Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

July 24, 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. IL0070955
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). The petition is unchanged from the petition filed as docket AS 2007-07 that was withdrawn July 20, 2007.

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

Sincerely,

Ellen Schanzle-Haskins

Ellen Schanzle-Haskins
Chief Counsel

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

Enclosures

cc: Steven Gobelman, Illinois Department of Transportation – Bureau of Design and Environment – Springfield, Illinois
Mary Lamie, Attn: Jeffrey Keim – Illinois Department of Transportation – District 8 – Collinsville, Illinois
Lance Jones, Illinois Department of Transportation – Office of Chief Counsel – Springfield, Illinois
Kenneth W. Liss -- Andrews Engineering, Inc.

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

July 2007

By:

Illinois Department of Transportation
Bureau of Design and Environment
2300 South Dirksen Parkway
Springfield, Illinois 62764

Submitted to:

Illinois Pollution Control Board
1021 North Grand Avenue East
P.O. Box 19274
Springfield, Illinois 62794-9274

ANDREWS
ENGINEERING INC
3300 Ginger Creek Drive
Springfield, Illinois 62711
Tel: (217) 787-2334

TABLE OF CONTENTS

FIGURES

APPENDICES

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	**)**	
PETITION OF ILLINOIS DEPARTMENT OF	**)**	**AS 07-**
TRANSPORTATION FOR AN ADJUSTED	**)**	
STANDARD FROM 35 Ill. 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.

CONSTITUENT	UNITS	STORET NUMBER	STANDARD
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 TRANSPORATION 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.

25^{th} Street System

The 25^{th} 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 25^{th} Street which exits from I-64. Low road grades at 25^{th} Street were required to gain access below an I-64 overpass and a St. Louis Metro Transit System rail bridge. The 25^{th} 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 25^{th} 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.

Sulfates, Total

	Flow, MGD	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	30,199	39,315
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.

Total Dissolved Solids

	Flow, MGD	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	86,952	93,372
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.

Analyte	Units	9/13/06	10/24/06	11/28/06	Mean
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 ÷ 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. Capitol 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 capitol 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 Illinios 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 25^{th} 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.

Toxicity of Discharge

- Total dissolved solids – in the R07-009 Proposed Amendments Statement of Reasons the Illinois EPA stated that its "investigations into sulfate toxicity 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 ILLNOIS EPA'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 electrodialysis 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 form 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.

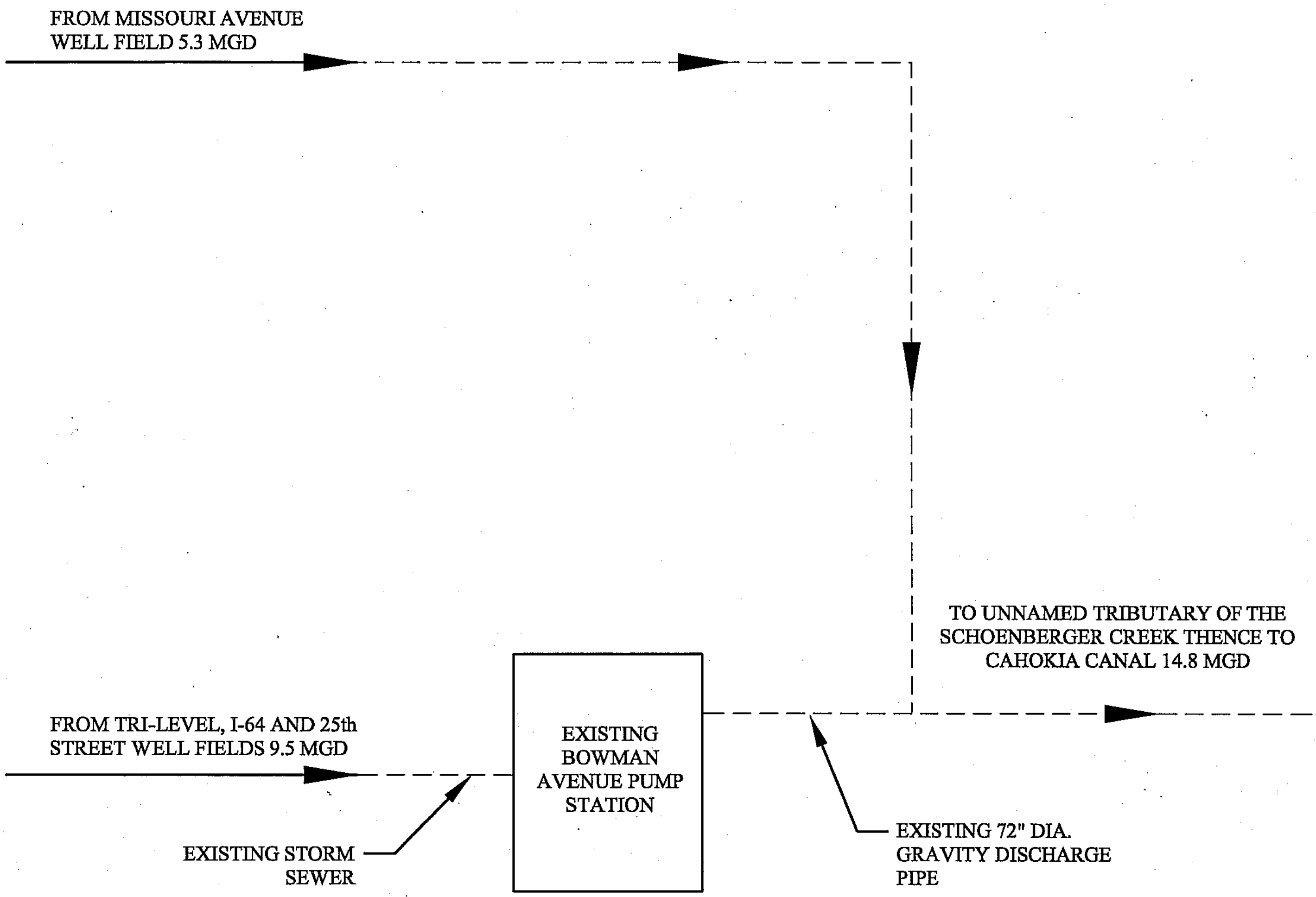
Sanderson, E.W., A.P. Visocky, M.A. Collins, R.D. Olson, and C.H. Neff, 1984, *Dewatering Well Assessment for the Highway Drainage System at Four Sites in the East St. Louis Area, Illinois (Phase 1)*, Illinois State Water Survey Contract Report 341, 48 p.

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

File: J:\IDOT2006\IDOT2006-003\DWG\WO-003 WPrev1-26-07.dwg   User: mnguyen   Plotted: Jun 04, 2007 - 1:35 PM

