF.

WELL INSPECTION/REHABILITATION

Well rehabilitation is defined as restoring a well to its most efficient condition by various treatments or reconstruction methods (Driscoll, 1986). According to the City of Newark Water Department staff, the wells in the SWF have not been rehabilitated since before 1990. No well rehabilitation activities have been considered necessary given the infrequent use of the SWF since 1990, and the generally acceptable production capacity of the SWF.

Under the current SWF operating scenario, approximately 915 gpm of wellfield capacity are reliably available from the primary production wells (excluding Wells 10, 12, 16, 17, and 19):

Well	Recent Rate
PW-11	115
PW-13	160
PW-14	260
PW-15	380
	915 gpm

In general, this production capability appears to be suitable to the meet the City of Newark's current needs for secondary water supply from the SWF, as this has been the capacity of the wellfield for the last several years. A comprehensive rehabilitation program would not provide any major benefit for current operations, and therefore, no wide-scale well rehabilitation activities are recommended under this operating scenario.

However, site-specific rehabilitation activities would be recommended if one of the major SWF production wells (such as Well 14 or 15) experienced operational problems (i.e. major reduction of well yield/specific capacity) attributable to well screen fouling/plugging, or additional production capacity was required for the SWF (see next section on Expanded Wellfield Operations).

WELL ABANDONMENT/REPAIR/RETROFIT

There are several well maintenance items (abandonment/repair/retrofit) regarding the current operation of the SWF that were evaluated as part of this study.

The following specific production well maintenance measures are recommended for the SWF under the current operating scenario:

1. **Well 10 -- This well should be removed from service as a production well and designated as a Potomac aquifer observation/monitoring well in the future.** Well 10 continues to have high iron concentrations (greater than 1 mg/l), multiple detections of VOCs (over 10 compounds detected during the August 1995 sampling event), a wellhead in need of repair, and a relatively low yield (30 gpm during recent pumping activities), which is not optimum (compared to other wells in the SWF) for continued operation.

   This well, which is only 4 inches in diameter (compared to 6 to 10 inch diameter of the other SWF production wells) appears to have initially been an observation well that was converted to a production well in 1987 to supplement the SWF production capacity. Therefore, given the overall well design, location, and condition, it is better suited as a observation/monitoring well for the SWF.

   Abandonment as a production well would be a relatively simple task, and require the removal of riser pipe, pump, and other appurtenances from the well, and the installation of a protective locking well cap. Estimated cost for production well abandonment is $500 to $750.

2. **Wells 11, 13, 14, 15, and 19 -- These wells should be repaired or retrofitted to provide a water level measurement port to allow for accurate monitoring of pumping water levels.** All of these wells currently have inoperable or marginally operable air-line measurement devices (Wells 11, 13, 14, and 15) or no other means for water level measurement (Well 19 - Well 10 also has no accessible water level measurement port at present, but if this well is maintained as a production well, a water level port should be provided). Given the importance of pumping level data for the evaluation of specific well performance (e.g. decrease in pumping levels over time) and compliance with maximum pumping level drawdown requirements, these wells should be retrofitted to ensure that these data can be accurately collected.

   Repair or retrofit of these wells would require the modification of the wellhead assembly for a measurement port (the preferred alternative) or replacement/recalibration of air-line gauges, all of which would require that the well head be disassembled. Estimated cost for repair/retrofit is $250 to $1000 per well head if completed during other types of well rehabilitation activities which require pump removal or well head disassembly (see Section 4.1.1), or $1000 to $4000 per well head if not completed during other well rehabilitation activities.

CONTINUAL PUMPING REQUIREMENTS

The current SWF operations require that a minimum flow of water be pumped through the treatment plant (chlorination) and to provide pressure in the line. Presently, Well 11 has been used to provide this continuous flow.

A matrix analysis was conducted to evaluate which well (or wells) would be most appropriate to meet this operational requirement. An evaluation matrix was developed to evaluate each SWF well with respect to several important factors which can be used to determine overall well performance and usefulness. These factors include: long-term iron and manganese concentrations, ease of operation, pumping rate, presence of VOCs, and potential capture zone impacts (see Appendix C for more discussion regarding the capture zone impacts). Each of these factors was ranked in terms of importance, and a weighting factor was developed for each. For this analysis, long-term iron concentration was ranked as most important (weighting factor of 4), followed by long-term manganese concentration and capture zone impacts (each with a weighting factor of 3), which are followed by ease of operation (weighting factor of 2) and pumping rate considerations (weighting factor of 1).

It should be noted that in this analysis, the presence of VOCs is designated a weighting factor of 1. Although the presence of VOCs is extremely important in the evaluation of the suitability of a given well, historically, VOCs have only been present in most wells at relatively low concentrations, and with the exception of a select number of wells (such as Well 15), operations in the past have not required special attention to address the VOCs. However, even though this parameter has a small weighting factor at present, should VOCs become more of an issue in the SWF, the weighting factor should be increased, and the process reevaluated.

Each well was ranked (good, intermediate, or poor) for each evaluation factor. The results of this ranking and quasi-quantitative matrix analysis is presented on the following exhibit.

Based on this generic ranking approach, Wells 17 (should it become operational - see Expanded Wellfield Operations Section for discussion regarding Well 17), 14, 13, 11, and 15 (in order of decreasing rank, but all relatively similar) are most appropriate in terms of the 6 evaluation parameters to provide continuous flow under the current operating scenario. However, this ranking approach, by itself, is not sufficient to effectively determine which wells are most appropriate for continuous use. This ranking approach must be supplemented by the application of the most recent iron, manganese, and VOC data to the individual wells to determine which is most suitable. The benchmark values to consider include iron (.3 mg/l), manganese (.05 mg/l), and VOCs (any MCL value). In general, wells with analytes exceeding these values in a given month would be ranked lower than wells not exceeding these values.

WELL EVALUATION MATRIX
CONTINUOUS PUMPING SCENARIO

WELL	Long-Term Fe Concentration	Wt	Long-Term Mn Concentration	Wt	Ease of Operation	Wt	Pumping Rate	Wt	Presence of VOCs	Wt	Capture Zone Impacts	Wt	TOTAL	RANKING
PW-10	2	4	3	3	2	2	1	1	1	1	2	3	29	(see Note 2)
PW-11	3	4	1	3	3	2	2	1	2	1	2	3	31	4
PW-12	1	4	2	3	2	2	1	1	2	1	2	3	23	6
PW-13	3	4	3	3	3	2	2	1	1	1	1	3	33	2
PW-14	3	4	3	3	2	2	3	1	1	1	1	3	32	3
PW-15	3	4	1	3	3	2	3	1	1	1	1	3	28	5
PW-16	1	4	1	3	1	2	3	1	1	1	2	3	19	8
PW-17	3	4	3	3	1	2	2	1	3	1	3	3	37	1
PW-19	1	4	1	3	1	2	1	1	3	1	3	3	22	7

Notes: 1) assume PW-17 is operable. If inoperable, ease of operation = 0.
2) PW-10 is proposed to be removed from service as a production well.

Ranking
3 - Good
2 - Intermediate
1 - Poor

Weighting factor (Wt):
4 - most important component
3 -
2 -
1 - least important component

A. **Long-Term Fe/Mn Concentration** - includes evaluation of average concentration, frequency and duration of concentration
B. **Ease of Operation** - Includes vehicle access, distance from WCCTP, safety concerns (traffic, remote location, etc.), condition of facilities (vandalism, enclosures, pumping equipment, etc.), equipment dependability.
C. **Pumping Rate** - Poor (0 - 100 GPM), Intermediate (100 - 300 GPM), Good (> 300 GPM). This is based on the DNREC allocation rate and not the current pumping rate.
D. **Presence of VOCs** - Poor (VOCs recently present); Intermediate (VOC potentially present); Good (low probability of VOCs)
E. **Capture Zone Impacts** - Poor (nearby contaminant sources); Intermediate (sources farther away); Good (no nearby sources)

For example, if the most recent monthly iron data indicate concentrations of 0.1 mg/l, 1.0 mg/l, .25 mg/l, 1.0 mg/l, and total VOC concentrations of <0.003 mg/l, 0.004 mg/l, 0.001mg/l, and 0.002 mg/l for wells 17, 14, 13, and 11, respectively, then the optimum operation sequence would be wells 17, 13, 14, and 11. This approach should be used each month to evaluate the most appropriate well for continuous operation. Overall, the use of this approach will likely result in the use of multiple wells throughout the year to provide the continuous flow.

The benefit of pumping multiple wells is that it will ensure that water of the highest quality will be incorporated into the City of Newark water supply. Using multiple wells throughout the year also provides an added benefit in that it promotes the cycling of water through different parts of the aquifer system, which may result in an overall improvement in the water quality (with respect to iron) of the aquifers, in particular, the Potomac aquifer (Well 14).

In summary, it is recommended that a variety of wells, including Wells 17 (should it become operational), 14, 13, 11, and 15 (in decreasing order of preference), be used to replace Well 11 as the designated source to provide the necessary continuous minimum flow to the treatment plant. The selection of the most appropriate well for this task should be based on a monthly evaluation of iron, manganese, and other water quality data provided by DDHS.

VARIOUS PUMPING SCENARIO REQUIREMENTS

The RFP document presented various pumping scenarios that may be used in the future, including a one to three day scenario, a one month scenario, and a three month scenario.

The results of the ground-water modeling and existing data evaluation indicate that short duration pumping of the wellfield at current maximum allocation rates, whether it be one day or three months, does not present any major concerns with respect to unacceptable expansion of well capture zones to impacted ground water at nearby sites of concern; overdraft of the aquifer (i.e. exceedence of safe yield); or detrimental aquifer drawdown affects. Consequently, any sequence developed is suitable for all pumping applications of less than 3 months in duration. However, the appropriateness of this sequence over the long-term is subject to change based on the evaluation of wellfield data in the future.

For short-term duration pumping scenario, another matrix analysis was conducted. The short-term matrix analysis is identical to the continuous pumping scenario matrix analysis with the exception that the short-term matrix analysis does not incorporate a capture zone impact factor. The results of this matrix analysis are presented on the following exhibit.

Based on this matrix analysis, the optimum sequence for short term pumping is Well 13, 14, 17 (should it become operational), 11, 15, 12, 16, and 19. It should be noted that there is no pumping duration specified with these pumping scenarios, as duration of pumping over the short-term does

WELL EVALUATION MATRIX
SHORT-TERM PUMPING SCENARIO

WELL	Long-Term Fe Concentration	Wt	Long-Term Mn Concentration	Wt	Ease of Operation	Wt	Pumping Rate	Wt	Presence of VOCs	Wt	TOTAL	RANKING
PW-10	2	4	3	3	2	2	1	1	1	1	23	(see Note 2)
PW-11	3	4	1	3	3	2	2	1	2	1	25	4
PW-12	1	4	2	3	2	2	1	1	2	1	17	6
PW-13	3	4	3	3	3	2	2	1	1	1	30	1
PW-14	3	4	3	3	2	2	3	1	1	1	29	2
PW-15	3	4	1	3	3	2	3	1	1	1	25	5
PW-16	1	4	1	3	1	2	3	1	1	1	13	7
PW-17	3	4	3	3	1	2	2	1	3	1	28	3
PW-19	1	4	1	3	1	2	1	1	3	1	13	8

Notes: 1) assume PW-17 is operable. If inoperable, ease of operation = 0.
2) PW-10 is proposed to be removed from service as a production well.

Ranking
3 - Good
2 - Intermediate
1 - Poor

Weighting factor (Wt):
4 - most important component
3 -
2 -
1 - least important component

A. **Long-Term Fe/Mn Concentration** - includes evaluation of average concentration, frequency and duration of concentration
B. **Ease of Operation** - Includes vehicle access, distance from WCCTP, safety concerns (traffic, remote location, etc.), condition of facilities (vandalism, enclosures, pumping equipment, etc.), equipment dependability.
C. **Pumping Rate** - Poor (0 - 100 GPM), Intermediate (100 - 300 GPM), Good (> 300 GPM). This is based on the DNREC allocation rate and not the current pumping rate.
D. **Presence of VOCs** - Poor (VOCs recently present); Intermediate (VOC potentially present); Good (low probability of VOCs)
E. **Capture Zone Impacts** - Poor (nearby contaminant sources); Intermediate (sources farther away); Good (no nearby sources)

not affect the overall performance of the wellfield. Further, as described for the continual pumping scenario, this optimum sequence should be reevaluated and adjusted prior to and during each well operation to account for the most recent iron, manganese, and VOC data provided by DDHS.

The benefit of this well sequence is that it identifies the wells which are likely to consistently provide ground water of the best quantity and quality based on a combination of factors including ease of operation, long-term iron and manganese concentrations, presence of VOCs, and pumping rate. The benefit of evaluating this sequence prior to each use using recent iron, manganese, and VOC data will ensure that the highest quality water is being extracted from the wellfield.

In addition to the optimum sequence considerations, to the extent that water quality permits, all of the wells in the SWF should be used more frequently than in the past as part of an attempt to cycle more water through the aquifer system, thereby potentially improving local water quality. The benefit to more frequent use of the wellfield is that cycling of the wellfield appears to be one of the factors which possibly has contributed to the improved water quality in the SWF since the early 1990's.

Given that an extensive amount of information is going to be collected during future operations of the wellfield, reevaluation of the optimal pumping sequence should be part of a periodic update (at least annually) of this AMP. The benefit of the periodic reevaluation of the sequence is that it provides the ability to adjust the pumping scheme for optimal operation and performance of the wellfield. As stated previously for the monitoring data and evaluation recommendation, it is anticipated that City of Newark Water Department staff can conduct most of the cursory evaluation of the data on a periodic basis as well as potentially the annual evaluation, with some supplemental support from outside designates. Estimated cost for the periodic review and update of the AMP by an outside party ranges from $4000 to $6000.

It is recommended that the optimum sequence for well operations during the one to three day, one month, and three month pumping scenarios be Well 13, 14, 17 (should it become operational), 11, 15, 12, 16, and 19. This performance sequence is a general guide only and should be reevaluated and adjusted prior to and during each well operation to account for the most recent iron, manganese, and other water quality data provided by DDHS. It is further recommended that this sequence be reevaluated and updated for applicability on a quarterly basis if the wellfield is used extensively, or on an annual basis if the wellfield is used only periodically, by the City of Newark or its designate. It is also recommended that all SWF wells, to the extent that water quality permits, be used more frequently than in the past as part of an attempt to cycle more water through the aquifer system, thereby potentially improving local water quality.

D. EXPANDED SWF PUMPING OPERATIONS

The expanded SWF operation scenario would include one major component beyond that specified for current SWF operations: the increase in the reliable production capacity of the SWF. As stated earlier in this section, the current reliable production rate of the SWF is approximately 915 gpm, which is provided primarily by wells 11, 13, 14, and 15 -- this is only 48% of the DNREC allocated production rate (1915 gpm) for the SWF!

The technical discussion and recommendations presented in the following sections are designed to increase the reliable production capacity of the SWF wells (excluding Well 16, which is discussed separately in Appendix E) by nearly 35% (315 gpm), to an estimated capacity of 1,230 gpm (which is 64% of the DNREC allocation rate) under normal operating conditions, or by nearly 75% (685 gpm), to an estimated capacity of 1,600 gpm, under emergency drought conditions.

