TECHNICAL SUPPORT DOCUMENT
SITE SPECIFIC WATER QUALITY STANDARD
GALVA, ILLINOIS

PREPARED FOR:

THE CITY OF GALVA
ILLINOIS

PREPARED BY:

BRUNER, COOPER & ZUCK, INC.
Civil Engineers ♦ Structural Engineers ♦ Land Surveyors
188 East Simmons Street, P.O. Box 1519
Galesburg, Illinois 61401
PH: (309) 343-9282 FAX: (309) 343-5232

STEPHEN M. BRUNER
ILLINOIS LICENSED PROFESSIONAL
ENGINEER NO. 40386
LICENSE RENEWAL DATE: 11/30/09

Revised October 6, 2008
Project No. 250099

Table of Contents

List of Figures

Appendices

1. Introduction

1.1 Purpose of this Report

The purpose of this report is to identify, discuss, and analyze the circumstances and effects of a site specific water quality standard for the City of Galva, Illinois, to discharge boron concentrations in their wastewater treatment plant effluent in excess of the Illinois Environmental Protection Agency's (IEPA) current limits.

The City of Galva has been working with the IEPA and intends on filing a petition to the Illinois Pollution Control Board (IPCB) requesting a site specific water quality standard for the discharge from both the Northeast Sewage Treatment Plant and the Southwest Sewage Treatment Plant.

1.2 Scope of this Report

The scope of this report includes pertinent background information on the City of Galva's existing sewage treatment and water treatment facilities. This report also includes information on the affected natural resources, an analysis of the limits of the adjusted standard, and a discussion of the environmental effects of a site specific water quality standard. Alternative solutions to an adjusted standard are also discussed in this report.

1.3 Background Information

The City of Galva is a community of 2,758 people located in the south central portion of Henry County, Illinois. Galva occupies portions of Sections 21, 26, 27, 28, 33, 34 and 35 in Township 14 North, Range 4 East of the Fourth Principal Meridian, Henry County, Illinois. Refer to Figure 1 for a location map, and to Figure 2 for a city map.

The City's sewage treatment process consists of two (2) plants. The Northeast Sewage Treatment Plant (Northeast STP) is an activated sludge plant that discharges into an unnamed tributary of the South Branch of the Edwards River. The Southwest Sewage Treatment Plant (Southwest STP) is an aerated lagoon system that discharges into Mud Creek, a tributary of Walnut Creek, a tributary of Spoon River. Refer to Figure 3 for a map depicting the affected streams.

The Southwest STP accepts numerous domestic wastes as well as pretreated industrial waste from the Dixline Corporation, a metal finishing plant. While sampling for a site specific metal translator (copper and nickel) as part of the City's NPDES discharge permit, it was discovered that the boron levels in the discharge was above the set limit of 1.0 mg/L.

LOCATION MAP

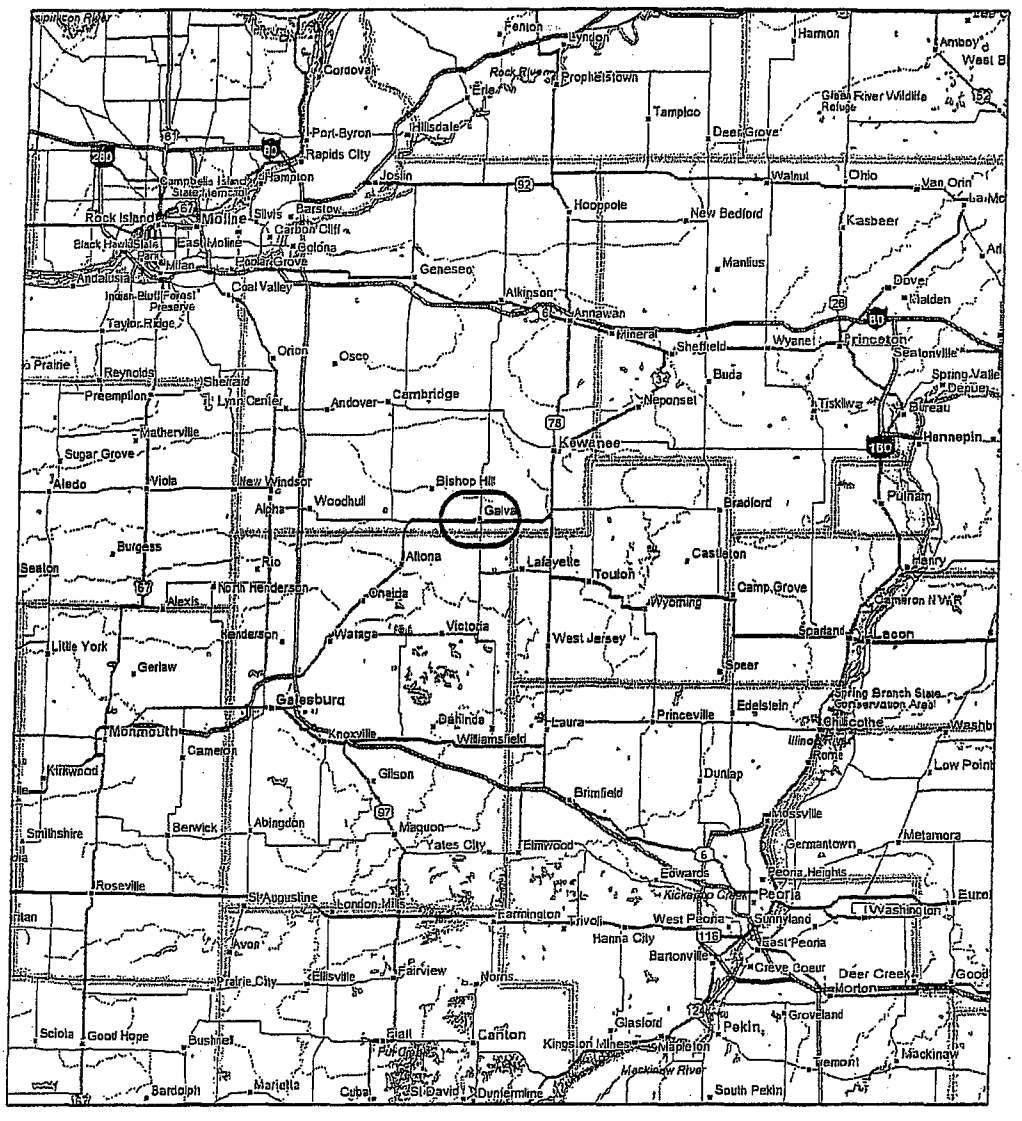


FIGURE 1

Bruner, Cooper & Zuck, Inc.
Consulting Engineers | Structural Engineers | Land Surveyors
Phone: (309) 343-9282
Fax: (309) 343-5232
E-Mail: bcz@bczengineering.com
188 East Simmons Street
P.O. Box 1519
Galesburg, Illinois 61402-1519
PROFESSIONAL DESIGN FIRM
LS/PE/SE CORP. 184-002633

JOB NO. 250099 DATE: 12/09/2005

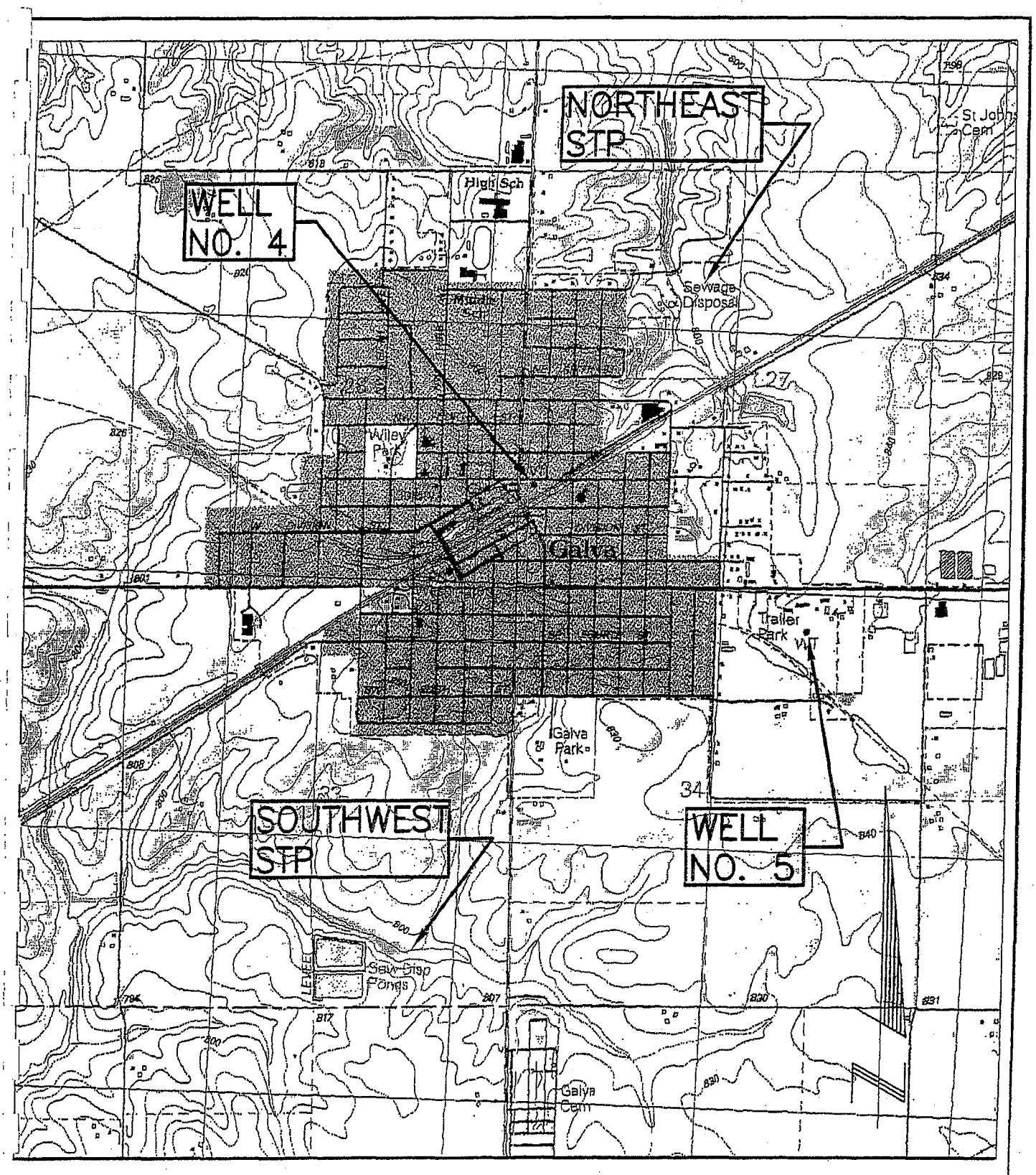


FIGURE 2

CITY MAP
CITY OF GALVA

Bruner, Cooper & Zuck, Inc.
Consulting Engineers | Structural Engineers | Land Surveyors
Phone: (309) 343-9282
Fax: (309) 343-5232
E-Mail: bcz@bczengineering.com
188 East Simmons Street
P.O. Box 1519
Galesburg, Illinois 61402-1519
PROFESSIONAL DESIGN FIRM
LS/PE/SE CORP. 184-002633