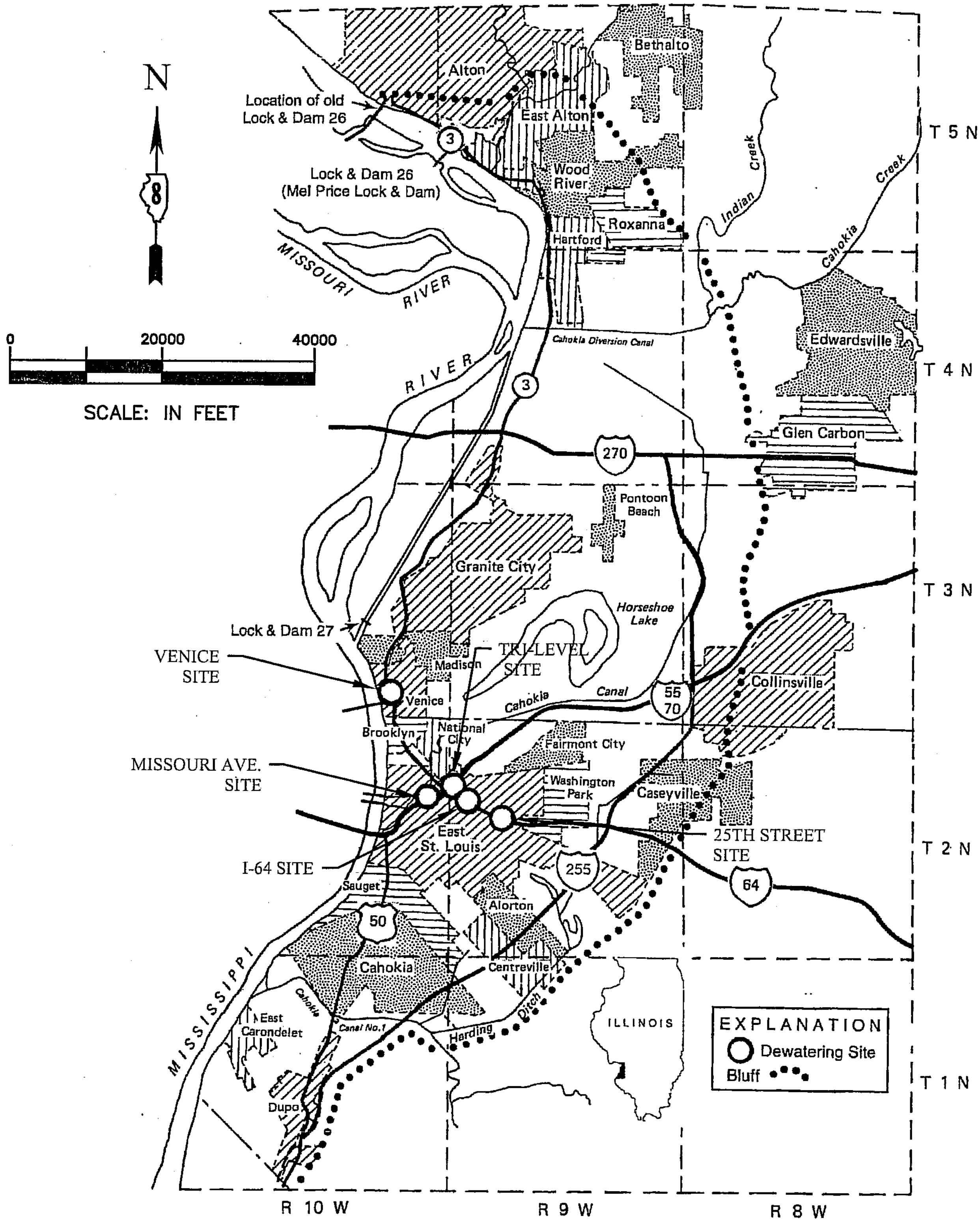


NOT TO SCALE

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	**SCHEMATIC OF BOWMAN YARD DISCHARGE** PLANS PREPARED FOR ILLINOIS DEPARTMENT OF TRANSPORTATION BOWMAN YARD AT FAI 55/64/70 TRI-LEVEL INTERCHANGE EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS	DATE: OCTOBER 2006 PROJECT ID: IDOT WO 003 FILE: J:\IDOT2006-003\WO-003 WP	SHEET NUMBER: FIGURE 1
APPROVED BY: LWE	DESIGNED BY: N/A	DRAWN BY: MPN	

Figure 2

Location of East St. Louis Dewatering Sites

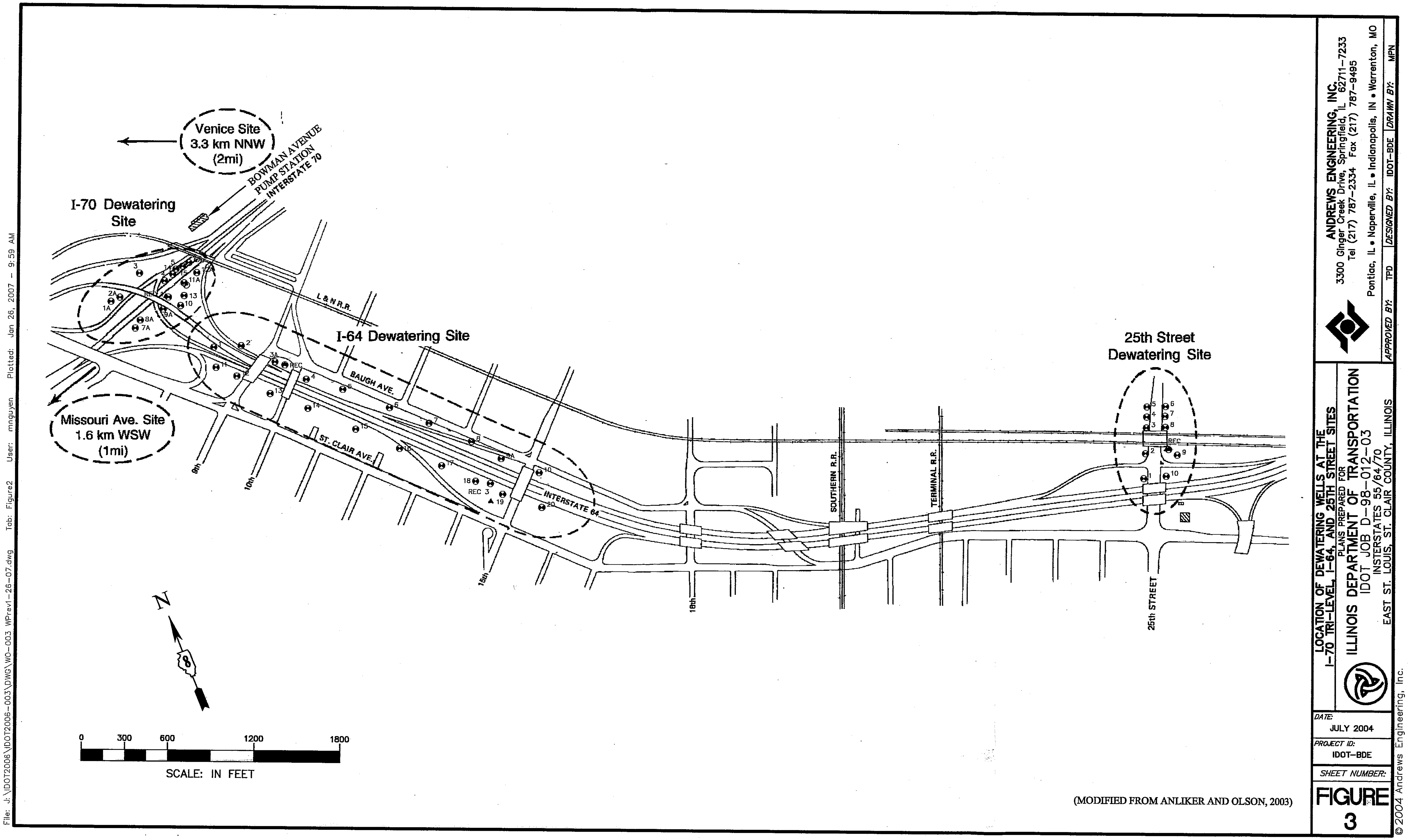


(MODIFIED FROM ANLIKER AND OLSON, 2003)

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	LOCATION OF EAST ST. LOUIS DEWATERING SITES	DATE: AUGUST 2006	SHEET NUMBER:
APPROVED BY: TPD; DESIGNED BY: IDOT-BDE; DRAWN BY: MPN	PLANS PREPARED FOR ILLINOIS DEPARTMENT OF TRANSPORTATION BOWMAN YARD AT FAI 55/64/70 TRI-LEVEL INTERCHANGE EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS	PROJECT ID: IDOT WO 003 FILE: [illegible]	FIGURE 2

