



Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

June 6, 2007

Ms. Dorothy Gunn
Clerk of the Board
Illinois Pollution Control Board
1021 North Grand Avenue East
P.O. Box 19274
Springfield, IL 62794-9274

Re: East Saint Louis – St. Clair County
Illinois Department of Transportation, District 8
Bowman Avenue Pump Station – Deep Well System
IEPA NPDES Permit No. ILD0070955
Petition for an Adjusted Standard from 35 Ill. Adm. Code 302.208(g)

Dear Ms. Gunn:

Submitted herein is a petition of Illinois Department of Transportation, District 8 for an adjusted standard from 35 Illinois Administrative Code (Ill. Adm. Code) 302.208(g).

If you have any questions or require further information, please contact Lance Jones at 217/782-3215.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ellen Schanzle-Haskins'.

Ellen Schanzle-Haskins
Chief Counsel

S:\GEN\WPDOCS\GOBELMAN\Districts\Distr8\PSI\Andrews2\03 adjusted Standard letter to IPCB.doc

Enclosures

cc: Steven Gobelman, Illinois Department of Transportation – Bureau of Design and Environment – Springfield, Illinois
Mary Lamie, Attn: Jeffrey Keirn – Illinois Department of Transportation – District 8 – Collinsville, Illinois
Lance Jones, Illinois Department of Transportation – Office of Chief Counsel – Springfield, Illinois
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Petition for an Adjusted Standard

ILLINOIS DEPARTMENT OF TRANSPORTATION – DISTRICT 8
BOWMAN AVENUE PUMP STATION AND DEEP WELL SYSTEM
EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS
NPDES PERMIT NO. IL0070955

June 2007

By:



Illinois Department of Transportation

Bureau of Design and Environment

2300 South Dirksen Parkway

Springfield, Illinois 62764

Submitted to:

Illinois Pollution Control Board

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:)

PETITION OF ILLINOIS DEPARTMENT OF) AS 07-
TRANSPORTATION FOR AN ADJUSTED)
STANDARD FROM 35 III. ILLINOIS)
ADMINISTRATIVE CODE 302.208(G))
FOR THE BOWMAN AVENUE PUMP)
STATION AND DEEP WELL SYSTEM IN)
EAST ST. LOUIS, IL)

Petition for an Adjusted Standard

INTRODUCTION AND BACKGROUND

The Illinois Department of Transportation (IDOT) is submitting a petition for an adjusted standard from 35 Illinois Administrative Code (Ill. Adm. Code) 302.208(g) for sulfates and total dissolved solids. In order to prevent flooding and structural damage to the Interstate Highway system in the East St. Louis area, groundwater levels are kept pumped down by four separate groundwater pumping systems. Three of the systems discharge to the IDOT District 8 Bowman Avenue Pump Station (Bowman) where they are pumped to a discharge sewer. The Bowman discharge is combined with the final system discharge from the Missouri Avenue Pumping system and the combined effluent discharges to an unnamed drainage way. The discharge is regulated by effluent standards from 35 Ill. Adm. Code 304 and an Illinois Environmental Protection Agency (Illinois EPA) National Pollutant Discharge and Elimination System (NPDES) Permit. Due to the naturally occurring concentrations of the various parameters, the groundwater pumped from the well systems may cause exceedences of water quality standards as set forth in 35 Ill. Adm. Code 302.208. The groundwater in this system is not known to have been contaminated by any human activity.

The NPDES Permit requires the discharge waters meet parameter effluent limits that are derived from water quality limits. The sulfate constituent may have occasionally and the total dissolved solids (TDS) parameter has routinely exceeded the respective permitted NPDES effluent limits. Therefore, IDOT seeks an adjusted standard for sulfates and TDS.

This discharge has been the subject of a previous adjusted standard in AS 96-12, for iron, suspended solids and color. On October 3, 1996, the Illinois Pollution Control Board (IPCB) issued an order granting IDOT relief for the aforementioned parameters.

Pursuant to Section 28.1, the Illinois Environmental Protection Act (Act) provides a means for a petitioner to ask and receive approval for a revised environmental standard from the IPCB that varies from a standard the petitioner is regulated by. The purpose of the standards for which adjustment is sought in this petition is to protect aquatic life, safeguard the quality for crop irrigation, and to protect the streams as a potential public water supply. It is believed the regulations were promulgated, in whole or in part, to implement the provisions of the Clean Water Act.

A. STATEMENT OF STANDARD OF GENERAL APPLICABILITY FROM WHICH RELIEF IS SOUGHT

IDOT seeks adjusted standards from the IPCB's regulations for constituents contained in 35 Ill. Adm. Code 302.208(g). The additional regulations 35 Ill Adm. Code 304.105 (regarding compliance with water quality standards) and 35 Ill. Adm. Code 304.141 (regarding compliance with limits in the permit) were evaluated to see if they should also be adjusted. The IPCB found in AS 03-1 (Exelon Generation Company) that if 35 Ill. Adm. Code 302.208 was adjusted, it is not necessary to adjust 35 Ill. Adm. Code 304.105. If the water quality standards were changed, and the petitioner could meet the new standard, then there would be no need to provide additional relief from meeting that standard. Using similar logic, IDOT has decided not to petition the IPCB regarding 35 Ill. Adm. Code 304.105. While not addressed in the above referenced decision (AS 03-1), the applicability of 35 Ill. Adm. Code 304.141 is analogous. If the water quality standard changes, then the permit can be changed to reflect the adjusted standard; therefore, relief will not be requested for this standard either. The standard from which an adjusted standard is being sought is:

Section 302.208 - Numeric Standards for Chemical Constituents

g) Concentrations of the following chemical constituents shall not be exceeded except in waters for which mixing is allowed pursuant to Section 302.102.

| <u>CONSTITUENT</u> | <u>UNITS</u> | <u>STORET NUMBER</u> | <u>STANDARD</u> |
|------------------------|--------------|----------------------|-----------------|
| Sulfate | mg/L | 00945 | 500 |
| Total Dissolved Solids | mg/L | 70300 | 1000 |

Where: mg/L = milligrams per liter

B. IMPLEMENTATION OF FEDERAL LAW

The IDOT does not believe the granting of an adjusted standard proposed in this matter would be inconsistent with Section 303(a) of the Clean Water Act, if the Board finds the proposal to be protective of human health and welfare. It is also noted here that the Illinois EPA has conducted a triennial water quality standards review required under section 303(c)(1) of the Clean Water Act and as a result proposed revised standards for the substances being addressed here in R007-009. The existing discharge would meet the standards of R007-009 if that proposal passes as proposed. The IDOT's NPDES permit could be modified to incorporate the adjusted standard, and IDOT could comply with any such permit.

C. LEVEL OF JUSTIFICATION REQUIRED

The regulation of general applicability does not specify a level of justification required of a petitioner to qualify for an adjusted standard. Therefore Section 28.1(c) of the Act allows the IPCB to grant individual standards upon adequate proof by petitioner that:

1. Factors relating to that petitioner are substantially and significantly different from the factors relied upon by the IPCB in adopting the general regulation applicable to that petitioner;
2. The existence of those factors justifies an adjusted standard;
3. The requested standard will not result in environmental or health effects substantially or significantly more adverse than the effects considered by the IPCB in adopting the rule of general applicability; and

4. The adjusted standard is consistent with any applicable federal law.

This petition provides material to address all four demonstrations.

D. NATURE AND DESCRIPTION OF ILLINOIS DEPARTMENT OF TRANSPORTATION ACTIVITIES

Deep wells were installed as early as 1973 for the purpose of dewatering shallow groundwater in order to lower the water levels to a safe depth below the designed road grades. The IDOT District 8 Bowman Avenue Pump Station is located adjacent to Exchange Avenue (Exit 3 from Interstate 55/70) in East St. Louis, St. Clair County, Illinois (See Appendix A). There are typically three employees at the Bowman Yard facility. The pump station is part of the IDOT District 8 Bowman Yard maintenance facility. The pump station receives water from three well fields and various stormwater drainage ways. Another well field discharge combines with the discharge from the Bowman pump station and together they go to a drainage way (See Figure 1). The well fields are located adjacent to low pavement areas near Interstates 55 and 70 (Tri-level), Interstate 64 (I-64), the 25th Street underpass to I-64, (25th) and the I-55/I-70 underpass near Missouri Avenue (Missouri). The water from Bowman Yard maintenance facility includes the pump station discharge and the Missouri discharge and is discharged into a drainage way, which flows approximately 1,750 feet to the Schoenberger Creek, thence to the Cahokia Canal, and finally to the Mississippi River at Mile 180.6 (See Figure 1 and Appendix A).

Individual Well Systems

Forty-nine wells produce groundwater from four well fields that pump to the Bowman Yard. On average, 13 to 16 of the 49 wells are operational at any given time. The four well fields are identified as the Tri-Level (15 wells), I-64 (20 wells), 25th Street (10 wells), and Missouri Avenue (4 wells) dewatering sites (See Figure 2). These deep wells are equipped with submersible pumps to control the water table in areas of low pavement elevation. Without the systems of pumping wells, the respective interstate and intercity routes would flood and be impassable, ultimately requiring closure or modification in roadway grades.

The groundwater from the pumping wells is transferred via 6-inch to 42-inch diameter gravity and/or pressure collection systems to intermediate pump stations located at each well field. From the intermediate pump stations, the fluids are transported by 60-inch to 72-inch sewers. The groundwater from the Tri-level, I-64, and 25th Street dewatering

sites goes to the Bowman Avenue Pump Station and is discharged to a 72-inch (RCP) sewer. The Missouri Avenue dewatering site discharge is conveyed to the Bowman Yard where it combines with the pump station discharge.

Tri-Level System

The Interstates 55 and 70 Tri-Level System is located southwest of the Bowman Avenue Pump Station at the interchange of I-55/I-70 and I-64 (See Figure 3). The Tri-Level System consists of 15 deep pumping wells ranging in depth from 90 to 110 feet (see geologic cross sections A-A' and B-B' in Appendix B). To attain sufficient drawdown in the Tri-Level area, approximately seven of the fifteen wells need to pump at any given time. If significant groundwater recharge occurs due to precipitation and runoff, additional pumping wells can be turned on to maintain adequate water levels.

I-64 System

The I-64 System is located southeast of the Bowman Avenue Pump Station and the Tri-Level interchange (See Figure 3). The I-64 network is made up of 20 wells ranging in depth from 90 to 110 feet (See geologic cross sections B-B' in Appendix B). The roadway grades at the Tri-Level are lower than the I-64 surface elevations. The Tri-Level groundwater drawdown is sufficient enough to adequately maintain potentiometric levels for most of the I-64 System roadway grades except for the far southeastern elevations. Therefore, only one or two southern wells at I-64 require pumping to attain sufficient drawdown.

25th Street System

The 25th Street System is located approximately one and a quarter miles southeast of the I-55/I-70 Tri-Level and I-64 interchange (See Figure 3). This system is located on 25th Street which exits from I-64. Low road grades at 25th Street were required to gain access below an I-64 overpass and a St. Louis Metro Transit System rail bridge. The 25th Street System consists of 10 deep pumping wells ranging in depth from 110 to 115 feet (See geologic cross sections C-C' in Appendix B). To attain sufficient drawdown in the vicinity of the 25th Street low pavement elevations, approximately four of the ten wells need to pump at any given time.

Missouri Avenue System

The Missouri Avenue System is located approximately one mile west-southwest of the Bowman Avenue Pump Station and the Tri-Level interchange (see Figure 3 and

Appendix A). The low pavement elevations along I-55/I-64/I-70 at the Missouri Avenue overpass include a network of four wells ranging in depth from 75 to 110 feet (see geologic cross sections D-D' in Appendix B). To attain sufficient drawdown at the Missouri Avenue area, generally two to four of the wells need to pump at any given time. The flow from this system goes to the Bowman Yard where it mixes with the discharge from the Bowman Pump Station.

Operations

Generally, between 13 to 16 of the 49 wells are pumping into the Bowman Avenue Pump Station system. The electrical circuitry of each pump is hooked up to a local control center. Each control center is self-contained and securely locked. Each well field system has one or more control centers that enable one to manually turn on/off the pumps and to monitor the status of each pumping well hooked up to the respective control center. When any number of wells need to be turned on or off due to well/pump repairs or to modify the water level (raise or lower), the control center for the respective system(s) are accessed.

Water levels are monitored by taking measurements from piezometers or observation wells located within each well field. The low pavement areas require a predetermined potentiometric level. When the water level measurements attained from the piezometers or observation wells in a given system indicates a need to increase or decrease the water levels, the number of wells to be turned on/off are modified based on the need. The number of wells from each system that pump at any given time include approximately 6-7 of the 15 wells at the Tri-Level area, generally 1 or maybe 2 southern wells at I-64, generally 4 of the 10 wells at 25th Street, and between 2 and 4 wells at Missouri Avenue.

Pumping Results

The NPDES permit application from 2001 provided estimated average flow (volume) of 19 MGD (13,000 gpm) with maximum levels of 26 MGD (18,000 gpm) from the Tri-Level, I-64, Missouri Avenue, and 25th Street sites.

During the sampling of the individual wells from October 2003 to February 2005, the Tri-Level, I-64, Missouri Avenue, and 25th Street operated an average of six, one, three and four wells, respectively, to maintain adequate water levels at each site. Based on the estimated pumping rates and the average number of wells operating, the Tri-Level pumps between 2,700 and 3,600 gpm, I-64 pumps between 450 and 600 gpm, Missouri Avenue pumps between 3,250 and 3,700 gpm, and 25th Street pumps between 1,800 and 2,400 gpm, totaling an estimated 8,200 and 10,300 gpm (or 11.8 to 14.8 MGD). Based on the

average number of wells pumping and estimated pumping rates, the percent groundwater volumes that contribute to the Bowman Avenue Pump Station from the Tri-Level is 37%, I-64 is 6%, Missouri Avenue is 33%, and 25th Street is 24%.

Historical Groundwater Results

A revised Illinois EPA NPDES permit became effective January 1, 2003. The revised NPDES permit requires monthly sampling of pH, total suspended solids (TSS), iron (dissolved and total), TDS and sulfate, and semiannual sampling of manganese, boron, fluoride and ammonia. Of these parameters, TDS and possibly sulfate have exceeded the respective effluent standards.

To comprehensively evaluate the effluent quality, including sulfate and TDS, IDOT collected and compiled data at a greater frequency than required by the permit. All of the monthly and semi-annual parameters were sampled twice a month from the Bowman Avenue Pump Station between February 2003 and January 2005. From February 2005 to present, the pump station has been sampled on a monthly basis. The table provided in Appendix C summarizes the water quality results for total dissolved solids and sulfates from the Bowman Avenue Pump Station grab samples. Graphs showing the trends of the individual parameters from the grab samples are given in Appendix D.