JOB NO. 250099 DATE: 12/09/2005

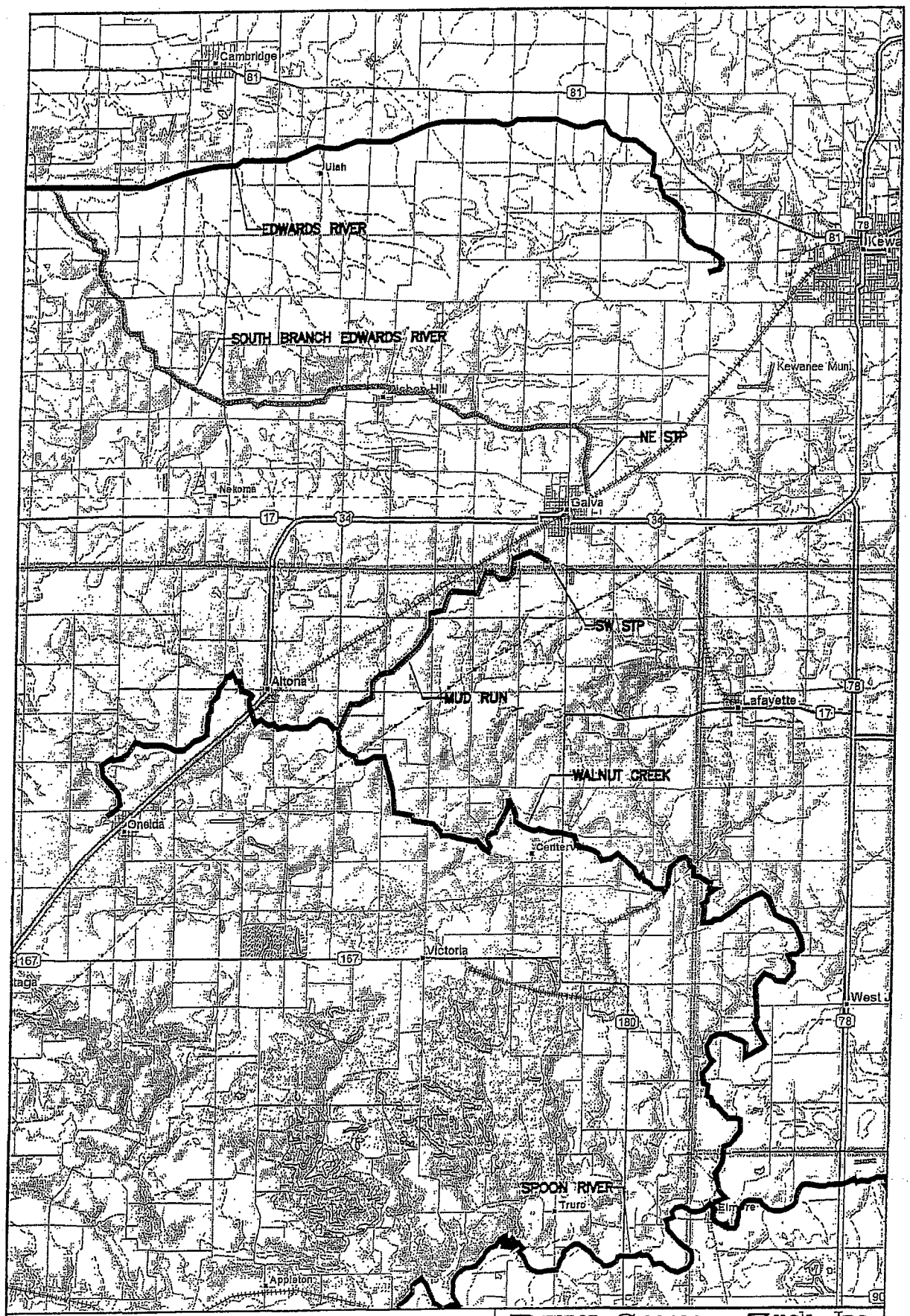


FIGURE 3

AFFECTED WATERWAYS

Bruner, Cooper & Zuck, Inc.
Consulting Engineers Structural Engineers Land Surveyors
Phone: (309) 343-9292
Fax: (309) 343-9232
E-Mail: bcz@cooperengineering.com
188 East Stevenson Street
P.O. Box 1519
Galesburg, Illinois 61402-1519
PROFESSIONAL DESIGN FIRM
IS/FE/SE CORP. 184-002633

JOB NO. 250099 DATE: 01/23/2007

The levels of boron from the discharge at the Southwest Plant have been traced by City personnel back to the Galva Municipal Water Supply. Recent samples taken from the Galva Municipal Wells show boron levels of 1.0 mg/L and 1.1 mg/L, respectively, for Well #4 and Well #5. A copy of these test results is available in the appendix of this report.

2. Existing Facilities Information

2.1 Northeast Sewage Treatment Plant

The Northeast STP, as stated above, utilizes an activated sludge process to treat a design average flow of 0.385 MGD and a design maximum flow of 0.867 MGD. Refer to Figure 4 for a schematic of the Northeast STP.

The Northeast STP discharges into an unnamed tributary of the South Branch of the Edwards River located in the Mississippi Central River Watershed. The effluent travels approximately 1.1 miles downstream to the South Branch of the Edwards River. The South Branch of the Edwards River travels approximately 15.0 miles downstream and joins the Edwards River.

Discharge from the Northeast STP is permitted under NPDES Permit No.IL0026344, which is included in the appendix of this report. Sampling and reporting of effluent boron levels are not required by this permit. A chart of discharge flows from both of the sewage treatment plants may be found in Figure 5.

SCHEMATIC DRAWING
NORTHEAST TREATMENT PLANT

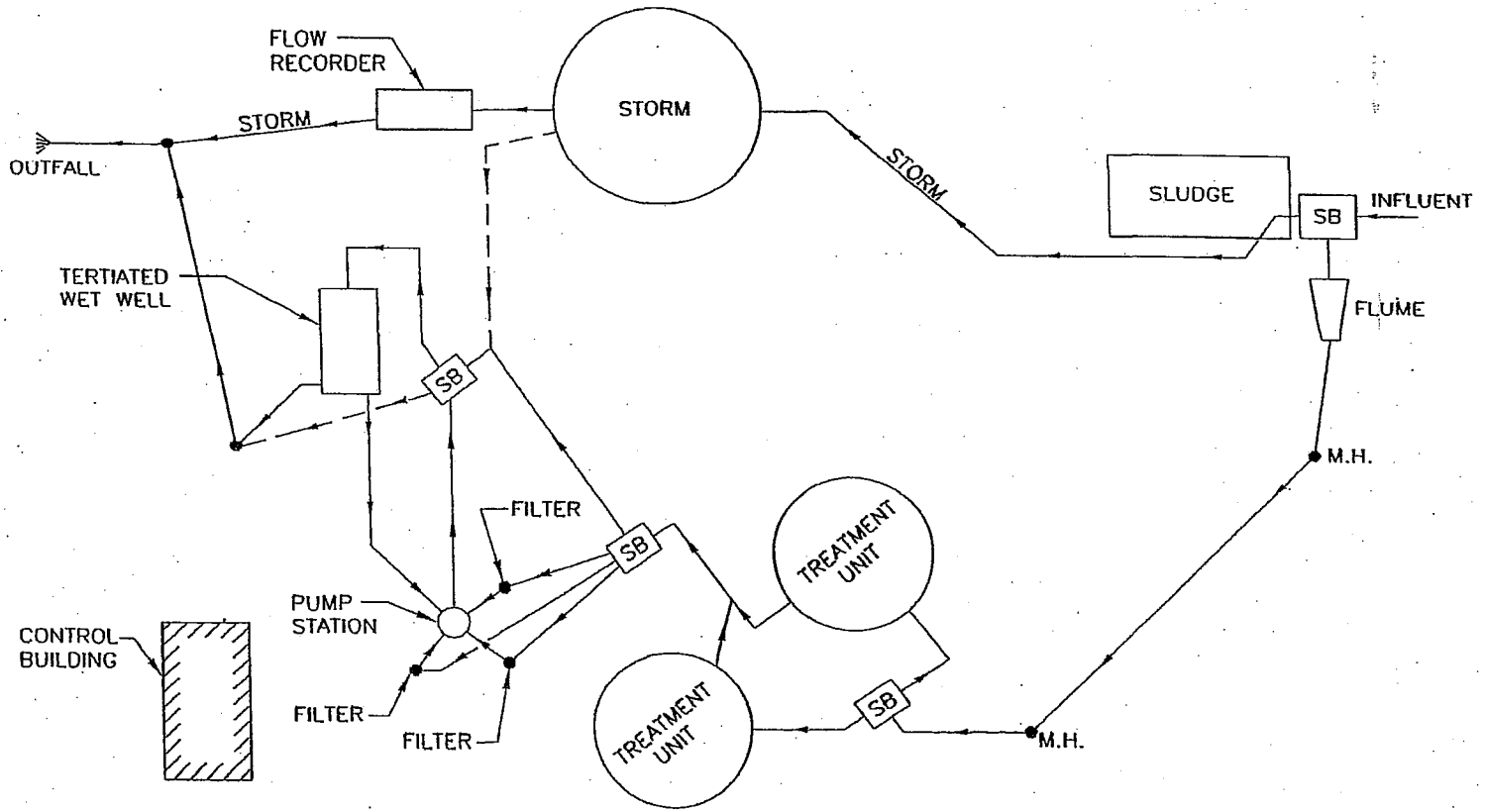


FIGURE 4

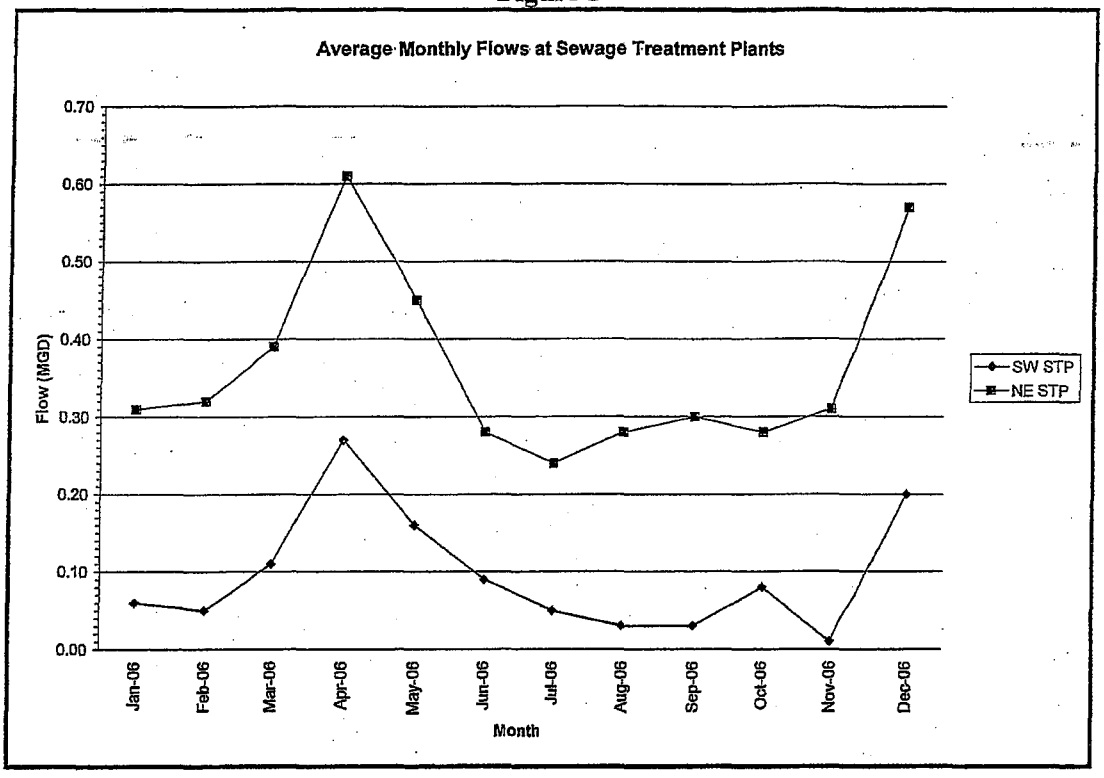
NOT TO SCALE

WASTE WATER TREATMENT PLANT CITY OF GALVA

Bruner, Cooper & Zuck, Inc.
Consulting Engineers Structural Engineers Land Surveyors
Phone: (309) 343-9282
Fax: (309) 343-5232
E-Mail: bcz@bczengineering.com
188 East Simmons Street
P.O. Box 1519
Galesburg, Illinois 61402-1519
PROFESSIONAL DESIGN FIRM
LS/PE/SE CORP. 184-002633

PCG JOB NO. 250099 DATE: 08/26/2005

Figure 5



Considering that the boron levels being experienced at the Southwest STP have been traced back to the Galva Municipal Water Supply, it can be assumed that the boron levels in the effluent from the Northeast STP are somewhat similar. Testing conducted in July of 2005 shows the correlation of the two STP discharges. These test results are available in the appendix of this report.