Figure 3

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

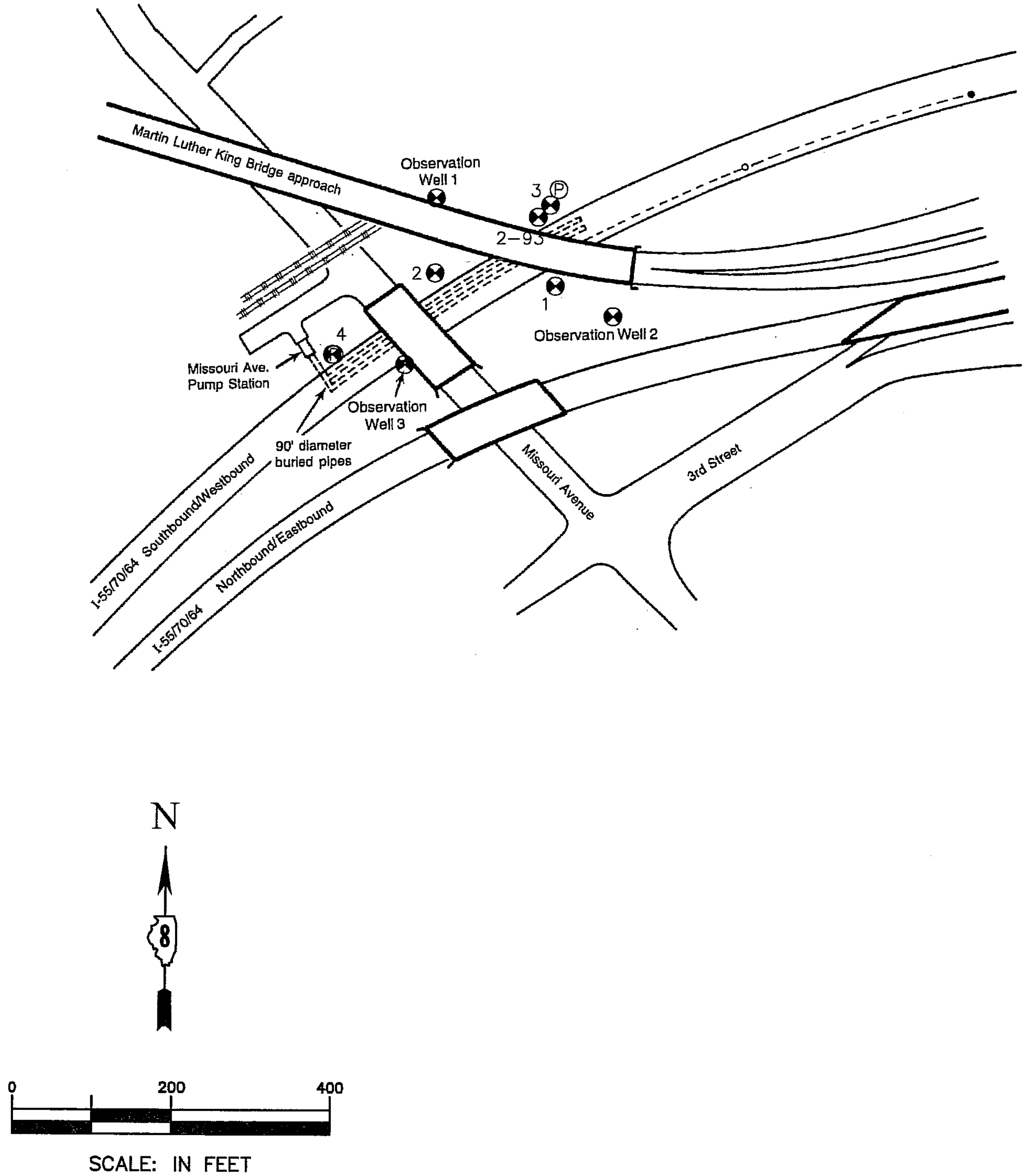


File: J:\IDOT2006\IDOT2006-003\DWG\WO-003 WPrev1-26-07.dwg Tab: Figure2 User: mnguyen Plotted: Jan 26, 2007 - 9:59 AM

Figure 4

Locations of Dewatering Wells at Missouri Avenue Site

File: J:\IDOT2006\IDOT2006-003\DWG\WO-003 WPrev1-26-0 ... mnguyen Plotted: Jan 26, 2007 - 10:03 AM



(MODIFIED FROM ANLIKER AND OLSON, 2003)

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	LOCATIONS OF DEWATERING WELLS AT MISSOURI AVENUE SITE	DATE: JULY 2004	SHEET NUMBER:
APPROVED BY: TPD / DESIGNED BY: IDOT-BDE / DRAWN BY: MPN	PLANS PREPARED FOR ILLINOIS DEPARTMENT OF TRANSPORTATION IDOT JOB D-98-012-03 INTERSTATES 55/64/70 EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS	PROJECT ID: IDOT WO 047 FILE:	FIGURE 4

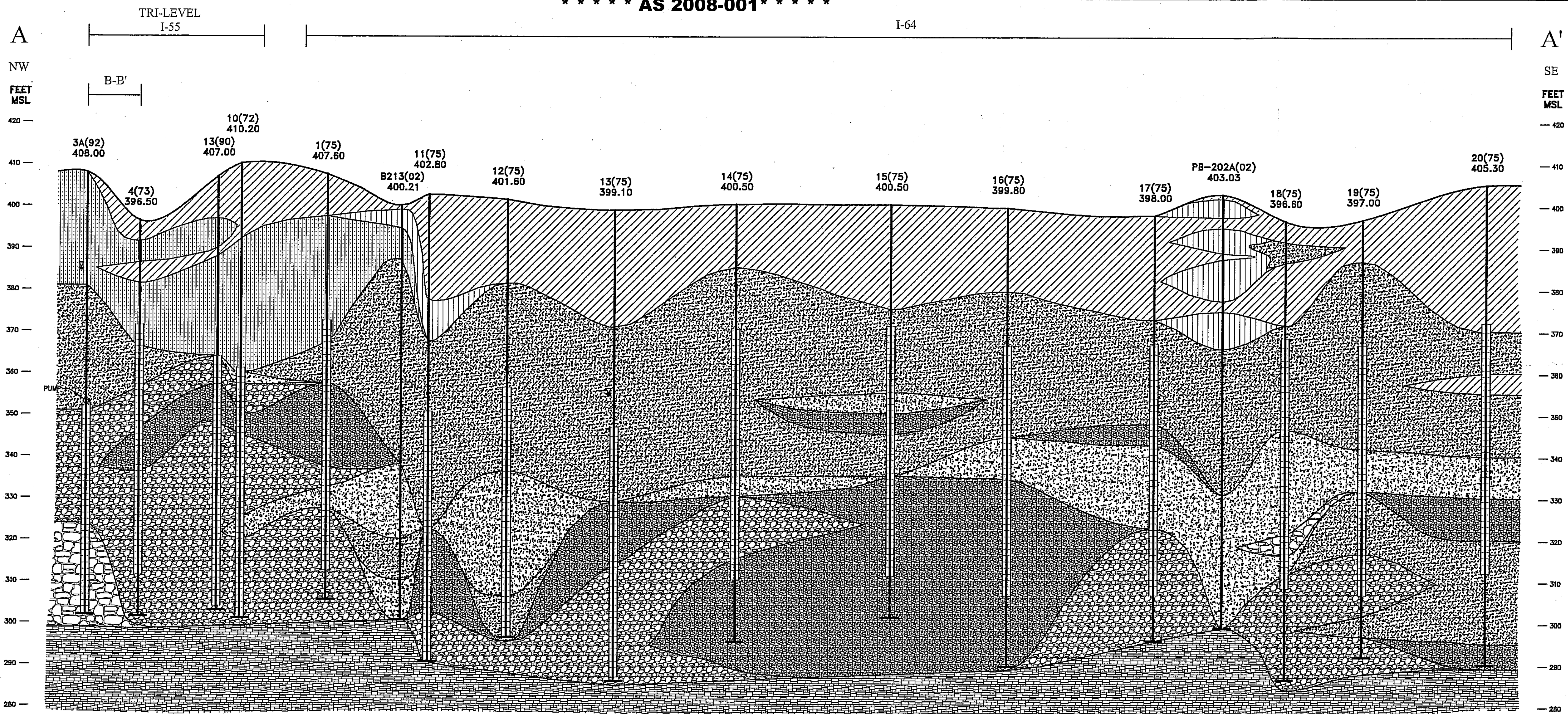
Appendix A

Site Location Map

Electronic Filing, Received, Clerk's Office, July 27, 2007
*** * * * * AS 2008-001* * * * ***