In addition to the bimonthly, monthly, and semi-annual sampling at the Bowman Avenue Pump Station, groundwater sampling was collected during eight events from individual wells from October 2003 through February 2005 for comparison with the grab sample results and characterization of the originating groundwater. Analyzing the groundwater from the individual wells contributing to the pump station was conducted to determine the potential source(s) of the sulfate and TDS. The table in Appendix E shows the water quality data for individual deep pumping wells within the Bowman Avenue Pump Station system and Missouri Avenue well field. The data show there is significant variability between well fields and between individual wells in any given field.

Chloride, Total

Total chloride is not required as part of the site NPDES monitoring program. However, TDS is a primary constituent in the NPDES permit. Since the chloride contributes to the TDS, it was sampled for during the same events as the individual wells. The chloride levels for the individual well samples were low (33-336 mg/L) and well below the

concentration limits of 35 Ill. Adm. Code 302.208 (500 mg/L). The individual wells show concentrations below 500 mg/L, with most data results below 100 mg/L. See Appendix E.

Fluoride, Total

The total fluoride levels of the Bowman Station and individual well samples are generally below the 35 Ill. Adm. Code 302.208 standard of 1.4 mg/L. All of the Bowman Station samples were below 1 mg/L while only two wells from the I-64 system had regular detections above 1.4 mg/L. See Appendix E. The NPDES permit for the facility does not include a concentration limit for total fluoride.

Sulfate, Total

The 35 Ill. Adm. Code 302.208 water quality standard and NPDES concentration limit for total sulfate is 500 mg/L. The grab sample levels for all sampling points for total sulfate are generally below 500 mg/L. However, occasionally the concentrations exceed the sulfate limits. A few individual wells show total sulfate concentrations exceeding the limit. I-64 wells 19 and 20, and 25th Street well 2, experienced total sulfate exceedences relatively consistently, while I-55 wells 11A, 12A, and 13, and Missouri Avenue well 2 recorded one to three exceedences out of the eight sampling events (see Appendix E).

Total Dissolved Solids (TDS)

The 35 Ill. Adm. Code 302.208 water quality standards and NPDES concentration limit for total dissolved solids is 1,000 mg/L. The grab sample levels for TDS are frequently above 1,000 mg/L. A few individual wells from the Tri-Level, 25th Street, and Missouri Avenue sites and all of the sampled wells at I-64 show high TDS concentrations. The Bowman Station TDS concentrations, despite the well-to-well variability, are relatively consistent, generally with TDS levels between 1,050 mg/L and 1,130 mg/L (See Appendix D). The grab and individual well sample TDS levels are attributable to naturally occurring conditions.

Combined Equivalent Effluent

Historically, the final outfall discharge to the drainage way has not been sampled. However, the pump station (which includes the I-64, 25th Street and Tri-level well fields), and the Missouri well field have been sampled as previously noted. The analytical results of the Bowman pump station and the Missouri well field have been mathematically added using estimated flow data to create a combined equivalent

effluent (CEE). The Bowman data represents one sampling point (representing three well fields). The Missouri data represent results from all the wells in that field.

A statistical analyses of results from 2003 until the end of 2005 has been conducted to determine various numerical characteristics of the groundwater sampling results. Both the mean and the 95% upper confidence limit (UCL) are presented. The mass was calculated using flow and concentration figures. The CEE concentration was calculated using combined mass and flow. The tables below show the results of this analysis.

For sulfates, concentrations at the Bowman Station were greater than 500 mg/l three times, but there has only been one sample result greater then 500 mg/l from the Missouri Avenue field. These excursions did not occur at the same time so it is unclear as to whether the CEE would have ever exceeded the 500 mg/l limit.

| | Flow, MGD | Sulfates, Total Concentration mg/l | | | Mass Lbs/day – (flow x conc x 8.34) | |
|---|--------------|---------------------------------------|-------|--------|--|--------|
| | | Mean | Max | 95%UCL | Mean | 95%UCL |
| | | Bowman Station | 9.504 | 381 | 580 | 496 |
| Missouri Well field | 5.328 | 291 | 642 | 445 | 12,931 | 19,774 |
| Combined equiv. effluent - mass/(flow x 8.34) | 14.832 | 349 | | 478 | 43,130 | 59,088 |

For TDS, it is estimated that the CEE for both the mean and the 95% UCL would have exceeded the 1,000 mg/l level.

| | Flow, MGD | Total Dissolved Solids Concentration mg/l | | | Mass, Lbs/day – (flow x conc x 8.34) | |
|---|--------------|--|-------|--------|---|---------|
| | | Mean | Max | 95%UCL | Mean | 95%UCL |
| | | Bowman Station | 9.504 | 1,097 | 1,280 | 1,178 |
| Missouri Well field | 5.328 | 912 | 1,390 | 1,121 | 40,525 | 49,812 |
| Combined equiv. effluent - mass/(flow x 8.34) | 14.832 | 1,031 | | 1,158 | 127,477 | 143,184 |

Combined Actual Effluent

Starting in the fall of 2006, the discharge to the drainage way has been sampled for parameters consistent with the NPDES permit. Results for key parameters are listed

below. The mean for sulfate is 341 mg/l, and TDS is 1047 mg/l. These levels seem to be consistent with what is expected.

| <u>Analyte</u> | <u>Units</u> | <u>9/13/06</u> | <u>10/24/06</u> | <u>11/28/06</u> | <u>Mean</u> |
|----------------|--------------|----------------|-----------------|-----------------|-------------|
| Sulfates | Mg/l | 397 | 300 | 326 | 341 |
| TDS | Mg/l | 1070 | 1020 | 1050 | 1047 |
| Chloride | Mg/l | 94.4 | - | 82.8 | 86.6 |
| Hardness | Mg/l | | | 639 | 639 |

E. EFFORTS THAT WOULD BE NECESSARY TO ACHIEVE COMPLIANCE AND ALTERNATIVES

This discharge was also the subject of a IPCB action in 1996, in the matter of AS 96-12 regarding suspended solids iron and color. As part of that proceeding, IDOT evaluated two alternatives -- treatment of the discharge and direct discharge to the Mississippi River. While the treatment cost for the parameters evaluated then are not applicable to TDS and sulfates, they were nonetheless very high; \$14,120,000 to \$21,550,000. The cost for river outfall and diffusion system, which remains an applicable alternative, was estimated at that time to be \$5,690,000 to \$9,630,000. Using the Implicit Price Deflator, the estimated costs in the 1994 Horner & Shifrin report associated with the river outfall/diffusion system alternatives have been updated for inflation. To update the estimate costs for inflation, an inflation factor derived from the Implicit Price Deflator for Gross Domestic Product as published by the U.S. Department of Commerce was calculated. Tables of the Implicit Price Deflator can be downloaded from the U.S. Department of Commerce, Bureau of Economic Analysis' website at <http://www.bea.doc.gov/bea/dn/nipaweb/index.asp>. The Implicit Price Deflator for Gross Domestic Product table contains the Implicit Price Deflators in Annual or Quarterly formats. As of the writing of this report, the latest Implicit Price Deflator was published in fourth quarter 2006.

The inflation factor can be derived in one of two ways: (1) the inflation factor is the result of dividing the current deflator by the deflator for the previous reporting period, or (2) the inflation factor is the result of dividing the current deflator by the deflator for the reporting period you wish to start from. The Horner & Shifrin estimates were submitted in 1994.

The 1995 implicit price deflator is 92.106. The fourth quarter 2006 implicit price deflator is 116.857. Thus, the inflation factor is 1.2687 (i.e., $116.857 \div 92.106 = 1.2687$). Costs today are approximately 26.9% higher than they were in 1995. Therefore, the updated for inflation estimated costs for the river outfall/diffusion system alternatives range between \$7,219,033 and \$12,217,581, respectively.

There are other types of treatment available, such as reverse osmosis, electrodialysis, and others. These are not considered conventional treatment technologies and would be expected to be more expensive than conventional technologies. In other proceedings before the IPCB petitioners have evaluated such technologies and determined them to be economically unreasonable. The IPCB has concurred.

In the current regulatory proceeding, R-26-04, regarding a TDS change for the Des Plaines River, Mobil Oil investigated both sulfate and TDS removal and found the only potentially effective technology would be evaporation/crystallization. Applied to a small 200ppm (.288MGD) stream, the costs would be \$36 million to \$56 million, not including operation costs. Projected flows for this project would be over 19MGD.

In a similar situation, in adjusted standard proceeding, AS 02-1 Material Service Corp. pumped a lesser flow 3.6MGD, but it was groundwater with high TDS and sulfates, and discharged to Summit Ditch. In 2001, Material Service estimated the 20-year costs of reverse osmosis to be \$81 million to \$113 million.

In adjusted standard proceeding, AS 01-9, Rhodia Inc., a pretreatment discharger to the Thorn Creek Sanitary District, evaluated reverse osmosis followed by evaporation with a mechanical vapor recompression, for a 0.59MGD discharge. Capital costs were \$4 million and annual operating costs were estimated at \$600,000. This was estimated at \$7.78/1,000 gallons. IDOT acknowledges that this cannot be correlated with its discharge, but nonetheless, the IDOT discharge will be 32 times greater than Rhodia's.

In adjusted standard proceeding, AS 99-5, Abbott Laboratories estimated the cost to use reverse osmosis was \$750,000 capital and \$500,000/yr operating costs.

Given the widely accepted known high costs of treating TDS and sulfates, IDOT feels that the river discharge option is still the least expensive. Even at the lower end of the estimate, \$7.2 million, IDOT feels this cost is economically unreasonable, especially given the fact that there would be no improvement to the environment.

Due to the high cost of the conventional water treatment plant and the outfall/diffusion system alternatives, the option to seek adjustment of the standard(s) has been selected. Thus, to achieve compliance, IDOT is seeking an adjusted standard from the IPCB.

F. DESCRIPTION OF PROPOSED ADJUSTED STANDARD (35 ILL. ADM. CODE SECTION 104.406(F))

Due to the complicated nature of this situation, a system of 49 wells with varying water quality, operating at varying flows, from an uncontrolled groundwater source, determining the appropriate adjusted standard involved the evaluation of several factors. For sulfates, it is arguable as to whether there has even been an exceedence, since the combined Bowman Station and Missouri Avenue discharge has not been sampled after mixing, but rather before mixing and averaged mathematically. The current mean and 95% UCL do not exceed 500 mg/l, and the highest estimated concentration may not have ever exceeded 500mg/l. However, since individual sample results may have exceeded 500 mg/l, it is felt that the maximum value recorded of 642 mg/l is appropriate.

For TDS the current mean and 95% UCL exceed the 1,000 mg/l limit. Therefore, the present 95%UCL of 1,128 mg/l should be the appropriate adjusted standard.

The following language is proposed:

The General Use Water Quality Standard for total dissolved solids and sulfates shall not apply to the drainage way that receives the Bowman Yard facility discharge from the point of discharge approximately 1,750 feet to the drainage way's confluence with Schoenberger Creek, and in Schoenberger Creek approximately 5,000 feet to its confluence with Cahokia Canal. Instead, the portions of waterway mentioned above shall be subject to a total dissolved solids standard of 1,128 mg/l, and a sulfates standard of 642 mg/l.

Internally and separate from the Bowman Avenue Pump Station situation with effluent concentrations, the Illinois EPA is reviewing the sulfate and TDS water quality standards as part of statewide NPDES discharge requirements. The Illinois EPA has petitioned the IPCB in R007- 009 with a proposal to modify the existing effluent standards by:

- a. Removing TDS;
- b. Keeping the current chloride standard at 500 mg/l;
- c. Increasing the sulfate concentration limits;
- d. Using the combined chloride and sulfate limits to replace TDS.

If the Illinois EPA's petition were to be adopted as proposed, there would be no need for the adjusted standard proposed in this case. The proposed sulfate standard is calculated to be over 2,000 mg/l for this discharge (see Toxicity of discharge – sulfates section below). If this becomes the new standard then no adjusted standard is needed. If the TDS standard is eliminated then no adjusted standard is needed in this case either.

G. DESCRIPTION OF PETITIONERS' IMPACT ON THE ENVIRONMENT (35 ILL. ADM. CODE SECTION 104.406(G))

Analyses of Discharge Characteristics

The concentrations representative of the pumping wells are not known to have been contaminated by any human activity and are representative of naturally occurring conditions. The NPDES permit identifies one discharge point, 001. This point is actually the combination of the discharge from the Bowman pump station and the flow from the Missouri System. Grab samples have been collected individually of the three groundwater systems that go through the Bowman Avenue pump station (the Tri-level, the I-64, and the 25th Street), the Bowman Station discharge and the Missouri Avenue system. The final discharge represents a combination of the Missouri Avenue and the Bowman Pump Station. In order to mathematically combine the discharges, nominal flow rates based on pump designs were used. Actual flow rates have not been collected, but had they been, they would have been less and would not have changed any recommendations made herein. These data are summarized in the table in Section 3.

Sulfates

The mean concentration from Bowman station was 381 mg/l and the 95% upper confidence limit of the data (UCL) was 496 mg/l. When the Missouri Avenue data is added, the CEE mean becomes 349 mg/l and the 95% UCL is 478 mg/l. While individual wells may have exceeded 500 mg/l, it is unclear whether the CEE has ever exceeded the threshold; therefore any impact would be minimal, if at all.

Total Dissolved Solids (TDS)

The mean concentration was 1,031 mg/l and the 95% UCL is 1,158 mg/l.

discovered that the existing TDS standard is unnecessary as the toxicity of each constituent rather than the sum, is the essential factor ensuring protection of aquatic life. With toxicity based sulfate and chloride standards in force, a TDS standard is unnecessary as it is incapable of predicting the threshold of adverse effects to aquatic life.” Having said this, the Illinois EPA has proposed eliminating the TDS standard. Thus, it is not felt the TDS limits proposed here represent a threat to aquatic toxicity, per se. The discussion below will address the likelihood of toxicity resulting from sulfate and chloride levels.

- Chlorides – As noted in sec. 3.1.1 the chloride levels are well below the current standard of 500 mg/l; they are typically below 100 mg/l. The most recent samples were 82.8, and 94.4 mg/l. thus chlorides exhibit no indication of toxicity.
- Hardness - Hardness data is not collected routinely but was included as part of the last NPDES submittal. The hardness data submitted ranged from 454 to 898 mg/l (mostly over 500mg/l). Recent data shows hardness of 639 mg/l.
- Sulfates – In Illinois EPA studies and follow up research by Dr. David Soucek, the toxicity was found to be related to hardness and chloride levels. The relationship is explained in formulae proposed by the Illinois EPA in R07-009. The standards are determined by these formulae as “concentrations not to be exceeded at any time.” Using recent hardness data of 639 mg/l and chloride values of 82 mg/l and 94 mg/l, the sulfate standard would be 2,000 mg/l. Even if more historical values (using hardness of 454 mg/l and chlorides of 80 mg/l) were evaluated, the sulfate standard would still be greater than 2,500 mg/l. The table in sec. 3.2 shows the sulfate average (mean) to be 349 mg/l and the 95%UCL of 478mg/l - both considerably below the toxicity based sulfate standards proposed by the Illinois EPA. The IDOT feels that the research information presented in the Statement of Reasons and the historical data demonstrate the discharge is not toxic to aquatic life.