The primary means of increasing capacity under the expanded SWF operations scenario is through well inspection/rehabilitation activities and well maintenance/repair/retrofit activities, which are described in the following sections.

WELL INSPECTION/REHABILITATION

Based on the results of recent pumping activities, it appears that the current well yields for most of the SWF are well below the DNREC maximum allocation rate:

Well	DNREC Allocation	Recent Rate	Difference
PW-10	60 gpm	30	30
PW-11	150	115	35
PW-12	75	55	20
PW-13	180	160	20
PW-14	325	260	65
PW-15	425	380	45
PW-16	475	400	75

Although this reduced efficiency has not been an operational problem given the sporadic pumping in the SWF, rehabilitation of the wells could improve the yields of certain wells by 15 to 20% over current pump settings. For example, the yields at Well 11 (current production rate of 115 gpm vs. allocated production rate of 150 gpm), Well 13 (current 160 gpm rate vs. 180 gpm allocated rate), Well 14 (current 260 gpm rate vs. 325 gpm allocated rate), and Well 15 (current 380 gpm rate vs. 425 gpm allocated rate) could all probably be improved through well rehabilitation activities, thereby increasing the existing production capability of the SWF by approximately 165 gpm. The benefit of well rehabilitation in the short-term is that it will ensure maximum production capability from the SWF when needed, as well as reduce iron problems specifically related to well conditions (i.e. chemical incrustation and biofouling). The long-term benefit includes the overall increase in the water supply capacity of the SWF.

Well inspection and rehabilitation typically involves the removal and retrofit of pumps; down-hole television inspection of the well casing and screen; and acid treatment combined with scouring and surging to address well encrustation. It should be noted that in the short-term, well rehabilitation may not be necessary for all wells (such as Wells 19, 16, and other wells used infrequently); however, all wells should be addressed as part of the long-term wellfield management plan. Estimated cost for well inspection/rehabilitation (including oversight activities) ranges from $2,000 to $6,000 per well, based on overall pump and well condition.

Therefore, it is recommended that all primary production wells (11, 13, 14, and 15) be inspected and rehabilitated to improve overall well efficiency and increase wellfield production potential.

WELL MAINTENANCE/REPAIR/RETROFIT

The following specific production well maintenance/repair/retrofit measures are recommended for the SWF under the expanded operating scenario:

1. **It is recommended that Well 17 should be repaired (it reportedly had been pumping sand) and placed back into service as part of the SWF to increase wellfield production capability.** Well 17 has historically had a good yield (150 gpm allocated rate with total historical reported capacity up to 400 gpm), good water quality (iron and manganese concentrations of less than 0.3 mg/l and 0.05 mg/l, respectively), and has few, if any, capture zone impacts to consider (i.e. the well is located in a relatively isolated area, with no major commercial or industrial land-uses nearby), thereby making this well very attractive for reliable water supply. Repair of this well would require a down-hole television inspection of the well casing to investigate the extent of the problem prior to the determination of the corrective action. Estimated cost for repair of this production well cannot be determined until the specific problem is identified, however, it is expected to range from $1000 to $10,000.

   It should be noted that the recommendation to place Well 17 back into service is conditional because of the location of this well within the right-of-way of the proposed Old Baltimore Pike/Newtown Road, SR896 to SR72 connector road. According to the DELDOT Capital Transportation Improvement Program (CTIP), Fiscal Years 1996 - 2001 report (DELDOT, 1995a), design on this roadway is slated for fiscal year 1998, with construction (if funded) planned for some period after the year 2001. However, neither the draft WILMAPCO FY 1997-1999 Transportation Improvement Program (TIP) project listing (WILMAPCO, 1996) nor the

DELDOT CTIP, Fiscal Years 1997 - 2002 (DELDOT, 1995b) presently include this connector road, indicating that the project may have been placed on hold indefinitely or cancelled. Should the project ever proceed, the well would have to be abandoned and potentially replaced.

Consequently, the ultimate decision to return Well 17 to service should consider a cost/benefit or present worth analysis approach which incorporates: the cost of repairing and operating Well 17; the availability and cost to obtain water from other alternative sources; and the time to potential well abandonment (greater than 5 years from present). However, given the lengthy delay anticipated until the start of construction (i.e. greater than 5 years, with a possibility that it may never be constructed), it is likely that the cost/benefit of returning Well 17 to service is very feasible and viable at this time.

2. **It is recommended that all well pumps be inspected and repaired/retrofitted to ensure that the pump capacity exceeds (by at least 20%) the DNREC allocation limits for each well. Further, it is also recommended that larger sized pumps be considered for Well 13 (300 gpm) and Well 17 (400 gpm) for expanded production capacity during drought emergency conditions.** The benefit of having pump capacity that exceeds the DNREC allocation limit for any given well is the ability to ensure that the wells can produce at the allocation limit during periods of low water level, well specific capacity reduction, or other operational problems, all of which can contribute to an increase in the pressure head, which in turn will reduce pumping rates. Historically, the City of Newark has installed lower capacity pumps in these wells to prevent the overdraw of the aquifer and to simplify the operation of the wellfield; however, higher pump capacity for each well will provide more flexibility with the overall production capacity of the SWF. The estimated cost of retrofitting well pumps ranges from $500 to $3000 per pump.

   With regard to increased pump capacity for Well 13 (300 gpm) and Well 17 (400 gpm), these wells have historically demonstrated well yield capacity (based on the review of original pump test data) above their DNREC allocation rates of 180 gpm and 150 gpm, respectively. Although these higher rates are not believed to be sustainable for long-term operation of these wells, they could operate safely at higher capacities for a period of several days to several weeks (1 to 3 weeks) during emergency drought conditions where allocation rates are temporarily suspended (as occurred in September 1995). The benefit of higher capacity pumps in these wells is that an estimated 370 gpm of additional yield could be derived from these wells in an emergency situation. The estimated cost of replacing the pumps for these wells is $2000 to $3000 per pump.

   It should be noted that no other primary SWF well (including wells 11, 14, and 15) appears to have this additional emergency capacity based on a review of historical pump test data, as the current allocation rates for these wells are near their maximum capacity.

CONTINUAL PUMPING REQUIREMENTS

It is recommended that Well 17 (once returned to service) be incorporated into the sequence of wells proposed to replace Well 11 as the designated source to provide the necessary continuous minimum flow to the treatment plant. With Well 17 operational, the preferred operation sequence for this continuous pumping task is Well 17, 14, 13, 11, and 15. However, as specified previously, the selection of the most appropriate well for this task should be based on a monthly evaluation of iron, manganese, and other water quality data provided by DDHS.

The benefit of using Well 17 as one of the primary multiple wells to provide the continuous flow for the treatment plant is that it has historically provided water with consistently high quality (e.g. low iron). Although all of the primary wells are proposed to be used periodically to provide the continuous flow, Well 17 would provide probably the best quality and optimum quantity of water for this purpose.

VARIOUS PUMPING SCENARIO REQUIREMENTS

It is recommended that Well 17 (once returned to service) be incorporated into the sequence of wells proposed for the one to three day, one month, and three month pumping scenarios. With Well 17 operational, the optimum sequence for operations is Well 13, 14, 17, 11, 15, 12, 16, and 19. This performance sequence is a general guide only and should be reevaluated and adjusted prior to and during each well operation to account for the most recent, iron, manganese, and other water quality data provided by DDHS.

Based on the matrix analysis presented in last section, Well 17 is only listed third in the optimum pumping sequence because of its remote location. This remote location makes the operation of this well more difficult than some of the other wells in the SWF. However, because of its historic good water quality and lack of capture zone impacts, Well 17 can be an extremely reliable production well, in terms of quality and quantity, for the SWF.

E. CONTINUOUS WELLFIELD OPERATIONS

Continuous SWF operations would involve a change in the overall status of the SWF from a secondary water supply source to a primary water supply source for the City of Newark as part of a plan to reduce dependence on water provided by other purveyors. This would require that several, or potentially all, of the production wells in the SWF are returned to some type of continuous operation. The SWF is currently allocated by permit from the Delaware Department of Natural Resources and Environmental Control (DNREC) for up to 1915 gpm, or 2.76 million gallons per day (MGD), which is considered to be the "safe yield" for the wellfield during the average water year. Once again it should be noted that there is long-term uncertainty regarding water quality that should be fully considered as part of any plan to expand operations at the SWF. A treatment program remains the only way to eliminate the water quality uncertainty issue under the continuous wellfield operation scenario.

There are two important elements to pumping under continuous conditions: safe yield considerations, and capture zone considerations. Both of these elements have been discussed previously in this appendix as part of the Safe Yield Pumping Considerations Section, and the Continuous Pumping Scenario Section, and the rationale for optimum well selection and pumping concerns are presented in those sections.

The following recommendations for pumping approaches for continuous operations are based on several considerations, including ease of operation, well capacity, historical water quality, and capture zone analysis. The concept of safe yield for the SWF was also taken into consideration during the development of the pumping recommendations.

It is recommended that any continuous wellfield operations be maintained within the allocated 2.76 MGD pumping rate, which is determined to be the "safe yield" of the SWF in an average water year. However, during long-term periods of water shortages, as defined by the Water Conditions Index (WCI) for Northern New Castle County, wellfield operations should be reduced to specified rates to ensure conservation of the water resources in the basin. The benefit of operating the wellfield within the safe yield in the long term will ensure that the SWF aquifer system is not overdrafted and adequate ground-water discharge rates to local streams and rivers are maintained. An added benefit of working within the current allocation rates is there are no additional permitting requirements to bring the SWF back to full production potential.

The proposed wellfield operation rates are as follows:

WCI Value	Estimated Corresponding SWF Safe Yield	Pumping Rate	% Reduction
>5.0	2.76 MGD	1915	0
4.5 - 5.0	2.48 MGD	1725	10
4.0 - 4.5	2.20 MGD	1530	20
3.5 - 4.0	1.93 MGD	1340	30
3.0 - 3.5	1.65 MGD	1145	40
2.5 - 3.0	1.38 MGD	960	50

Using this approach for a continuous pumping scenario, the average SWF pumping rate for a given month should not exceed the safe yield number associated with a given WCI value.

For example, reduced pumping would have been recommended during the 1995 drought period, where a potential water shortage (WCI value between 5.0 and 3.0) was recorded in February (4.89), June (3.59), July (3.68), and September (3.63), and a water shortage (WCI value less than 3.0) was recorded in August (2.79). Therefore, if the SWF had been operating in a continuous mode (i.e. being operated as a primary water supply source) during 1995, a reduction in pumping rates would have been recommended to be consistent with the "safe yield" of the aquifer system. A 10% reduction of the pumping rates below the allocated limit would have been recommended during March 1995 (to address February 1995 WCI value), whereas a 30% reduction would have been recommended during July, August, and October 1995 (to address June, July, and September 1995 WCI values), and a 50% reduction would have been recommended during September 1995 (to address the August 1995 WCI value).

Although it is important that the appropriate safe yield be maintained under a long-term continuous pumping scenario (i.e. periods greater than 3 to 6 months) to minimize stress on the aquifer system, it is probably not as important to maintain safe yield under short-term continuous pumping scenarios (less than 3 months duration, for example), even during periods of drought (such as the case in late summer/early fall 1995). The results of the ground-water model indicate that continuous short-term pumping scenarios do not extensively stress the aquifer system, as long as the aquifer system has the opportunity to recover between high capacity pumping periods.

It is recommended that the optimum sequence for any long-term continuous wellfield operations for specific wells be Well 17, 13, 14, 11, 15, 12, 19, and 16. As with all other pumping scenarios, this performance sequence is a general guide only and should be reevaluated and adjusted during operations to account for the most recent iron, manganese, and other water quality data provided by DDHS. The benefit of this general sequence is that it takes into account capture zone elements for each well, which for the highest ranked wells, will likely result in better water quality as the long-term pumping of these wells are expected to minimize the potential impacts from known ground-water problem areas in the SWF area.

Appendix E
Well 16 Assessment Study

APPENDIX E

Well 16 Assessment

WELL 16 ASSESSMENT

Well 16, which is screened in the Potomac aquifer, was formerly the most highly productive production well in the SWF, with a given allocation of 475 gpm (or a capacity to provide over .680 MGD), and a yield of over 600 gpm. This well pumped nearly continuously from July 1977 (when it was placed into service) until July 1990, at which time it was essentially removed from service because of unacceptable high iron concentrations (2 to 6 mg/l). Since that time it has not been used for City of Newark water supply, although during the drought of early Fall 1995, this well was pumped to a nearby surface water feature to supplement surface water flow in the Christina River.

Physical Setting and Iron Problem

The current iron problem associated with the Potomac aquifer in the SWF is a function of two primary elements - the mineralogy of the aquifer material and the hydrogeochemistry of the aquifer water. The mineralogy of the aquifer material is the fundamental source of the iron (siderite, pyrite, and other iron oxyhydroxide compounds), whereas the aquifer water hydrogeochemistry is what actually controls the release of dissolved iron to the ground water. The cause of the current iron problem appears to be a combination of a natural condition and specific aquifer-wide changes in hydrogeochemistry that resulted in the exceptionally high iron concentrations during the period 1989-1991.

Elevated iron concentrations are a common occurrence in the Potomac aquifers in New Castle County (Martin and Denver, 1982) and in other nearby states (Langmuir, 1969; Pyne, 1995) because of the natural combination of mineralogy and geochemistry which promotes the dissolution of iron in certain geochemical zones within the aquifer. Historically before the 1989 - 1991 time period, iron concentrations at the SWF were consistently higher in the Potomac aquifer wells (especially well 19 which was never used extensively because of high iron concentrations) as compared to Columbia aquifer wells. Specifically, water quality data collected from Well #16 during the late 1960's through the mid-1980's reveal that iron was often detected at concentrations above the 0.3 mg/l SMCL, although usually only in a range of .3 to .8 mg/l (which is much less than the 1 to 12 mg/l iron concentrations detected after December 1989). Therefore, elevated levels of iron are not an unexpected feature in the Potomac aquifer. It should be noted, however, that although iron concentrations in the range of 1 to 10 mg/l are common in the Potomac aquifer in other parts of New Castle County, concentrations in this range were not historically common at the SWF prior to 1989 - 1991.

The cause of the aquifer-wide changes in hydrogeochemistry which triggered the high iron concentrations in both the Columbia and Potomac aquifers is not well understood. It is probably related to a complex combination of factors, with both large and small scale components. On the large scale, changes in climate, which affected the quantity/rate and geochemistry of recharge water to the entire aquifer system, is probably a principal cause of the aquifer-wide changes. On the smaller scale, factors such as SWF pumping rates and pumping levels, localized spills and releases of hazardous chemicals and wastes (which result in localized areas of elevated iron concentrations), and general land-use in the area all probably contributed somewhat to the problem, but it is uncertain to what extent any specific small-scale factor contributed to the overall iron problem.