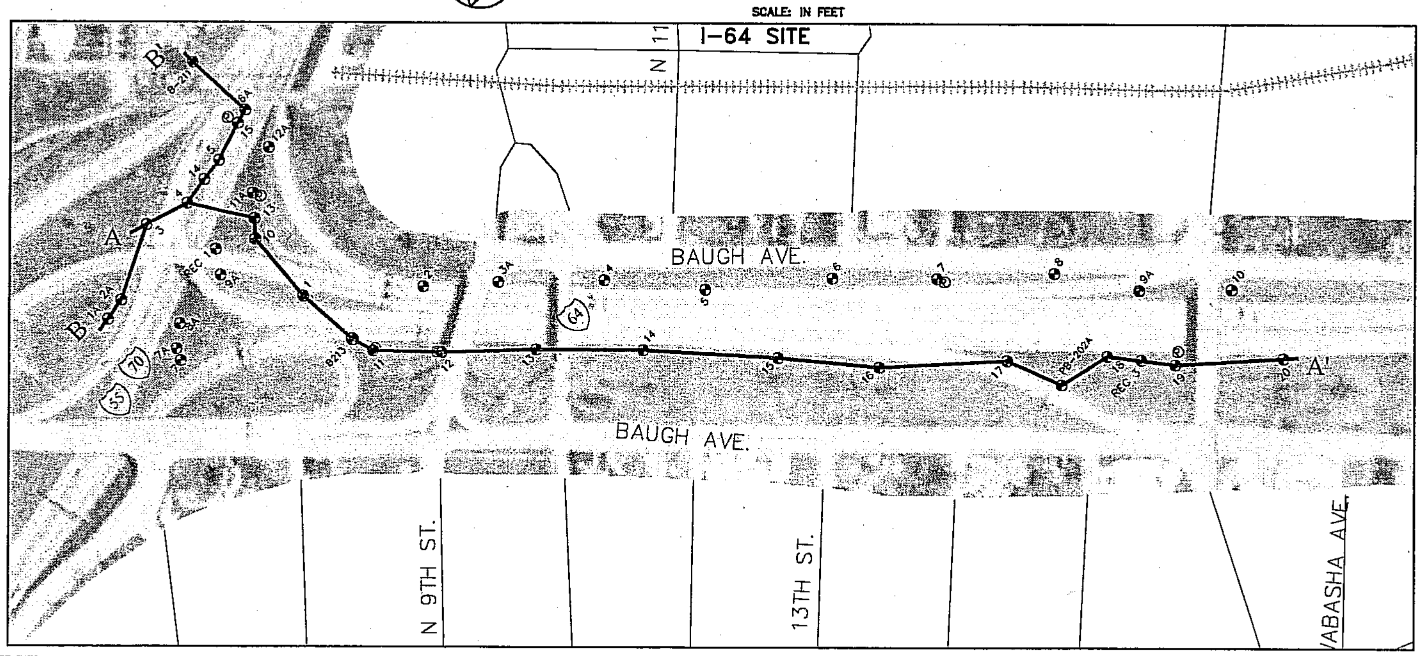
Appendix B

Geologic Cross Sections



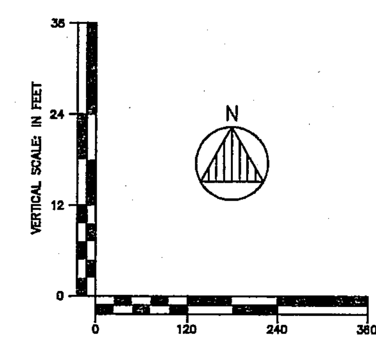
CROSS SECTION LOCATION MAP

SCALE: IN FEET (2500 0 2500 5000)



EXPLANATION

- SILTY CLAY
- SILT
- SILTY TO VERY FINE-GRAINED SAND
- FINE-GRAINED SAND
- FINE- TO MEDIUM-GRAINED
- WATER LEVEL
- TOP OF PUMP
- FINE- TO COARSE-GRAINED SAND
- SAND AND GRAVEL
- MOSTLY GRAVEL, COBLES, BOULDERS
- BEDROCK-LIMESTONE
- WELL SCREEN



GRAPHIC SCALE

NO.	DATE	REVISIONS DESCRIPTION	BY

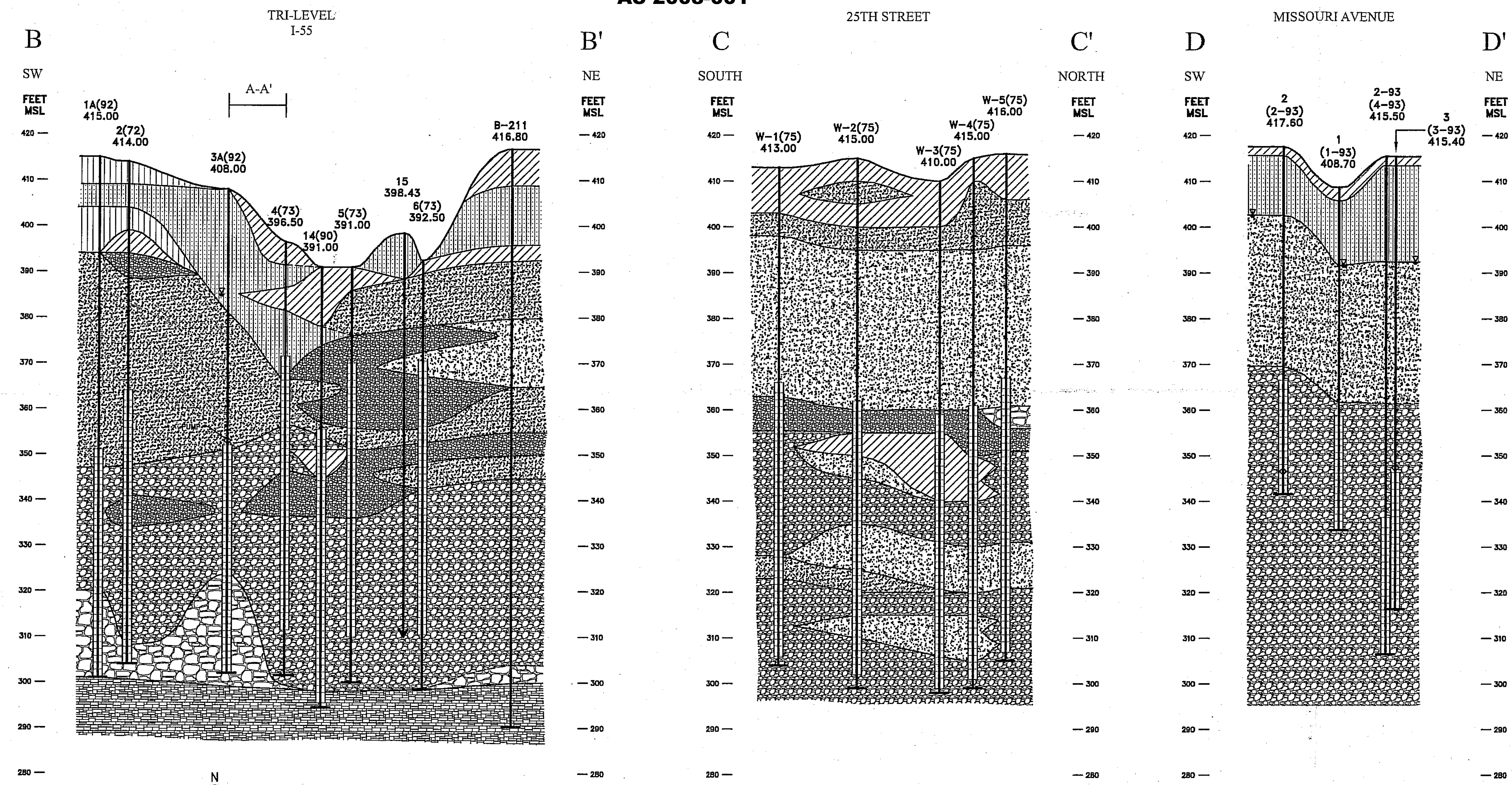
ANDREWS ENVIRONMENTAL ENGINEERING INC.
3535 Mayflower Blvd., Springfield, IL 62711
Tel (217) 787-2334 Fax (217) 787-9495
Pontiac, IL • Naperville, IL • Indianapolis, IN