H. EXISTING PHYSICAL CONDITIONS (DESCRIPTION OF RECEIVING STREAM)

The Bowman discharge and the Missouri Avenue discharge combine in a sewer and go thence to the Bowman Pump Station drainage way. This drainage way is a channelized ditch that also takes stormwater flow from the Interstate System near Collinsville Road. This ditch goes 1,750 feet to the reported Schoenberger Creek. Schoenberger Creek at

this point is channelized also and goes about 5,000 feet to Cahokia Canal. Cahokia Canal is also channelized and goes to the Mississippi River. Flow data are not kept on all these waterways, but it is suspected that during non-rainy weather most if not all of the flow in the drainage way is from the IDOT flows. The Pfizer Co. also reportedly discharges to Schoenberger Creek. This discharge was the subject of a IPCB action in AS 81-29.

There are no known users of the receiving drainage way or Schoenberger Creek for drinking water or other purposes.

The entire receiving water system from the discharge point to the Mississippi River is channelized and habitat limited. This system serves as a stormwater control system for this area, and is not known as a recreational area.

I. THE CHARACTER OF THE AREA INVOLVED INCLUDING SURROUNDING LAND USE AND ZONING CLASSIFICATIONS

This area covers a number of political jurisdictions including East St. Louis, Madison, Fairmont City and unincorporated St. Clair County. The Bowman Yard facility is in East St. Louis and is reported zoned as "unknown". The areas immediately to the northeast and northwest are zoned "R-3" or multifamily. The property to the east from the facility from Bowman Station to the discharge point is "M-2" or heavy manufacturing and industrial. Adjacent areas are zoned R- 1A single family. The drainage way to which to outfall discharges and Schoenberger Creek from the outfall to the confluence with Cahokia Canal are in unincorporated St. Clair Co. and are zoned "B-2" or general business. At least part of the area near the confluence of Schoenberger Creek and Cahokia Canal is in Madison (zoned as "planned commercial"), and Fairmont City (zoned as highway business). The drainage way and Schoenberger Creek are located in largely undeveloped, uninhabited areas. There are no known uses of these waters for potable or agricultural uses. To the east of the drainage way is the highway system, including exchanges and overpasses, and to the west is a vacant undeveloped field. To the east of Schoenberger Creek is a vacant field and several hundred feet further is the Gateway International Raceway. To the west is a vacant field for several hundred feet. The area further to the west contains industrial facilities, including waste management activities, and is fairly flat, allowing water to pond (in undeveloped areas) during wet period.

J. JUSTIFICATION FOR PROPOSED ADJUSTED STANDARDS (35 ILL. ADM. CODE SECTION 104.406(H))

In the aforementioned R81-29 matter the IPCB recognized the impact of IDOT's discharges and stated "...for purposes of this decision, the Board will accept the IDOT discharge as a fundamental, irreversible change in the stream." Given the IPCB's position, the fact an adjusted standard was granted for this discharge in AS 96-012 in 1996, and the data presented, IDOT still represents that there is no adverse impact on the environment.

The typical sulfate discharge meets the 500mg/l standard and could only be expected to rarely, if ever, exceed it. Additionally, the IEPA's petition indicates there is no adverse impacts at this level (considering chlorides and TDS as well). Thus, it is not felt that there is any adverse impact related to sulfates.

The TDS average is only slightly greater than the 1,000mg/l standard (1,031 mg/l ave. and 1,158 mg/l for 95% UCL). It has also been noted that the Illinois EPA intends to recommend of the elimination of the TDS standard in the future because there is no relationship to toxicity. It is IDOT's opinion that since the discharges either meet or almost meet the standards now, the receiving waters are severely habitat limited, and the Illinois EPA intends on eliminating the standard, there is no impact on the environment, nor will there be one in the future.

K. ADDITIONAL JUSTIFICATION FACTORS

Various sites have been granted approved adjusted standards similar to the requested constituents, discharge type, and concentration limits of Bowman Yard. An outline of several of these sites is provided below to illustrate that the proposal to adjust the standards of total sulfate and total dissolved solids is viable and justifiable. These decisions also confirm that the proposed adjusted standard would be consistent with federal law.

Bowman Avenue Pump Station

- Petitioner – Illinois Department of Transportation
- Facility – Bowman Avenue Pump Station and associated IDOT deep well system
- Location – East St. Louis, St. Clair County, Illinois
- Case No. – AS 1996-012
- Case Type – Adjusted Standard
- Approval date: October 3, 1996
- Media Type – Water
- Proposal to adjust standards of iron (dissolved) from 1 mg/L to 10 mg/L, iron (total) from 2 mg/L to 20 mg/L and total suspended solids from 15 mg/L to 40 mg/L.
- Illinois EPA Response – The Illinois EPA recommended a grant of the requested adjusted standards. The Illinois EPA asserted that the requested alternative levels should provide relief with a margin of safety for compliance.
- IPCB granted IDOT an adjusted standard from 35 Ill. Adm. Code 302.208 and 304.124 as they apply to the discharge of iron (dissolved), iron (total) and total suspended solids in its discharge from the FAI-55/70-FAI-64 system; and 35 Ill. Adm. Code 302.203 as it applies to color resulting from oxidation and biotransformation of naturally occurring iron.

Material Service's Federal Quarry

- Petitioner – Material Service Corporation
- Facility – Material Service's Federal Quarry and associated McCook Drainage Ditch (from the 47th Street culvert to the Summit Conduit).
- Location – Village of McCook, Cook County, Illinois
- Case No. – AS 02-1
- Case Type – Adjusted Standard
- Approval date: June 6, 2002
- Media Type – Water

- Proposal to adjust effluent limits of sulfate from 500 mg/L to 850 mg/L and total dissolved solids (TDS) from 1,000 mg/L to 1,900 mg/L. The groundwater seepage into the quarry is a shallow dolomite aquifer with sulfate and TDS levels ranging from 500 mg/L to 700 mg/L and 1,200 mg/L to 1,600 mg/L, respectively.
- Illinois EPA Response – The Illinois EPA recommended a grant of the requested adjusted standards. The Illinois EPA agreed and/or asserted that (1) the discharge levels of sulfate and TDS are not likely to have any adverse or detrimental effects on the aquatic life that resides in the ditch, (2) the proposed adjusted standard limits are lower than necessary to protect the aquatic life, and (3) the sulfate and TDS standards were established to protect domesticated livestock watering, which the ditch does not support as a use.
- IPCB granted Material Service an adjusted standard from 35 Ill. Adm. Code 304.105 and 406.202. However, the IPCB did not grant the petitioners an adjusted standard from 35 Ill. Adm. Code 302.208 because such relief was unnecessary.

Services and Training Center of Exelon

- Petitioner – Exelon Generation Company
- Facility – Services and Training Center (STC) of Exelon (located on Essex Road) and associated small drainage ditch tributary to Horse Creek, about 3.5 miles upstream of the confluence of Horse Creek with the Kankakee River.
- Location – South of Braidwood, Will County, Illinois
- Case No. – AS 03-1
- Case Type – Adjusted Standard
- Approval date: June 19, 2003
- Media Type – Water
- Proposal to adjust effluent limits of total dissolved solids (TDS) from 1,000 mg/L to 1,900 mg/L. The discharge from the STC includes domestic and cafeteria waste streams, as well as pollution control waste produced in the electro dialysis reversal process used to treat the brackish groundwater to potable standards. The concentrations of TDS from the groundwater range from 1,300 mg/L to in excess of 1,600 mg/L.

- Illinois EPA Response – The Illinois EPA recommended the IPCB grant Exelon the requested adjusted standard from the general use water quality standards (Section 302.208) for TDS. The Illinois EPA agreed that (1) the discharge levels of TDS are not likely to have any adverse or detrimental effects on the aquatic life in the receiving stream, (2) the unnamed tributary and the area of confluence with Horse Creek are not public water supplies, (3) TDS is not the limiting factor in the receiving stream, (4) decreasing the concentrations of TDS in the STC effluent would not necessarily improve the biological communities in the receiving stream, (5) the TDS concentrations in the unnamed tributary have no impact on Horse Creek due to the water flow at the confluence of the unnamed tributary and Horse Creek, and (6) Exelon's request for an adjusted standard from the IPCB's TDS water quality standard (Section 302.208(g)) is consistent with federal law. However, the Illinois EPA argues that granting an adjusted standard from the IPCB's effluent limits (Section 304.105) is not consistent with federal law. Therefore, the Illinois EPA recommended the IPCB deny an adjusted standard from Section 304.105.
- IPCB granted Exelon Generation Company an adjusted standard from 35 Ill. Adm. Code 302.208.

Rhodia, TCBSD, and Consumers Illinois Water

- Petitioner – Rhodia, Inc., the Thorn Creek Basin Sanitary District (TCBSD), and Consumers Illinois Water Company.
- Facility – Rhodia's proposed expansion of their existing silica manufacturing plant and the TCBSD treatment plant.
- Location – Chicago Heights, Cook County, Illinois
- Case No. – AS 01-9
- Case Type – Adjusted Standard
- Approval date: January 10, 2002
- Media Type – Water
- Proposal to adjust effluent limits of sulfate and total dissolved solids (TDS) for the following locations:

- a. Thorn Creek from the TCBSD WWTP discharge to the confluence with Deer Creek for sulfate from 1,000 mg/L to 1,350 mg/L and total dissolved solids (TDS) from 2,100 mg/L to 2,650 mg/L.
 - b. Thorn Creek from the confluence with Deer Creek to USGS Gauging Station 05536275 at Thornton for sulfate from 1,000 mg/L to 1,340 mg/L and total dissolved solids (TDS) from 1,900 mg/L to 2,620 mg/L.
 - c. Thorn Creek from USGS Gauging Station 05536275 at Thornton to Thorn Creek's confluence with the Little Calumet River for sulfate from 850 mg/L to 1,160 mg/L and total dissolved solids (TDS) from 1,900 mg/L to 2,360 mg/L.
 - d. Little Calumet River from the Thorn Creek confluence to the Calumet-Sag Channel for sulfate from 750 mg/L to 1,000 mg/L and total dissolved solids (TDS) from 1,700 mg/L to 2,020 mg/L.
- Illinois EPA Response – The Illinois EPA recommended a grant of the requested adjusted standards. The Illinois EPA agreed that granting the adjusted standards for sulfate and TDS will have no measurable adverse effect on aquatic life in Thorn Creek and the Little Calumet River.
 - IPCB granted the petitioners adjusted standards from 35 Ill. Adm. Code 304.105. However, the IPCB did not grant the petitioners an adjusted standard from 35 Ill. Adm. Code 302.208 because such relief was unnecessary.

L. FUNDAMENTALLY DIFFERENT FACTORS

The Environmental Protection Act at ILCS 5/28.1(c) provides that if the regulation of general applicability does not specify a level of justification, the Board may grant individual adjusted standards whenever the Board determines that: "...factors relating to the petitioner are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation". Factors in this situation are fundamentally different from factors relied upon by the Board in promulgating the current rule in many aspects. Firstly, the discharge waters are all naturally occurring, not waste waters contaminated by anthropogenic activities as is the case with other wastewater discharges. IDOT has absolutely no control over the nature of the discharge. Also, unlike other discharges the purpose of this discharge is not to get rid of water because it is contaminated, but it has to be moved from its underground location in order to prevent

flooding and potentially significant structural damage to a major urban highway system. Flooding of the interstate system would create a major safety hazard to the general public. Attempting to move the discharge to go directly to the Mississippi River would cause an enormous financial burden on the citizens of Illinois for no improvement in the environment. This is a very unique situation, unlike anything typically contemplated in rulemaking, and unlike any other in the State.

M. WAIVER OF HEARING (35 ILL. ADMINISTRATIVE CODE SECTION 104.406(J))

The IDOT waives hearing on this petition.

N. CONCLUSIONS

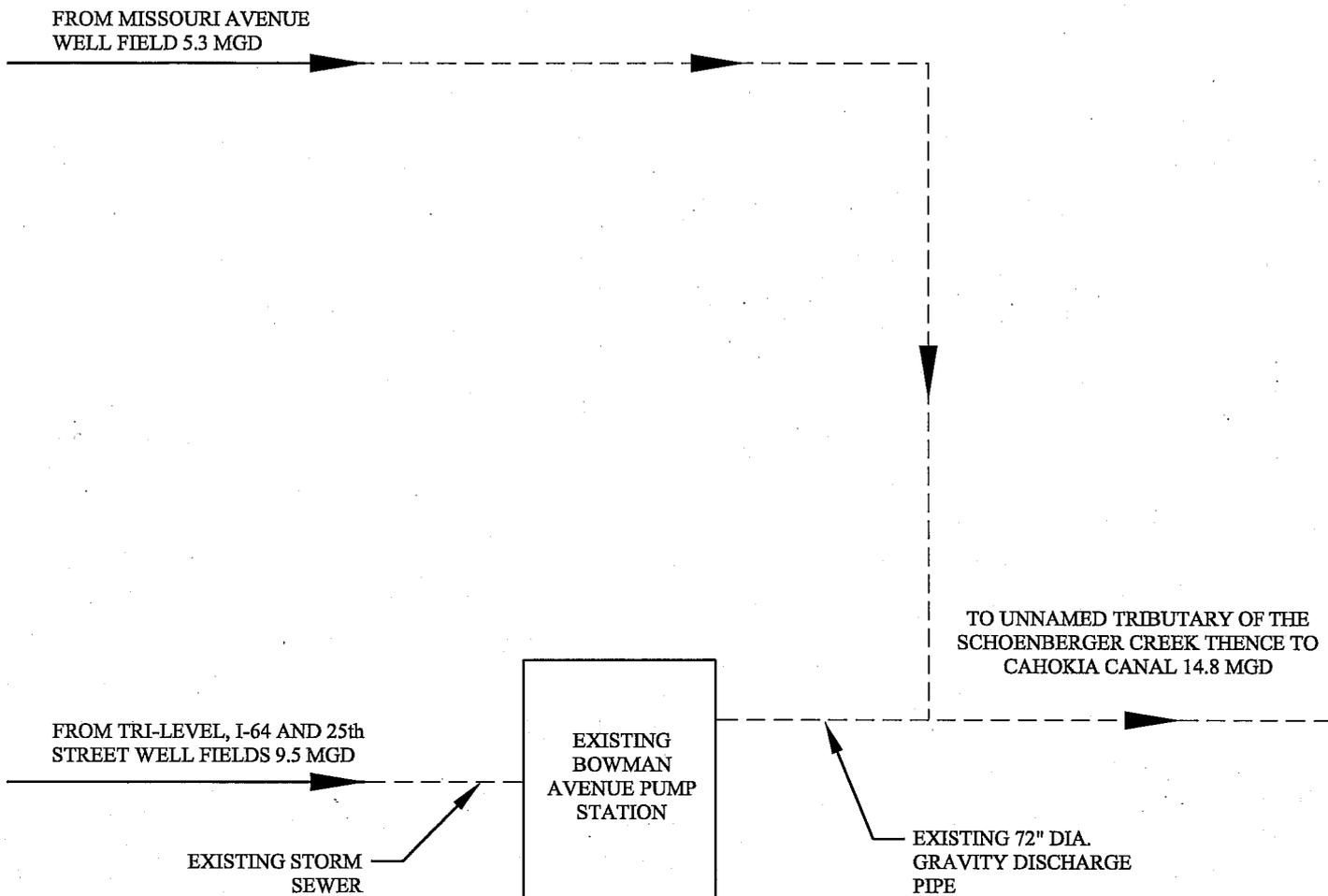
The IDOT District 8 Bowman Yard receives water from several well field systems and discharges to a drainage way, thence to Schoenberger Creek, thence to the Cahokia Canal, and finally to the Mississippi River. The discharge is regulated by effluent standards from 35 Ill. Adm. Code 304 and an Illinois EPA NPDES permit. Sulfate and TDS have or may have exceeded the respective permitted NPDES effluent limits and require an adjusted standard so that the IDOT facility will stay in compliance with applicable regulations. The discharged water, including concentrations of sulfate and TDS, is representative of naturally occurring conditions and is not known to have been contaminated by any human contact. IDOT believes that the above factors are substantial and significantly different from the factors relied upon by the IPCB in adopting the general regulation, and justify an adjusted standard. The proposal to adjust the standards was chosen over the other compliance alternatives (i.e. treatment at the facility versus pumping or piping discharge to the Mississippi River) because of the substantial cost.