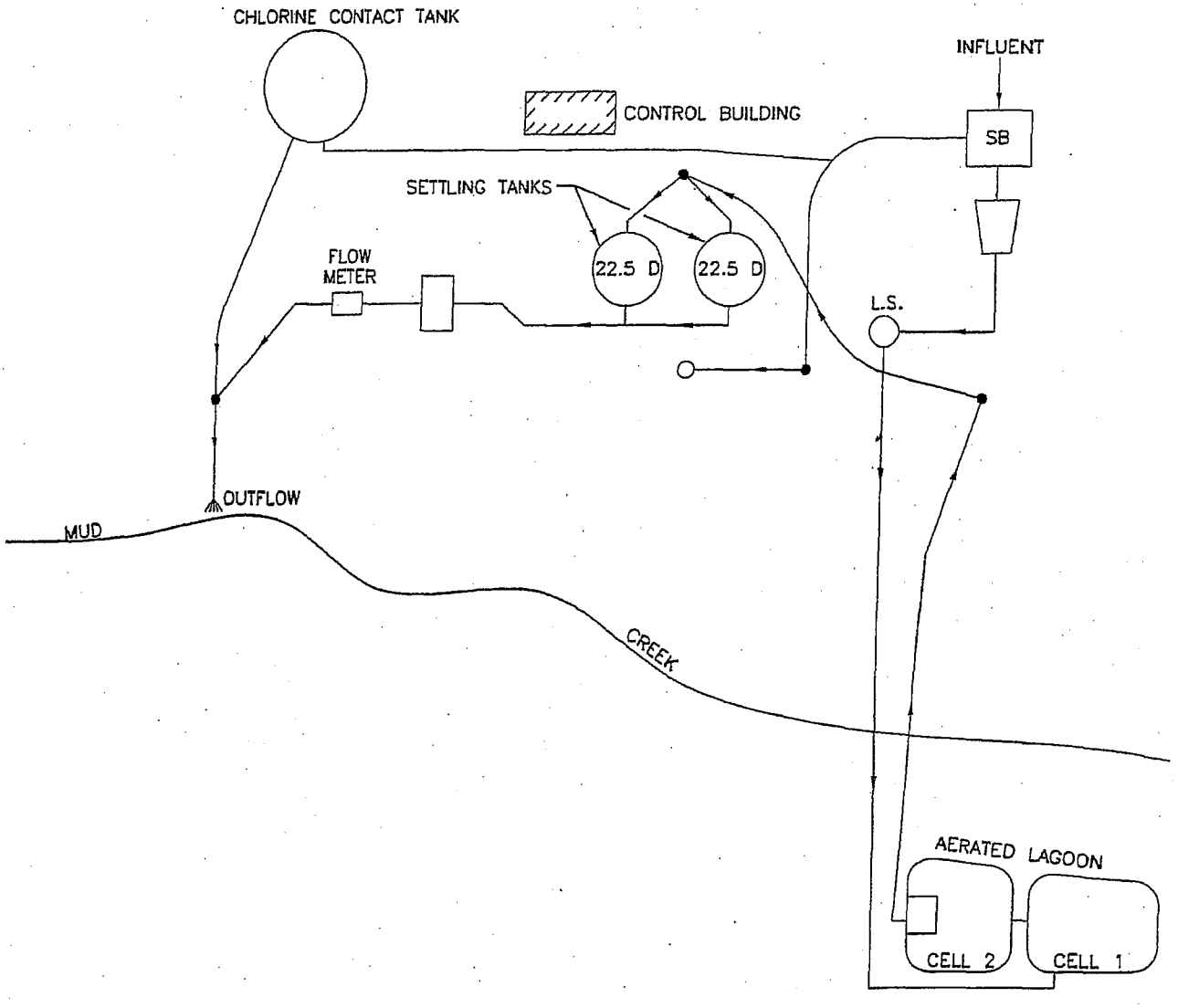
2.2 Southwest Sewage Treatment Plant

The Southwest STP, as previously stated, utilizes an aerated lagoon process to treat a design average flow of 0.3 MGD and a design maximum flow of 1.0 MGD. Refer to Figure 6 for a schematic of the Southwest STP.

The Southwest STP discharges into Mud Run Creek located in the Spoon River Watershed. The effluent travels approximately 7.0 miles downstream to Walnut Creek. Walnut Creek then discharges into the Spoon River 31.7 miles downstream.

Discharge from the Southwest STP is permitted under NPDES Permit No.IL0023647, which is included in the appendix of this report. The permit was issued June 4, 2004, and effective July 1, 2004, and included effluent sampling and reporting requirements for boron with a limit of 1.0 mg/l. However, this permit was subsequently revised and reissued August 4, 2004, and effective

SCHEMATIC DRAWING
SOUTHWEST TREATMENT PLANT



NOT TO SCALE

FIGURE 6

Bruner, Cooper & Zuck, Inc.
Consulting Engineers | Structural Engineers | Land Surveyors
Phone: (309) 343-9282
Fax: (309) 343-5232
E-Mail: bcz@bczengineering.com
188 East Simmons Street
P.O. Box 1519
Galesburg, Illinois 61402-1519
PROFESSIONAL DESIGN FIRM
LS/PE/SE CORP. 184-002633

PCG JOB NO. 250099 DATE: 08/26/2005

September 1, 2004. The revised permit has a condition with a compliance schedule to achieve the permitted levels of boron in the effluent.

A chart of the boron levels measured at the Southwest STP from September of 2004 through May 30, 2008 compiled by Mr. Larry Lawson, Plant Operator, may be seen in Figure 7 of this report. The maximum concentration was 3.0 mg/L in September of 2006.

It should be noted that the results show the effect of the increase in flow to the facility due to rainfall infiltration into the sewage collection system. Also the effects of the 2006 drought conditions experienced in Illinois decreased the flows into the STPs and along with evaporation, resulted in higher boron concentrations in the water discharged.

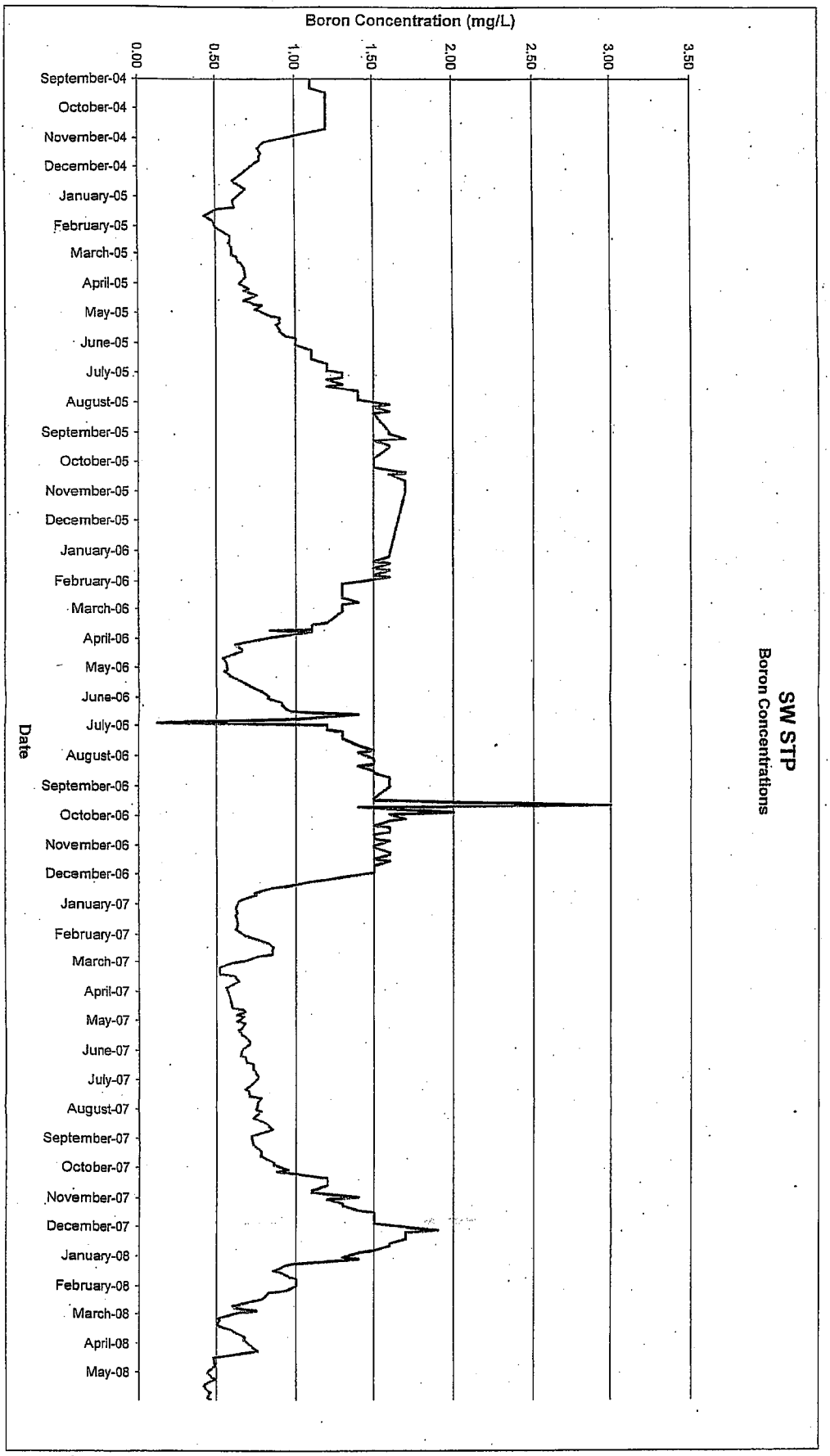

SW STP
Boron Concentrations
Boron Concentration (mg/L)
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Date
September-04
October-04
November-04
December-04
January-05
February-05
March-05
April-05
May-05
June-05
July-05
August-05
September-05
October-05
November-05
December-05
January-06
February-06
March-06
April-06
May-06
June-06
July-06
August-06
September-06
October-06
November-06
December-06
January-07
February-07
March-07
April-07
May-07
June-07
July-07
August-07
September-07
October-07
November-07
December-07
January-08
February-08
March-08
April-08
May-08
Maximum Boron Concentration - 3.00 mg/L
Minimum Boron Concentration - 0.12 mg/L

FIGURE 7

2.3 Galva Municipal Water Supply

The City of Galva currently owns, operates and maintains a potable water supply, storage and distribution system within the City's corporate limits. The origins of this system date back to 1894, when Well No. 1 was drilled at the water works immediately east of the public square. Since that time, the City of Galva has made several major improvements and modifications to its public water supply.