APPROVED BY: TPD | DESIGNED BY: IDOT-BDE | DRAWN BY: MPN

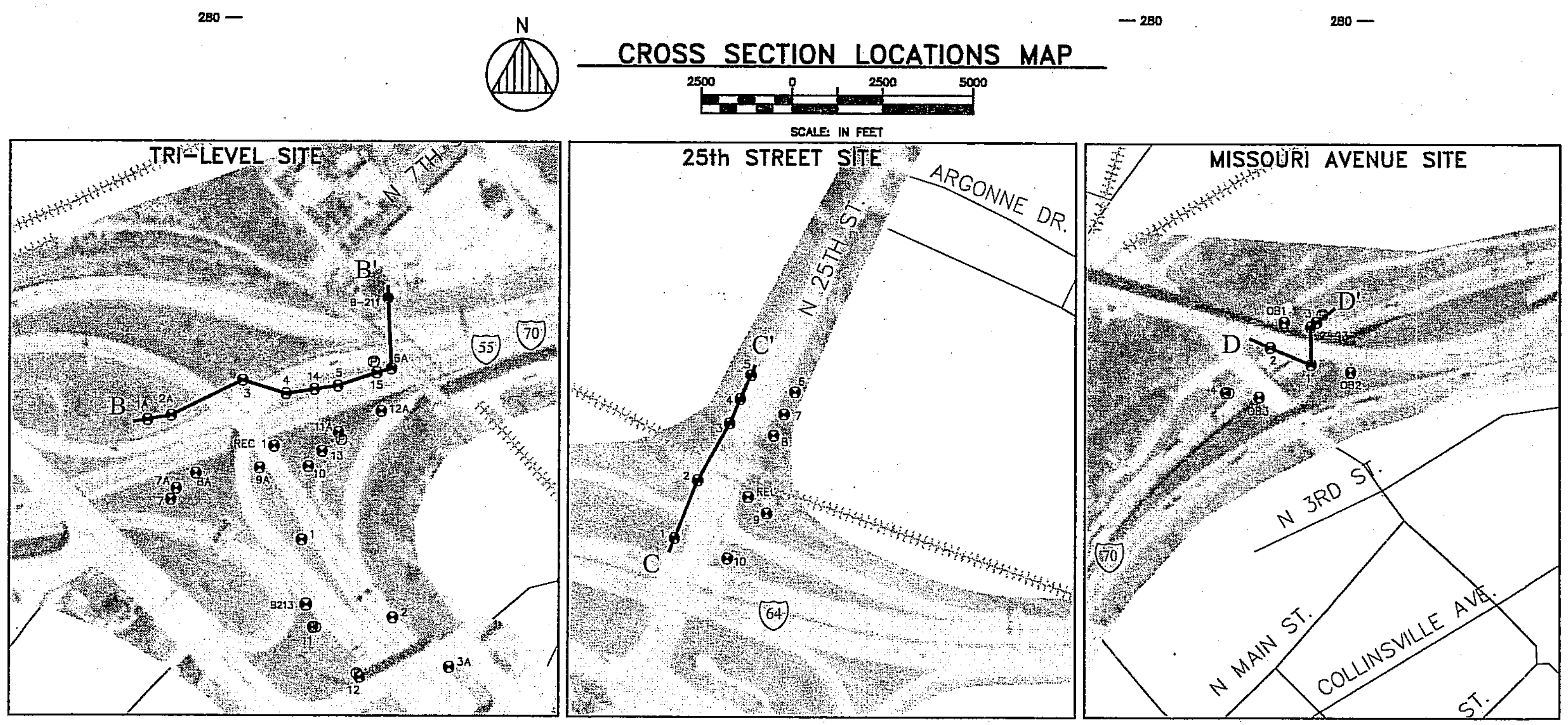
I-64 GEOLOGIC CROSS SECTION A-A'

PLANS PREPARED FOR
ILLINOIS DEPARTMENT OF TRANSPORTATION
IDOT JOB D-98-047-03
INTERSTATES 55/64/70
EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS

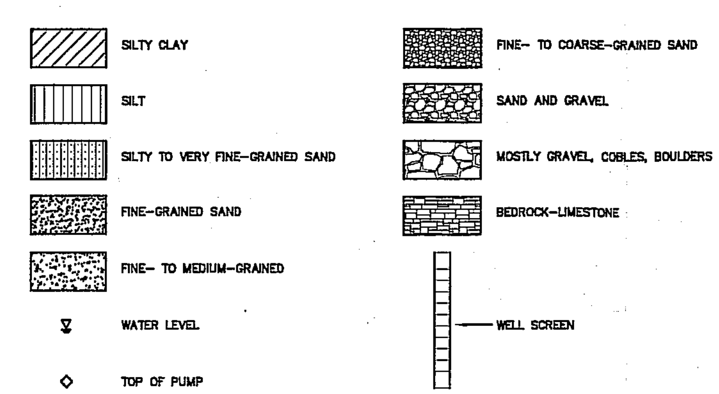
DATE: DECEMBER 2004
PROJECT ID: IDOT WO 047
FILE: J:\\DWG\XSECT
SHEET NUMBER: FIGURE XS-1

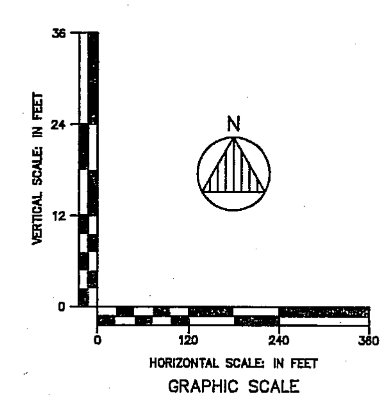


CROSS SECTION LOCATIONS MAP



EXPLANATION





REVISIONS			
NO.	DATE	DESCRIPTION	BY

ANDREWS ENVIRONMENTAL ENGINEERING INC.
3535 Mayflower Blvd., Springfield, IL 62711
Tel (217) 787-2334 Fax (217) 787-9495

Pontiac, IL • Naperville, IL • Indianapolis, IN

APPROVED BY: TPD | DESIGNED BY: IDOT-BDE | DRAWN BY: MPN

TRI-LEVEL, 25TH STREET, AND MISSOURI AVENUE
GEOLOGIC CROSS SECTIONS B-B', C-C' & D-D'
PLANS PREPARED FOR
ILLINOIS DEPARTMENT OF TRANSPORTATION
IDOT JOB D-98-012-03
INTERSTATES 55/64/70
EAST ST. LOUIS, ST. CLAIR COUNTY, ILLINOIS

DATE: DECEMBER 2004

PROJECT ID: IDOT WO 047

FILE: J:\\DWG\XSECT

SHEET NUMBER:

FIGURE XS-2

Appendix C

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

Appendix C
IDOT District 8 Bowman Avenue Pump Station
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

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

Note:
< indicates a non detect

Appendix C
IDOT DistrMissouri 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
	11/3/04	13		642		1390
Missouri - 3	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
	8/6/04	19		335		948
	11/3/04	20		247		954
Missouri - 4	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