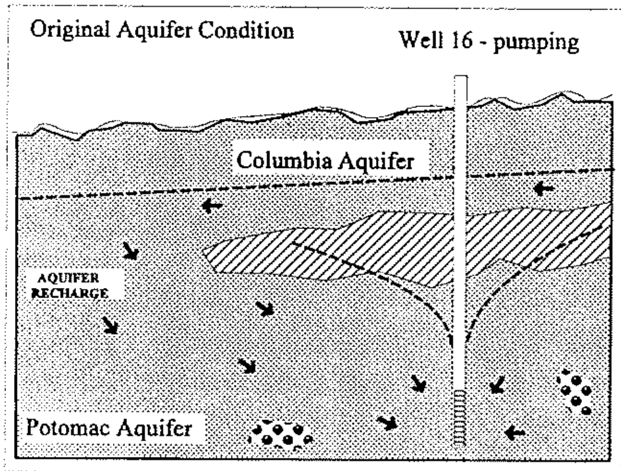
Regardless of what precipitated the iron problem in 1989, an elevated iron problem remains in the Potomac aquifer of the SWF. The primary reason that the iron remains a problem in the Potomac aquifer is that the hydrogeochemical conditions in the aquifer remain favorable for iron dissolution. This is in sharp contrast to the Columbia aquifer at the SWF, which has largely recovered from the high iron problem. An illustration of the historical and current conditions of the SWF aquifer system near Well 16 are presented on the following page.

It is believed that the Columbia aquifer has recovered from the iron problem because of major changes in the hydrogeochemistry within the aquifer, which is directly related to the nature of recharge and ground water flow through the aquifer. Given that the Columbia aquifer receives direct and relatively rapid recharge from precipitation (i.e. the aquifer responds within 30 to 40 days of a major precipitation event), provides baseflow to the Christina River and White Clay Creek, and has been pumped more extensively than the Potomac aquifer since 1989, ground-water moves through this aquifer system relatively quickly (as compared to the Potomac aquifer), at rates of 100's of feet per year. As a result of this "flushing of water" through the aquifer, conditions are no longer suitable for the extensive dissolution of iron in this aquifer, and iron is no longer a problem.

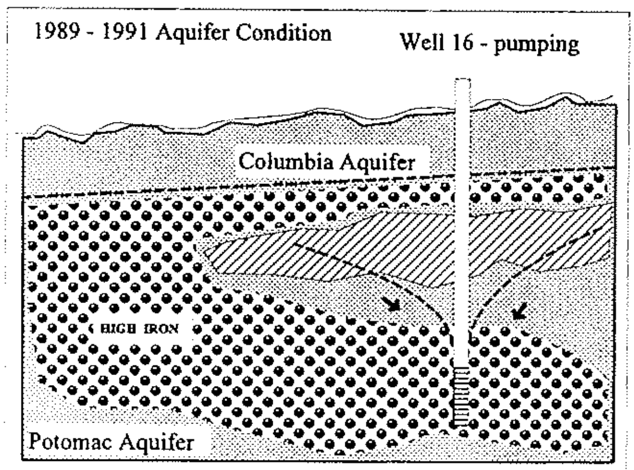
The movement of water through the Potomac aquifer is much different than the movement of water through the Columbia aquifer. Under non-pumping, natural conditions, the Potomac aquifer receives recharge from the overlying Columbia aquifer, either by leakage through the confining bed (where present) or by direct recharge where the confining bed is absent. The natural ground-water flow direction in this aquifer is "down-dip," or generally toward the Atlantic Ocean, with no major surface water body discharge points. Ground-water movement in this aquifer is very slow, typically on the order of only 10's of feet per year. However, during pumping conditions, ground-water movement can increase considerably.

The slow ground-water movement in the Potomac aquifer is one of the primary reasons that this aquifer continues to have high iron concentrations, as the hydrogeochemistry of the aquifer is not changing very quickly. **Consequently, it appears that iron concentrations in the Potomac aquifer (specifically as related to Well 16) can only be reduced in the short-term (i.e. months or years vs. decades) by inducing changes in aquifer geochemistry.**

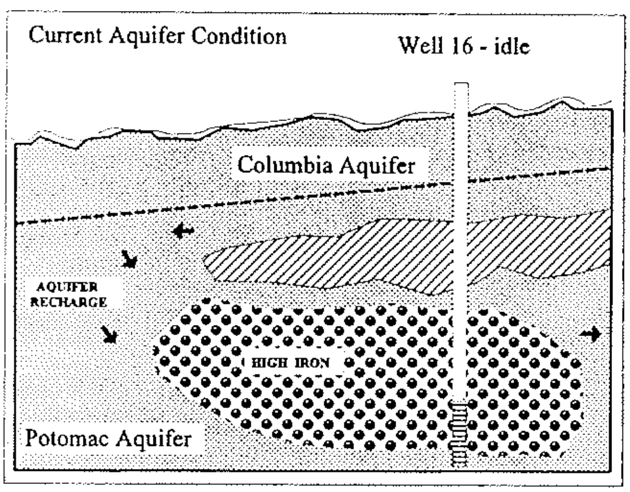
There are two potential options available to induce changes in aquifer geochemistry with respect to Well 16: Aquifer Storage Recovery (ASR) and Managed Pumping. A detailed assessment of these aquifer control options, as well as an iron treatment plant option (which is an alternative option for addressing the iron problem) is provided in the following sections. A brief comparative analysis is also provided in the last section of this appendix.



Original Aquifer Condition: Both the Columbia and Potomac aquifers are used for water supply in the SWF. Iron concentrations are very low in the Columbia aquifer, with occasional higher iron concentrations (.3 to .8 mg/l) in the Potomac aquifer. Pumping in the Potomac aquifer induces more recharge and ground-water flow from the Columbia aquifer into the Potomac aquifer, especially in areas where the confining layer is absent.



1989 - 1991 Aquifer Condition: Both the Columbia and Potomac aquifers are used for water supply in the SWF. Initially, changes in the Columbia aquifer hydrogeochemistry result in elevated concentrations of iron in the Columbia aquifer. Ultimately, iron concentrations in the Potomac aquifer also increase as a result of hydrogeochemical changes caused by the induced recharge and ground-water flow from the Columbia aquifer.



Current Aquifer Condition: The Columbia aquifer is the primary SWF water supply source; Well 16 is idle. Iron concentrations have decreased considerably in the Columbia aquifer because of favorable hydrogeochemical conditions, likely the result of the natural movement of recharge and ground-water through this aquifer (flushing) and possibly pumping activities. On the contrary, iron concentrations remain high in the Potomac aquifer because of hydrogeochemical conditions, and there is little movement of recharge and ground water through this aquifer given slow natural flow velocities and lack of pumping. Iron concentrations are expected to naturally diminish over time as recharge water from the Columbia aquifer water mixes with and moves through the Potomac aquifer, thereby changing the hydrogeochemistry. However, this natural process will be an extremely slow (10's to 100's of years).

A. AQUIFER STORAGE RECOVERY (ASR)

Aquifer storage recovery was first introduced as a potential option to address the iron problems associated with Well 16 as part of the Newark South Well Field Evaluation Report (Duffield Associates and CH2M Hill, 1994). As stated in the Evaluation Report:

> ASR is a relatively new water supply management concept in the United States whereby treated drinking water is recharged to a suitable storage aquifer through wells when treatment and supply facility capacity exceeds demands. The water is recovered from the same wells when demand exceeds treatment and supply capacity. Typically, the only water treatment required before releasing the water to the distribution system is disinfection.
>
> Converting Well 16 to an ASR well offers many advantages to Newark in terms of a conjunctive- use water system.
>
> 1. During recovery periods Well 16 could be pumped at its maximum capacity of 450 to 500 gallons per minute.
> 2. Other than disinfection (e.g. well head chlorination), no further treatment may be required for the water recovered from Well 16.
> 3. Recharge and recovery cycles could be scheduled to coincide with maximum demands, and production reductions at the surface water treatment facility, which is required to maintain a minimum downstream diversion rate.
> 4. Water purchased under a specified rate contract from Wilmington Suburban Water Company (United Water) could be put to maximum use by recharge Well 16.

In further correspondences regarding Well 16 and ASR (Duffield, 1994), it is stated:

> The conversion of PW-16 to an ASR well is considered an option if elevated iron concentrations are not reduced through managed pumping. ... there are numerous operational and economic advantages for ASR at PW-16...As an ASR well, PW-16 could be pumped at its maximum capacity, possibly 500 gpm during periods of high demand. Operationally, recharge and recovery cycles would be scheduled to coincide with Newark's peak supply demand periods, and with the imposed production reductions because of low creek levels at the surface water treatment facility on White Clay Creek. Water purchased from Wilmington Suburban Water Company on a set minimum and excess flows from Newark's surface water treatment plant could be optimally utilized.
>
> ASR allows water purveyors like Newark to recharge aquifers with wells when supply is high and recover water from the same wells to meet peak demands. Other than disinfection, no treatment of the recovered water is typically required. The ASR well would provide a reliable, high capacity, source of good quality water for peak period and emergency demands. Excess flows within the Newark system would be better managed and utilized.
>
> ...the order of magnitude costs for the conversion of PW-16 to an ASR well are approximately $400,000. The tasks involved in the ASR conversion include the following:
>
> - coring and monitoring well installation
> - core laboratory testing
> - geochemical analysis
> - permitting
> - wellhead design, construction, and oversight
> - aquifer testing
> - ASR test cycles
> - final report

The cost most subject to variation is the cost for construction of the wellhead and associated chemical feed systems. Although PW-16 is housed in a fairly substantial sized building, modifications may be required to accommodate the wellhead and chemical feed systems. The estimate assumes present piping to PW-16 can be used to convey recharge and recovery water to and from the wells. The only assumed pipeline costs are for tying PW-16 to the Wilmington Suburban pipeline.

It is likely that ASR could be a viable and successful option for Well 16, as this method has been shown to be effective in controlling iron and manganese concentrations at several Atlantic Coastal Plain sites, including those in Chesapeake, Virginia (Upper and Middle Potomac aquifers), Swimming River, New Jersey (Upper Potomac Raritan Magothy aquifer), and Wildwood, New Jersey (Cohansey aquifer). **However, the success of ASR at these sites have included a long and often complex process to refine the operations and maintenance of the ASR system to achieve optimal ASR performance (Pyne, 1995).**

The biggest technical challenges associated with the implementation of ASR at Well 16 include:

- ASR Field Testing and Feasibility Assessment Requirements
- Recovery Efficiency
- Duration of Time for Water Quality Improvement
- Well Plugging/Redevelopment
- Operations and Maintenance Requirements
- Cost Considerations

It should be noted that most of the information and analysis presented in this ASR section is derived exclusively from a recently published book entitled "Groundwater Recharge and Wells - A Guide to Aquifer Storage Recovery" by David Pyne (1995). This book is the first major work ever published in the field of ASR, and is a compilation of the knowledge and experience that has been gained from the 20 operational and 40 planned ASR sites in the United States. This is the primary reference for this section.

A.1 <u>ASR Feasibility Assessment and Field Testing</u>

Although ASR is considered feasible for Well 16, additional preliminary field testing and feasibility assessment would be required to determine the technical details of the ASR feasibility, and to modify the wellhead for extended ASR testing. Additional technical data that would be required include:

- additional aquifer coring to determine aquifer mineralogy to assess potential for plugging and geochemical fouling;

- additional monitoring well installation (1 to 2 additional wells) to establish long-term monitoring points to assess the dispersive mixing of the injected water and mixing due to advective movement;

- additional pump testing to assess specific hydraulic parameters in the Potomac aquifer as related to recharge/injection activities and baseline water quality sampling;

- detailed characterization of the proposed recharge water to determine the necessity for pre-treatment (likely pH) prior to recharge into Well 16;

- hydrogeologic simulation modeling to determine: constituent concentrations during recovery and to estimate percentage recovery; geochemical reactions to evaluate mixing between stored water and native water in the presence of aquifer minerals;

- an assessment of the piping system associated with Well 16 and the SWF to identify the most likely connection with the recharge water source;

- an assessment of the suitability of the current Well 16 submersible pump to perform both extraction and injection duties given that some submersible pump manufacturers do not recommend the use of their products for injection, as well as an assessment of wellhead modifications (such as recharge and recovery pressure control valves, air/vacuum release valves, recharge and recovery flow rate, water level measurement, restart delay, etc.) that are needed to facilitate field testing;

- DNREC permit preparation and submission to operate Well 16 as an injection well -- it should be noted that a well of this type has never been permitted by DNREC before, and although the ASR concept was not anticipated to pose a permitting problem (according to Bruce Patrick, DNREC Ground-Water Discharges Branch, telephone conversation - 2/15/96), some additional steps may be required during the permitting process; and

- DNREC permit preparation and submission to discharge Well 16 cycle testing water to waste -- an NPDES permit may be required if the testing duration is lengthy (up to a period of 2 years) and substantial amounts of waste water are generated.

Once the initial field investigation and feasibility assessment are completed, the wellhead can be reconfigured and the ASR field testing and cycle program implemented. ASR cycle testing would include the following tasks:

- An initial series of short ASR cycles (2 to 3 cycles or 1 to 2 weeks in duration) will be performed to provide a quick appraisal of plugging potential and geochemical reactions, with supporting intensive hydraulic and water quality data collection;

- Pending the results of the initial series of cycle tests, a series of longer term ASR cycles will be performed to refine system operation. If the initial tests indicate severe plugging potential or adverse geochemical reactions, then pre-treatment of the recharge water may be considered before proceeding further. However, if the initial tests indicate that recharge water and native aquifer water are relatively compatible, a series of 4 to 10 cycles would be performed to evaluate recovery efficiency and assess aquifer-wide changes. Finally, the last cycle would be conducted to mimic the expected operational cycle frequency and duration for Well 16.

It should be noted that the design of the ASR testing program would be based on the expected future use of Well 16. For example, if Well 16 is to be used for only short-duration (2 to 3 weeks) pumping 3 to 4 times per year, the ASR testing program would be very different than a scenario which included more extended duration (2 to 4 months or continuous) pumping throughout the year.

A.2 Recovery Efficiency

Recovery efficiency is defined as *the percentage of the water volume stored that is subsequently recovered while meeting a target water quality criterion in the recovered water*. Recovery efficiency is an extremely important factor in the assessment of ASR feasibility, and is highly dependent on the differences in water quality between the recharge and native aquifer water and the extent of mixing between the two, and the potential for aquifer plugging because of the differences in water quality. If recovery efficiency is unacceptably low (either as a result of poor water quality or extensive aquifer plugging) then ASR would not be effective in addressing the iron problem at Well 16. Therefore, the source and nature of the recharge water is a very important component in determining the expected ASR recovery efficiency.

The ground water of the Potomac aquifer in the vicinity of Well 16 is presently characterized as: having a relatively low pH (4 to 5), a low dissolved oxygen content (0 to 2 mg/l), and often under reducing conditions (negative redox potential). The presence of iron in the ground water is likely controlled primarily by the relative concentrations of dissolved oxygen and H^{+1} ions (which is directly related to pH), the overall oxidation/reduction potential, and the specific aquifer mineralogy.

Potomac aquifer ground water chemistry can be quite different than the chemistry of the potential recharge sources which include: other SWF Potomac aquifer wells (Well 14); SWF Columbia aquifer wells (Wells 11, 13, 15, and 17); City of Newark Water Treatment Plant (treated surface water derived from White Clay Creek); United Water interconnection (treated surface water derived from White Clay/Red Clay Creek); and Artesian Water interconnection (treated surface/ground-water from several sources). A summary of the basic water quality characteristics of the various recharge sources is presented below ([a] note City of Newark WTP, United Water, and Artesian Water data provided by Delaware Health and Social Services - Health Systems Protection [2/27/96]):

	pH	TDS	DO	Fe
Potomac Aquifer - Well 16	4.0 - 5.0	60 - 80 mg/l	0 - 2 mg/l	3 - 10 mg/l
Potomac Aquifer - Well 14	5.1 - 5.5	100 - 200 mg/l	4 - 6 mg/l	.009 - .04 mg/l
SWF Columbia Aquifer Wells	4.8 - 6.0	80 - 170 mg/l	4 - 10 mg/l	.009 - .1 mg/l
City of Newark WTP (a)	5.0 - 7.0	136 mg/l	NR	NR
United/Artesian Interconnection (a)	7.0 - 8.0	250 - 350 mg/l	NR	NR

An assessment of the feasibility of these sources for Well 16 ASR recharge, with respect to impact on recovery efficiency follows:

Other SWF Potomac Aquifer Wells

At present, Well 14 is the only SWF Potomac aquifer well that is of suitable water quality (i.e. low iron and manganese) to be considered as a potential recharge source.