REFERENCES

- Andrews Environmental Engineering, Inc., 2003, *Compliance Schedule Plans and Specifications for IDOT District 8 Bowman Avenue Pump Station At FAI 55/7-FAI-64 Deep Well System, 7th and Bowman, East St. Louis, St. Clair County, Illinois*, Consultant's report to Illinois Environmental Protection Agency Bureau of Water pursuant to IEPA NPDES Permit No. IL0070955.
- Anliker, M.A., and R.D. Olson, 2003, *Dewatering Well Assessment for the Highway Drainage System at Four Sites in the East St. Louis Area, Illinois (FY00-Phase 17)*, Illinois State Water Survey Contract Report 2003-08, 53 p.
- Bergstrom, R.E., and T.R. Walker, 1956, *Groundwater Geology of the East St. Louis Area, Illinois*, Illinois State Geological Survey, Report of Investigations 191, 44 p.
- Consoer Townsend Envirodyne (CTE) Engineers, Inc., 2004, *Mainline Drainage Report – Final Submittal Illinois – FAP 999 Section 81-2 82 R, Project: I-55/70/64 Tri-Level Interchange, St. Clair County IL*, Consultant's report to Illinois Department of Transportation District 8, Job No. D-98-067-00, 9 p.
- Horner & Shifrin, Inc., 1994, *Stage I – Existing Condition and Analysis for Groundwater Treatment Facilities Route FAI-55/64/70 Tri-Level Complex and Missouri Avenue in East St. Louis and IL Route 3 Railroad Viaduct in Venice*, Consultant's report to Illinois Department of Transportation District 8, Job No. D-98-120-93, 47 p.
- Illinois Environmental Protection Agency – Division of Water Pollution Control, December 18, 2002, *NPDES Permit No. IL0070955 for IDOT District 8 Bowman Avenue Pump Station*.
- Illinois Pollution Control IPCB, October 3, 1996, *Petition of Illinois Department of Transportation, District 8 for an Adjusted Standard from 35 Ill. Adm. Code 302.208, 304.124 and 302.203, AS 96-12 (Adjusted Standard – Water)*.
- Layne Western Company, 2003, *Computer Simulation of Groundwater Flow Illinois Department of Transportation Dewatering Wellfield, East St. Louis Illinois – FAP 999 Section 81-2 82 R (I-55/70/64) Tri-Level Interchange, St. Clair County IL*, Consultant's report for Consoer Townsend Envirodyne Engineers, Inc. and Illinois Department of Transportation District 8, Job No. D-98-120-93, 47 p.
- Sanderson, E.W., A.P. Visocky, M.A. Collins, R.D. Olson, and C.H. Neff, 1984, *Dewatering Well Assessment for the Highway Drainage System at Four Sites in the East St. Louis Area, Illinois (Phase 1)*, Illinois State Water Survey Contract Report 341, 48 p.
- Schicht, R.J., and A.G. Buck, 1995, *Ground-Water Levels and Pumpage in the Metro-East Area, Illinois, 1986-1990*, Illinois State Water Survey Circular 180, 44 p.

Figure 1

Schematic of Bowman Yard Discharge



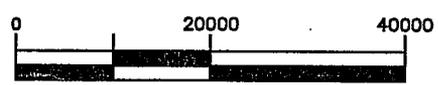
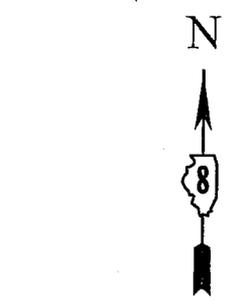
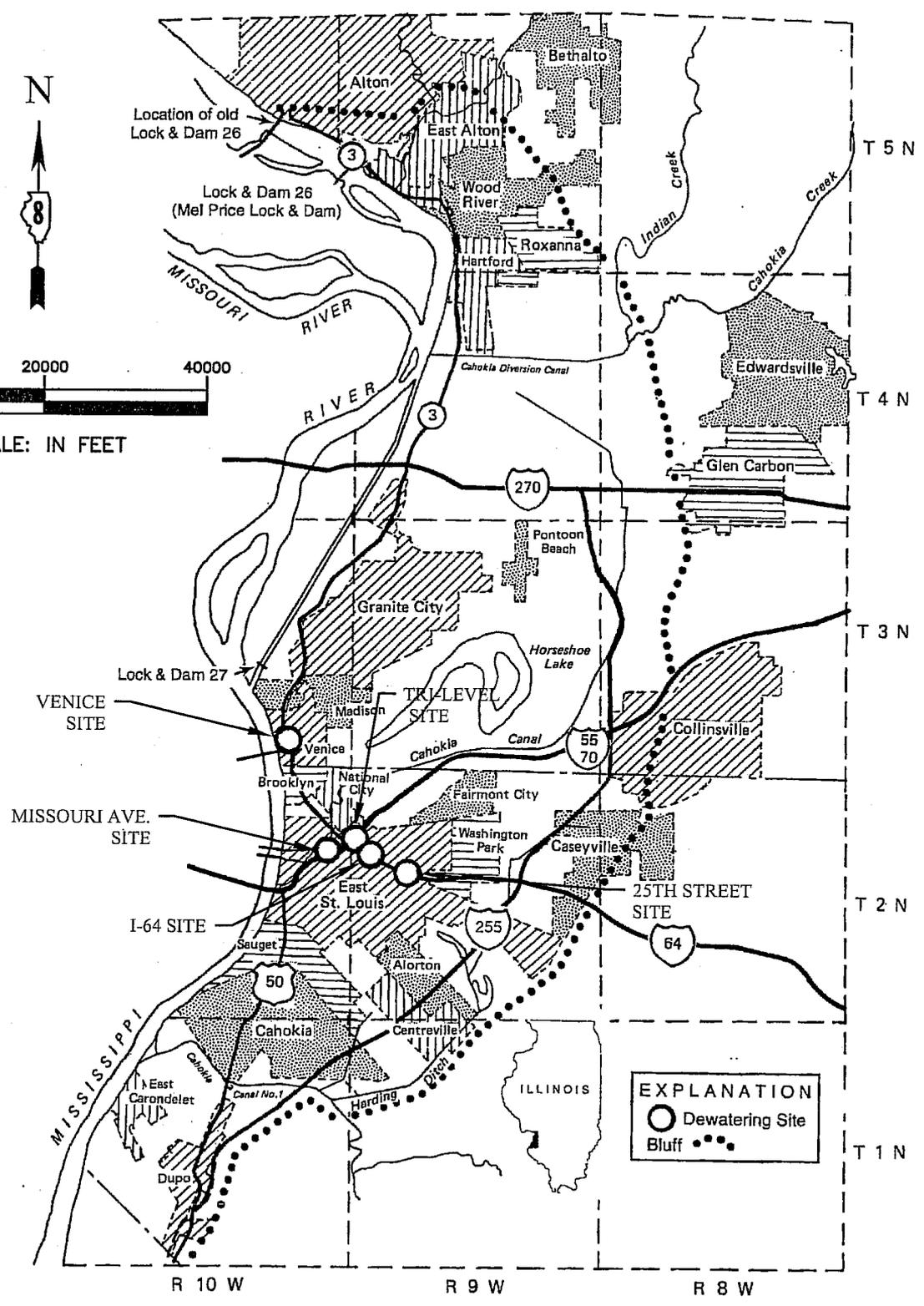
NOT TO SCALE

| | | | |
|---|--|--------------------------------|---------------------------------------|
|  <p>ANDREWS ENGINEERING, INC. 3300 Ginger Creek Drive, Springfield, IL 62711-7233 Tel (217) 787-2334 Fax (217) 787-9495 Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO</p> | <p>SCHMATIC OF BOWMAN YARD DISCHARGE</p> <p>PLANS PREPARED FOR ILLINOIS DEPARTMENT OF TRANSPORTATION BOWMAN YARD AT I-55/64/70 TRI-LEVEL INTERCHANGE EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS</p>  | <p>DATE: OCTOBER 2006</p> | <p>SHEET NUMBER:</p> |
| | | <p>PROJECT ID: IDOT WO 003</p> | <p>FIGURE 1</p> |
| <p>APPROVED BY: LWE</p> | <p>DESIGNED BY: N/A</p> | <p>DRAWN BY: MPN</p> | <p>FILE: J:\DOT2006-003\WO-003 WP</p> |

Figure 2

Location of East St. Louis Dewatering Sites

***** AS 2007-007 *****



SCALE: IN FEET

EXPLANATION

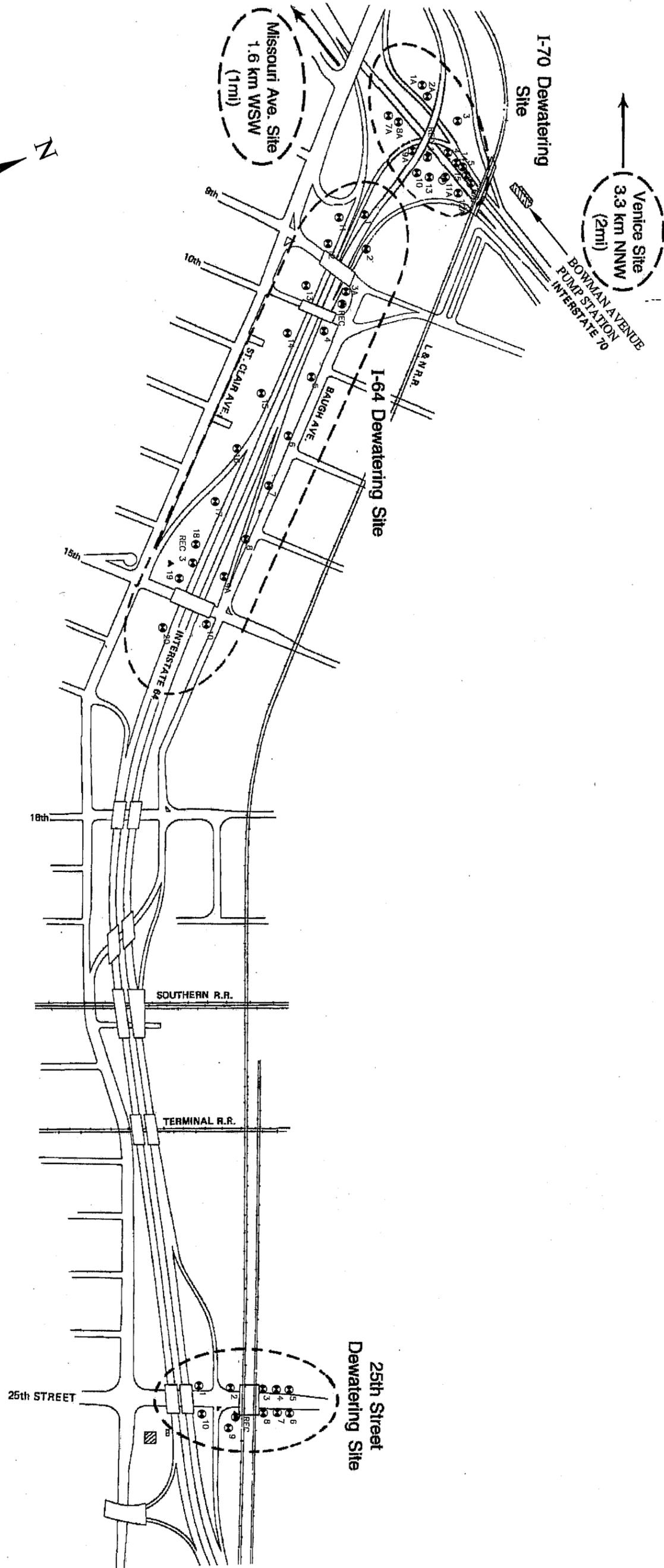
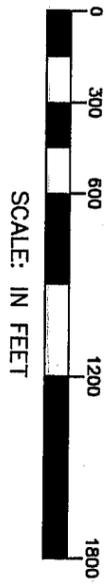
- Dewatering Site
- Bluff

(MODIFIED FROM ANLIKER AND OLSON, 2003)

| | | | |
|---|--|--|---|
|  <p>ANDREWS ENVIRONMENTAL ENGINEERING INC. 3535 Mayflower Blvd., Springfield, IL 62711 Tel (217) 787-2334 Fax (217) 787-9495 Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO</p> | <p>LOCATION OF EAST ST. LOUIS DEWATERING SITES</p> <p>PLANS PREPARED FOR ILLINOIS DEPARTMENT OF TRANSPORTATION BOWMAN YARD AT I-55/64/70 TRI-LEVEL INTERCHANGE EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS</p> | <p>DATE: AUGUST 2006</p> <p>PROJECT ID: IDOT WD 003</p> <p>FILE: 4/2007000-003\WD-003 WP</p> | <p>SHEET NUMBER:</p> <p style="font-size: 2em; font-weight: bold;">FIGURE</p> <p style="font-size: 3em; font-weight: bold;">2</p> |
| | <p>APPROVED BY: TPD DESIGNED BY: IDOT-BDE DRAWN BY: MPN</p> | | |