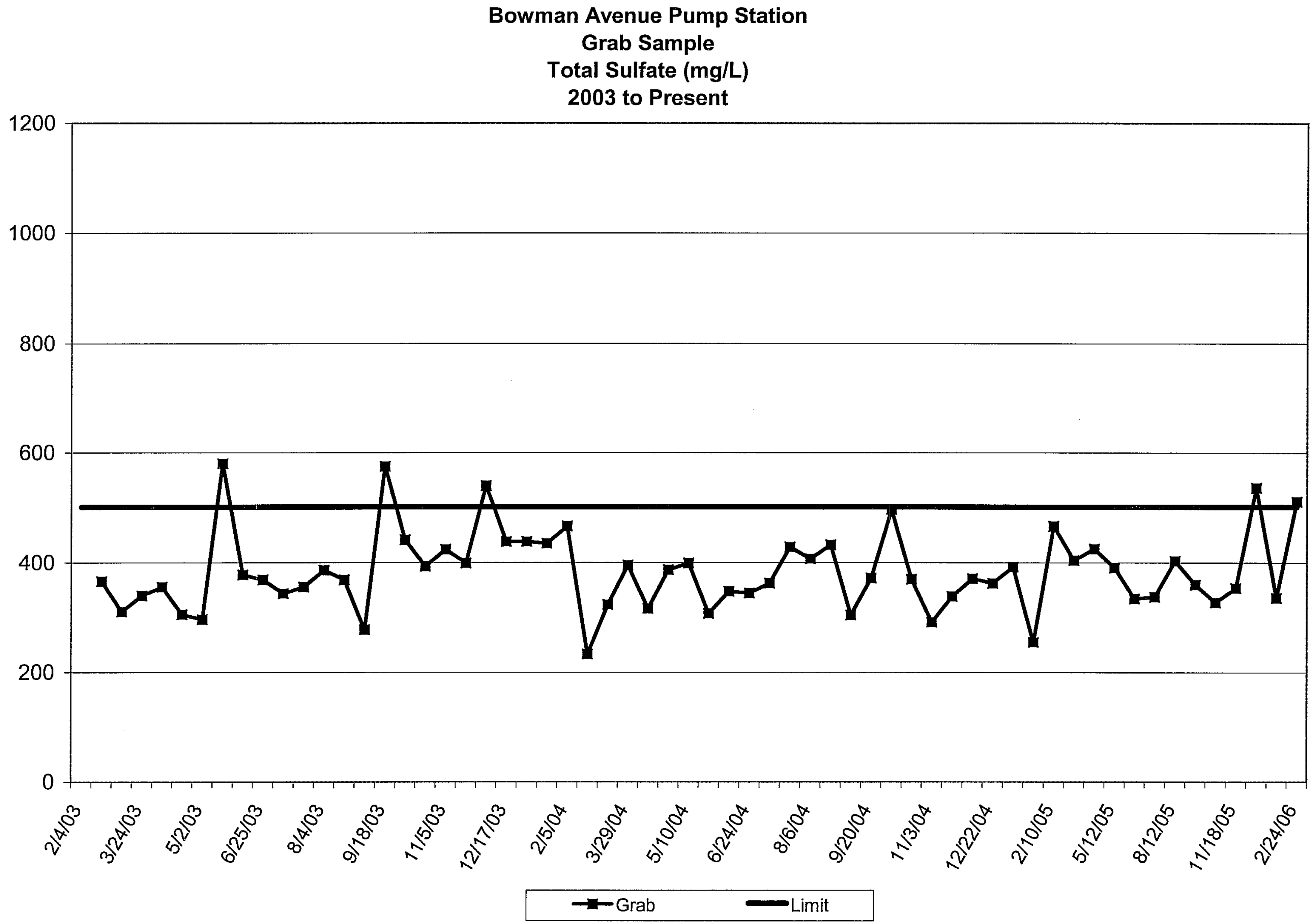
Note:
< indicates a non detect

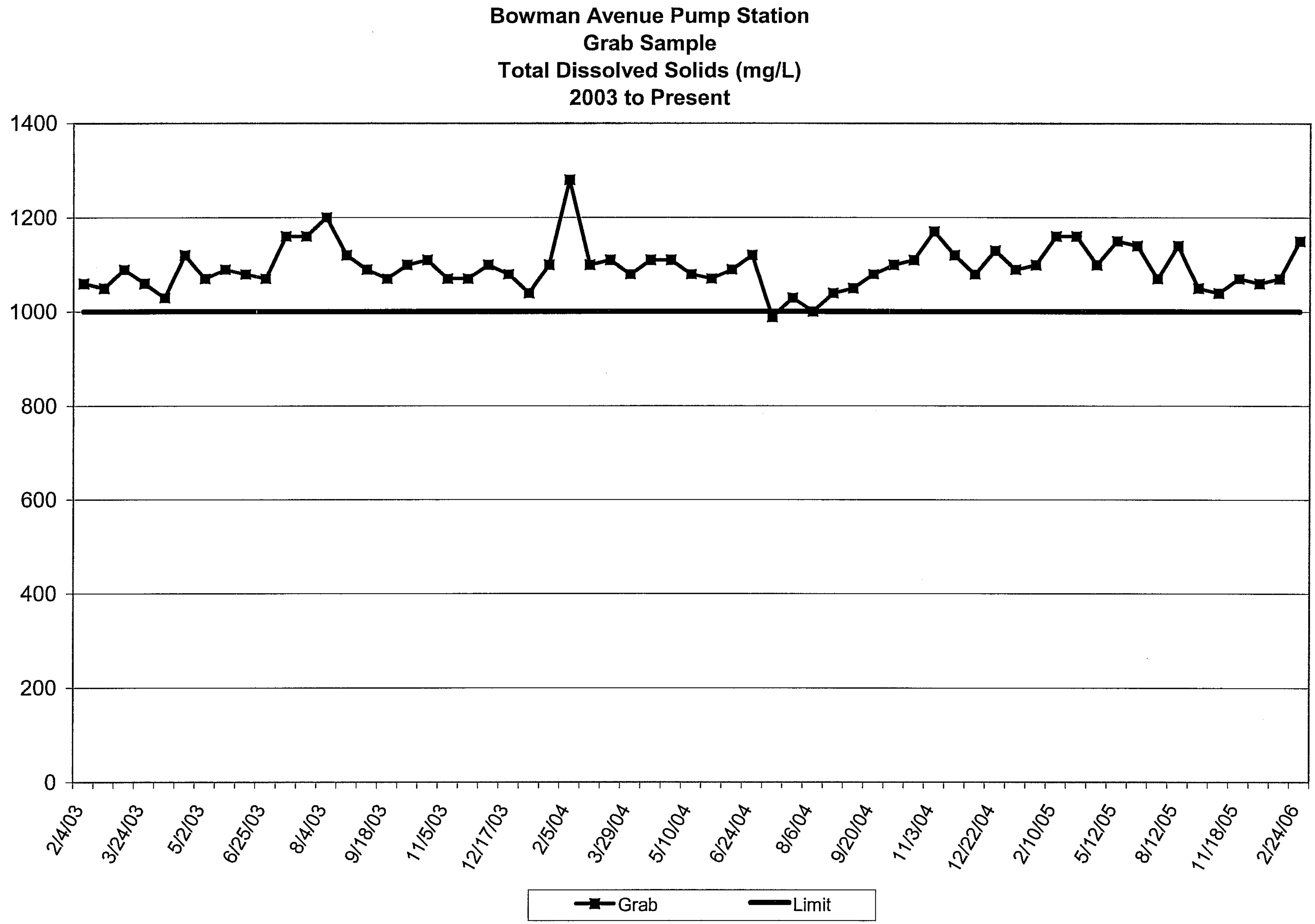
Andrews Engineering, Inc.

J:\IDOT2006\IDOT2006-003\Analytical\Backgrounds\IDOT CALCS for Adjusted std Missouri Data Values