At the present time, the City of Galva is producing potable water from both Well No. 4 and Well No. 5. Refer to Figure 2 for the location of the wells within the City of Galva and in relation to the location of the sewage treatment plants. The City of Galva currently uses an average of approximately 400,000 gallons of water per day. A further description of how water is produced at each well site is as follows below.

Well No. 4, located near the southwest corner of NE 2nd Street and Center Avenue, was drilled in 1933 to a depth of 1,686 feet, stopping in the Shakopee Dolomite Formation. The well pump installed in this well is a turbine pump set at a depth of 450 feet below ground level. The pump is driven by a 100 horsepower motor and has a nominal pumping capacity of 550 gallons per minute (gpm).

During the early 2000's, excessive radium concentrations were discovered in the water from Well No. 4. To exclude the radium bearing waters from this Well, the Well was successfully lined, leaving the effective depth of the Well at 834 feet. This procedure reduced the capacity of the Well to approximately 420 gpm.

Water from the pump in Well No. 4 is discharged into a 600 gpm capacity forced draft aerator. This unit sits approximately 20 feet above ground level, being mounted on top of a 43,000 gallon steel ground storage tank.

Well No. 5, located on the south side of U.S. Route 34 on the eastern edge of Galva, near the City's Maintenance Building, was drilled in 1988 to a depth of 1,770 feet, stopping in the Shakopee Dolomite Formation. The well pump installed in this well is a submersible pump set at a depth of 540 feet below ground level. The pump is driven by a 125 horsepower motor and has a rated pumping capacity of 600 gpm.

During the early 2000's, excessive radium concentrations were discovered in the water from Well No. 5. To exclude the radium bearing waters from this Well, the Well was successfully lined, leaving the effective depth of the Well at 794 feet. This procedure reduced the capacity of the Well to approximately 420 gpm.

The water works system at the site of Well No. 5 works in a manner similar to that of the system at the site of Well No. 4. Water from the submersible pump in Well No. 5 is discharged into a force draft aerator, which is mounted on top of a 20,000 gallon ground storage tank.

Galva's two water works/well sites are located approximately ¾ of a mile from each other, but work in tandem to supply water to the citizens of Galva through a series of interconnecting 6" and 8" water mains that form the heart of the City's potable water distribution system.

The excess boron levels found by Mr. Lawson at the STPs can be directly traced back to the municipal water supply, as boron is a naturally occurring element in the City of Galva's Municipal Water Supply. Refer to the appendix of this report for testing results. While the levels of boron experienced at the STPs have been traced back to the drinking water, the potable water supply for the City of Galva remains in compliance with Federal and State Water Quality Standards.

3. Evaluation of Potential Solutions

3.1 Wastewater Treatment Options

Prior to considering a site specific water quality standard, the City of Galva considered several options for solving the boron concentration problem in their wastewater effluent.

3.1.1 Ion Exchange

Ion exchange has been used successfully for boron removal. Ion exchange is a process which selectively removes ions from water. This is accomplished by exchanging them with other ions which are attached to an exchange media or resin. With a properly selected resin, the undesirable ions are replaced by the resin as the water passes through the exchange media. When the supply of resin becomes saturated, the media is backwashed, regenerated with a solution of acid, and rinsed.

A properly operated ion exchange plant will reduce the boron levels in the feed water by approximately 90%.

Usually the wastewater from backwashing, regenerating and rinsing is discharged to drain after the Ph is adjusted. However, in this instance that is obviously not an option.

The wastewater concentrations of boron from the regeneration cycle would be approximately 3100 mg/l. Even with dilution of the regeneration wastewater from the backwash and rinse cycles the concentration of boron would be about 375 mg/l.

Assuming an ion exchange unit at each of the STPs and treating 50% of the effluent, approximately 5000 gallons of wastewater would be produced at each STP every 8-9 days. This means that ever 4^{th} or 5^{th} day 5000 gallons of water, highly concentrated with boron, would have to be disposed of.

The most reasonable method of disposal would be to pump or truck the water to a large sewage treatment plant that discharges to a major river. This would be one of the plants in the Quad Cities or Peoria, both approximately 50 miles away. Typically, evaporation ponds have not been effective in the central Illinois climate; however, with the relatively small amount of wastewater being generated evaporation as a disposal method might be possible. Numerous project specifics would need to be known and analyzed to make that determination.

Although an ion exchange system would need to be installed at both STPs, operation would only be necessary when infiltration levels do not provide adequate dilution to reduce boron levels below the permit limits. Unfortunately, the number of days that operation would be required cannot be predicted because it would be entirely weather dependant.

The estimated cost to construct an ion exchange system at each STP may be seen in Figure 8. This estimate does not include operation and maintenance costs which would add considerably to the long term costs.

Figure 8

Cost Estimate - Ion Exchange Process at STPs

Construction Items	Cost
Ion Exchange Equipment	$420,000
Backwash Storage Tank	$78,750
Building	$105,000
Plant Piping	$52,500
Electrical	$78,750
HVAC	$21,000
Site Work	$10,500
Miscellaneous	$15,750
Subtotal	$782,250
10% Contingency	$78,225
Subtotal Construction	$860,475
x 2 Plants	$1,720,950
Non-Construction Items	
Design Engineering	$177,450
Construction Engineering	$100,800
Legal Fees	$17,210
Subtotal Non-Construction Items	$295,460
(Engineering Fees based on Rural Development Fee Schedule and Legal Fees based on 1% of Construction)	
Total Estimated Cost:	$2,016,410

3.2 Potable Water Treatment Options

The City of Galva also considered treating their potable water supply to reduce the amount of boron in the wastewater effluents.

3.2.1 Potable Water Ion Exchange Process

The ion exchange process, as discussed above, could be utilized to treat the potable water supply to reduce the levels of boron prior to the water being sent to the distribution system and ultimately to the STPs.

Unlike treating at the STPs, the treatment would have to operate every day. Even if only about 50% of the water is treated, reducing boron levels to approximately 55% - 60% of current, the same 5000 gallons of waste from the regeneration cycle, and the associated disposal problems would be generated every 7-8 days.

For the purposes of this report, it has been assumed that treatment facilities would be constructed on City property near Well #5. Well #4 would pump to the facility to be treated, or blended, and pumped back to the Well #4 site to utilize the existing storage reservoir and the high service pumps to the distribution system.

An estimated cost to construct an ion exchange system at the property near Well #5 can be seen in Figure 9. This estimate does not include operation and maintenance costs associated with the system.

Figure 9

Cost Estimate – Potable Water Ion Exchange Process

Construction Items	**Cost**
Ion Exchange Equipment	$525,000
Backwash Storage Tank	$105,000
Finish Water Reservoir	$210,000
Building	$136,500
Plant Piping	$63,000
Electrical	$105,000
HVAC	$31,500
Site Work	$21,000
Raw/Finish Water Mains (± 4000' each)	$420,000
Miscellaneous	$31,500
Subtotal	$1,648,500
10% Contingency	$164,850
Subtotal Construction	$1,813,350
Non-Construction Items	
Design Engineering	$163,800
Construction Engineering	$94,500
Legal Fees	$18,134
Permit Fees (B.N.S.F.)	$10,000
Subtotal Non-Construction Items	$286,434
(Engineering Fees based on Rural Development Fee Schedule and Legal Fees based on 1% of Construction)	
Total Estimated Cost:	$2,099,784

3.2.2 Potable Water Reverse Osmosis Process

Reverse osmosis (RO) has been successfully pilot tested and used in full scale operation for boron removal, although, somewhat just recently and not as commonly as the ion exchange process.

RO is a membrane-separation technique in which a semi-permeable membrane allows water permeation while acting as a highly selective barrier. This barrier allows separation of inorganic and microbial species. In RO, an external pressure difference is applied to the solution, causing water to flow against the natural direction through the membrane producing water purer than the original solution.

RO presents a much larger problem with the waste disposal issue than the ion exchange option. A typical RO unit would have a 75% recovery rate. In other words, 100 gallons of feed water would result in 75 gallons of permeate, or good water, and 25 gallons of concentrate to be sent to waste. However, considering pre and post cycle flushes, to rinse the membranes, about 1/3 of the feed water is actually sent to waste. Similar to the ion exchange option, if only 50% of the water is treated to reduce the levels of boron this would generate approximately 100,000 gallons of waste each day.

Obviously, this is too large of quantity to be trucked to another facility or to consider evaporation ponds, which are not effective in the central Illinois climate, leaving deep well injection as a method of disposal.

Deep well injection has been used for disposal of RO concentrate, primarily for seawater treatment plants, in some locations in the United States. The use of deep wells has been limited to seawater plants because the concentrate from treating seawater is so highly mineralized that there is practically no other option for disposal. On the other hand, the concentrate from treating the brackish well feed water can be satisfactorily diluted by merely discharging to a municipal sewer system. Usually when the decision is made to treat seawater the available options to provide a potable water supply are so limited that the huge cost for a deep well disposal system can be justified.

For the purposes of this report, it has been assumed that treatment facilities would be constructed on City property near Well #5. Well #4 would pump to the facility to be treated, or blended, and pumped back to the Well #4 site to utilize the existing storage reservoir and the high service pumps to the distribution system.

An estimated cost to construct a RO system at the property near Well #5 is included in Figure 10. This estimate does not include operation and maintenance costs, which would be significant.

Figure 10

Cost Estimate – Reverse Osmosis Process

Construction Items	Cost
Reverse Osmosis Equipment	$1,050,000
Concentrate Storage Tank	$420,000
Deep Well & Injection System	$3,150,000
Replace Well Pumps	$78,750
Building	$157,500
Plant Piping	$78,750
Electrical	$105,000
HVAC	$31,500
Site Work	$26,250
Raw/Finish Water Mains (± 4000' each)	$420,000
Miscellaneous	$105,000
Subtotal	$5,622,750
10% Contingency	$562,275
Subtotal Construction	$6,185,025
Non-Construction Items	
Design Engineering	$467,250
Construction Engineering	$266,700
Legal Fees	$61,005
Permit Fees (B.N.S.F.)	$10,500
Subtotal Non-Construction Items	$805,455
(Engineering Fees based on Rural Development Fee Schedule and Legal Fees based on 1% of Construction)	
Total Estimated Cost:	**$6,905,955**

3.3 Alternative Water Sources

The City researched several alternative water sources to solve its boron discharge problems. For map depicting each of the options discussed below refer to Figure 11.

3.3.1 Drill a New Well

Locating and utilizing an alternative source of boron-free water to blend with, or replace, the City's current water supply would provide a solution to the problem. Most of the public water supplies owned by surrounding communities are served by deep wells drilled into the same or similar geologic formations as the wells in the City of Galva.

Shallow wells in sand and gravel deposits would be the most likely source of boron free water. Consulting the "Groundwater Geology in Western Illinois, North Part" published as Circular 222 in 1956 by the Illinois State Geological Survey, indicated that the nearest location with the potential for this type of well is in the far northeastern portion of Henry County near the Green River. This is a straight line distance of 20 to 25 miles.