Figure 3

**Locations of Dewatering Wells at the I-70 Tri-Level,
I-64 and 25th Street Sites**

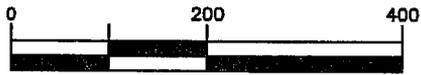
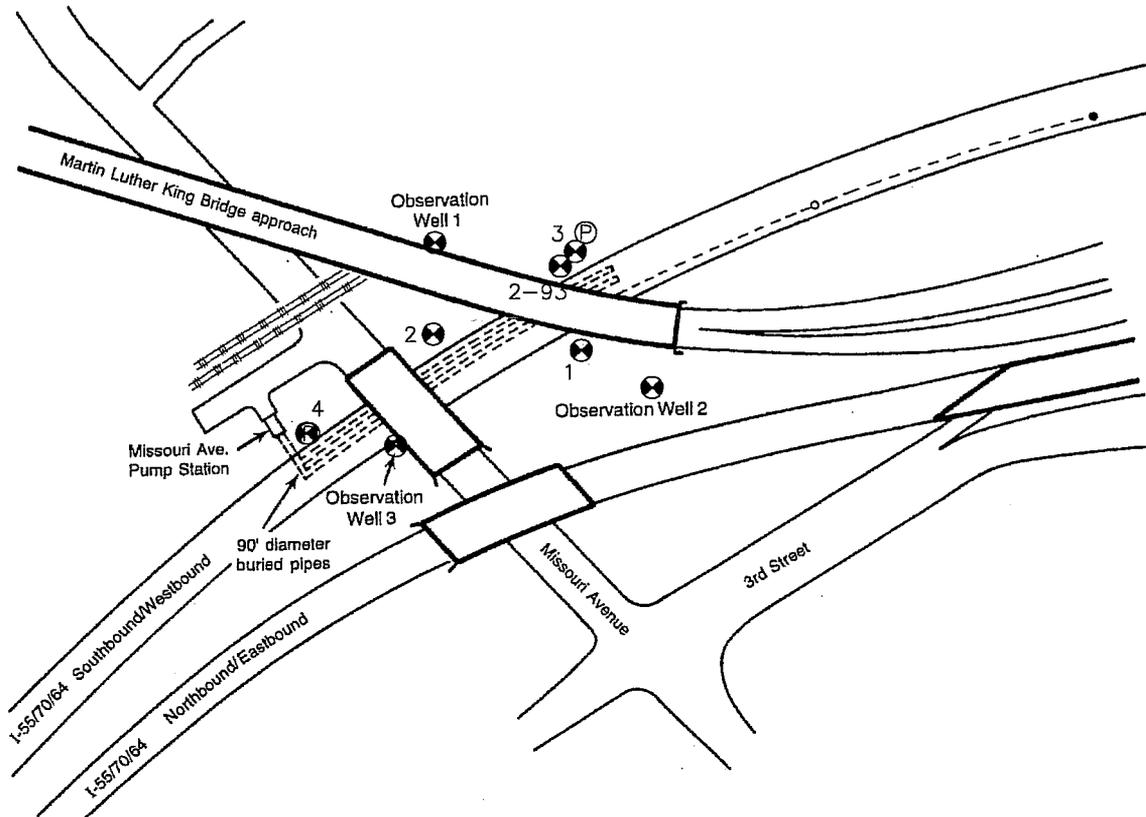


(MODIFIED FROM ANLIKER AND OLSON, 2003)

| | | |
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| <p>FIGURE 3</p> | <p>LOCATION OF DEWATERING WELLS AT THE I-70 TRI-LEVEL, I-64, AND 25TH STREET SITES</p> | <p>ANDREWS ENGINEERING, INC. 3300 Ginger Creek Drive, Springfield, IL 62711-7233 Tel (217) 787-2334 Fax (217) 787-9495 Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO</p> |
| | <p>PLANS PREPARED FOR ILLINOIS DEPARTMENT OF TRANSPORTATION IDOT JOB D-98-012-03 INTERSTATES 55/64/70 EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS</p> | |
| <p>DATE: JULY 2004 PROJECT ID: IDOT-BDE SHEET NUMBER:</p> | | |

Figure 4

Locations of Dewatering Wells at Missouri Avenue Site



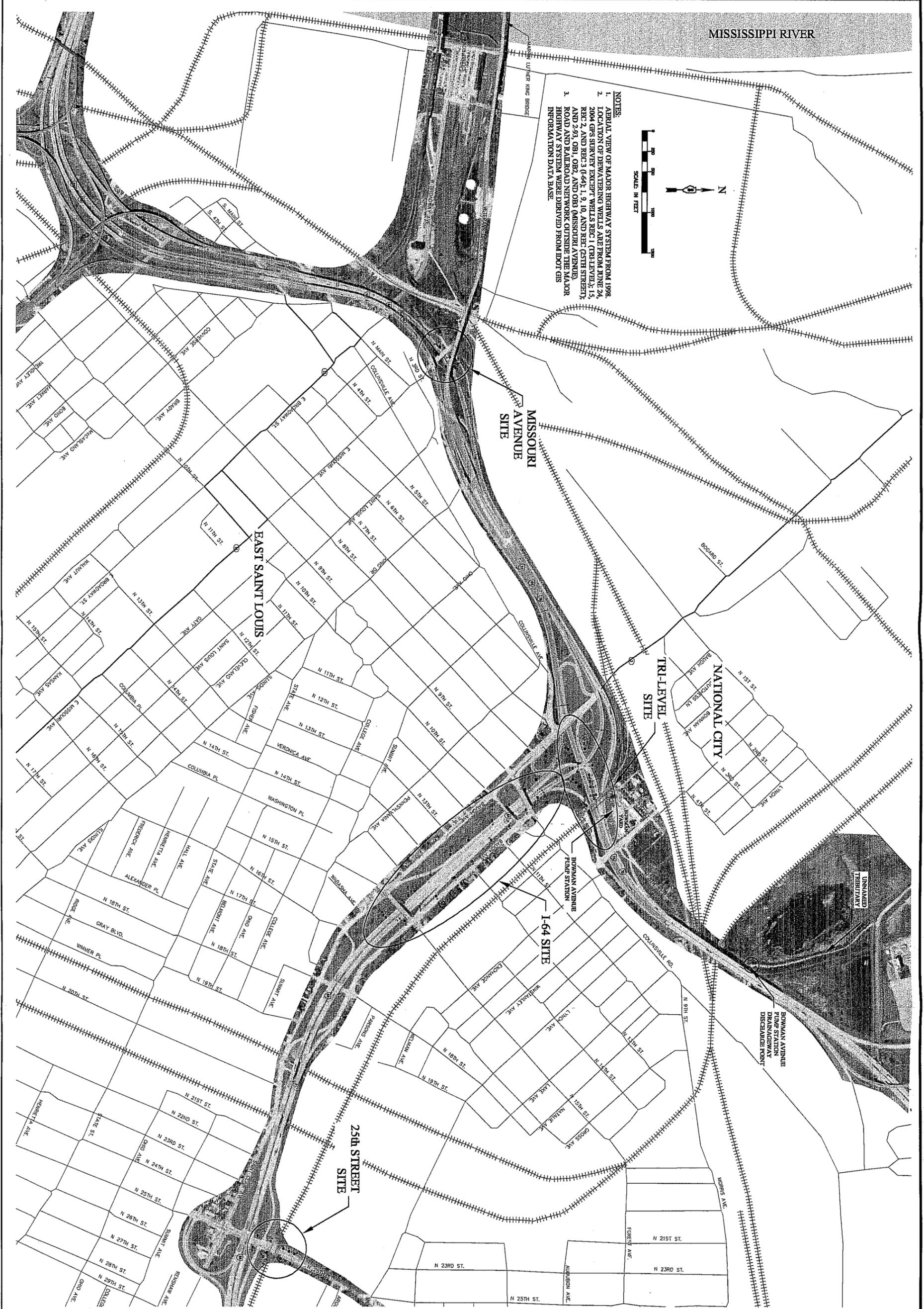
SCALE: IN FEET

(MODIFIED FROM ANLIKER AND OLSON, 2003)

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|--|---|----------------------|--|-----------------------------------|
|  <p>ANDREWS ENGINEERING, INC. 3300 Ginger Creek Drive, Springfield, IL 62711-7233 Tel (217) 787-2334 Fax (217) 787-9495 Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO</p> | <p>LOCATIONS OF DEWATERING WELLS AT MISSOURI AVENUE SITE</p> | | <p>DATE: JULY 2004</p> | <p>SHEET NUMBER:</p> |
| | <p>PLANS PREPARED FOR ILLINOIS DEPARTMENT OF TRANSPORTATION IDOT JOB D-98-012-03 INTERSTATES 55/64/70 EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS</p> | | <p>PROJECT ID: IDOT WO 047</p> | <p>FIGURE 4</p> |
| <p>APPROVED BY: TPD</p> | <p>DESIGNED BY: IDOT-BDE</p> | <p>DRAWN BY: MPN</p> | <p>FILE: </p> | |

Appendix A
Site Location Map

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|--|---|--|---|---|--|--------------------------------|-------------------------------------|-----------------------------|
| <p>APP A</p> | <p>SHEET NUMBER 047</p> | <p>PROJECT NO. IDOT NO 047</p> | <p>DATE JULY 2004</p> | <p>SITE LOCATION MAP PLANS PREPARED FOR ILLINOIS DEPARTMENT OF TRANSPORTATION BOWMAN AVENUE PUMP STATION AND ASSOCIATED DEWATERING SITES INTERSTATES 55/70 & 64 EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS</p> | <p>ANDREWS ENGINEERING, INC. 3300 Ginger Creek Drive, Springfield, IL 62711-7233 Tel (217) 787-2334 Fax (217) 787-9495 Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO</p> | <p>REVISIONS</p> | | |
| | | | | | | <p>APPROVED BY: TPD</p> | <p>DESIGNED BY: IDOT-BDE</p> | <p>DRAWN BY: MPN</p> |

Appendix B
Geologic Cross Sections

Appendix C

**Bowman Avenue Pump Station and Missouri Avenue Well Field
Historical Water Quality Data**

Electronic Filing, Received, Clerk's Office, June 8, 2007

* * * * * **AS 2007 007** * * * * *

Historical Water Quality Data (Monthly DMR Grab Sample)

| Sample Date | Grab Samples | nd | mg/L Total Sulfate | nd | mg/L Total Dissolved Solids |
|-------------|--------------|----|-----------------------|----|--------------------------------|
| 02/21/03 | 1 | | 366 | | 1050 |
| 03/04/03 | 2 | | 311 | | 1090 |
| 03/24/03 | 3 | | 340 | | 1060 |
| 04/02/03 | 4 | | 356 | | 1030 |
| 04/18/03 | 5 | | 306 | | 1120 |
| 05/02/03 | 6 | | 297 | | 1070 |
| 05/27/03 | 7 | | 580 | | 1090 |
| 06/16/03 | 8 | | 378 | | 1080 |
| 06/25/03 | 9 | | 369 | | 1070 |
| 07/09/03 | 10 | | 344 | | 1160 |
| 07/21/03 | 11 | | 356 | | 1160 |
| 08/04/03 | 12 | | 386 | | 1200 |
| 08/19/03 | 13 | | 369 | | 1120 |
| 09/04/03 | 14 | | 278 | | 1090 |
| 09/18/03 | 15 | | 575 | | 1070 |
| 10/01/03 | 16 | | 441 | | 1100 |
| 10/22/03 | 17 | | 393 | | 1110 |
| 11/05/03 | 18 | | 424 | | 1070 |
| 11/20/03 | 19 | | 399 | | 1070 |
| 12/03/03 | 20 | | 539 | | 1100 |
| 12/17/03 | 21 | | 438 | | 1080 |
| 01/06/04 | 22 | | 438 | | 1040 |
| 01/21/04 | 23 | | 435 | | 1100 |
| 02/05/04 | 24 | | 466 | | 1280 |
| 02/20/04 | 25 | | 233 | | 1100 |
| 03/11/04 | 26 | | 324 | | 1110 |
| 03/29/04 | 27 | | 395 | | 1080 |
| 04/14/04 | 28 | | 317 | | 1110 |
| 04/30/04 | 29 | | 387 | | 1110 |
| 05/10/04 | 30 | | 399 | | 1080 |
| 05/24/04 | 31 | | 308 | | 1070 |
| 06/10/04 | 32 | | 348 | | 1090 |
| 06/24/04 | 33 | | 345 | | 1120 |
| 07/14/04 | 34 | | 363 | | 988 |
| 07/29/04 | 35 | | 428 | | 1030 |
| 08/06/04 | 36 | | 407 | | 1000 |
| 08/19/04 | 37 | | 432 | | 1040 |
| 09/01/04 | 38 | | 305 | | 1050 |
| 09/20/04 | 39 | | 372 | | 1080 |
| 10/06/04 | 40 | | 496 | | 1100 |
| 10/21/04 | 41 | | 370 | | 1110 |
| 11/03/04 | 42 | | 292 | | 1170 |
| 11/19/04 | 43 | | 339 | | 1120 |
| 12/08/04 | 44 | | 371 | | 1080 |
| 12/22/04 | 45 | | 363 | | 1130 |
| 01/07/05 | 46 | | 392 | | 1090 |
| 01/20/05 | 47 | | 255 | | 1100 |
| 02/10/05 | 48 | | 466 | | 1160 |
| 03/09/05 | 49 | | 404 | | 1160 |
| 04/15/05 | 50 | | 425 | | 1100 |
| 05/12/05 | 51 | | 391 | | 1150 |
| 06/09/05 | 52 | | 335 | | 1140 |
| 07/18/05 | 53 | | 338 | | 1070 |
| 08/12/05 | 54 | | 403 | | 1140 |
| 09/22/05 | 55 | | 360 | | 1050 |
| 10/24/05 | 56 | | 403 | | 1140 |
| 11/18/05 | 57 | | 354 | | 1070 |

| Parameter: | Total Sulfate | Total Dissolved Solids |
|---|---------------|------------------------|
| Units: | mg/L | mg/L |
| Number of samples: | 57 | 57 |
| Number of ND's: | 0 | 0 |
| Minimum: | 233 | 988 |
| Maximum: | 580 | 1280 |
| Mean: | 380.7719 | 1097.3333 |
| STD: | 68.4421 | 48.2439 |
| % Relative Standard Deviation: | 17.9746 | 4.3965 |
| Prediction Limits | | |
| Proposed 95% Prediction Limit: | 496.2426 | 1178.7271 |
| Existing Standard: | 500 | 1000 |
| TPD Proposed Standard: | 750 | 1500 |
| # of Standard Deviations from the Mean | | |
| Proposed 95% Prediction Limit: | 1.69 | 1.69 |
| Existing Standard: | 1.74 | 2.02 |
| TPD Proposed Standard: | 5.39 | 8.35 |
| Mean within 2 - 3 Standard Deviations | | |
| 2 STD | 517.66 | 1193.82 |
| 3 STD | 586.10 | 1242.07 |

Note:
< Indicates a non detect

Data Values
Bowman Yard interwell 95% all data (2006)