Advantages:

- Overall similar water chemistry as it is derived from the same aquifer
- Good dissolved oxygen content and pH
- Local proximity

Disadvantages:

- Potential for increased iron concentration in the future
- pH may not be high enough to address low residual iron concentrations; consequently pH adjustment may be required for optimum operation

SWF Columbia Aquifer Wells

Columbia aquifer wells 11, 13, 15, and 17 all have suitable water quality to be considered as a potential recharge source.

Advantages:

- Somewhat similar water chemistry to Potomac aquifer water
- High dissolved oxygen content and pH as compared to Potomac aquifer water
- Local proximity

Disadvantages:

- Potential for increased iron concentration in the future
- pH may not be high enough to address low residual iron concentrations; consequently pH adjustment may be required for optimum operation
- Manganese concentrations may be a concern

City of Newark Water Treatment Plant

The City of Newark Water Treatment Plant obtains water from White Clay Creek and is the primary water supply source for the City of Newark.

Advantages:

- Dependable surface water supply source during likely ASR recharge periods (i.e. periods of low use/high availability of water resources)
- Low iron concentration in treated water, with good dissolved oxygen content
- Excess capacity during certain times of the year

Disadvantages:

- Surface water treatment requirements (use of floc for removal of suspended solids) may promote well plugging
- pH may not be high enough to address low residual iron concentrations; consequently pH adjustment may be required for optimum operation
- May require extensive pipeline work to convey recharge water directly to Well 16

United Water/Artesian Water Interconnections

Both United Water and Artesian Water Company provide water to the City of Newark through interconnections. United Water provides water through interconnections near the intersection of Kirkwood Highway and Red Mill Road and along Academy Street near the Amtrak corridor. Water provided at these interconnections is derived from both the Stanton plant (White Clay Creek source) and the Christiana Plant (Christina River source). Artesian Water provides water to the City of Newark on an emergency basis through an interconnection at Polly Drummond Road. This water is derived from a series of surface-water and ground-water sources.

Advantages:

- Dependable surface water supply source during likely ASR recharge periods (i.e. periods of low use/high availability of water resources)
- Low iron concentration in treated water, with good dissolved oxygen content and high pH (7.2)

Disadvantages:

- Surface water treatment requirements (use of floc for removal of suspended solids) may promote well plugging
- Purchase of water for recharge required
- May require extensive pipeline work to convey recharge water directly to Well 16

A.3 Duration of Time for Water Quality Improvement

As stated previously, initial ASR implementation requires cycling of the water into and out of the aquifer to build a buffer zone around the ASR to stabilize overall water quality. The number of cycles and the amount of time required to develop this buffer zone is very site specific, but can range from as little as 3 months to as long as 2 years or more, depending on the complexity of hydrogeochemistry of the aquifer and differences between the native water and recharge water. Given that the Potomac aquifer of the SWF has a complex geochemistry, ASR testing and buffer zone development would likely be longer (such as 9 to 14 months), rather than shorter, in duration for Well 16.

A.4 Well Plugging and Redevelopment

ASR wells are highly subject to plugging because of the nature of well injection mechanics and geochemical reactions related to recharge water quality, native ground-water quality, aquifer mineralogy, and changes in temperature and pressure during pumping activities. The sources of plugging include entrained air and gas bubbles, bacterial growth, suspended solids, and geochemical precipitation, especially with respect to iron. Consequently, all ASR wells require periodic redevelopment to maintain operating efficiency. The frequency and duration of redevelopment events can only be determined based on the initial testing and operational experience. **The rate of ASR plugging and the expected frequency of redevelopment is often perceived as a potential operational problem for this technology.**

Plugging associated with iron is specific concern with ASR, and has been addressed with various techniques in the past including: aquifer pretreatment; recharge water pretreatment; and operational redevelopment activities.

Aquifer Pretreatment

One means of minimizing plugging as well as accelerating the water quality improvement time is an aquifer pretreatment approach. Using this approach, a buffer zone around Well 16 (70 to 100 feet - which is equivalent to a the zone of influence of Well 16 during a 2 to 3 week pumping period at a rate of 400 gpm) would be developed by removing the primary iron bearing mineral (siderite) from this area using a low pH/deoxygenated recharge solution. This recharge solution would essentially dissolve the siderite from the buffer zone, and with subsequent recharge, the dissolved constituents would move away from the buffer zone.

Advantages:

- Removes a key potential source of iron (siderite) from the buffer zone, thereby minimizing the potential for any recharge water to dissolve further any remaining iron-bearing minerals.
- Single-type event that can be implemented during initial ASR cycle testing.

Disadvantages:

- May require laboratory-based column testing to determine the specific details of the aquifer pretreatment solution (optimum pH, amount of contact time, etc.) for most effective iron mineral dissolution.
- Requires the pretreatment of large quantities of recharge water (up to 10 to 20 million gallons of water), including deoxygenation and pH reduction.
- May require more test cycles to mitigate aquifer pre-treatment effects associated with pyrite (another iron-bearing mineral) dissolution.
- Requires a long-term commitment to ASR to control the mass of water containing very high concentrations of dissolved iron constituents (i.e. resulting from the aquifer treatment activities), as discontinuing ASR activities could result in aquifer iron concentrations higher than initially present.

Recharge Pretreatment

Recharge pretreatment may be necessary when the recharge water and native water are substantially different or the recharge water qualities promote plugging or geochemical fouling. Typical ASR pretreatment approaches include filtration (to address total suspended solids) and pH adjustment (to address iron precipitate plugging and subsequent recovery water quality standards). Recharge water pretreatment is a common feature on ASR systems to minimize plugging and geochemical fouling, including the Atlantic Coastal Plain systems at Swimming River, New Jersey (pH adjustment of surface water derived recharge water from about 7.6 to about 9.0 to control iron); and Chesapeake, Virginia (pH adjustment of surface water derived recharge water to above 8.0 to control manganese and filtration to address residual alum floc used in the surface water treatment program).

Advantages:

- Allows for the use of recharge water from a variety of water supply sources with various chemical properties.
- Most effective means to prevent plugging and geochemical fouling in the ASR well and associated aquifer.

Disadvantages:

- Requires the design, construction, operation, and monitoring of small scale treatment systems (filtration and pH adjustment) for all recharge water sources.
- Subject to occasional operational problems (e.g. pH correction problems (specifically low pH) and failed or ineffective filtration) which can negatively impact the ASR well or buffer zone by directly causing plugging or geochemical fouling.

Operational Redevelopment Activities

Periodic redevelopment of ASR wells is a proven technique to address some causes of plugging or clogging, especially that plugging which is caused by entrained air and gas binding and suspended solids. The primary objective of redevelopment is to remove solids from the well, thereby maintaining recharge and extraction rates. Every operational ASR system includes some-type of redevelopment scheme as part of its operation. Redevelopment pumping or backflushing involves pumping the ASR well to waste for a period of 10 minutes to several hours, either on a daily, weekly, monthly, or seasonal basis, based on the site-specific conditions (it should be noted that ASR sites in New Jersey utilizing the Potomac-Raritan-Magothy aquifer system backflush or redevelop on a daily basis, although these systems recharge only during off-peak [winter] months and are pumped only during high-peak [summer] months). In addition to this short-term redevelopment, ASR wells typically require full redevelopment every 3 to 5 years, including pulling the pump, television inspection, acidization and mechanical surging, and other related redevelopment activities to restore optimum conditions.

Advantages:

- Ensures dependable operation of the ASR system, especially during recharge activities.
- May be a suitable alternative to recharge water treatment (i.e. filtration) if suspended solids are a primary source of well plugging.

Disadvantages:

- Requires frequent (daily or weekly) operation of ASR well, pumping to waste, and thorough monitoring and recordkeeping to determine effectiveness of redevelopment activities.
- Frequent redevelopment activities are perceived as an operational problem at some ASR locations.

A.5 Operations and Maintenance Requirements

In summary, the O&M requirements depend on the type of ASR approach ultimately selected. The following are the simplified ASR approaches that may be applicable to Well 16:

ASR1
Recharge Source: Well 14
Pretreatment Requirements: Filtration for suspended solids removal; possible aquifer pre-treatment to eliminate iron carbonate minerals (siderite) in the buffer zone; possible pH adjustment to minimize further iron dissolution.
Operational Requirements: Periodic backflushing/redevelopment during recharge activities to ensure recharge efficiency; twice-weekly water quality monitoring of recharge water during recharge events; monthly water level and water quality monitoring of ASR buffer zone; monitoring and periodic cleaning of the filtration unit; operation and monitoring of pH adjustment equipment.

ASR2
Recharge Source: SWF Columbia aquifer wells
Pretreatment Requirements: Filtration for suspended solids removal/potential pH adjustment (to address potential manganese problem); possible aquifer pre-treatment to eliminate iron carbonate minerals (siderite) in the buffer zone.
Operational Requirements: Periodic backflushing/redevelopment during recharge activities to ensure recharge efficiency; twice-weekly water quality monitoring of recharge water during recharge events; monthly water level and water quality monitoring of ASR buffer zone; monitoring and periodic cleaning of the filtration unit; operation and monitoring of pH adjustment equipment.

ASR3
Recharge Source: Surface water derived sources
Pretreatment Requirements: Filtration for suspended solids removal/pH adjustment; possible aquifer pre-treatment.
Operational Requirements: Periodic backflushing/redevelopment during recharge activities to ensure recharge efficiency; twice-weekly water quality monitoring of recharge water during recharge events; monthly water level and water quality monitoring of ASR buffer zone; monitoring and periodic cleaning of the filtration unit; operation and monitoring of pH adjustment equipment.

A.6 Cost Considerations

The cost of ASR application at Well 16 is highly variable depending on the following major factors:

- Source of recharge water;
- Conveyance requirements for recharge water;
- Treatment requirements for recharge water (and aquifer if pre-treatment is necessary);
- Wellhead modification requirements;
- Duration of field characterization and ASR cycle testing; and
- Frequency of use/operation

An order-of-magnitude cost for ASR provided in the South Wellfield Evaluation Report (1994) was $300,000 - 400,000 for the implementation of a relatively simple ASR application, with limited wellhead modification and pre-treatment requirements, as well as limited pipeline modification requirements to convey the water to Well 16. However, with extended cycle testing requirements, an aquifer pre-treatment requirement (i.e. low pH/deoxygenated aquifer recharge scenario), extensive wellhead modification requirements (including pump/well replacement), extensive recharge water pre-treatment requirements (both pH adjustment to the 7.5 to 8.5 range and filtration), etc. could easily double the cost of ASR implementation at Well 16 ($800,000 or more).

Operations and maintenance costs are also highly variable and are a function of how often the system is operated, pre-treatment requirements, and how frequently periodic redevelopment/backflushing is required. Typical O&M costs are expected to range from $1,000 to $5,000 per month of operation for a simple ASR application, but could be as high as $10,000 to $12,000 per month of operation based on pre-treatment requirements (for example, a 3MGD ASR system in Florida has an annual O&M cost of approximately $120,000/yr).

The ultimate cost of ASR application at Well 16 cannot be further refined without additional feasibility study and field characterization, including cycle testing.

B. MANAGED PUMPING

Managed pumping is another option introduced in the South Well Field Evaluation Report as a means to improve the water quality at Well 16, although no specific details were presented regarding specific pumping rates or durations, as recommendations regarding these elements were proposed to be developed pending additional study of Well 16 (pump tests, core analysis, etc.).

For the purposes of this assessment, managed pumping is defined as the controlled pumping of Well 16 as a means to improve water quality in the Potomac aquifer in the vicinity of this well. Given that iron concentrations remain high at this well, any water pumped from this well would be discharged as waste. As stated and illustrated in the beginning of this Appendix, based on a review of the historical data, pumping of the wellfield, or cycling of water through the aquifers of the SWF appears to be one of the factors which possibly has contributed to the improvement of water quality at some locations since the early 1990's. Wells which have been pumped more frequently (such as wells 11, 13, and 14) appear to have recovered more rapidly from the iron event as compared to those pumped less frequently (such as wells 10, 12, 15, and 16).

Ground-water flow within the Potomac aquifer is very slow during non-pumping periods. Consequently, there has been little cycling of water or movement of ground water through the Potomac aquifer in the vicinity of Well 16 since pumping was discontinued in July 1990. Given the slow rate of ground-water flow (approximately 60 feet per year under non-pumping conditions), the hydrogeochemistry of the aquifer has likely been relatively stable during that time. Further, there has likely been little mixing with recharge water from the overlying Columbia aquifer since pumping was stopped. Therefore, the ground water in the vicinity of Well 16 could be considered "stagnant" at present, as its current hydrogeochemistry is probably a function somewhat of changes associated with historic recharge geochemistry (such as that which caused the elevated iron event nearly 5 years ago) rather than current or recent recharge geochemistry.

Given that the current Columbia aquifer water quality is relatively good, enhancing the recharge of this good quality water into the Potomac aquifer via pumping at Well 16 would be expected to result in an improvement of water quality in the Potomac aquifer. However, there remains an uncertainty as to how long it would take to facilitate a favorable change in the aquifer system through aquifer cycling, given the complex geochemistry of the aquifer system. The primary factors which determine how quickly a change would occur include: the current extent and rate of aquifer mixing between the Columbia and Potomac aquifers and the current distribution of dissolved oxygen and Eh/pH conditions in the Potomac aquifer in the recharge zones and in the vicinity of Well 16.

Despite the uncertainty, this option remains viable given that little or no additional equipment (with the exception of some additional piping to convey the discharge water further away from the Well 16 pump house) or facilities are presently needed to implement managed pumping. However, this option would only be considered a short-term or limited management measure, since managed pumping would not be able to prevent or limit future occurrences of elevated iron.

Initially, it would be useful to pump Well 16 to evaluate water quality changes over an extended period of time to determine the extent to which water quality will improve. Under a managed pumping approach, Well 16 would be pumped to waste at a rate of 400 gpm for a period of 6 weeks in an attempt to determine the extent of the geochemical conditions in the Potomac aquifer and the rate of subsequent water quality change.

It should be noted that a longer period of pumping (e.g. 3 to 6 months) was initially evaluated as having a higher potential for promoting a change in aquifer geochemistry. However, the DNREC Water Supply Branch initially expressed serious concern during informal discussions about this approach to address the iron problem at Well 16, given that such a large quantity of water would be pumped to waste. Alternatively, DNREC did indicate that a pumping approach may be considered feasible if it was conducted for a brief period of time (i.e. 6 weeks) during periods of low ground water use (i.e. winter/spring). Consequently, the actual pump rate and duration of pumping would be determined after negotiation with DNREC regarding water use and discharge to waste issues if this method was selected for implementation.