A search of the Illinois State Water Survey's Private Well Database revealed that there are very few private shallow wells anywhere near the City of Galva. A well for a private residence would not need to produce a large quantity of water, and the fact that there are very few would seem to confirm that the Green River Valley is in fact the nearest location available.

This option would require a test–drilling program to determine whether suitable deposits are present and, if present, whether or not an adequate supply can be obtained. Other factors to be considered would be the availability of land, the type of well, or wells, that would necessary, pumping facilities and a transmission main to Galva.

An up-front cost estimate for this option can not be presented at this time because so many factors would depend upon the results of the test drilling program. Discussions with a well driller, familiar with the area, resulted in a recommended budget figure of $100,000 for a preliminary test drilling program.

3.3.2 City of Kewanee

Another potential source of boron free water is the City of Kewanee, which is approximately 12 miles northeast from Galva.

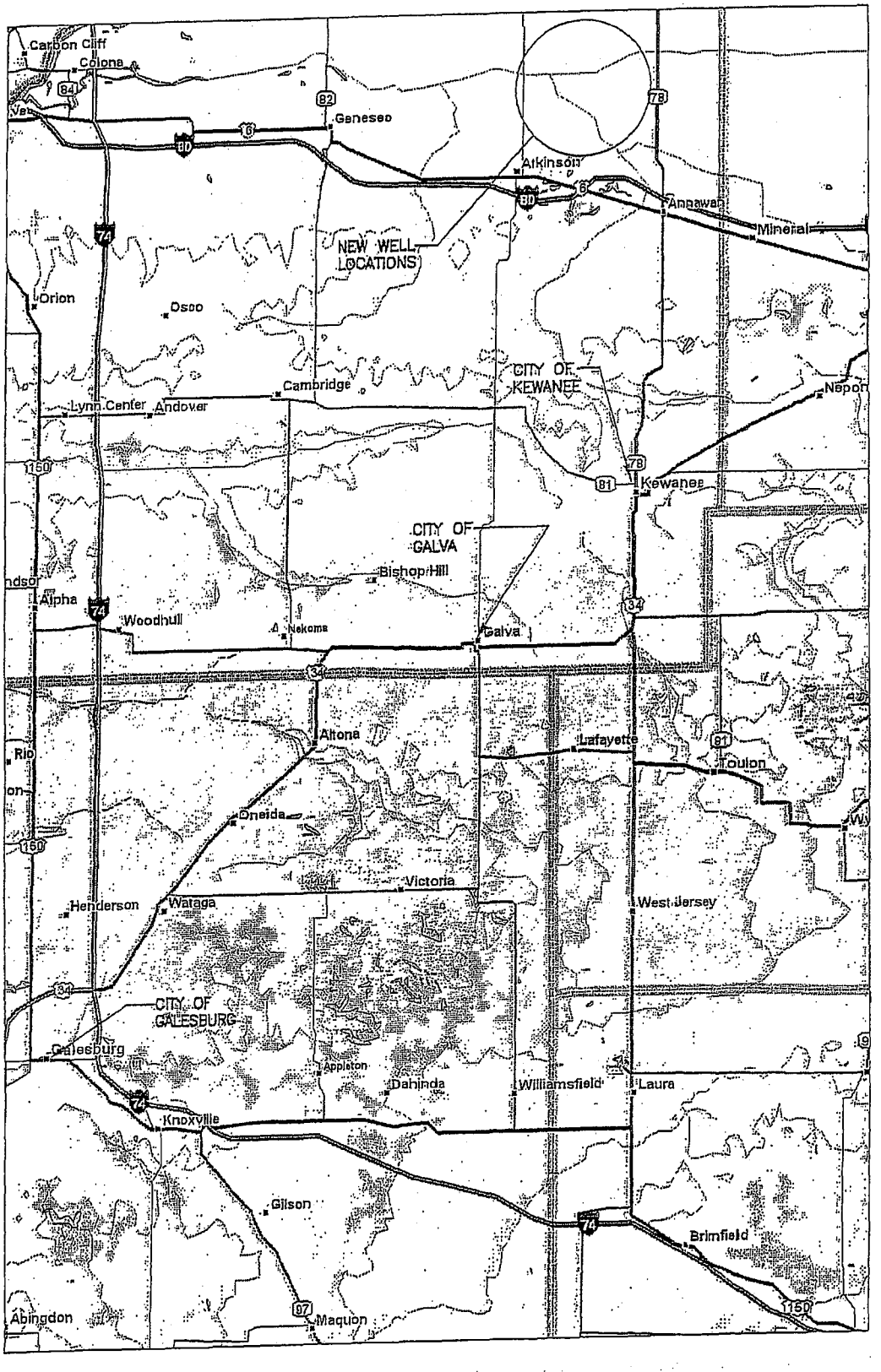


FIGURE 11

ALTERNATIVE WATER SOURCE LOCATIONS

Bruner, Cooper & Zuck, Inc.
Consulting Engineers Structural Engineers Land Surveyors

JOB NO. 250099 DATE: 01/23/2007

The City of Kewanee has recently installed two new reverse osmosis water treatment plants to treat potable water from its municipal wells. An initial inquiry to the City of Kewanee regarding a pipeline and subsequent purchase of treated water by the City of Galva was determined to not be feasible by the City of Kewanee, due to amount of water that may potentially be needed by Galva in the future.

3.3.3 City of Galesburg

Another source of boron-free water exists in the City of Galesburg, located approximately 22 miles southwest of Galva. The idea of a Galesburg to Galva pipeline has been around for quite a number of years. Initial discussions have taken place between the City of Galva and the City of Galesburg regarding such a project and they have been positive. A report discussing the technical issues and estimated costs that would be faced by such a project has just recently been completed and presented to the City of Galva for consideration.

The estimated cost of such a pipeline project is a very complex issue, with several municipalities along the route and questions of how the proportionate share of the costs are to be determined. From the report, the City of Galva's share would be approximately $13.6 million of the total estimated project cost of $16.1 million. This estimate does not factor in operation and maintenance costs which are expected to be very significant.

It should be noted that the contact with the City of Kewanee and the discussions with the City of Galesburg were not because of the boron issue. Presently, the City of Galva is actively involved with Prairie Ethanol, LLC, in developing a Galva site for the construction of an ethanol plant. A feasibility study of the proposed site has been prepared for Prairie Ethanol by BMI International Consulting, a leading independent consulting firm in the energy industry. The results of this study indicate that the City of Galva is an excellent site for a new ethanol plant. However, should the ethanol plant not locate in Galva, along with their need for large quantities of water, the situation would need to be re-examined from a "boron only" point of view as a solution.

4. A Site Specific Water Quality Standard

4.1 Relief Necessary for Compliance

With the considerable costs associated with the aforementioned options, the City of Galva has decided to petition the IPCB for a site specific water quality standard. A summary of the various aspects of this course of action is discussed in the following sections.

From the data provided in Figure 6, the City of Galva would need permission to discharge from their existing sewage treatment plants an effluent flow with a concentration of up to 3 mg/L of boron. This was the maximum recorded boron concentration recorded since September of 2004.

Stream flow data was collected using the 7 Day 10 Year Low Flow Map (7Q10 Map) for the Spoon River Region published by the Illinois State Water Survey (ISWS) and the Illinois Streamflow Assessment Model available online from the ISWS. The low flow stream discharges were assessed at the 7 day-10 year low flow event (7Q10).

Using the minimum average monthly discharge data from the STPs from 2006 (Figure 7), and assuming that the maximum recorded boron concentration was to occur during a low flow period, the extents of the necessary relief were calculated using the below equation for each of the sewage treatment plants.

$$C_{BORON\ ADDED} = [Q_{STP} \times C_{STP}] / [Q_{STP} + Q_{STREAM}]$$

Where:

$C_{BORON\ ADDED}$ = Final boron concentration in receiving stream (mg/L)
Q_{STP} = Discharge from sewage treatment plant (cfs)
C_{STP} = Boron concentration in STP discharge (mg/L)
Q_{STREAM} = Water flow in stream during Q710 conditions (cfs)

4.2 Northeast STP Effluent Mass Balance

The lowest average monthly discharge for the Northeast STP for 2006 was 0.37 cfs. This was the average discharge for the month of July 2006 (Figure 5).

During low flow periods (7Q10), the discharge from the Northeast STP would receive adequate dilution at the point where the South Branch of the Edwards River discharges and mixes with the Edwards River. It is at this point that the boron concentration in the stream would drop below 1 mg/L during 7Q10 conditions.

$C_{BORON\ ADDED} = [Q_{STP} \times C_{STP}] / [Q_{STP} + Q_{STREAM}]$

$C_{BORON\ ADDED} = [0.37\ cfs \times 3.0\ mg/L] / [0.93\ cfs]$

$C_{BORON\ ADDED} = 0.94\ mg/L$

Thus dilution would occur approximately 16.1 miles downstream of the outfall of the Northeast STP.

It should be noted that this is a worst case scenario, and during normal stream flow conditions, dilution would occur much closer to the discharge of the Northeast STP.

Refer to Figure 12 for a map depicting the point of dilution for the Northeast STP.

4.3 Southwest STP Effluent Mass Balance

The lowest average monthly discharge for the Southwest STP for 2006 was 0.015 cfs. This was the average discharge for the month of November 2006 (Figure 5).

During low flow periods (7Q10), the effluent from the Southwest STP would receive adequate dilution at the point just past where Mud Run discharges into Walnut Creek. Again, it should be noted that this is a worst case scenario, during normal conditions, dilution would occur closer to the discharge of the Southwest STP.

$C_{BORON\ ADDED} = [Q_{STP} \times C_{STP}] / [Q_{STP} + Q_{STREAM}]$

$C_{BORON\ ADDED} = [0.015\ cfs \times 3.0\ mg/L] / [0.20\ cfs]$

$C_{BORON\ ADDED} = 0.225\ mg/L$

Thus dilution would occur approximately 7 miles from the outfall of the Southwest STP.

Refer to Figure 12 for a map showing the point of dilution of the Southwest STP. Detailed mass balance calculations for each of the sewage treatment plants may be found in the appendix of this report.

5. Environmental Effects of a Site Specific Water Quality Standard

5.1 Nature of Boron

Boron is a naturally occurring element that is found in nature in compounds called borates. Borates are found in the oceans, sedimentary rocks, coal, shale, and some soils. Borates are naturally released into the environment from the oceans, volcanic activity and other geothermal releases such as geothermal steam, and weathering of clay-rich sedimentary rocks. Boron is also released, to a lesser extent, from sources due to human activity.