Appendix C
IDOT Distr Missouri Avenue
Historical Water Quality Data

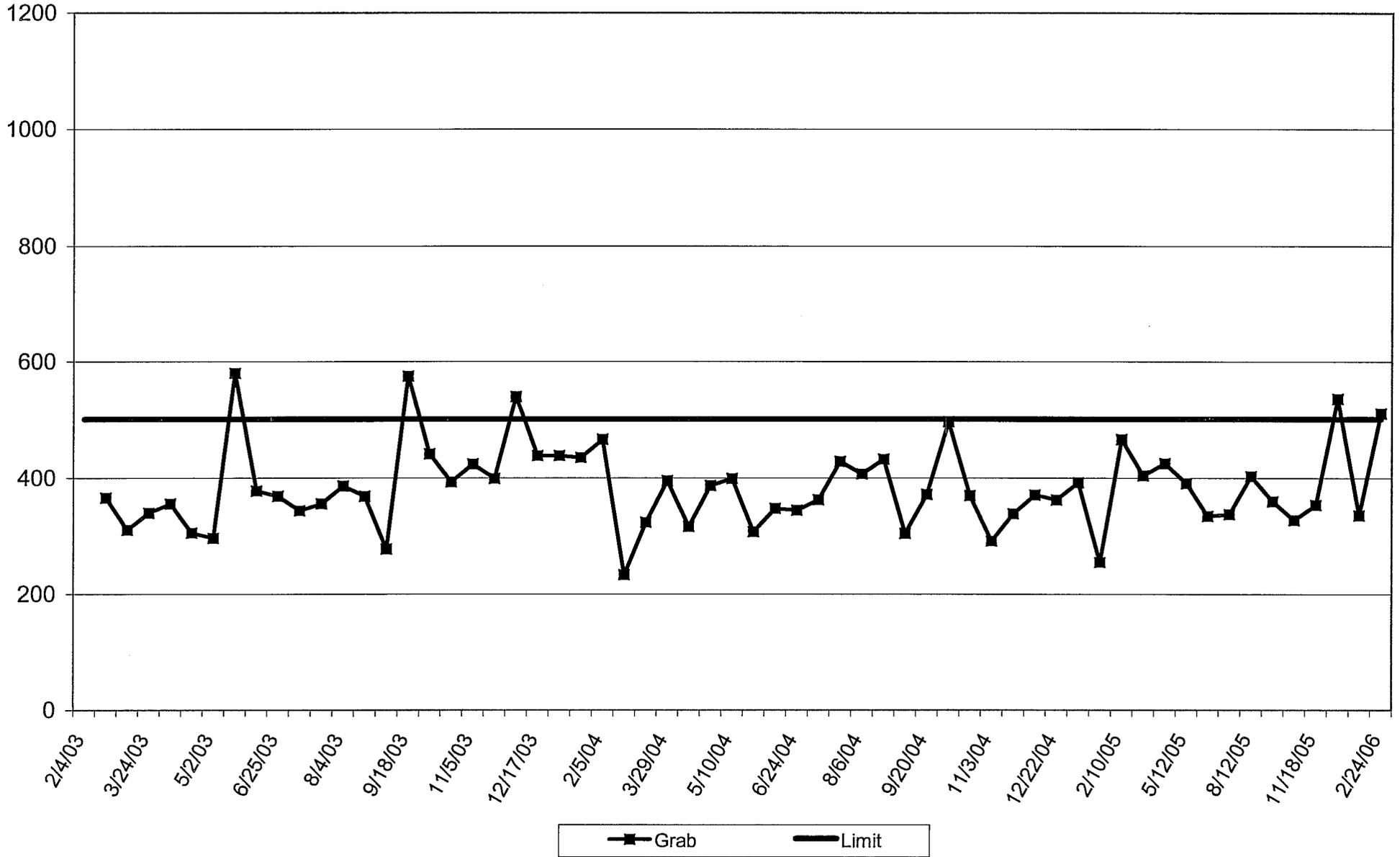
| | Sample Date | samples | nd | mg/L Total Sulfate | nd | mg/L Total Dissolved Solids |
|---------------------|-------------|---------|----|-----------------------|----|--------------------------------|
| Missouri - 1 | 10/30/03 | 1 | | 301 | | 831 |
| | 12/16/03 | 2 | | 257 | | 836 |
| | 02/04/04 | 3 | | 280 | | 942 |
| | 3/29/04 | 4 | | 188 | | 813 |
| | 5/24/04 | 5 | | 241 | | 879 |
| | 8/6/04 | 6 | | 257 | | 866 |
| Missouri - 2 | 10/30/03 | 7 | | 340 | | 963 |
| | 12/16/03 | 8 | | 288 | | 933 |
| | 02/04/04 | 9 | | 267 | | 856 |
| | 3/29/04 | 10 | | 281 | | 957 |
| | 5/24/04 | 11 | | 179 | | 808 |
| | 8/6/04 | 12 | | 301 | | 883 |
| Missouri - 3 | 11/3/04 | 13 | | 642 | | 1390 |
| | 10/30/03 | 14 | | 365 | | 963 |
| | 12/16/03 | 15 | | 326 | | 943 |
| | 02/04/04 | 16 | | 295 | | 935 |
| | 3/29/04 | 17 | | 260 | | 970 |
| | 5/24/04 | 18 | | 248 | | 916 |
| Missouri - 4 | 8/6/04 | 19 | | 335 | | 948 |
| | 11/3/04 | 20 | | 247 | | 954 |
| | 10/30/03 | 21 | | 405 | | 990 |
| | 12/16/03 | 22 | | 360 | | 1060 |
| | 02/04/04 | 23 | | 316 | | 1050 |
| | 3/29/04 | 24 | | 344 | | 1070 |
| | 5/24/04 | 25 | | 265 | | 1050 |
| | 8/6/04 | 26 | | 373 | | 979 |
| | 11/3/04 | 27 | | 181 | | 746 |

| Parameter: | Total Sulfate | Total Dissolved Solids |
|---|---------------|------------------------|
| Units: | mg/L | mg/L |
| Number of samples: | 27 | 27 |
| Number of ND's: | 0 | 0 |
| Minimum: | 179 | 746 |
| Maximum: | 642 | 1390 |
| Mean: | 290.7857 | 911.8214 |
| STD: | 88.9370 | 120.5332 |
| % Relative Standard Deviation: | 30.5851 | 13.2189 |
| Prediction Limits | | |
| Proposed 95% Prediction Limit: | 445.2619 | 1121.1775 |
| Existing Standard: | 500 | 1000 |
| # of Standard Deviations from the Mean | | |
| Proposed 95% Prediction Limit: | 1.74 | 1.74 |
| Existing Standard: | 2.35 | 0.73 |
| Mean within 2 - 3 Standard Deviations | | |
| 2 STD | 468.66 | 1152.89 |
| 3 STD | 557.60 | 1273.42 |

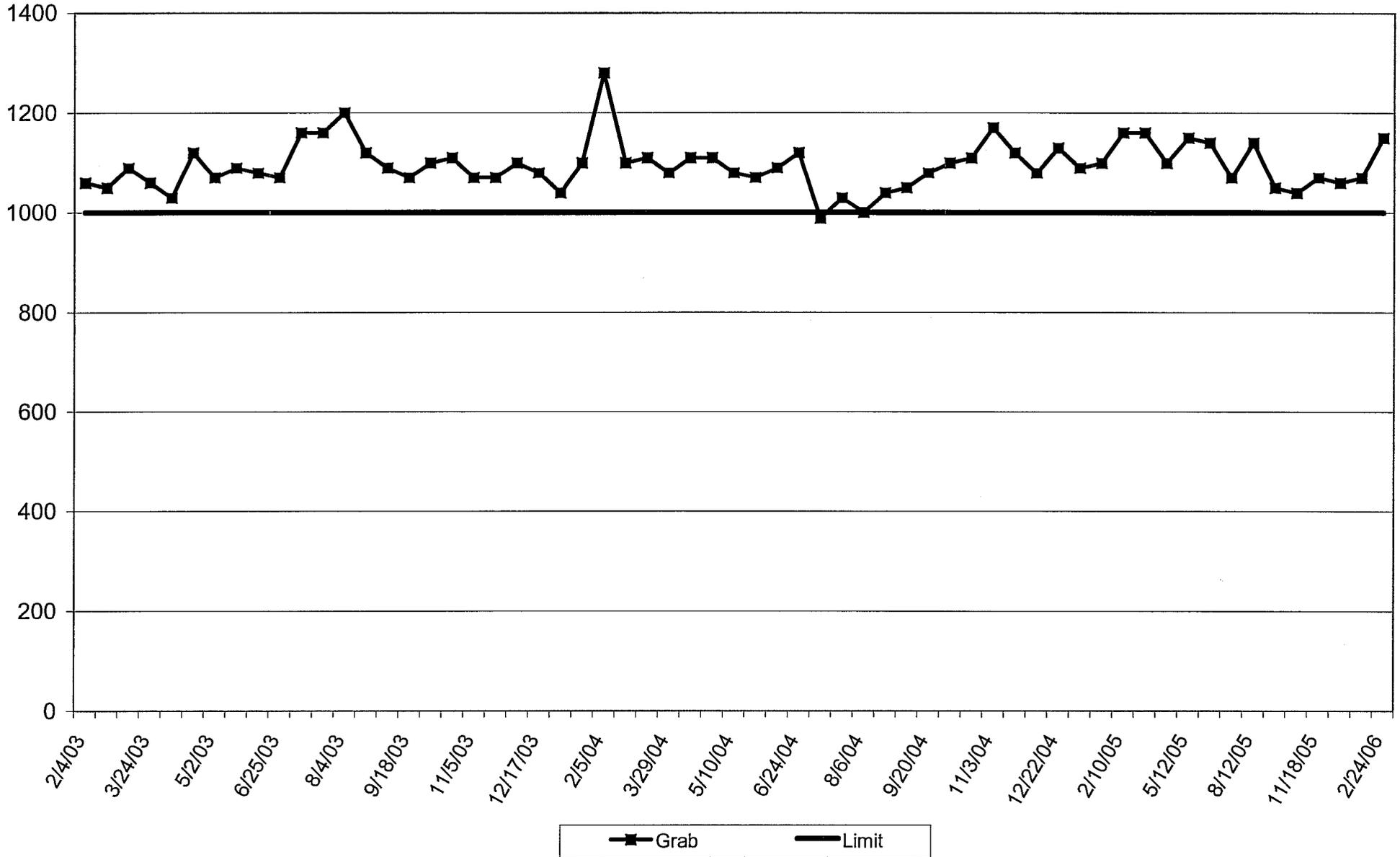
Appendix D

**Bowman Avenue Pump Station and Missouri Avenue Well Field
Graphs of Parameters versus Time**

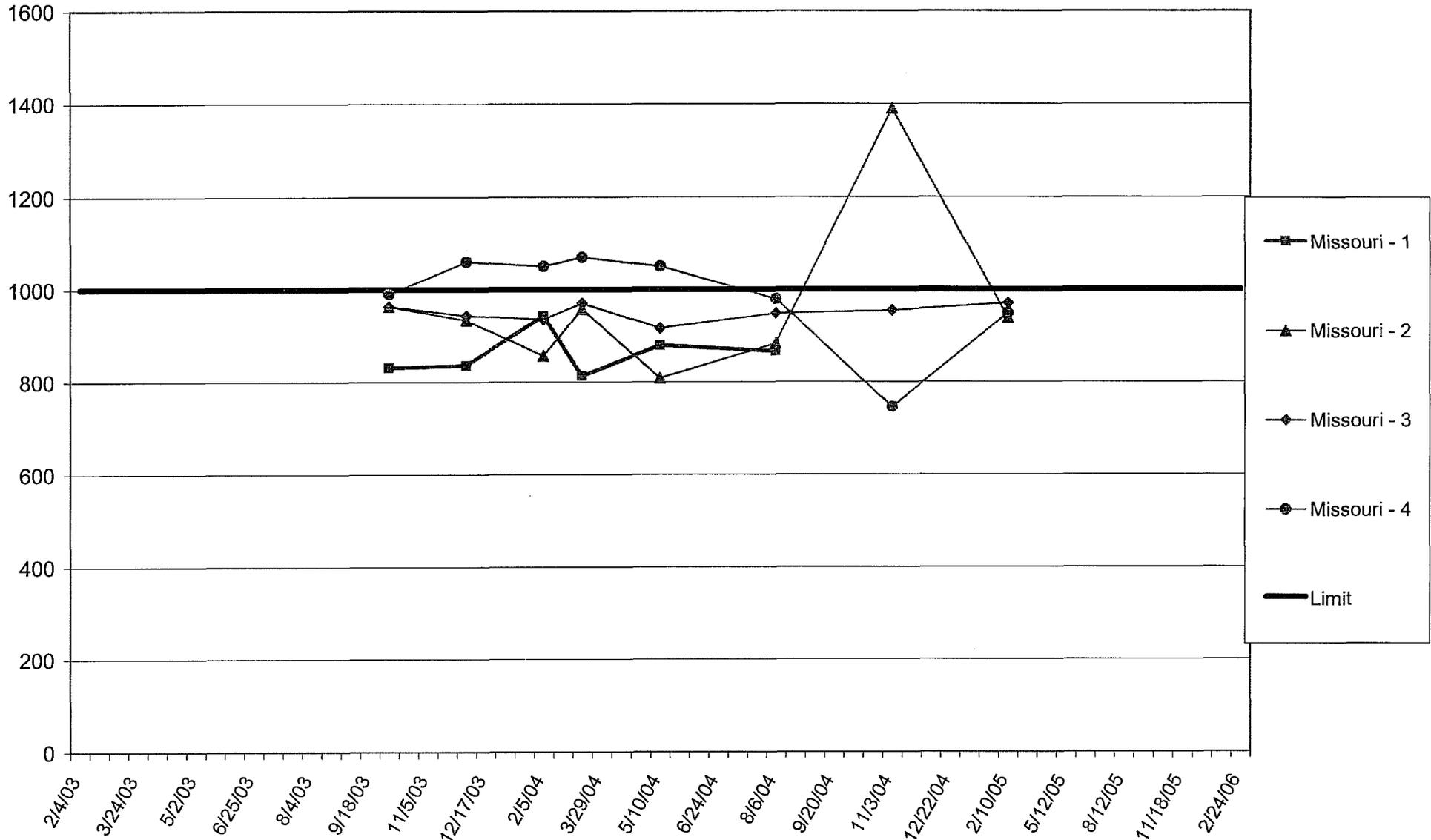
Bowman Avenue Pump Station
Grab Sample
Total Sulfate (mg/L)
2003 to Present