If the managed pumping approach is selected to be implemented, it would be reevaluated after the test period to determine if an improvement in water quality is being observed or sustained. If iron concentrations have improved to acceptable levels in this well, this well should be pumped continuously (at a rate of at least 100 to 200 gpm - see discussion below) to maintain flow through this aquifer system. However, if iron concentrations are not sustained at an acceptable level or have not improved, a decision to continue with, or cease pumping should be made based on the water quality trends (if any) shown by the monitoring data.

A rate of 100 to 200 gpm is considered a reasonable rate to move water through the Potomac aquifer in the vicinity of Well 16. The average ground-water flow velocity in the Potomac aquifer under non-pumping conditions in this area is in the range of 50 to 60 feet per year (based on a calculation using the average ground-water gradient (.00278), hydraulic conductivity value of 15 feet/day, and a porosity of 25%). However, under a pumping condition of 200 gpm, the velocity increases to nearly 500 feet per year (according to the ground-water flow model computations), which is nearly 10 times higher than non-pumping conditions!

Further, the ground-water discharge (i.e. flow of ground-water through a given cross-sectional area) under non-pumping conditions in the Potomac aquifer is .03 gpm per unit foot width (assuming a aquifer thickness of 140 feet), or approximately 12 gpm for an area 400 feet in length (which is the estimated width of the Well 16 capture zone pumping at a rate of 400 gpm for a 6 week period [an operational scenario for Well 16]). Therefore, a pumping rate of 100 to 200 gpm would increase the flow through the effective area of the aquifer (i.e. the area influenced by pumping at a given rate and of a given duration) by more than an order of magnitude. Consequently, continued pumping at these rates would move a substantial amount of water through the system over the long run, thereby having the greatest opportunity to cause a positive change in the aquifer hydrogeochemistry.

C. IRON TREATMENT PLANT

Treatment of ground water to remove iron (and manganese) is a proven and conventional technology that is used to treat public water supplies at thousands of sites nationwide. Iron removal is relatively simple, and in most cases entails a simple treatment process of aeration, followed by sedimentation and filtration, or a more complex treatment process such as aeration, followed by chemical oxidation (using free chlorine residual or potassium permanganate), sedimentation and filtration, or a manganese zeolite process (Nyer, 1985; and Steel and McGhee, 1979). Order of magnitude capital costs for iron treatment range from $700,000 to $1.5M per MGD treated (NWSAC, 1991; other sources), with O&M costs ranging from $70,000 to $150,000 per year (or approximately 10% of the total capital cost).

[It should be noted that locally, Artesian Water Company uses a combination aeration-chlorine-lime-pressure sand filtration-pH adjustment-fluoride-corrosion inhibitor process to treat iron (and address other water quality requirements) in Potomac aquifer ground water in the Glascow, Delaware area. This treatment unit handles a flow of 2 MGD, and was built at a capital cost of approximately $2.9 M, with a monthly O&M cost of approximately $12,000].

Iron treatment was also discussed as part of the South Wellfield Evaluation Report, but was not recommended for the SWF, as stated:

> The construction and operation of an iron removal treatment plant for the South Well Field is not a preferred recommendation, because:
>
> 1. There would be a tendency to pump the wells at the maximum rate for prolonged periods of time. The result could be the exacerbation of the iron concentrations and other water quality parameters in the aquifers. Excessive pumping can eventually reduce the water transmitting properties of the aquifer, consequently terminating its use as a viable water supply;
> 2. In the experience of CH2M HILL/Duffield Associates, the capital cost of a treatment facility is much greater (typically 2-10 times greater) than ASR for an equivalent volume of water;
> 3. Treatment technology is not fallible, upsets occur; and
> 4. Treatment plant operations costs (e.g., sludge disposal) can be considerable.

In further correspondences regarding iron treatment for the SWF (Duffield, 1994), a general treatment plant scheme for the SWF and associated costs was described as stated:

> The treatment plant would be consists of a conventional, pressure filter plant to remove iron and manganese. Because of the high iron concentrations (up to 16 mg/l in PW-16), a flat tray aerator and a clarifier unit would be installed in front of a filter (greensand) in the treatment stream. The plant facility would include a heated building to house filters and associated chemical feed systems...
>
> The operations and maintenance (O+M) costs for the iron removal plant are based on periodic backwashing of filters, costs for replenishment of chemicals and removal of iron sludge from the bottom of the filters. The greatest O+M costs in the operation of an iron removal plant is usually the costs to remove and ship concentrated iron sludge.
>
> A comparison of costs for the wellfield management plan and ASR conversion versus a treatment plant shows that the treatment plant alternative costs approximately 7.4 times the combination of the management plan and ASR conversion ($4.3M vs. $580,000). On a unit cost basis, the treatment plant alternative cost is approximately 3 times greater per MGD than the conversion of PW-16 to an ASR well. This unit cost comparison assumes that PW-16 is recovering water at its near maximum production capacity of 500 gpm (.72 MGD).

Although there are some notable disadvantages to iron treatment for the SWF (such as potential cost and operational issues), the obvious and most important advantage to an iron treatment plant is the convention of the technology and reliability of providing a good quality water supply. There is no uncertainty regarding the technology's ability to treat the iron in the ground water, and the performance of this option is not dependent unknown natural factors which may be affecting the aquifers of the SWF.

A full-scale iron treatment facility would not likely be feasible for Well 16 alone. A iron treatment system would only be feasible for the entire SWF, although it would likely not require continuous operation based on water quality trends regarding iron (and manganese). The likely location for any iron treatment facility would be at the present treatment plant location on Rt. 72 (rather than a new location), where existing piping from each production well is already present and where all SWF water is currently chlorinated.

D. OPTION COMPARATIVE ANALYSIS

A summary of the advantages and disadvantages of the three options evaluated is presented on the attached exhibit.

With regard to ASR, this option is technically viable and innovative, but requires further extensive testing to evaluate its specific feasibility to address the iron problem at Well 16. ASR approaches using recharge water from Well 14 and other SWF Columbia aquifer wells appear technically more feasible and more readily implemented compared to approaches using surface-water derived recharge water in terms of proximity of existing facilities and potential geochemical compatibility. However, SWF-derived recharge water is highly susceptible to episodes of elevated iron or other water quality concerns in the future, thereby limiting their reliability over the long-term. Alternatively, surface-water derived recharge water scenarios provide excellent reliability from the perspective of dependable water quality, but would require extensive changes in facilities to convey recharge water to Well 16, as well as potential pretreatment facilities to adjust pH. The general cost of implementing ASR at Well 16 ranges from $300,000 to $800,000. Operation and maintenance requirements are based on the source of the recharge water, recharge pre-treatment requirements, monitoring and reporting requirements, and redevelopment requirements, and are expected to range from $1,000 - $2,000 month (monitoring, reporting, redevelopment) to $5,000 - $10,000 month for extensive pretreatment requirements.

With regard to managed pumping, this option is viable in the short-term in that it would begin to cycle water through the Potomac aquifer, which may result in an improvement in overall water quality. However, it remains uncertain how effective managed pumping will be in actually improving the water quality of the aquifer in the vicinity of Well 16. Despite the uncertainty, implementation of this option would be relatively simple (since all of the components are already in place), and the cost to initiate and operate this option would be minimal as compared to the other options. However, managed pumping would not likely prevent a reoccurrence of elevated iron concentrations in the aquifer system in the future. Therefore, in the long term, this option will not guarantee the unrestricted or restricted use of Well 16 as it can not control the overall iron problem in the Potomac aquifer. However, this option appears to be a feasible management option for Well 16 in the short-term in an attempt to improve water quality at Well 16.

With regard to the treatment plant, this option is the most viable option available for returning Well 16 (as well as other wells impacted by iron in the SWF) to unrestricted use in the future. Although potentially costly (as compared to the current Well 16 management practice), this option is technically proven and feasible, and has relatively no uncertainty regarding its effectiveness in addressing the iron problem. This option is a feasible management option for Well 16 and other wells impacted with iron in the SWF, but it is probably only cost effective if the SWF returns to full operational capacity.

In summary, the most applicable options for addressing the iron problem at Well 16 for the three SWF operational scenarios are as follows:

<u>Scenario 1 - Current Operations</u>

Short-term managed pumping is the most applicable option under the current operations scenario. Depending on the results of the initial 6-week pumping operation, a plan for continuous pumping of Well 16 may be promoted in the future to further improve water quality at this well location.

Scenario 2 - Expanded SWF Performance

A limited application of ASR may be the most viable alternative under this operating scenario if the managed pumping specified for Scenario 1 is unsuccessful. Approach ASR1 or ASR2 could be implemented without major extensive facilities renovation if water quality remains good (with respect to iron) in the SWF, but additional study, design, and testing would be required prior to final implementation of this technology. Facilities renovation would include Well 16 pump replacement/retrofit (including wellhead modifications) and well rehabilitation, new SWF valve fittings (to enable water to be conveyed to Well 16), installation of a filtration device, flow and level indicators, etc. ASR implementation would include additional hydrogeologic characterization (the installation of 1 to 2 additional wells, source-water characterization, etc.), cycle testing and monitoring, and the development of an implementation and operations plan.

Aquifer pre-treatment (injection of low pH recharge water) could also be considered for Well 16, but would require pH adjustment of a large amount of recharge water (an estimated 25 million gallons), which may require the construction of treatment facilities. Pre-treatment of the buffer zone would enhance the utility of ASR for Well 16, but is not considered necessary for its success at this location.

It should be noted, however, that this ASR application is highly susceptible to water quality changes (specifically iron) in the recharge water. However, the implementation of approach ASR3 (surface water sources) eliminates this uncertainty, but would require additional facilities renovation and potential pre-treatment requirements, thereby increasing the cost and difficulty of operation.

It should also be noted that the final determination of the applicability of ASR under this operating scenario requires an full assessment of the cost/benefit of this approach versus other water supply alternatives not specifically related to Well 16 (e.g. conjunctive use with other water purveyors or alternative water supplies).

Scenario 3 - Continuous Wellfield Operations

An iron treatment plant is the only viable alternative available to support the long-term continuous operation of Well 16. Given the uncertainty regarding the cause of the iron problem, as well as the uncertainty as to whether or not the iron problem could worsen again in the future, treatment of the Well 16 water prior to use is the most feasible and reliable method (as compared to managed pumping) to ensure consistently acceptable water quality. However, an iron treatment plant would not be cost-effective to address Well 16 exclusively. Rather it would likely only be viable for the entire SWF, as it would allow Well 16 and all of the other Potomac and Columbia aquifer wells to be utilized at their maximum "safe yield" production rates, thereby optimizing the use of the water resources in the SWF.

LIST OF ATTACHMENTS

1. Summary of Well 16 Options - Advantages and Disadvantages

SUMMARY OF WELL 16 OPTIONS
ADVANTAGES AND DISADVANTAGES

OPTION	ADVANTAGES	DISADVANTAGES
Managed Pumping	• No additional equipment/facilities necessary • Relatively low cost • Likely to improve water quality • Can be implemented rapidly (several weeks)	• Will not prevent future iron problems • Some uncertainty regarding effectiveness • Dependent on aquifer conditions • Water pumped to waste
Aquifer Storage Recovery	• Innovative approach • Potentially cost effective if feasible • Optimum ground-water resource utilization • Provides for maximum pumping capacity potential • Same well can be used to recharge and recovery • Would likely improve long-term water quality	• Dependent on aquifer conditions • Relatively new technology (only 20 systems on line in U.S.) • High degree of uncertainty regarding effectiveness • Requires extensive testing prior to implementation—3 to 24 months • Potentially complex O & M, especially if pretreatment is required • Potential high cost • Pretreatment of recharge water likely
Iron Treatment Plant	• Conventional proven technology—thousands of applications nationwide • No uncertainty regarding effectiveness • Allows unrestricted use of all new wells • Not dependent on aquifer conditions • Long-term water quality reliability	• Capital cost expenditure • Extensive O&M requirements • Requires construction of new facilities/equipment • Public perception (?) • Requires 12 to 24 months to implement

Appendix F
Wellfield Automation
Feasibility Study

APPENDIX F

Wellfield Automation Feasibility Study

WELLFIELD AUTOMATION FEASIBILITY STUDY

This feasibility study evaluates alternatives for automating the operation of the City of Newark's South Wellfield (SWF). The automation considered is limited to evaluating the instrumentation required at each well site and a means to communicate data to, and receive commands from, a central location. The centrally located portion of the automation system, the Master Telemetry Unit (MTU) and related components, is excluded from this study. It is part of a separate project being considered by the City of Newark Water Department to implement a Supervisory Control And Data Acquisition (SCADA) system for their operations.

A. DESCRIPTION OF EXISTING SYSTEM

All SWF wells are generally similar with respect to operation and equipment installed. General descriptions are given below, followed by a more detailed description of equipment seen during well inspections. Equipment information is tabulated in Table I.

GENERAL OPERATION PROCEDURES

The SWF wells provide water for the City of Newark system as part of a priority list of sources. Those sources, in order of priority, are:

1. White Clay Creek, by way of Paper Mill Road Treatment Plant.
2. Purchased water from United Water Company.
3. South Well Field (focus of this study).
4. Purchased water from Artesian Water Company.

In general, most of the SWF wells run for approximately 3 days each month. During the recent drought period, many of them ran continuously for a period of several weeks. Well number 11 is currently running 24 hours a day to maintain line pressure.

Flow, pressure, water level monitoring, and all pump control are performed manually by water department operators. The operating team consists of one Senior Operator and three water department employees. The operators work in two shifts, one from 7:00 AM to 3:00 PM, and one from 11:00 PM to 7:00 AM. Daily rounds are made by an operator to all pumps which are operating at the time. The operator checks the general status of each site visited and records flow and pressure readings. When visiting the site of wells 10, 12, and 13, near the chlorination plant, water tank levels are checked and written down. Each time a pump is required to be started or stopped, an operator drives to that location. It is estimated that approximately 45 minutes are required for an operator to start or stop a pump. It is also estimated that daily rounds to take readings require about one hour if only one well is running. If all wells are running, daily rounds require about two hours. On average, about 70 miles are driven each day while making rounds. Most of the work is performed by the day shift operator. College students, employed by the Water Department, tabulate the data collected by the operators.

Decisions to pump from the SWF wells are generally based on decreasing tank levels or increased demand, such as an influx of students at the University of Delaware. Decisions as to which wells to pump from are sometimes based on well access considerations, or proximity to the operator's current location. As a result, some wells are pumped whenever there is a need, and other wells are seldom pumped.

GENERAL EQUIPMENT

The SWF wells, with the exception of wells 10 and 19, are located within small pump buildings, equipped with lights and electric heating. Each well is equipped with an electric motor which drives a pump. The pump is started by the operator using a HAND-OFF-AUTO switch mounted on the door of a motor starter, which is located near the pump. When the switch is placed in the HAND position, the motor starts. It runs until the switch is returned to the OFF position. Placing the switch in the AUTO position has no effect, and it appears not to be wired up for use at this time. A manual pneumatic-type water level gauge (see description under Well 12) is typically also present, with a dial indicator mounted near the well head. A pressure gauge with a dial indicator and a mechanical, totalizing flow meter are generally present in the pump discharge piping as well as a manually-operated gate valve.