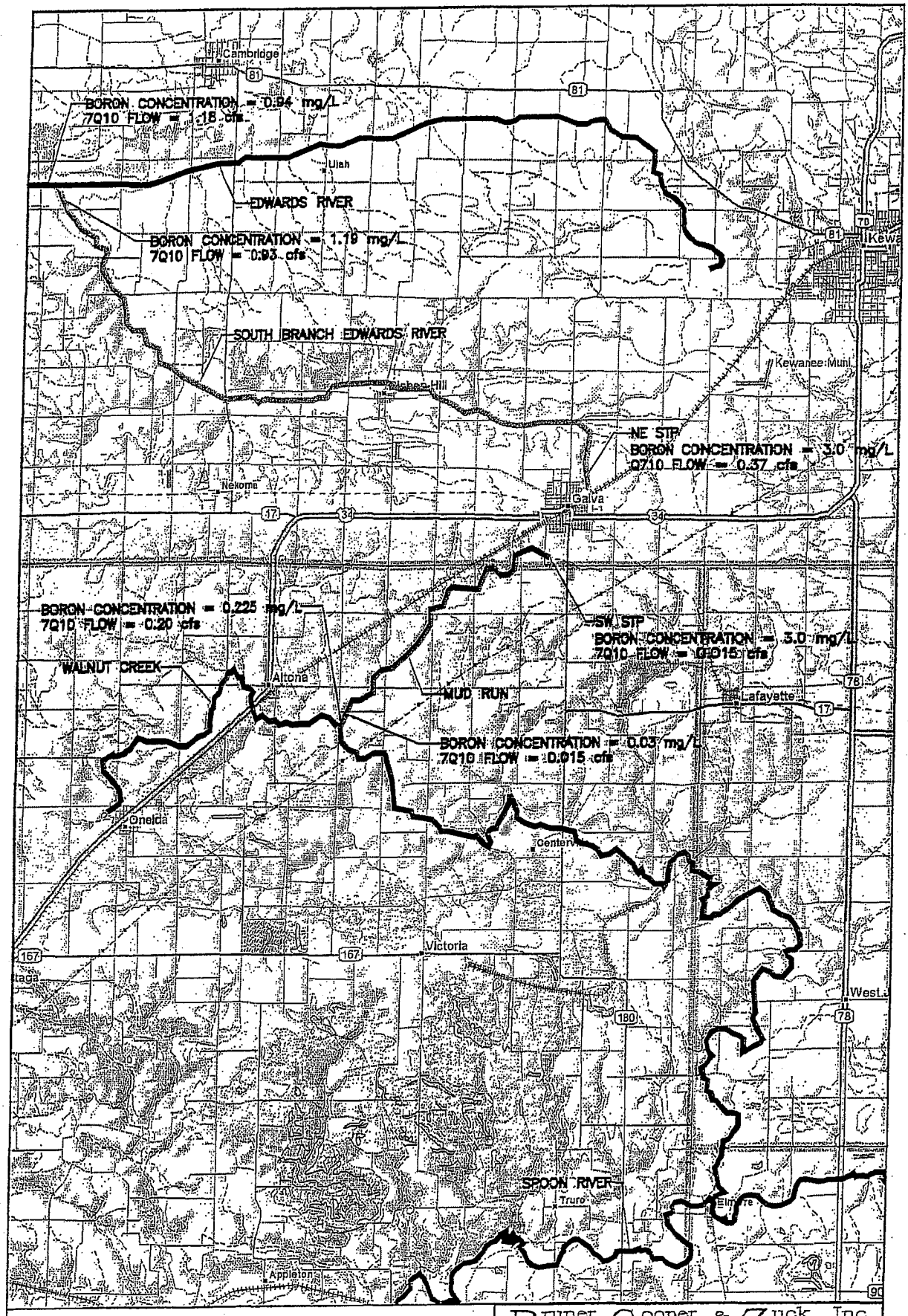


FIGURE 12
POINTS OF DILUTION

Bruner, Cooper & Zuck, Inc.
Consulting Engineers | Structural Engineers | Land Surveyors

JOB NO. 250099	DATE: 01/23/2007	
DRAWN: KCK	CHECKED: SRM	APPROVED:

Boron is an essential micronutrient for plants, with levels of boron required for optimum growth depending on the plant species. In some plants, there is but a narrow range between boron deficiency and toxicity.

Humans are primarily exposed to boron through food and drinking water. The average daily intake of boron in the diet is about 1.2 mg per person per day and the estimated average boron concentration in drinking water is between 0.1 and 0.3 mg/L. In humans and animals, most of the boric acid and borate are absorbed from the gastrointestinal and respiratory tracts and excreted in the urine.

The effects of boron concentrations in excess of the current 1 mg/L discharge standard are discussed in great detail in previously granted petitions which are discussed later in this report.

5.2 IEPA Stream Assessment

The South Branch of the Edwards River was rated by the IEPA in its *Integrated Water Quality Report and Section 303(d) List (2006)* as "fully supporting" of aquatic life and "fully supporting" of fish consumption. It is "not supporting" of primary contact use based on fecal coliform bacteria data. The source of the bacteria concentrations is listed as "unknown".

The South Branch of the Edwards River does not discharge enough water to make it a viable source for potable water for any of the surrounding communities.

Mud Run and Walnut Creek were not assessed in the 2006 edition of the IEPA's Report. Neither stream is large enough to make it a source for potable water either.

5.3 Current Stream Usage

Research into the current uses of the affected waterways showed the streams were essentially used for drainage purposes and nothing more.

At the time of this report, there were 18 registered nurseries in Henry County. None of these 18 nurseries are located close enough to the affected waterways to utilize them for irrigation. Similarly, all 4 registered nurseries in Knox County were not located near the affected streams. There are no golf courses currently located along the affected waterways.

Communications with Gary Clark, Director of the Office of Natural Resources (part of IDNR), confirmed that there are no authorized permits for structures to draw water from the streams.

Henry County Farm Bureau Director, Katie Boruff, checked with her county Farm Bureau board members to see if there were any specialty crops being grown along the South Branch of the Edwards River. No one was aware of any specialty crops that may require constant irrigation being grown along the affected waterways.

Also, the Knox County Farm Bureau Director, Josh Gibb, also looked into any specialty crops being grown along Walnut Creek and Mud Run in Knox County. To the best of his knowledge, there were no specialty crops being grown in that area of the county.

Considering the lack of current use of the effected streams and their relatively low flows it is reasonable to assume that a site specific water quality standard will not affect future stream usage.

6. Past Petitions Granted by the IPCB

Research into the requirements for a site specific water quality standard yielded similar petitions filed to the IPCB for boron related discharges. Three past adjusted water quality petitions to the IPCB have exhaustively explored the toxicity of boron to humans, livestock, aquatic life, and plant life. In these past petitions, relief was granted for boron concentrations much higher than the relief requested by the City of Galva. These past petitions are AS 94-9, AS 96-1, and AS 96-8.

In AS 96 – 1, Exhibit 1, "An Assessment of an Adjusted Water Quality Standard for the Kaskaskia River, Randolph County, Illinois; Baldwin Power Plant Ash Pond Discharge (April, 1995)" by Illinois Power Company, goes into great detail of the effects of boron concentrations on the environment and wildlife. It was concluded that the additional boron concentrations would have no significant adverse affects on the Kaskaskia River ecosystem.

Similarly, in AS 96 – 8, Exhibit 1 "Technical Support Document, Adjusted Water Quality Standard for Boron, Duck Creek Station, Fulton County, Illinois (January, 1996)" by Hanson Engineers Incorporated, the effects of high boron concentrations on the environment are also discussed. Again, the conclusion was that the high boron concentrations discharged by the Duck Creek Station would pose no additional risk to the local ecosystem.

In each these previously granted petitions, relief was granted with boron discharge concentrations of 11.0 mg/L (AS 94-9), 9.9 mg/L (AS 96-1), and 4.5 mg/L (AS 96-8). The City of Galva is requesting relief to a maximum of 3.0 mg/L at the point of discharge for each sewage treatment plant.

7. Conclusion

In summary, removal of boron from a water source is not completely uncommon; however, the majority of applications are industrial in nature as opposed to a municipal wastewater or potable water. This is evident in the high upfront costs associated with each of the explored alternative solutions.

Each of the treatment options have very complex issues regarding the disposal of the resulting waste. As such, operation and maintenance costs can not be accurately estimated at this time although they are expected to be significantly high. These costs combined with the upfront construction, design, and legal costs make these options impractical without significant financial assistance.

The alternative water supply sources are a considerable distance from the City of Galva. The Galesburg to Galva option has numerous technical, as well as political issues that would have to be resolved, not to mention the expenses associated with such a large scale pipeline system. The Green River Valley option would require a significant expense to determine if it is even feasible, which would be in addition to the cost to develop a well, or wells, and construct a pipeline.

Considering the information obtained from researching the issue, discussions with persons in the field, including personnel with the I.E.P.A., a site specific water quality standard seems the most feasible option at the current time. The adjusted standard is expected to yield no foreseeable negative impacts on the existing environment.

It is reasonable to assume with the source of the boron concentrations attributed to the City's water supply, that the City of Galva has been discharging boron concentrations in excess of the current 1.0 mg/L limit since the drilling of their first well in 1894. A site specific water quality standard would allow the City to continue to discharge as it has for over the past 100 years.

8. References

"An Assessment of an Adjusted Water Quality Standard for the Kaskaskia River, Randolph County, Illinois; Baldwin Power Plant Ash Pond Discharge (April, 1995)" by Illinois Power Company. IPCB AS 96-1.

"Technical Support Document, Adjusted Water Quality Standard for Boron, Duck Creek Station, Fulton County, Illinois (January, 1996)" by Hanson Engineers Incorporated. IPCB AS 96 – 8.

Illinois Streamflow Assessment Model (ILSAM). Illinois State Water Survey. http://www.sws.uiuc.edu/data/ilsam/ . Accessed 2/1/07.

Integrated Water Quality Report and Section 303(d) List (2006). Illinois Environmental Protection Agency. http://www.epa.state.il.us/water/water-quality/index.html . Accessed 3/1/07.

APPENDIX A

CITY OF GALVA
NORTHEAST S.T.P.

NPDES PERMIT NO. IL0026344

NPDES Permit No. IL0026344

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Reissued (NPDES) Permit

xpiration Date: August 31, 2009

Issue Date: August 3, 2004
Effective Date: September 1, 2004

lame and Address of Permittee:

City of Galva
P.O. Box 171
Galva, Illinois 61434

Facility Name and Address:

City of Galva Northeast STP
523 NE 9th Street
Galva, Illinois
(Henry County)

eceiving Waters: Unnamed tributary to the South Branch of Edwards River

n compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the standard conditions and attachments herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

AK:MRA:04052601.daa

NPDES Permit No. IL0026344

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall

Load limits computed based on a design average flow (DAF) of 0.385 MGD (design maximum flow (DMF) of 0.867 MGD).

Excess flow facilities (if applicable) shall not be utilized until the main treatment facility is receiving its maximum practical flow.

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS MG/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
BOD_5**	32 (72)		64 (145)	10		20	2 Days/Week	Composite
Suspended Solids	39 (87)		77 (174)	12		24	2 Days/Week	Composite
Dissolved Oxygen	Shall not be less than 6 mg/L						2 Days/Week	Grab
pH	Shall be in the range of 6 to 9 Standard Units						2 Days/Week	Grab
Ammonia Nitrogen as (N)								
April-May/Sept.-Oct.	4.8 (11)		9.6 (22)	1.5		3.0	2 Days/Week	Composite
June-August	4.5 (10)		9.6 (22)	1.4		3.0	2 Days/Week	Composite
Nov.-Feb.	18 (41)		26 (58)	5.7		8.0	2 Days/Week	Composite
March	8.4 (19)	21 (47)	26 (58)	2.6	6.5	8.0	2 Days/Week	Composite

Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

pH shall be reported on the DMR as a minimum and a maximum.

Dissolved oxygen shall be reported on DMR as minimum.

NPDES Permit No. IL0026344

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): A01 - Excess Flow Outfall (Flows Over 0.867 MGD

These flow facilities shall not be utilized until the main treatment facility is receiving its maximum practical flow.