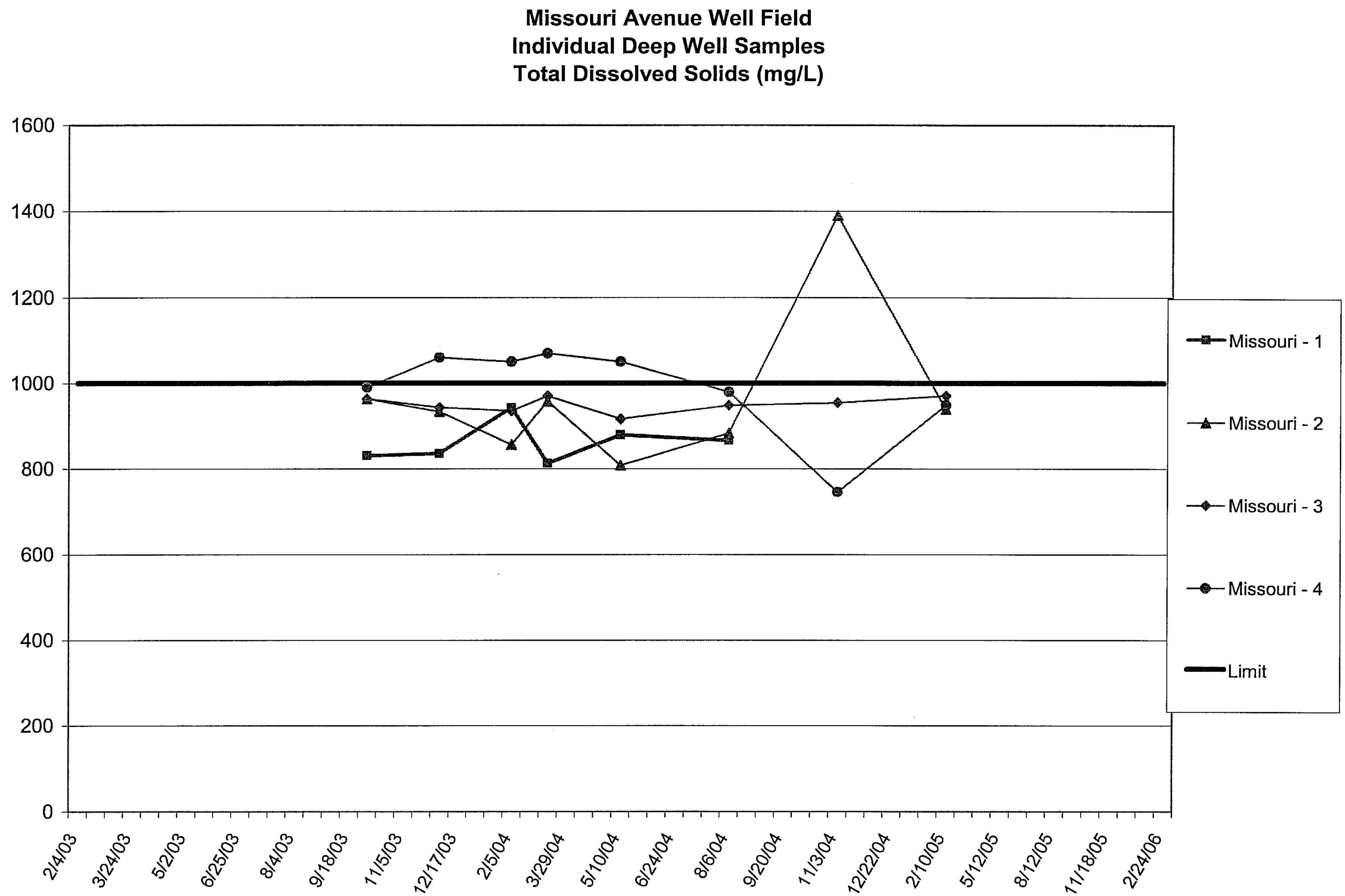
Appendix D

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

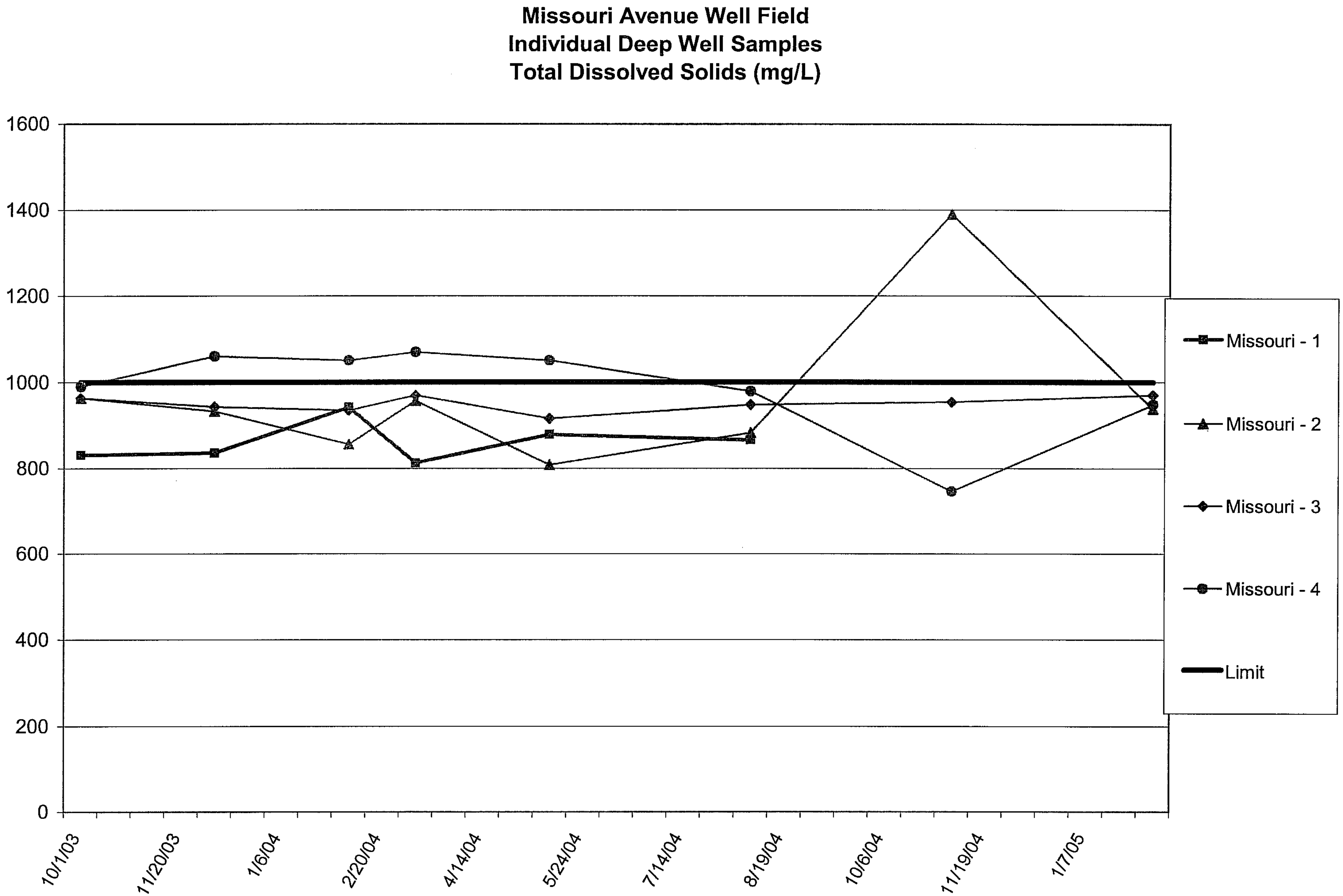

Bowman Avenue Pump Station
Grab Sample
Total Sulfate (mg/L)
2003 to Present
1200
1000
800
600
400
200
0
2/4/03
3/24/03
5/2/03
6/25/03
8/4/03
9/18/03
11/5/03
12/17/03
2/5/04
3/29/04
5/10/04
6/24/04
8/6/04
9/20/04
11/3/04
12/22/04
2/10/05
5/12/05
8/12/05
11/18/05
2/24/06
Grab
Limit


Bowman Avenue Pump Station
Grab Sample
Total Dissolved Solids (mg/L)
2003 to Present
1400
1200
1000
800
600
400
200
0
2/4/03
3/24/03
5/2/03
6/25/03
8/4/03
9/18/03
11/5/03
12/17/03
2/5/04
3/29/04
5/10/04
6/24/04
8/6/04
9/20/04
11/3/04
12/22/04
2/10/05
5/12/05
8/12/05
11/18/05
2/24/06
Grab
Limit

Electronic Filing, Received, Clerk's Office, July 27, 2007
* * * * * AS 2008-001* * * * *



Electronic Filing, Received, Clerk's Office, July 27, 2007
* * * * * AS 2008-001* * * * *