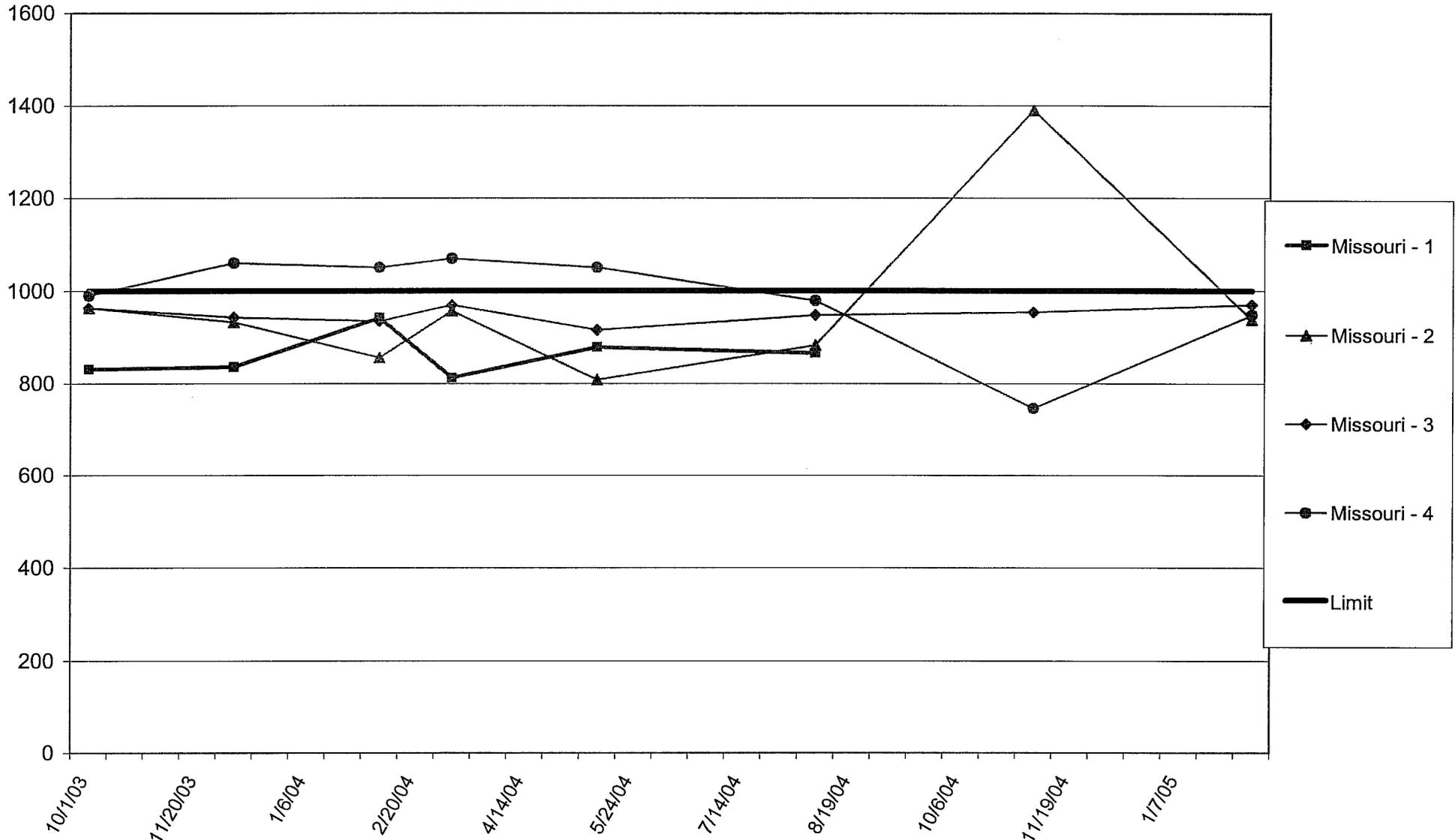
Bowman Avenue Pump Station
Grab Sample
Total Dissolved Solids (mg/L)
2003 to Present



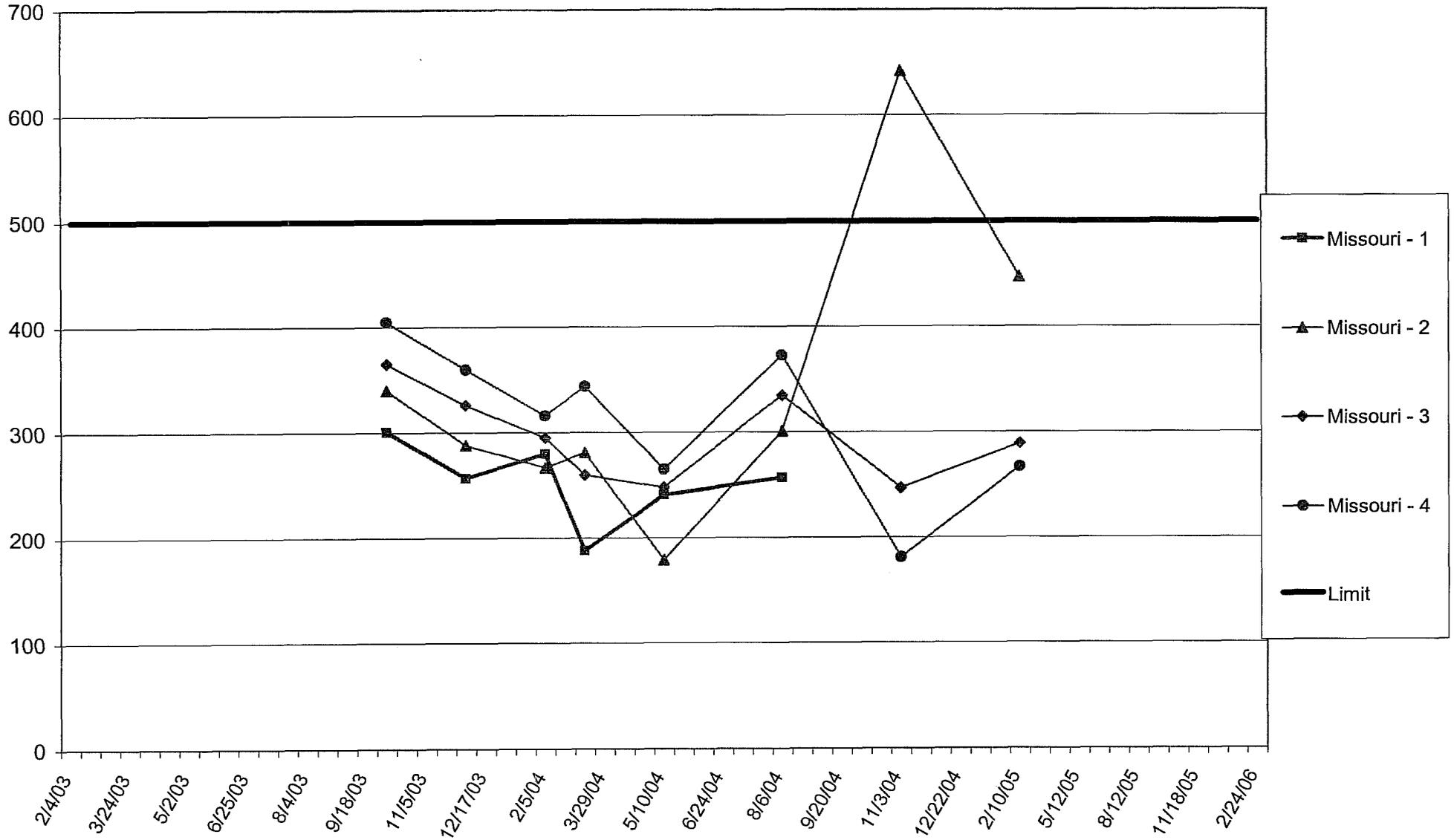
Missouri Avenue Well Field
Individual Deep Well Samples
Total Dissolved Solids (mg/L)



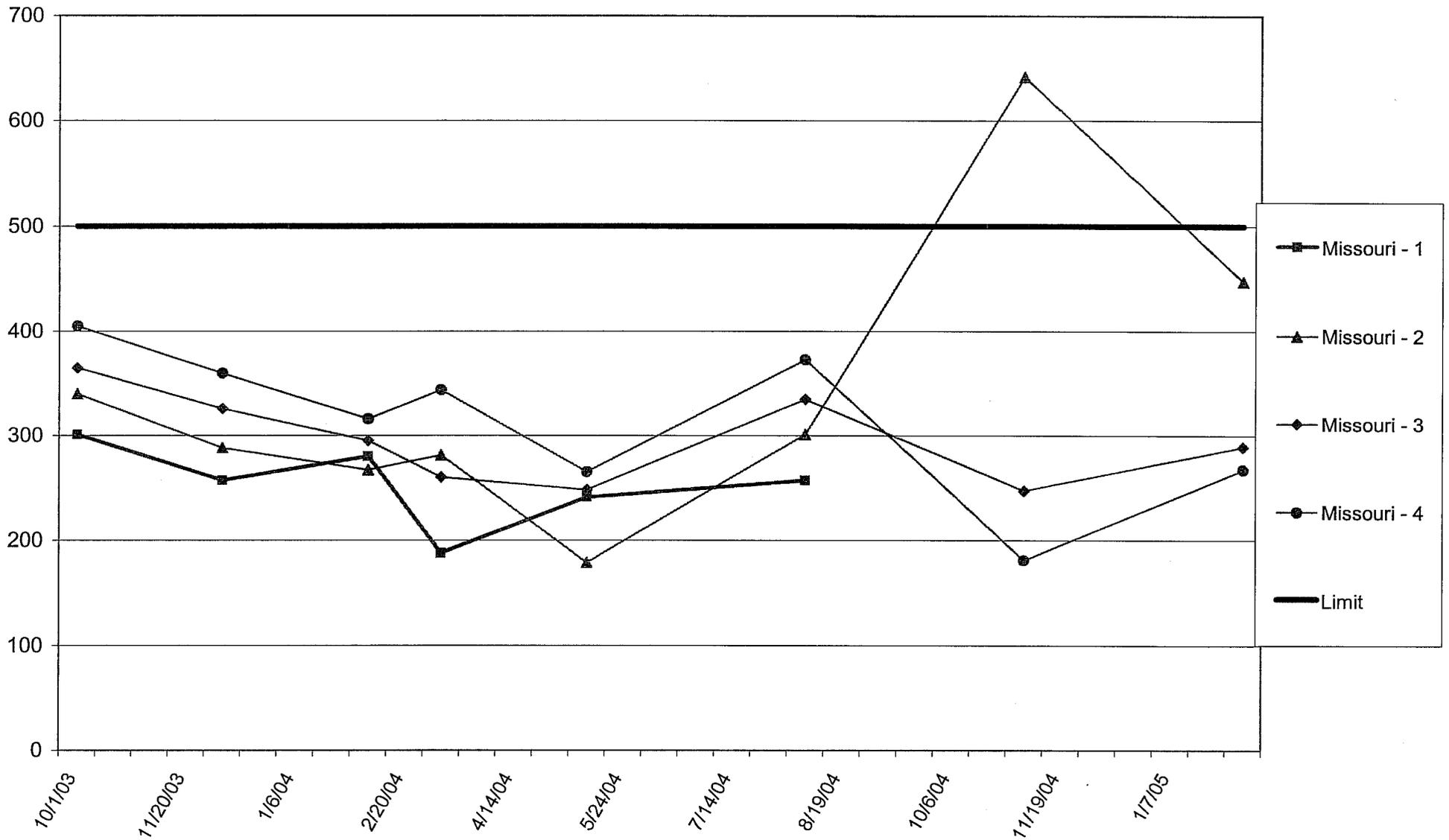
Missouri Avenue Well Field
Individual Deep Well Samples
Total Dissolved Solids (mg/L)



Missouri Avenue Well Field
Individual Deep Well Samples
Total Sulfate (mg/L)



Missouri Avenue Well Field
Individual Deep Well Samples
Total Sulfate (mg/L)



Appendix E

Individual Deep Pumping Wells Historical Water Quality Data

Electronic Filing, Received, Clerk's Office, June 8, 2007

* * * * * **AS 2007-007** * * * * *

**Appendix E - Individual Deep Pumping Wells
(25th St./I-55 TRI-Level/I-64/Missouri Ave.) - Historical Water Quality Data**