SPECIFIC WELL EQUIPMENT

The following equipment was identified by inspection and equipment inventory at the individual well locations:

Well #10

This well is located within a fenced site owned by the City of Newark. The site contains a small chlorination building and two large, recently painted storage tanks. An electrical substation is also located at this site.

A submersible pump is controlled by a pole mounted, Franklin Electric Company single phase control box, rather than a conventional motor starter. The control box is rated for a 5 hp motor. It is assumed that starting and stopping the pump is accomplished by turning power on and off using a pole mounted disconnect switch. The well is located outside, adjacent to the chlorination building near Route 72. The well head and discharge piping are protected by fiberglass insulation around the well head. Electrical power appears to be 240 volt, single phase and is supplied from a pole to the disconnect switch. A mechanical flow meter is mounted in the pump discharge line. The discharge line is equipped with a pressure indicator and a sampling port. A plastic discharge pipe runs on grade to a nearby storage tank. There is no gate valve for this well. An approximately 1" diameter pipe extends down into the well to be used for water level measurements, but it is currently obstructed and is unusable.

Wells #12 and #13

These wells are located within the same fenced site as Well #10. Each well and related equipment are located inside a pump building. Electrical power is supplied via pole-mounted wiring, and each building has its own circuit breaker panel and pump control equipment. In each case, a motor starter is equipped with a HAND-OFF-AUTO switch, allowing the pump to be started manually.

The Well #12 pump motor appears to be 230 volt, 3 phase. The pump is a submersible pump; its horsepower rating was not discernable. A manual, pneumatic water level gauge is installed and functioning. It consists of a dial indicator connected to metal tubing which extends into the well, presumably to near the bottom. To read the water level, an operator must manually pressurize the tubing using a bicycle pump connected to a fitting in the tubing. Air is forced into the tubing and exits the end submerged in the well. The air pressure required to do this (which is shown on the indicator) is proportional to the height of the water column in the well.

An approximately 1" diameter pipe is installed in the well for insertion of an electronic water level probe. Either this pipe may be obstructed or the water level gauge may be inaccurate; water level measurements taken through the pipe conflict with readings obtained using the manual pneumatic gauge. A mechanical flow meter is mounted in the discharge line along with a pressure indicator, sampling port, and a shutoff valve. A manually operated gate valve is installed in a vertical section of the discharge pipe just above grade.

The Well #13 pump is a 15 hp, 230 volt, 3 phase turbine pump. It is equipped with a gasoline powered engine drive in case of electrical power failure. It has a mechanical flow meter, a pressure indicator, and a manual gate valve. The valve is located just above the bottom of a shallow pit, through which the piping goes underground. A manual, pneumatic level gauge is installed and functioning. It also has an approximately 0.75" diameter pipe for insertion of an electronic water level probe. A pressure indicator is installed, as well as a pressure switch. Wiring from the pressure switch is connected to the starter. It is assumed this switch shuts the pump down in case of high or low discharge line pressure - it is not clear which is the case.

Well #11

Well #11 is located just off of Rt. 72 behind a small private school, approximately 0.5 mile south of the chlorination building site.

Well #11 is nearly identical to Well #13. It differs in that the pump is 20 hp (instead of 15 hp), and it does not have a pressure switch installed or a back-up engine drive.

Well #14

Well #14 is located in a small building about 10 feet east of Rt. 72 and about a quarter mile south of the chlorination building site.

Well #14 is also nearly identical to Well #13. The pump is 20 hp. It does have a back-up engine drive, but does not have a pressure indicator or a pressure switch installed. Electrical power is provided from pole-mounted transformers located on the west side of Rt. 72.

Well #15

Well #15 is located on the perimeter of Diamond State Industrial Park, approximately 1 mile south of the chlorination building site, several hundred yards west of Rt. 72.

Well #15 is identical to Well #14, except that it does not currently have a back-up engine drive. The Water Department intends to move an existing engine from Well #16 to this well. Electrical power is provided from pole-mounted transformers located on a pole just south of the pump building.

Well #16

Well #16 is located about 0.5 mile south of Well #15 at the end of the road through the South Chapel Street Industrial Park.

Well #16 is equipped with a submersible pump. Horsepower rating was not discernable. Otherwise, it is similar to Well #15. It has a mechanical flow meter installed, but its top works have been disassembled and appear not to be functional. It does not have a manual pneumatic water level gauge. A pipe is installed for insertion of a portable electronic level probe. This pipe is apparently functional, as periodic readings have been taken. An abandoned back-up engine drive is in the building. As discussed above, the Water Department is planning to move this engine to Well #15. Electrical power is via pole-mounted wiring.

Well #17

Well #17 has been partially dismantled and the pump has been removed. It is assumed that this well has electrical distribution equipment in working order, but no motor starter. In addition to the new instrumentation discussed above, this well will require the installation of a new starter and pump to be operational. The pump and piping or other mechanical work related to the pump is beyond the scope of this project. The status of this well will be evaluated in the same manner as Well #10.

Well #19

Well #19 is located within a fenced area on the east side of Rt. 72, approximately 1 mile south of Old Baltimore Pike. There is no pump building; an above-grade concrete vault structure encloses the well head.

The Well #19 pump motor is 230 volt, 3 phase. It has a submersible pump, however the horsepower rating was not discernable. The pump is controlled by a Franklin Electric Company "Subtrol" control panel mounted on a steel frame located nearby. Maximum allowable horsepower for this control panel is 7.5 hp. The panel is equipped with a HAND-OFF-AUTO switch and an electrical disconnect. A mechanical flow meter is mounted in the discharge line. A rubber hose is installed into the well for insertion of a portable electronic water level probe. The discharge piping is equipped with a pressure indicator, sample port, and waste discharge line with a shutoff valve. A manually-operated gate valve is installed in a horizontal section of pipe, just before the pipe bends and extends vertically into the ground.

B. IDENTIFICATION OF ALTERNATIVES

This study evaluates four alternatives:

Alternative 1 EXISTING SYSTEM - Continue manual operation using the existing method of sending personnel to the well sites to start and stop pumps as needed, and manually record totalized flow data and well water levels, where possible. See Detail 1 attached.

Alternative 2 REMOTE MONITORING - Continue starting and stopping the pumps manually. Install instrumentation to measure well level and flow, discharge line pressure and monitor electrical power supply to the well site. Instrument signals would be connected to a Remote Telemetry Unit (RTU) at the well site for transmission to the central location. See Detail 2 attached.

Alternative 3 REMOTE MONITORING WITH PUMP CONTROL - This alternative is the same as Alternative 2, but adds the capability to remotely start and stop the well pumps from the central location. Existing motor starter circuits would be modified to enable control from the central location. See Detail 3 attached.

Alternative 4 REMOTE MONITORING WITH PUMP CONTROL AND FLOW CONTROL - This alternative is the same as Alternative 3, but adds the ability to remotely control well flow. A motorized flow control valve would be required. The motorized operator would connected to the RTU to enable control from the central location. See Detail 4 attached.

Option 1 REMOTE MONITORING AT CHLORINATION BUILDING - This option provides monitoring in the chlorination building for water leaks and chlorine leaks. A liquid level switch and chlorine gas monitor would be installed. Signals would be connected to the RTU at a nearby well for transmission to the central location.

Option 2 WATER QUALITY MONITORING - This option provides for monitoring well water for pH, iron content and manganese content.

C. IDENTIFICATION OF REQUIRED EQUIPMENT UPGRADES

For the implementation of Alternatives 2, 3, and 4, manual measuring devices for well variables would be replaced to varying degrees by electronic instrumentation. Each well site would be equipped with a Remote Telemetry Unit (RTU), with an optional small control panel containing digital indicators and an electrical power monitor. The indicators would display the well variables being transmitted to the central location for operator convenience while at the site. The instrument signals would be wired to the RTU, which would transmit the data to the central location.

In order to provide for automation of the SWF, a number of equipment modifications must be made. A basic requirement is that all measurements must be made using instruments capable of producing 4-20 Ma electronic signals. A discussion of the installation requirements of the instruments follows.

1. *ALTERNATIVE 2 - REMOTE MONITORING*

Water Level Measurement - The measurement of the water level in a given well can be accomplished using a pressure transducer specifically designed for wells. It is installed near the bottom of the well above the pump. Water pressure on the transducer is directly proportional to the height of the overlying column of water. Transducer diameter is one inch for models with replaceable electronics, therefore the transducers will not fit into existing water level measurement pipes. It would be a more appropriate design to install them directly into the well.

There is no acceptable way to "insert" a transducer into the wells. The services of a well drilling firm would be needed to provide access for the installation of the transducer. The driller may have to pull the pump from the well to accomplish this work. The exact method for installing the transducer is best determined by the driller on a well by well basis. If installation of the transducer were to be scheduled in conjunction with a well rehabilitation, some cost savings could be realized.

Once the transducer is in place, it can be connected to the RTU and digital display. The transducer's 4-20 mA output signal will be wired to an analog input channel of the RTU. The RTU and digital display will be calibrated to indicate feet of water above the transducer.

Well Flow Measurement - As stated above, flow is currently measured using mechanical, turbine-type flow meters. Sizes and model numbers vary from well to well. Instrumentation can be acquired which will provide a 4-20 mA signal for connection to the RTU and display. A high speed pickup register would be installed in place of the mechanical register. This unit provides a pulse signal which would be connected to a compatible flow rate indicator/totalizer. The totalizer provides display of flow rate and totalized flow. It would be mounted in a small control panel. It also provides a 4-20 mA output, proportional to flow rate. This signal would be connected to an analog input channel in the RTU for transmission to the central location. The RTU and totalizer would be calibrated to indicate gallons per minute for flow rate, and gallons for totalized flow.

Discharge Line Pressure Measurement - Discharge line pressure would be measured with an pressure transmitter. The transmitter could be equipped with a dial indicator for local display of line pressure. It would be desirable, however, to connect the 4-20 mA signal to a digital indicator located in the control panel; all local displays would be mounted in the same enclosure. In that case, the pressure transmitter would not include a dial indicator, as it would be redundant. It is assumed the new transmitter could be installed in place of existing local dial indicator. The 4-20 mA output of the transmitter would also be connected to an analog input channel in the RTU. Calibration would be for PSIG.

Well Site Power Monitoring - Due to occasional power outages and other electrical malfunctions such as phase failure, it would be desirable to monitor the electrical power supply to each well site. Monitoring would protect motors and other equipment from abnormal voltage conditions. For all wells except Well 10, the power supply is 480 volt, three phase. A voltage monitor would be installed in a control panel at the well site. It would be connected to the three phase wiring feeding the site. A contact output would be wired into the motor starter to shut-off or inhibit the motor upon detection of a power problem. Another contact would be wired to the RTU as an alarm input to the central location.

Remote Telemetry Unit - The RTU would be mounted in an enclosure located in each pump building. In most cases, the enclosure would be mounted on existing equipment racks. The RTU requires a 115 volt power supply, which can be furnished from existing circuit breaker panels in the buildings. Signal wiring from instruments will be run to the RTU and connected to terminals in the enclosure. RTU's can be purchased to transmit signals by phone or by radio signal to the central location.

Digital Displays - A small control panel would be mounted in the pump building, near the RTU. This panel would contain the flow totalizer and digital display units for other well variables. These digital displays may not be necessary. Some RTU's have an LCD display and keypad for on-site display of variables.

2. *ALTERNATIVE 3 - REMOTE MONITORING WITH PUMP CONTROL*

In addition to the instrumentation described above, the following would be needed:

Pump Control - Remote control of pumps would be accomplished through the RTU. Wiring modifications would be made to the starter circuitry. Wiring will be connected between a digital output in the RTU and the motor starter. The output would be connected into a circuit wired to the AUTO position of the HAND-OFF-AUTO switch on the door of the starter. With the switch in the AUTO position, the pump motor will be responsive to commands from the central location. Programming of the central unit could incorporate other logic into the pump control scheme. For example, pump control could be integrated with well water level, such that it would shut off should the level drop below a pre-determined level. The flow signal could also be incorporated into pump control, such that the pump would shut off if the flow fell below some predetermined flowrate while the pump was running. This condition could indicate a massive leak before the flow meter, or pump failure.

Because Well #10 is not equipped with a traditional HAND-OFF-AUTO starter, the purchase of a starter for this well would be required.

3. *ALTERNATIVE 4 - REMOTE MONITORING WITH PUMP CONTROL AND FLOW CONTROL*

In addition to the instrumentation described above for Alternative 3, the following would be needed:

Flow Control - Flow control could be accomplished through the RTU. This option would require substantial piping modifications, as well as a new valve. The well discharge lines are currently equipped with gate valves, which are inappropriate for flow control. They would be replaced with motor-operated ball or butterfly valves, equipped with appropriate valve operators. Additionally, most existing valves are installed in a pit just before the point where the piping goes underground. This piping would be relocated to provide room for valve control accessories and by-pass block valves. The valve operator could be connected to an analog output in the RTU, and would then be responsive to commands from the central location.

4. *IMPLEMENTATION OF OPTIONS*

Water Leak Detection - Water leak detection in the chlorination building could be accomplished through the installation of a liquid level detector. The detector, which could be a float switch, should be located in the low point of the floor in the area in which a leak is most likely. The switch provides a contact closure, which could be wired to an RTU either at Well #10 or Well #13. Activation of the switch would provide alarm notification at the central location.

Chlorine Leak Detection - Chlorine leak detection (chlorine in air) could be accomplished by installing a chlorine gas sensor/controller in the chlorination building. The equipment would be located in a small control panel. A sensor/transmitter would be mounted in the chlorination area. It would be wired to a controller, either integral or remotely mounted in another part of the building. Upon detection of chlorine in the atmosphere, the controller will activate a relay contact, which could be wired to an RTU, again at Well #10 or #13. This would provide alarm notification at the central location.

Water Quality Monitoring - See Discussion of Alternatives

D. EVALUATION OF ALTERNATIVE COSTS

Costs for alternatives shown below are for a single well. Operating/maintenance costs are not included, except for Alternative 1 (operating costs only).

1. Alternative 1- Existing System

Estimated Annual Operating Expenses - Direct labor and mileage.

Two operators	$8,300	1 hr/day each, 7 days/wk @ $11.50/hr
One part time employee	$2,600	1 hour/day, 5 days/week @ $10.00/hr
Car mileage	$7,700	70 miles/day, 7 days/week @ .30/mile
Total operating costs	$18,600	

2. Alternative 2 - Remote Monitoring

Estimated Cost - Material, equipment and installation. Total Operating Cost, shown for Alternative 1, should be added to cost for this and all other alternatives, since it is unlikely that existing operating cost will decrease significantly. General cost references are attached.

Level Measurement	$1,200	Transducer & cable
Mechanical Work	$1,500-$2,000	Drilling crew, 1 day
Electrical Work	$ 300	4 hours - see Note 1
Flow measurement	$1,200	Pickup, totalizer, cable
Mechanical Work	$ 100	Technician, 2 hours
Electrical Work	$ 300	4 hours, Note 1
Pressure measurement	$ 300	Sensor-Transmitter
Mechanical Work	$ 100	Technician - 2 hours
Electrical Work	$ 300	4 hours, Note 1
Power Monitoring	$ 600	Voltage Monitor
Electrical Work	$ 300	4 hours, Note 1
RTU System	$3,500-$9,000	RTU/radio/antenna, Note 7
Mechanical Work	$ 400	Technician - 8 hours
Electrical Work	$ 300	4 hours, Note 1
Control Panel	$1,000-$2,000	Note 2
Electrical Work	$ 450	6 hours, Note 1
Total	$11,850-$18,850	

3. Alternative 3 - Remote Monitoring with Pump Control

Estimated cost - Material, Equipment and Installation required for the addition of pump control to Alternative 2.