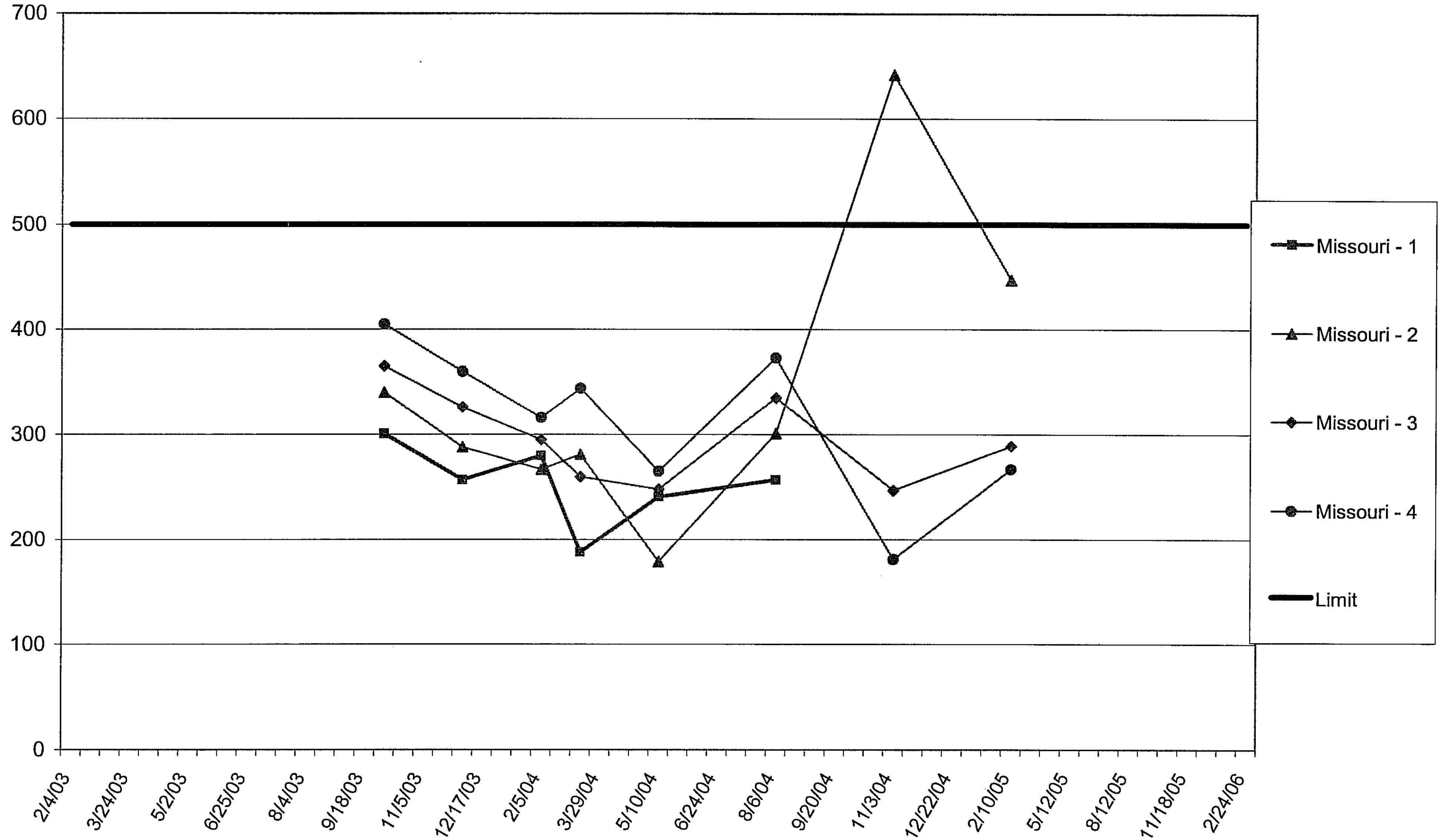


Andrews Engineering, Inc.

Graphs Individual (2003 - 2006)
TDS (Mo) (2)

Electronic Filing, Received, Clerk's Office, July 27, 2007
* * * * * AS 2008-001* * * * *

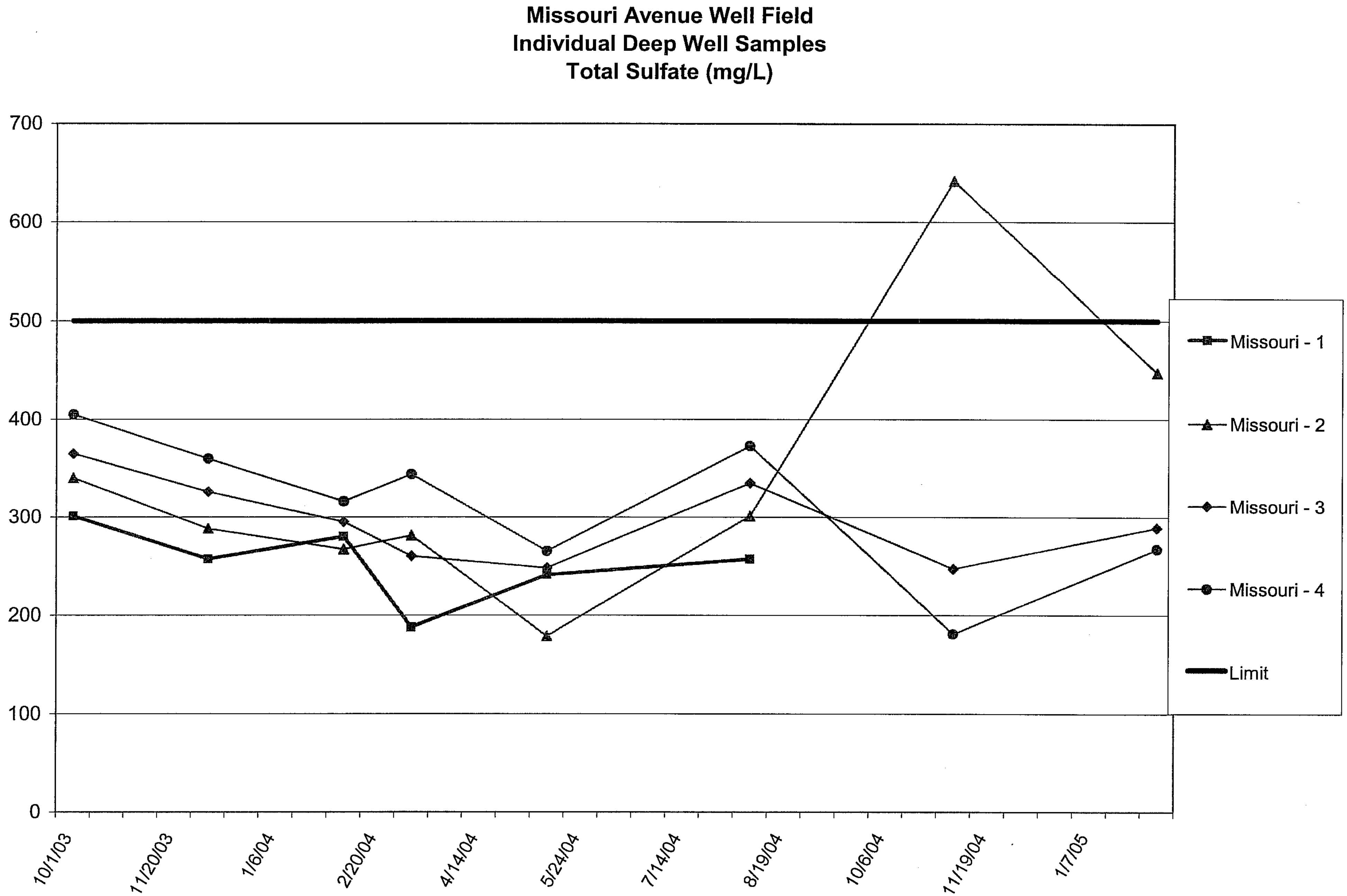
Missouri Avenue Well Field
Individual Deep Well Samples
Total Sulfate (mg/L)



Andrews Engineering, Inc.

Graphs Individual (2003 - 2006)
SO4 (Mo)

Electronic Filing, Received, Clerk's Office, July 27, 2007
* * * * * AS 2008-001* * * * *



Andrews Engineering, Inc.

Graphs Individual (2003 - 2006)
SO4 (Mo) (2)

Appendix E

Individual Deep Pumping Wells Historical Water Quality Data

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

												by Parameter			by site			within each well		
												Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Well	**Analyte**	**Units**	**Limits**	**Oct-03**	**Dec-03**	**Feb-04**	**Mar-04**	**May-04**	**Aug-04**	**Nov-04**	**Feb-05**	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.

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

												by Parameter			by site			within each well		
												Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Well	**Analyte**	**Units**	**Limits**	**Oct-03**	**Dec-03**	**Feb-04**	**Mar-04**	**May-04**	**Aug-04**	**Nov-04**	**Feb-05**	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			
Well	**Analyte**	**Units**	**Limits**	**Oct-03**	**Dec-03**	**Feb-04**	**Mar-04**	**May-04**	**Aug-04**	**Nov-04**	**Feb-05**	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.