| Well | Analyte | Units | Limits | Oct-03 | Dec-03 | Feb-04 | Mar-04 | May-04 | Aug-04 | Nov-04 | Feb-05 | by Parameter | | | by site | | | within each well | | |
|--------------|-----------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------|------|----------|---------|-------|----------|------------------|-------|----------|
| | | | | | | | | | | | | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| | | | | | | | | | | | | 33.5 | 336 | 91.03304 | | | | | | |
| 25th St.-2 | Chloride, total | mg/L | | | 41.4 | 35.4 | 46.7 | 43.1 | 45.5 | 80.4 | 47.5 | | | | | | | 35.4 | 80.4 | 48.57143 |
| 25th St.-4 | Chloride, total | mg/L | | | 38.4 | 37.3 | 38.7 | 40.1 | 41.3 | 85.4 | 55.3 | | | | | | | 37.3 | 85.4 | 48.07143 |
| 25th St.-7 | Chloride, total | mg/L | | | 38.4 | 33.5 | 34.7 | 35.2 | 41.4 | | 51.9 | | | | | | | 33.5 | 51.9 | 39.18333 |
| 25th St.-8 | Chloride, total | mg/L | | | 37.4 | 33.5 | 40.7 | 37.2 | 41.7 | | 51.4 | | | | | | | 33.5 | 51.4 | 40.31667 |
| | | | | | | | | | | | | | | | 33.5 | 85.4 | 44.36538 | | | |
| I55 - 04 | Chloride, total | mg/L | | | 68 | 85.2 | 94.3 | 87.1 | 93.4 | 111 | 75.3 | | | | | | | 68 | 111 | 87.75714 |
| I55 - 05 | Chloride, total | mg/L | | | 112 | | 106 | 69.5 | | 97.8 | 134 | | | | | | | 69.5 | 134 | 103.86 |
| I55 - 06A | Chloride, total | mg/L | | | 89.7 | 101 | 96.3 | 92 | 82.9 | 100 | 93.9 | | | | | | | 82.9 | 101 | 93.68571 |
| I55 - 09A | Chloride, total | mg/L | | | 67 | | | | | | | | | | | | | 67 | 67 | 67 |
| I55 - 10 | Chloride, total | mg/L | | | 85.7 | 74.7 | 71.5 | | 88.6 | | | | | | | | | 71.5 | 88.6 | 80.125 |
| I55 - 11A | Chloride, total | mg/L | | | 72.9 | 77.5 | 89.3 | 82.2 | 79.8 | 68.5 | 85.1 | | | | | | | 68.5 | 89.3 | 79.32857 |
| I55 - 12A | Chloride, total | mg/L | | | 55.2 | 85.2 | 98.3 | 86.1 | 86.3 | 93.3 | 94.4 | | | | | | | 55.2 | 98.3 | 85.54286 |
| I55 - 13 | Chloride, total | mg/L | | | | 79.4 | 94.3 | 82.2 | 85.8 | 79.4 | 81.2 | | | | | | | 79.4 | 94.3 | 83.71667 |
| I55 - 15 | Chloride, total | mg/L | | | | 113 | | 105 | 108 | 103 | 132 | | | | | | | 103 | 132 | 112.2 |
| | | | | | | | | | | | | | | | 55.2 | 134 | 89.67959 | | | |
| I64-19 | Chloride, total | mg/L | | | 168 | 166 | 175 | 173 | 85.2 | 191 | 158 | | | | | | | 85.2 | 191 | 159.4571 |
| I64-20 | Chloride, total | mg/L | | | 315 | 297 | 275 | 111 | 290 | 336 | 333 | | | | | | | 111 | 336 | 279.5714 |
| | | | | | | | | | | | | | | | 85.2 | 336 | 219.5143 | | | |
| Missouri - 1 | Chloride, total | mg/L | | | 71 | 87.1 | 68.5 | 71.4 | 71.4 | | | | | | | | | 68.5 | 87.1 | 73.88 |
| Missouri - 2 | Chloride, total | mg/L | | | 80.8 | 76.6 | 76.4 | 69.5 | 64.2 | 39.7 | 82.2 | | | | | | | 39.7 | 82.2 | 69.91429 |
| Missouri - 3 | Chloride, total | mg/L | | | 64.1 | 69.9 | 72.5 | 63.6 | 61.6 | 69 | 70.4 | | | | | | | 61.6 | 72.5 | 67.3 |
| Missouri - 4 | Chloride, total | mg/L | | | 77.9 | 80.4 | 83.9 | 78.3 | 80.4 | 39.7 | 77.3 | | | | | | | 39.7 | 83.9 | 73.98571 |
| | | | | | | | | | | | | | | | 39.7 | 87.1 | 71.06923 | | | |
| Well | Analyte | Units | Limits | Oct-03 | Dec-03 | Feb-04 | Mar-04 | May-04 | Aug-04 | Nov-04 | Feb-05 | 0.1 | 2.69 | 0.525621 | | | | | | |
| 25th St.-2 | Fluoride, total | mg/L | | 0.26 | 0.801 | 0.8 | 0.757 | 0.669 | 0.73 | 0.386 | 1.16 | | | | | | | 0.26 | 1.16 | 0.695375 |
| 25th St.-4 | Fluoride, total | mg/L | | 0.82 | 0.259 | 0.22 | 0.27 | 0.1 | 0.162 | 0.285 | 0.226 | | | | | | | 0.1 | 0.82 | 0.29275 |
| 25th St.-7 | Fluoride, total | mg/L | | 0.26 | 0.271 | 0.22 | 0.259 | 0.1 | 0.196 | | 0.223 | | | | | | | 0.1 | 0.271 | 0.218429 |
| 25th St.-8 | Fluoride, total | mg/L | | 0.32 | 0.305 | 0.23 | 0.276 | 0.1 | 0.188 | | 0.408 | | | | | | | 0.1 | 0.408 | 0.261 |
| | | | | | | | | | | | | | | | 0.1 | 1.16 | 0.375367 | | | |
| I55 - 01A | Fluoride, total | mg/L | | 2.27 | | | | | | | | | | | | | | 2.27 | 2.27 | 2.27 |
| I55 - 04 | Fluoride, total | mg/L | | 1.41 | 0.312 | 0.26 | 0.263 | 0.13 | 0.199 | 0.266 | 0.273 | | | | | | | 0.13 | 1.41 | 0.389125 |
| I55 - 05 | Fluoride, total | mg/L | | | 0.325 | | 0.299 | 0.245 | | 0.403 | 0.288 | | | | | | | 0.245 | 0.403 | 0.312 |
| I55 - 06A | Fluoride, total | mg/L | | 0.43 | 0.413 | 0.36 | 0.365 | 0.258 | 0.335 | 0.442 | 0.389 | | | | | | | 0.258 | 0.442 | 0.374 |
| I55 - 09A | Fluoride, total | mg/L | | 0.26 | 0.236 | | | | | | | | | | | | | 0.236 | 0.26 | 0.248 |
| I55 - 10 | Fluoride, total | mg/L | | 0.47 | 0.463 | 0.29 | 0.226 | | 0.212 | | | | | | | | | 0.212 | 0.47 | 0.3322 |
| I55 - 11A | Fluoride, total | mg/L | | 0.38 | 0.319 | 0.39 | 0.395 | 0.275 | 0.385 | 0.978 | 0.544 | | | | | | | 0.275 | 0.978 | 0.45825 |
| I55 - 12A | Fluoride, total | mg/L | | 0.29 | 0.271 | 0.26 | 0.276 | 0.1 | 0.26 | 0.328 | 0.278 | | | | | | | 0.1 | 0.328 | 0.257875 |
| I55 - 13 | Fluoride, total | mg/L | | | 0.59 | 0.282 | 0.115 | 0.171 | 0.386 | 0.882 | | | | | | | | 0.115 | 0.882 | 0.404333 |
| I55 - 15 | Fluoride, total | mg/L | | | | 0.28 | | 0.167 | 0.261 | 0.39 | 0.312 | | | | | | | 0.167 | 0.39 | 0.282 |
| | | | | | | | | | | | | | | | 0.1 | 2.27 | 0.386732 | | | |
| I64-19 | Fluoride, total | mg/L | | 0.34 | 2.12 | 2 | 1.95 | 1.56 | 2.32 | 2.36 | 2.02 | | | | | | | 0.34 | 2.36 | 1.83375 |
| I64-20 | Fluoride, total | mg/L | | 0.34 | 1.44 | 1.5 | 1.61 | 1.38 | 1.8 | 1.82 | 2.69 | | | | | | | 0.34 | 2.69 | 1.5725 |
| | | | | | | | | | | | | | | | 0.34 | 2.69 | 1.703125 | | | |
| Missouri - 1 | Fluoride, total | mg/L | | 0.36 | 0.315 | 0.32 | 0.323 | 0.167 | 0.286 | | | | | | | | | 0.167 | 0.36 | 0.295167 |
| Missouri - 2 | Fluoride, total | mg/L | | 0.33 | 0.343 | 0.38 | 0.281 | 0.1 | 0.335 | 0.806 | 0.341 | | | | | | | 0.1 | 0.806 | 0.3645 |
| Missouri - 3 | Fluoride, total | mg/L | | 0.32 | 0.338 | 0.34 | 0.333 | 0.183 | 0.32 | 0.329 | 0.283 | | | | | | | 0.183 | 0.34 | 0.30575 |
| Missouri - 4 | Fluoride, total | mg/L | | 0.32 | 0.286 | 0.29 | 0.276 | 0.124 | 0.269 | 0.243 | 0.273 | | | | | | | 0.124 | 0.32 | 0.260125 |
| | | | | | | | | | | | | | | | 0.1 | 0.806 | 0.307133 | | | |

* System - Well # (ex. I55 - 01A) = Individual Well System followed by the specific well from the system.

Electronic Filing, Received, Clerk's Office, June 8, 2007

* * * * * **AS 2007-007** * * * * *

**Appendix E - Individual Deep Pumping Wells
(25th St./I-55 TRI-Level/I-64/Missouri Ave.) - Historical Water Quality Data**

| Well | Analyte | Units | Limits | Oct-03 | Dec-03 | Feb-04 | Mar-04 | May-04 | Aug-04 | Nov-04 | Feb-05 | by Parameter | | | by site | | | within each well | | |
|--------------|-------------------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------|------|----------|---------|------|----------|------------------|------|----------|
| | | | | | | | | | | | | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| | | | | | | | | | | | | 586 | 2350 | 1081.364 | | | | | | |
| 25th St.-2 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 1350 | 1370 | 1400 | 1320 | 1240 | 1300 | 939 | 1560 | | | | | | | 939 | 1560 | 1309.875 |
| 25th St.-4 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 724 | 712 | 719 | 738 | 756 | 697 | 1040 | 810 | | | | | | | 697 | 1040 | 774.5 |
| 25th St.-7 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 639 | 648 | 655 | 661 | 639 | 675 | | 706 | | | | | | | 639 | 706 | 660.4286 |
| 25th St.-8 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 641 | 586 | 644 | 691 | 686 | 677 | | 886 | | | | | | | 586 | 886 | 687.2857 |
| | | | | | | | | | | | | | | | 586 | 1560 | 870.3 | | | |
| I55 - 01A | Solids, Total Dissolved (TDS) | mg/L | 1000 | 1170 | | | | | | | | | | | | | | 1170 | 1170 | 1170 |
| I55 - 04 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 775 | 812 | 932 | 972 | 883 | 924 | 1130 | 818 | | | | | | | 775 | 1130 | 905.75 |
| I55 - 05 | Solids, Total Dissolved (TDS) | mg/L | 1000 | | 993 | | 997 | 688 | | 1020 | 972 | | | | | | | 688 | 1020 | 934 |
| I55 - 06A | Solids, Total Dissolved (TDS) | mg/L | 1000 | 806 | 784 | 782 | 792 | 772 | 676 | 736 | 772 | | | | | | | 676 | 806 | 765 |
| I55 - 09A | Solids, Total Dissolved (TDS) | mg/L | 1000 | 1040 | 1040 | | | | | | | | | | | | | 1040 | 1040 | 1040 |
| I55 - 10 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 1120 | 1180 | 1120 | 1130 | | | 1070 | | | | | | | | 1070 | 1180 | 1124 |
| I55 - 11A | Solids, Total Dissolved (TDS) | mg/L | 1000 | 1210 | 1150 | 1190 | 1190 | 1280 | 1140 | 999 | 1210 | | | | | | | 999 | 1280 | 1171.125 |
| I55 - 12A | Solids, Total Dissolved (TDS) | mg/L | 1000 | 717 | 973 | 1220 | 1330 | 1160 | 1200 | 1300 | 1280 | | | | | | | 717 | 1330 | 1147.5 |
| I55 - 13 | Solids, Total Dissolved (TDS) | mg/L | 1000 | | | 1040 | 1100 | 1100 | 1070 | 983 | 1050 | | | | | | | 983 | 1100 | 1057.167 |
| I55 - 15 | Solids, Total Dissolved (TDS) | mg/L | 1000 | | | 980 | | 1020 | 828 | 924 | 864 | | | | | | | 828 | 1020 | 923.2 |
| | | | | | | | | | | | | | | | 676 | 1330 | 1007.393 | | | |
| I64-19 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 1780 | 1800 | 1840 | 1860 | 1810 | 1770 | 1840 | 1630 | | | | | | | 1630 | 1860 | 1791.25 |
| I64-20 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 2210 | 2290 | 2350 | 2280 | 2210 | 1830 | 2070 | 2260 | | | | | | | 1830 | 2350 | 2187.5 |
| | | | | | | | | | | | | | | | 1630 | 2350 | 1989.375 | | | |
| Missouri - 1 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 831 | 836 | 942 | 813 | 879 | 866 | | | | | | | | | 813 | 942 | 861.1667 |
| Missouri - 2 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 963 | 933 | 856 | 957 | 808 | 883 | 1390 | 938 | | | | | | | 808 | 1390 | 966 |
| Missouri - 3 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 963 | 943 | 935 | 970 | 916 | 948 | 954 | 970 | | | | | | | 916 | 970 | 949.875 |
| Missouri - 4 | Solids, Total Dissolved (TDS) | mg/L | 1000 | 990 | 1060 | 1050 | 1070 | 1050 | 979 | 746 | 948 | | | | | | | 746 | 1070 | 986.625 |
| | | | | | | | | | | | | | | | 746 | 1390 | 946.2333 | | | |
| | | | | | | | | | | | | 108 | 1420 | 392.1515 | | | | | | |
| 25th St.-2 | Sulfate, total | mg/L | 500 | 377 | 876 | 1420 | 711 | 569 | 685 | 227 | 716 | | | | | | | 227 | 1420 | 697.625 |
| 25th St.-4 | Sulfate, total | mg/L | 500 | 256 | 315 | 249 | 202 | 141 | 205 | 250 | 205 | | | | | | | 141 | 315 | 227.875 |
| 25th St.-7 | Sulfate, total | mg/L | 500 | 198 | 273 | 236 | 172 | 141 | 240 | | 201 | | | | | | | 141 | 273 | 208.7143 |
| 25th St.-8 | Sulfate, total | mg/L | 500 | 259 | 349 | 231 | 226 | 139 | 188 | | 302 | | | | | | | 139 | 349 | 242 |
| | | | | | | | | | | | | | | | 139 | 1420 | 351.9667 | | | |
| I55 - 01A | Sulfate, total | mg/L | 500 | 368 | | | | | | | | | | | | | | 368 | 368 | 368 |
| I55 - 04 | Sulfate, total | mg/L | 500 | 219 | 256 | 381 | 287 | 220 | 341 | 247 | 224 | | | | | | | 219 | 381 | 271.875 |
| I55 - 05 | Sulfate, total | mg/L | 500 | | 388 | | 250 | 139 | | 275 | 245 | | | | | | | 139 | 388 | 259.4 |
| I55 - 06A | Sulfate, total | mg/L | 500 | 202 | 237 | 225 | 159 | 146 | 184 | 108 | 232 | | | | | | | 108 | 237 | 186.625 |
| I55 - 09A | Sulfate, total | mg/L | 500 | 368 | 438 | | | | | | | | | | | | | 368 | 438 | 403 |
| I55 - 10 | Sulfate, total | mg/L | 500 | 388 | 466 | 272 | 329 | | 457 | | | | | | | | | 272 | 466 | 382.4 |
| I55 - 11A | Sulfate, total | mg/L | 500 | 589 | 500 | 482 | 426 | 401 | 491 | 289 | 431 | | | | | | | 289 | 589 | 451.125 |
| I55 - 12A | Sulfate, total | mg/L | 500 | 307 | 419 | 461 | 487 | 522 | 670 | 342 | 516 | | | | | | | 307 | 670 | 465.5 |
| I55 - 13 | Sulfate, total | mg/L | 500 | | | 368 | 308 | 289 | 593 | 248 | 295 | | | | | | | 248 | 593 | 350.1667 |
| I55 - 15 | Sulfate, total | mg/L | 500 | | | 368 | | 251 | 248 | 183 | 181 | | | | | | | 181 | 368 | 246.2 |
| | | | | | | | | | | | | | | | 108 | 670 | 334.2143 | | | |
| I64-19 | Sulfate, total | mg/L | 500 | 1190 | 938 | 798 | 603 | 486 | 833 | 478 | 708 | | | | | | | 478 | 1190 | 754.25 |
| I64-20 | Sulfate, total | mg/L | 500 | 1340 | 1010 | 871 | 683 | 748 | 945 | 762 | 951 | | | | | | | 683 | 1340 | 913.75 |
| | | | | | | | | | | | | | | | 478 | 1340 | 834 | | | |
| Missouri - 1 | Sulfate, total | mg/L | 500 | 301 | 257 | 280 | 188 | 241 | 257 | | | | | | | | | 188 | 301 | 254 |
| Missouri - 2 | Sulfate, total | mg/L | 500 | 340 | 288 | 267 | 281 | 179 | 301 | 642 | 447 | | | | | | | 179 | 642 | 343.125 |
| Missouri - 3 | Sulfate, total | mg/L | 500 | 365 | 326 | 295 | 260 | 248 | 335 | 247 | 289 | | | | | | | 247 | 365 | 295.625 |
| Missouri - 4 | Sulfate, total | mg/L | 500 | 405 | 360 | 316 | 344 | 265 | 373 | 181 | 267 | | | | | | | 181 | 405 | 313.875 |
| | | | | | | | | | | | | | | | 179 | 642 | 304.8333 | | | |

* System - Well # (ex. I55 - 01A) = Individual Well System followed by the specific well from the system.