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

		CONCENTRATION LIMITS mg/L		
Parameter		Monthly Average	Sample Frequency	Sample Type
Total Flow (MG)	See Below		Daily When Discharging	Continuous
BOD_5		30	Daily When Discharging	Grab
Suspended Solids		30	Daily When Discharging	Grab
Fecal Coliform	Daily Maximum Shall Not Exceed 400 per 100 mL		Daily When Discharging	Grab
pH	Shall be in the range of 6 to 9 Standard Units		Daily When Discharging	Grab
Chlorine Residual		0.75	Daily When Discharging	Grab

Total flow in million gallons shall be reported on the Discharge Monitoring Report (DMR) in the quantity maximum column.

Report the number of days of discharge in the comments section of the DMR.

Fecal Coliform shall be reported on the DMR as daily maximum.

Chlorine Residual shall be reported on the DMR as a monthly average concentration.

pH shall be reported on the DMR as a minimum and a maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

NPDES Permit No. IL0026344

Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

Parameter	Sample Frequency	Sample Type
Flow (MGD)	Continuous	
BOD_5	2 Days/Week	Composite
Suspended Solids	2 Days/Week	Composite

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

NPDES Permit No. IL0026344

Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws, regulations, or judicial orders. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 2 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR § 122.63 and Without Public Notice in the event of operational, maintenance or other problems resulting in possible effluent deterioration.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302.

SPECIAL CONDITION 6. Samples taken in compliance with the effluent monitoring requirements shall be taken:

A. For Discharge Number 001 - During dry weather flows (no excess flow discharge), samples shall be taken at a point representative of the flows but prior to entry into the receiving stream. During periods of excess flow discharge, $CBOD_5$, Suspended Solids, and Ammonia Nitrogen, if Ammonia Nitrogen monitoring and sampling is required on the Effluent Limitations, Monitoring, and Reporting Page of this Permit, shall be monitored at a point representative of the discharge but prior to admixture with the excess flow. If Fecal Coliform limits are different for Discharge Numbers 001 and A01, sampling shall occur at a point representative of the discharge and prior to admixture, if hardware allows. Other parameters may be sampled after admixture but prior to entry into the receiving stream.

B. For Discharge Number A01 - Samples for all parameters shall be taken at a point representative of the discharge but prior to entry into the receiving stream. If Fecal Coliform limits are different for Discharge Numbers 001 and A01, sampling shall occur at a point representative of the discharge and prior to admixture, if hardware allows. The sampling point for other parameters may be at a point after admixture with the dry weather flows.

SPECIAL CONDITION 7. For Discharge No. 001, any use of chlorine to control slime growths, odors or as an operational control, etc. shall not exceed the limit of 0.05 mg/L (daily maximum) total residual chlorine in the effluent. Sampling is required on a daily grab basis during the chlorination process. Reporting shall be submitted on the DMR's on a monthly basis.

SPECIAL CONDITION 8. During January of each year the Permittee shall submit annual fiscal data regarding sewerage system operations to the Illinois Environmental Protection Agency/Division of Water Pollution Control/Compliance Assurance Section. The Permittee may use any fiscal year period provided the period ends within twelve (12) months of the submission date.

Submission shall be on forms provided by IEPA titled "Fiscal Report Form For NPDES Permittees".

SPECIAL CONDITION 9. For the duration of this Permit, the Permittee shall determine the quantity of sludge produced by the treatment facility in dry tons or gallons with average percent total solids analysis. The Permittee shall maintain adequate records of the quantities of sludge produced and have said records available for IEPA inspection. The Permittee shall submit to the IEPA, at a minimum, a semi-annual summary report of the quantities of sludge generated and disposed of, in units of dry tons or gallons (average total percent solids) by different disposal methods including but not limited to application on farmland, application on reclamation land, landfilling, public distribution, dedicated land disposal, sod farms, storage lagoons or any other specified disposal method. Said reports shall be submitted to the IEPA by January 31 and July 31 of each year reporting the preceding January thru June and July thru December interval of sludge disposal operations.

Duty to Mitigate. The Permittee shall take all reasonable steps to minimize any sludge use or disposal in violation of this Permit.

Sludge monitoring must be conducted according to test procedures approved under 40 CFR 136 unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this Permit.

Planned Changes. The Permittee shall give notice to the IEPA on the semi-annual report of any changes in sludge use and disposal.

The Permittee shall retain records of all sludge monitoring, and reports required by the Sludge Permit as referenced in Standard Condition 23 for a period of at least five (5) years from the date of this Permit.

If the Permittee monitors any pollutant more frequently than required by the Sludge Permit, the results of this monitoring shall be included in the reporting of data submitted to the IEPA.

NPDES Permit No. IL0026344

Special Conditions

Monitoring reports for sludge shall be reported on the form titled "Sludge Management Reports" to the following address:

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 10. The Permittee shall record monitoring results on Discharge Monitoring Report Forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR form shall be submitted with no discharge indicated.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 15th day of the following month, unless otherwise specified by the permitting authority.

Discharge Monitoring Reports shall be mailed to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

Attention: Compliance Assurance Section, Mail Code # 19

7.

Attachment H

Standard Conditions

Definitions

eans the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

ncy means the Illinois Environmental Protection Agency.

means the Illinois Pollution Control Board.

n Water Act (formerly referred to as the Federal Water Pollution Control Act) means L 92-500, as amended. 33 U.S.C. 1251 et seq.

S (National Pollutant Discharge Elimination System) means the national program for), modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and ising and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 e Clean Water Act.

A means the United States Environmental Protection Agency.

y Discharge means the discharge of a pollutant measured during a calendar day or any our period that reasonably represents the calendar day for purposes of sampling. For ants with limitations expressed in units of mass, the "daily discharge" is calculated as tal mass of the pollutant discharged over the day. For pollutants with limitations ssed in other units of measurements, the "daily discharge" is calculated as the average surement of the pollutant over the day.

imum Daily Discharge Limitation (daily maximum) means the highest allowable daily arge.

age Monthly Discharge Limitation (30 day average) means the highest allowable rage of daily discharges over a calendar month, calculated as the sum of all daily charges measured during a calendar month divided by the number of daily discharges ured during that month.

age Weekly Discharge Limitation (7 day average) means the highest allowable rage of daily discharges over a calendar week, calculated as the sum of all daily charges measured during a calendar week divided by the number of daily discharges ured during that week.

Management Practices (BMPs) means schedules of activities, prohibitions of practices, intenance procedures, and other management practices to prevent or reduce the pollution aters of the State. BMPs also include treatment requirements, operating procedures, and ices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage raw material storage.

quot means a sample of specified volume used to make up a total composite sample.

ab Sample means an individual sample of at least 100 milliliters collected at a randomly- ted time over a period not exceeding 15 minutes.

our Composite Sample means a combination of at least 8 sample aliquots of at least) milliliters, collected at periodic intervals during the operating hours of a facility over a 24- ir period.

ur Composite Sample means a combination of at least 3 sample aliquots of at least 100 ters, collected at periodic intervals during the operating hours of a facility over an 8-hour iod.

Proportional Composite Sample means a combination of sample aliquots of at least milliliters collected at periodic intervals such that either the time interval between each ot or the volume of each aliquot is proportional to either the stream flow at the time of mpling or the total stream flow since the collection of the previous aliquot.

1) Duty to comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

2) Duty to reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.

3) Need to halt or reduce activity not a defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4) Duty to mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

) Proper operation and maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up, or auxiliary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.

(6) Permit actions. This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(7) Property rights. This permit does not convey any property rights of any sort, or any exclusive privilege.

(8) Duty to provide information. The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency, upon request, copies of records required to be kept by this permit.

(9) Inspection and entry. The permittee shall allow an authorized representative of the Agency, upon the presentation of credentials and other documents as may be required by law, to:

(a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.

(10) Monitoring and records.

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of this permit, measurement, report or application. This period may be extended by request of the Agency at any time

(c) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The individual(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

(d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Where no test procedure under 40 CFR Part 136 has been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

(11) Signatory requirement. All applications, reports or information submitted to the Agency shall be signed and certified.

(a) Application. All permit applications shall be signed as follows:

(1) For a corporation: by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation;

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

(b) Reports. All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a); and

(2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and

(3) The written authorization is submitted to the Agency.

APPENDIX B

CITY OF GALVA
SOUTHWEST STP

N.P.D.E.S. PERMIT IL0023647

NPDES Permit No. IL0023647

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Reissued (NPDES) Permit

Expiration Date: August 31, 2009

Issue Date: August 4, 2004
Effective Date: September 1, 2004

Name and Address of Permittee:

City of Galva
P.O. Box 171
Galva, Illinois 61434

Facility Name and Address:

Galva Southwest STP
1/2 Mile South of BNSF RR and SW 4th St.
Galva, Illinois
(Henry County)

Receiving Waters: Mud Run Creek tributary to Walnut Creek tributary to Spoon River

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the standard conditions and attachments herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

SAK:MRA:04041302.bah

NPDES Permit No. IL0023647

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall

Load limits computed based on a design average flow (DAF) of 0.3 MGD (design maximum flow (DMF) of 1.0 MGD).

Excess flow facilities (if applicable) shall not be utilized until the main treatment facility is receiving its maximum practical flow.

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS MG/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
$CBOD_5$**	63 (209)	100 (334)		25	40		2 Days/Week	Grab
Suspended Solids	93 (309)	113 (375)		37	45		2 Days/Week	Grab
Dissolved Oxygen*****	Shall not be less than 6 mg/L						2 Days/Week	Grab
pH	Shall be in the range of 6 to 9 Standard Units						2 Days/Week	Grab
Copper***	0.11 (0.37)		0.19 (0.63)	0.044	--	0.075	2 Days/Week	Grab
Nickel***	0.05 (0.15)		0.75 (2.5)	0.018	--	0.300	2 Days/Week	Grab
Boron****	--		2.5 (8.3)	--	--	1.0	2 Days/Week	Grab

(Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 13.
***See Special Condition 14.
****See Special Conditin 15.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

pH shall be reported on the DMR as a minimum and a maximum.

NPDES Permit No. IL0023647

Effluent Limitations and Monitoring

Discharge Number(s) and Name(s): A01 Excess Flow Outfall

These flow facilities shall not be utilized until the main treatment facility is receiving its maximum practical flow.

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

Parameter		CONCENTRATION LIMITS mg/L Monthly Average	Sample Frequency	Sample Type
Total Flow (MG)	See Below		Daily When Discharging	Continuous
BOD_5		30	Daily When Discharging	Grab
Suspended Solids		30	Daily When Discharging	Grab
Fecal Coliform	Daily Maximum Shall Not Exceed 400 per 100 mL		Daily When Discharging	Grab
pH	Shall be in the range of 6 to 9 Standard Units		Daily When Discharging	Grab
Chlorine Residual		0.75	Daily When Discharging	Grab

Total flow in million gallons shall be reported on the Discharge Monitoring Report (DMR) in the quantity maximum column.

Report the number of days of discharge in the comments section of the DMR.

Fecal Coliform shall be reported on the DMR as daily maximum.

Chlorine Residual shall be reported on the DMR as a monthly average concentration.

pH shall be reported on the DMR as a minimum and a maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

NPDES Permit No. IL0023647

Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

Parameter	Sample Frequency	Sample Type
Flow (MGD)	Continuous	RIT*
BOD_5	2 Days/Week	Composite
Suspended Solids	2 Days/Week	Composite

*Recording, Indicating, Totalizing.

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

NPDES Permit No. IL0023647

Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws, regulations, or judicial orders. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 4 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR § 122.63 and Without Public Notice in the event of operational, maintenance or other problems resulting in possible effluent deterioration.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302.