Pump Control	$ 0 - 1,300	Starter, Note 3
Electrical Work	$ 300	4 hours, Note 1
Total	$ 300	

4. Alternative 4 - Remote Monitoring with Pump and Flow Control

Estimated cost - Material, Equipment and Installation required for the addition of flow control to Alternative 2 & 3.

Flow Control	$5,000-$8,000	Note 4
Mechanical Work	$2,000-$5,000	Note 5
Electrical Work	$ 300	4 hours, Note 1
Total	$7,300-$13,300	

5. Option 1 - Remote Monitoring at Chlorination Building

Estimated cost - Material, Equipment and Installation.

Water Leak Detection	$ 300	Float level switch
Mechanical Work	$ 100	Technician, 2 hours
Electrical Work	$ 600	8 hours, Note 1
Chlorine Leak Detection	$1,400-$2,500	Sensor/trans/controls
Mechanical Work	$ 200	Technician, 4 hours
Electrical Work	$ 600	8 hours, Note 1
Total	$3,200-$4,300	

6. Option 2 - Remote monitoring of Water Quality

Estimated cost - Material, Equipment and Installation.

pH Monitoring System	$1,000-$2,000	Probe, controller
Mechanical Work	$ 400	Technician, 8 hours
Electrical Work	$ 600	8 hours, Note 1
Fe/Mn Monitoring	$20,000 & up	1 component analyzer
Mechanical Work	$ 2,000	Note 6
Electrical Work	$ 600	8 hours, Note 1
Total	$23,400 & up	

7. Notes

Note 1 Electrical Work includes material and direct labor cost for a 2 person electrical crew to connect 115 vac power, when necessary, and install wiring between instruments and RTU and control panel (if used).

Note 2 Control Panel includes material and labor to provide the panel, digital indicators, power supply and other miscellaneous material for assembly at a panel vendor's shop. Mounting of panel is included in Electrical Work.

Note 3 A new magnetic starter ($1,300) appears to be required only for Wells 10 and 17. Other wells will require only the Electrical Work.

Note 4 Equipment cost includes valve, operator, and materials required for piping modifications, which may vary from well to well.

Note 5 Costs vary widely due to the impact of well location and existing piping configuration.

Note 6 Cost includes analyzer installation and piping modifications to bring samples to analyzer. No estimate has been made to allow for connection to sanitary sewer for disposal of used samples, or for instrument air supply, required by some systems.

Note 7 Costs vary widely depending upon features and accessories provided by individual manufacturer's.

8. Summary of Alternative Costs

All SWF wells, with the exceptions of wells 10 and 17, are equipped in a similar manner. Each well would require nearly the same level of effort to implement each of the automation alternatives. The estimated cost to implement the automation alternatives for a single well is summarized below.

Alternative 1	No capital cost. Operating cost - $18,600 annually
Alternative 2	$11,850 - $18,850
Alternative 3	$12,150 - $19,150
Alternative 4	$19,150 - $33,750
Option 1	$3200 - $4300 add-on to alternative cost
Option 2	$23,400 or greater add-on to alternative cost

E. DISCUSSION OF ALTERNATIVES

1. *ALTERNATIVE 1 - MAINTAIN EXISTING SYSTEM*

This alternative requires no capital investment, since it requires no changes to the existing equipment and methods of operation. This alternative does not meet the goal of automation for SWF. Although the existing operation apparently functions properly most of the time, it is outdated. Well level readings at some wells are inconsistent and may be inaccurate. Manual control of the pumps results in the most inaccessible wells being pumped very seldom, while the most accessible wells are pumped whenever a need is identified. Such practices generally do not contribute to the most efficient wellfield management.

2. *ALTERNATIVE 2 - REMOTE MONITORING*

Alternative 2 requires a moderate capital investment, but it meets the automation goal to a large degree. It provides needed upgrades in the instrumentation at the wells. Conditions at all wells could be monitored simultaneously. More accurate and timely well data would be available to the Water Department through their SCADA system, on a continuous basis if so desired. Operators would not have to make rounds to wells to collect data. The data would be more easily and accurately entered into a computerized database. The data could be automatically entered into certain spreadsheet programs, depending upon the SCADA system chosen by the department. Data collected from these sites could be used to help attain more efficient wellfield management.

3. *ALTERNATIVE 3 - REMOTE MONITORING WITH PUMP CONTROL*

Alternative 3 requires minimal additional capital investment above Alternative 2. For most wells, remote pump control can easily be implemented once an RTU is on the site. The RTU needs to be equipped with a digital output to start and stop the pump: all RTU's investigated for this project provide digital outputs as standard. Appropriate starters are already in place, with HAND-OFF-AUTO switches. Wells #10 and, most likely, #17 would require starters, therefore would be somewhat more costly than other well locations. The other sites would need wiring and conduit installed to connect the RTU and starter, and possibly an interposing relay. If the starters are equipped with auxiliary contacts, they could be brought into the RTU to give motor status (On or Off) indication for the SCADA system. Some programming or configuration for the RTU and the central SCADA system would be required. The extent of programming would be dependent upon the complexity of the logic used to run the pumps. Basic remote start/stop from the central location would require minimal programming. Integrating pump control with well level, flow and/or pressure would obviously require a greater level of programming.

4. *ALTERNATIVE 4 - REMOTE MONITORING WITH PUMP AND FLOW CONTROL*

This alternative requires a more substantial capital investment than any of the other alternatives. Control valves are expensive, and extensive mechanical modifications would be required at each site. Currently, well flow rates are rarely or never modified. The wells are pumped at their permit limit or to the capacity of the pump. There is little or no need or incentive to precisely control flow rates manually at the well site: even less so from a remote location. The RTU would require an analog output, usually available only with the more expensive units or as a costly option for the less expensive units. Very little would be gained from implementing this alternative.

5. *OPTIONS*

Optional Remote Leak Detection - This option addresses leak detection for water and chlorine gas in the chlorination building just off Route 72. It does not require a substantial expenditure. Cost is based upon purchase and installation of detectors; signals would be transmitted to the central location using an RTU installed at one of the nearby wells. If water and chlorine leaks at the chlorination building are recurring problems, this option may be desirable.

Optional Remote Water Quality Monitoring - Most vendors contacted do not provide equipment to continuously monitor water quality parameters (pH, iron, manganese, etc.). Colorimetric analysis of grab samples is a more commonly used approach. Atomic absorption or plasma emission spectrometry equipment could be used to perform the analysis in a laboratory setting using grab samples. An on-line titrator requires an instrument-quality air supply, and may add reagents to the samples. Cost for a single variable titrator is about $20,000. A process liquid chromatograph analyzer is available at $50,000 - $100,000.

PH monitoring instruments are commonly available for reasonable prices. PH probes, however, require regular calibration and maintenance. We recommend against adding this manual maintenance task to a new system, the purpose of which is to automate current manual chores.

F. CONCLUSIONS AND RECOMMENDATIONS

CURRENT SWF OPERATIONS

Continuation of the current status of the SWF as a secondary source of drinking water does not justify the expense of an automated system. However, it is recommended that all infrastructure be repaired or replaced as needed to permit accurate evaluation of water level, flow, sampling, and other parameters as recommended for wellfield management in Section 3.2. Consequently, **no automation of the wellfield is recommended under the current operating status, as the cost of automation outweighs the benefits, given the infrequent operation of the SWF.**

EXPANDED SWF OPERATIONS

Should it be desired to expand the production capability of the SWF under expanded SWF operations, **it is recommended that automation of some, or all, of the primary production wells be considered.** The cost-benefit analysis reveals that the automation of the SWF would be best accomplished by the selection of Alternative 3 - Remote Monitoring with Pump Control. This alternative provides expanded capability at essentially the same cost as Alternative 2. Alternative 4 is much more costly to provide a modification of questionable benefit. Further, the remote monitoring of water quality parameters is not included in the automation plan as this instrumentation and operation is cost-prohibitive and adds little value to the system.

Wells 17, 14, 15, 11, and 13 (in decreasing order of priority) should be considered for automation. The benefit of automated monitoring and remote pump control is that it allows for more effective operation of the wellfield from the perspective of both day to day operation (including pump operation (on/off), water level, flow, and pressure monitoring) and long-term operation and management (automated data collection and reporting). The operation of the SWF would be more efficient with the automation of all of the primary production wells, however, Wells 17 and 14 would benefit the most with automation given their respective location problems (i.e. remote location of Well 17 and the traffic hazard location of Well 14), followed by Wells 15 (longer drive for vehicle access), 11, and 13 (convenience).

The primary components of the recommended automation plan include: the use of a RTU and digital control panel to permit the remote measurement and transmission of water level, flow rate, discharge line pressure, and power, as well as remote control of pump operation (on/off). In general, all data collected at the RTU would be sent to the centrally located MTU, which together with the selected computer support systems, comprise the SCADA. The estimated cost for implementation of the selected automation plan ranges from $12,000 to $15,000 per well, or a total of $60,000 to $75,000 for the primary production wells.

The City of Newark Water Department has been investigating SCADA systems for some period of time. They are planning for radio communications between their central location and the RTU's. A radio survey has already been performed to determine feasibility. A license has been granted, with radio frequencies assigned for both master and remote units. The intention to use radio communications narrows the number of potential vendors for the MTU and RTU's somewhat, but many major vendors are available. There are equipment costs associated with radio-based systems that do not exist with dial-up (standard) phone line based systems. However, not all RTU's and MTU's can use dial up lines; some require dedicated lines, thereby increasing cost. Radio communication for these systems is routinely used by water and electric utilities for remote monitoring, and appears to be a good choice for this application.

Communication between RTU and MTU often uses proprietary protocols. Communication is not standardized; one vendor's RTU may be incapable of communicating with another vendor's MTU. The Water Department should evaluate products from a number of different vendors which meet the requirements of this automation project. It is strongly recommended that master and remote equipment be purchased from one manufacturer to assure complete compatibility.

Once the MTU receives the remote data, it is usually passed to the central computerized portion of the SCADA system. Some larger SCADA systems incorporate UNIX based computer systems for data handling and Human Machine Interface (HMI). These types of systems tend to be for larger applications, and may be on the high end of the price spectrum. Someone knowledgeable about this type of system would be required to be available for system maintenance.

Some systems are designed for DOS-based personal computers. Some MTU vendors can provide their own proprietary HMI software. Others may be compatible with commercially available HMI software. Personal computers are commonly used, easily obtained and maintained, and reasonably priced. They lend themselves to connection to most office networks, such as a Novell network. This type of system would most likely be a good choice for this project.

CONTINUOUS SWF OPERATIONS

It is recommended that automation of the entire wellfield be implemented as part of any plan to operate the SWF continuously. The benefit of automating the entire wellfield under a continuous pumping scenario is that it allows for the most effective operation of the wellfield from the perspective of both day to day operation and long-term operation and management.

The automation components under the continuous operating scenario are the same as those recommended under the expanded operating scenario, with the exception that the automation plan would also include a remote leak detection option for water and chlorine. The Remote Leak Detection Option is recommended for inclusion to reduce potential health and safety risks and associated financial liability that may be a result of the uncontrolled release of chlorine gas. This additional automation option will provide additional critical operational information related to the treatment of the raw water.

The estimated cost for implementation of automation to the entire SWF is approximately $96,000 to $120,000 (or $36,000 to $45,000 more than the automation cost presented for the expanded SWF operation).

LIST OF ATTACHMENTS

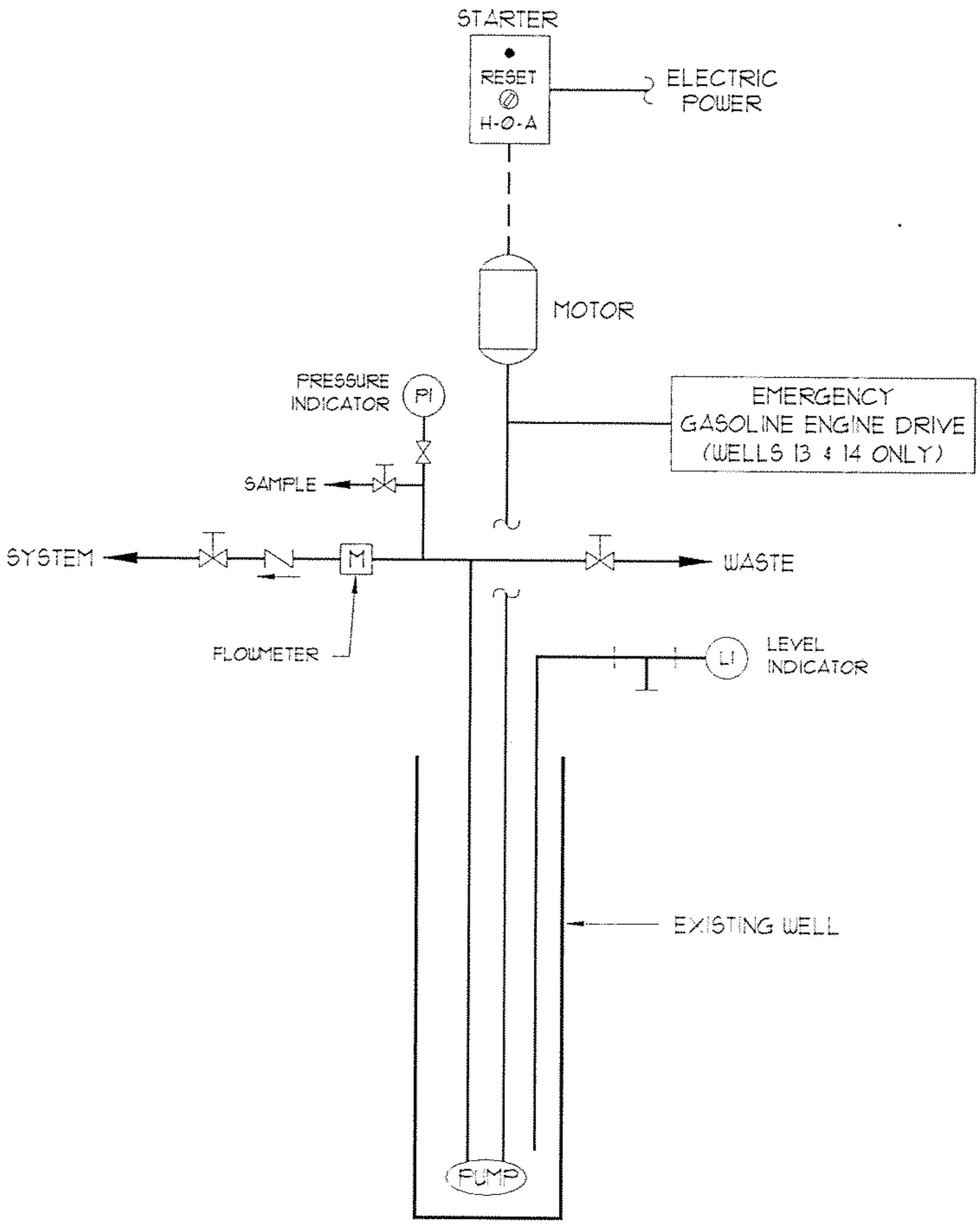
1. Table 1
2. Detail 1 - Existing Wells - Alternative #1
3. Detail 2 - Remote Monitoring - Alternative #2
4. Detail 3 - Remote Monitoring with Pump Control - Alternative #3
5. Detail 4 - Remote Monitoring with Pump and Flow Control - Alternative #4
6. Backup Cost Data

Well	Pump type	Pump Control	Electrical	Motor
10	Submersible	Franklin Control Panel	230 V, 1phase	5hp*
11	Turbine	HOA starter	230 V, 3 phase	20 hp
12	Submersible	HOA starter	230 V, 3 phase	*
13	Turbine	HOA starter w/press. switch	230 V, 3 phase	15 hp
14	Turbine	HOA starter	230 V, 3 phase	20 hp
15	Turbine	HOA starter	230 V, 3 phase	20 hp
16	Submersible	HOA starter	230 V, 3 phase	*
17	Removed	*	*	n/a
19	Submersible	Franklin Subtrol Panel w/HOA	230 V, 3 phase	*

Well	Flow meter	Level Measurements	Press. measurements	Engine drive
10	1.5" Rockwell Y-09	Tube only-blocked	Dial indicator	No
11	Rockwell W-160	Man Pneu	Dial indicator	No
12	1.5" Rockwell Y-09	Man Pneu & 1" pipe	Dial indicator	No
13	Rockwell W-160	Man Pneu	Dial indicator	Yes
14	Rockwell W-1000	Man Pneu	no	Yes
15	Rockwell W-1000	Man Pneu	Dial indicator	No
16	disassembled	Tube only	Dial indicator	Abandoned
17	*	*	*	*
19	Sensus W-160	Rubber hose only	Dial indicator	No

Well	GPM max
10	*
11	150
12	*
13	*
14	*
15	425
16	475
17	n/a
19	*

* Information is uncertain



EXISTING WELLS - ALTERNATIVE #1
CONFIGURATION VARIES (SEE TABLE 1)

TETRA TECH, INC.

DETAIL 1

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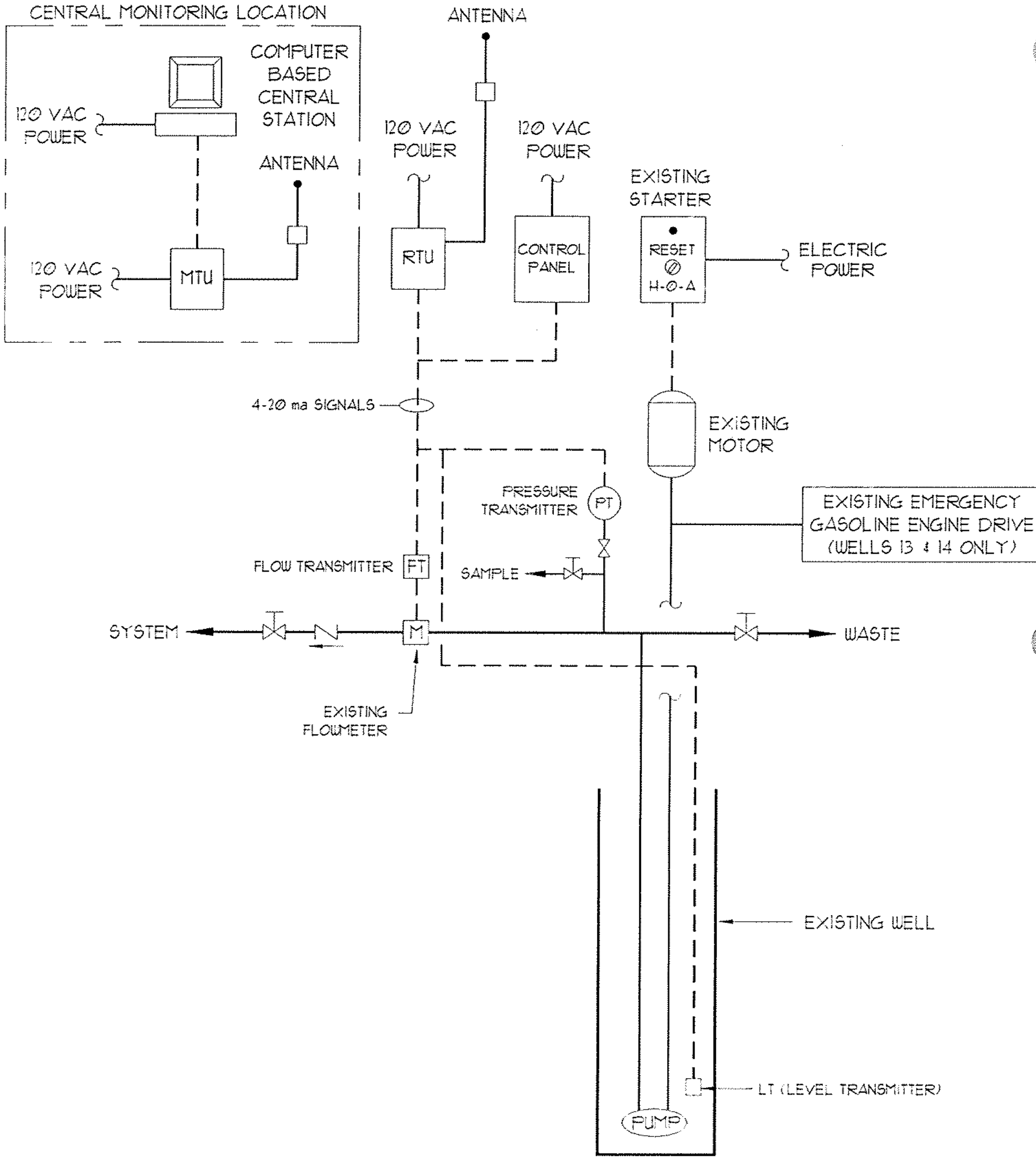

REMOTE MONITORING - ALTERNATIVE #2

TETRA TECH, INC.

DETAIL 2

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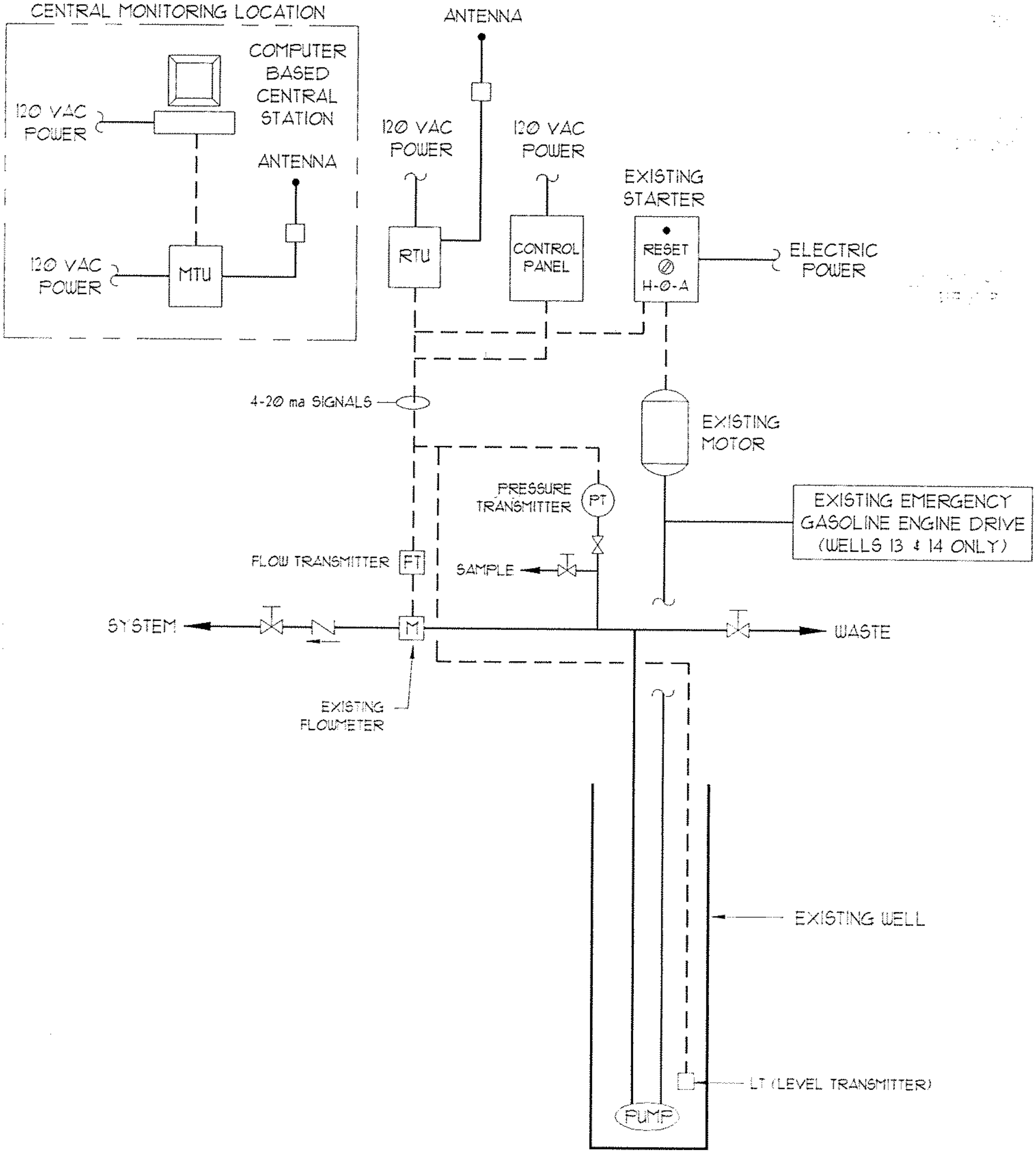

REMOTE MONITORING WITH PUMP CONTROL - ALTERNATIVE #3

TETRA TECH, INC.

DETAIL 3

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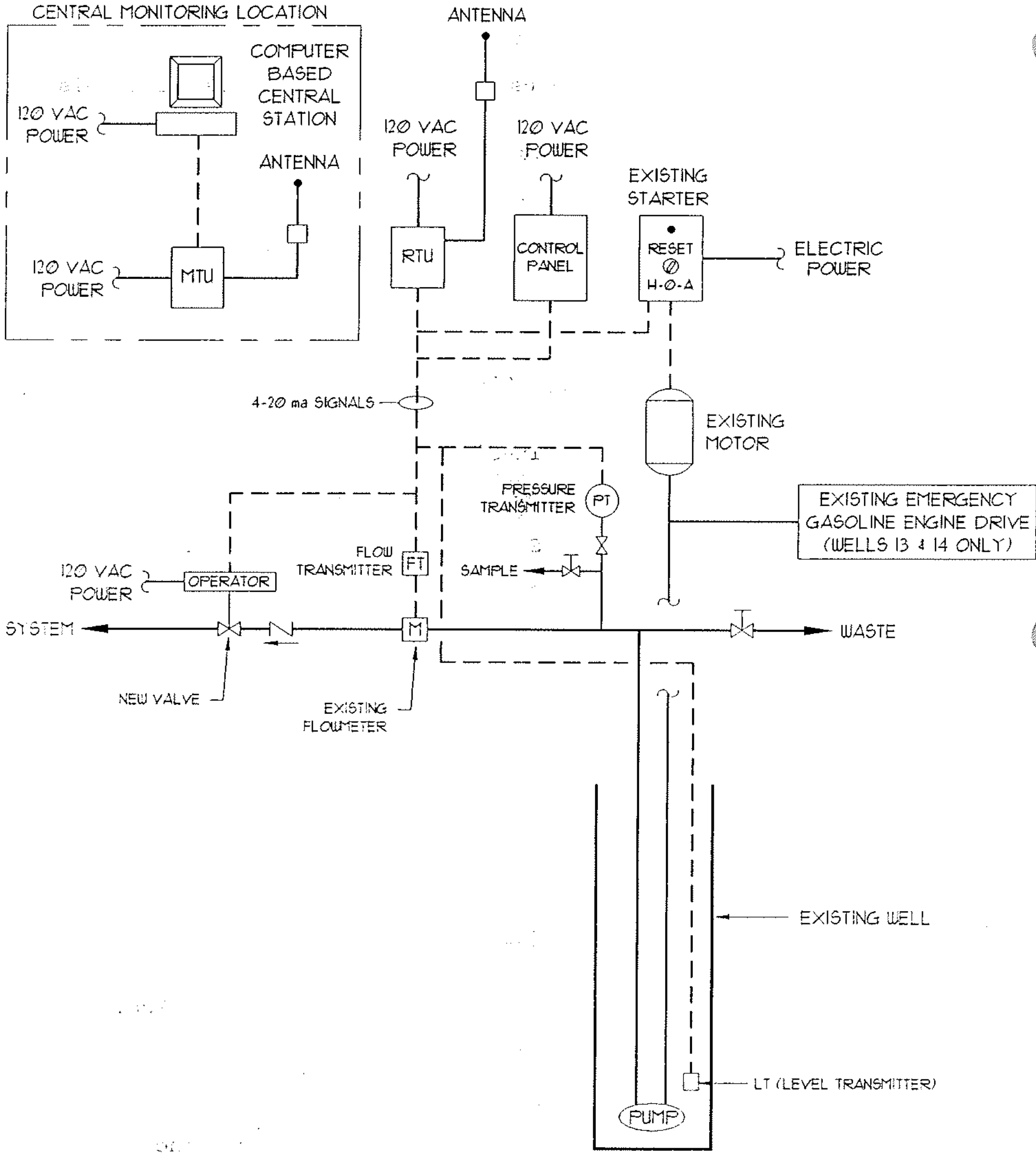

REMOTE MONITORING WITH PUMP AND FLOW CONTROL - ALTERNATIVE #4

TETRA TECH, INC.

DETAIL 4

0441ALT4.dwg

Backup Cost Data for NSW Automation Feasibility Study

The following references were used to develop cost data for this study:

Meeting with Mr. Joseph Dumbrowski, Newark Water Department

R. S. Means Building Cost Construction Data, 1996 Edition

Allen-Bradley Industrial Controls Catalog, 1994 Edition

Newark Electronics Catalog

Acopian Power Supply Catalog

Water World Magazine, October, 1995 Issue

Budgetary Price Quotes:

Level Sensor	-	In-Situ, Inc. (800) 446-7488
Pressure transmitter	-	Dwyer Instruments, Inc. (215) 957-0355
Flow metering	-	Sensus (Rockwell International) (800) 245-4095
RTU	-	Reinbrecht Assocociates (Autocon) (215) 957-5006
	-	Zetron, Inc. (206) 820-6363
	-	Valmet Automation (610) 940-1633
	-	Consolidated Electric Co. (612) 224-9474
	-	Aquatrol (Tano Automation, Inc.) (504) 243-2400
Radios/Antennas	-	Microwave Data Systems (716) 242-9600
Chlorine Gas Monitor	-	Bacharach (412) 963-2158
	-	Sensidyne, Inc. (800) 451-9444
pH Monitor	-	Leeds & Northrup (800) 533-3726
Power Monitor	-	Tecot Electric Supply Co., Inc. (302) 421-3939
Fe/Mn Analyzer	-	Ionics, Inc. (800) 348-1730, ext. 290
	-	Dionex (609) 596-0600
Control Panel	-	Analog Training Systems, Inc. (302) 892-3301
Well Driller	-	A. C. Schulties (609) 845-5656