SPECIAL CONDITION 6. Samples taken in compliance with the effluent monitoring requirements shall be taken:

A. For Discharge Number 001 - During dry weather flows (no excess flow discharge), samples shall be taken at a point representative of the flows but prior to entry into the receiving stream. During periods of excess flow discharge, $CBOD_5$, Suspended Solids, and Ammonia Nitrogen, if Ammonia Nitrogen monitoring and sampling is required on the Effluent Limitations, Monitoring, and Reporting Page of this Permit, shall be monitored at a point representative of the discharge but prior to admixture with the excess flow. If Fecal Coliform limits are different for Discharge Numbers 001 and A01, sampling shall occur at a point representative of the discharge and prior to admixture, if hardware allows. Other parameters may be sampled after admixture but prior to entry into the receiving stream.

B. For Discharge Number A01 - Samples for all parameters shall be taken at a point representative of the discharge but prior to entry into the receiving stream. If Fecal Coliform limits are different for Discharge Numbers 001 and A01, sampling shall occur at a point representative of the discharge and prior to admixture, if hardware allows. The sampling point for other parameters may be at a point after admixture with the dry weather flows.

SPECIAL CONDITION 7. Final Conditions - For Discharge No. 001: BOD_5 and Suspended Solids (85% removal required): The arithmetic mean of the values for effluent samples collected in a period of one calendar month shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period, except during those periods when the influent is diluted because of high flows if the tributary sewer system is combined. The percent removal need not be reported to the IEPA on DMR's but influent and effluent data must be available, as required elsewhere in this Permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent $CBOD_5$ concentration to determine the effluent BOD_5 concentration.

SPECIAL CONDITION 8. This Permit may be modified to include requirements for the Permittee on a continuing basis to evaluate and detail its efforts to effectively control sources of infiltration and inflow into the sewer system and to submit reports to the IEPA if necessary.

SPECIAL CONDITION 9. For Discharge No. 001, any use of chlorine to control slime growths, odors or as an operational control, etc. shall not exceed the limit of 0.05 mg/L (daily maximum) total residual chlorine in the effluent. Sampling is required on a daily grab basis during the chlorination process. Reporting shall be submitted on the DMR's on a monthly basis.

SPECIAL CONDITION 10. The permittee shall sample outfall 001 for weak acid dissociable or available cyanide monthly for a period of six months beginning effective date of this permit. These findings to be reported on the Discharge Monitoring Reports as a daily maximum. These results will be evaluated and the permit will be modified as needed.

SPECIAL CONDITION 11. During January of each year the Permittee shall submit annual fiscal data regarding sewerage system operations to the Illinois Environmental Protection Agency/Division of Water Pollution Control/Compliance Assurance Section. The Permittee may use any fiscal year period provided the period ends within twelve (12) months of the submission date.

Submission shall be on forms provided by IEPA titled "Fiscal Report Form For NPDES Permittees".

SPECIAL CONDITION 12. The Permittee shall record monitoring results on Discharge Monitoring Report Forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR form shall be submitted with no discharge indicated.

NPDES Permit No. IL0023647

Special Conditions

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 15th day of the following month, unless otherwise specified by the permitting authority.

Discharge Monitoring Reports shall be mailed to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 13. The Permittee may use a site-specific metals translator for copper and nickel in order to modify or eliminate these permit limits. The total and dissolved metal for a minimum of twelve weekly samples need to be collected from the effluent and a downstream location to determine a metal translator for these substances. The Agency will review submitted samples results and will modify the permit as needed. Done

SPECIAL CONDITION 14. Project Description: Compliance with Boron Water Quality Standards.

Thirty six (36) months from the effective date of this permit the following boron limits shall become effective:

STORET CODE	PARAMETER	Minimum Detection Limit
01022	Boron	1.0 mg/L

The Permittee shall complete the project described above in accordance with the following schedule:

(1)	Interim Report on boron sampling to date and what measures are necessary to comply with final boron limitations	6 months from the effective date of this permit
(2)	Preliminary Report on construction of boron compliance facilities	9 months from the effective date of this permit 6/1/06
(3)	Plans and specifications	12 months from the effective date of this permit 9/1/06
(4)	Commence Construction	18 months from the effective date of this permit 3/1/06
(5)	Interim Report	24 months from the effective date of this permit 9/1/06
(6)	Interim Report	30 months from the effective date of this permit 3/1/07
(7)	Permittee achieves compliance with final boron effluent limitations	36 months from the effective date of this permit 9/1/07

Upon completion of the compliance facilities, the Permittee shall monitor and report concentration (mg/L) of boron at 2 days/week intervals. The sample shall be grab and the results shall be submitted on the DMR's to IEPA.

Unless otherwise indicated, concentrations refer to the total amount of the constituent present in all phases, whether solid, suspended or dissolved, elemental or combined, including all oxidations states.

SPECIAL CONDITION 15. A dissolved oxygen limit of 6 mg/L (minimum) for discharge number 001 shall become effective one (1) year from the effective date of this Permit. The Permittee shall obtain compliance with the dissolved oxygen limit in accordance with the following schedule:

1.	Progress Report	6 months from the Permit effective date	3/1/05
2.	Obtain operational level	12 months from the Permit effective date	9/1/05

NPDES Permit No. IL0023647

Special Conditions

This Permit may be modified with Public Notice to include revised compliance dates set out in this Permit that are superseded or supplemented by compliance date in Judicial orders, Illinois Pollution Control Board orders or grant agreements. Prior to such permit modification, the revised dates in the appropriate orders or grant agreements shall govern the Permittee's compliance.

The dissolved oxygen limits in this permit are based on the Illinois Pollution Control Board Regulations contained in 35 Ill. Adm. Code Part 302.206. Should these regulations change, the IEPA may re-open and modify this permit to eliminate or revise dissolved oxygen limitations, based on the revised regulations. Prior to the dissolved oxygen limits becoming effective, such revised limits may be either more or less stringent than those above. After the dissolved oxygen limits become effective such revised limits shall be subject to the requirements of 40 CFR § 122.44(l). Reporting shall be submitted on the DMR's on a monthly basis.

REPORTING

The Permittee shall submit a report no later than fourteen (14) days following the completion dates indicated for each numbered item in the compliance schedule, indicating, a) the date the item was completed, or b) that the item was not completed, the reasons for non-compliance and the anticipated completion date.

Attachment H

Standard Conditions

Definitions

Act means the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

Agency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) means Pub. L 92-500, as amended, 33 U.S.C. 1251 et seq.

NPDES (National Pollutant Discharge Elimination System) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 of the Clean Water Act.

USEPA means the United States Environmental Protection Agency.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum Daily Discharge Limitation (daily maximum) means the highest allowable daily discharge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

Grab Sample means an individual sample of at least 100 milliliters collected at a randomly-selected time over a period not exceeding 15 minutes.

24-Hour Composite Sample means a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

8-Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour period.

Flow Proportional Composite Sample means a combination of sample aliquots of at least 100 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

(1) Duty to comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

Duty to reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.

Need to halt or reduce activity not a defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

Duty to mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

Proper operation and maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up, or auxiliary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.

(6) Permit actions. This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(7) Property rights. This permit does not convey any property rights of any sort, or any exclusive privilege.

(8) Duty to provide information. The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency, upon request, copies of records required to be kept by this permit.

(9) Inspection and entry. The permittee shall allow an authorized representative of the Agency, upon the presentation of credentials and other documents as may be required by law, to:

(a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.

(10) Monitoring and records.

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of this permit, measurement, report or application. This period may be extended by request of the Agency at any time.

(c) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The individual(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

(d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Where no test procedure under 40 CFR Part 136 has been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

(11) Signatory requirement. All applications, reports or information submitted to the Agency shall be signed and certified.

(a) Application. All permit applications shall be signed as follows:

(1) For a corporation: by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation;

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

(b) Reports. All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a); and

(2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and

(3) The written authorization is submitted to the Agency.

APPENDIX C

CITY OF GALVA
POTABLE WATER TESTING RESULTS

PDC Laboratories, Inc.
P.O. Box 9071 • Peoria, IL 61612-9071
(309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689

ACCREDITED IN ACCORDANCE WITH

Laboratory Results

City of Galva
PO Box 171

Galva, IL 61434-0171
Attn : Mr. Jerry Hoxworth

Date Received : 05/11/04 09:00
Report Date 05/19/04
Customer # : 275382
P.O. Number :
Facility : 0730450

Sample No: 04051760-1 Collect Date 05/07/04 13:10
Client ID.: DRINKING WATER Site : TP02 Locator: GRAB

Parameter	Qualifier	Result	Analysis Date	Analyst
EPA 200.7 R4.4	Well #5			
Boron		1.1 mg/l	05/12/04 13:00	KMC
SM.(18) 2130B				
Turbidity Check	<	1 NTU	05/12/04 08:00	JEM

Sample No: 04051760-2 Collect Date 05/07/04 13:15
Client ID : DRINKING WATER Site : TP03 Locator: GRAB

Parameter	Qualifier	Result	Analysis Date	Analyst
EPA 200.7 R4.4	Well #4			
Boron		1 mg/l	05/12/04 13:00	KMC
SM (18) 2130B				
Turbidity Check	<	1 NTU	05/12/04 08:00	JEM

PDC Laboratories participates in the following laboratory accreditation/certification and proficiency programs. Endorsement by the Federal or State Government or their agencies is not implied.

NELAC Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100239
State of Illinois Bacteriological Analysis in Drinking Water Certified Lab Registry No. 17533
Drinking Water Certifications: Indiana (C-IL-040); Kansas (E-10338); Kentucky (90056); Missouri (00870); Wisconsin (998294430)
Wastewater Certifications: Arkansas; Iowa (240); Kansas (E-10338); Wisconsin (998294430)
Hazardous/Solid Waste Certifications: Arkansas; Kansas (E-10338); Wisconsin (998294430)
UST Certification: Iowa (240)

Certified by: Lori L. Stenzel, Project Manager

APPENDIX D

CITY OF GALVA
MASS BALANCE CALCULATIONS

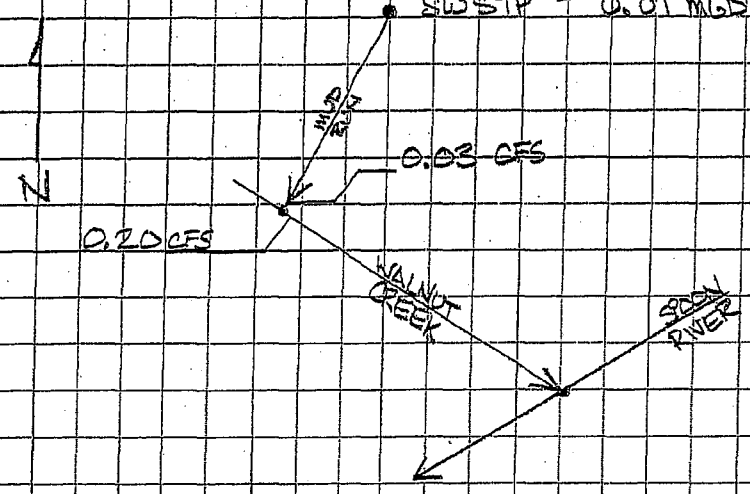
BRUNER, COOPER & ZUCK, INC.
Civil Engineers
Land Surveyors
GALESBURG, ILLINOIS 61401

JOB 250099 GALVA BORON
DESCRIPTION MASS BALANCE CALCULATIONS
SHEET NO. 1 OF
CALCULATED BY SRM DATE
CHECKED BY DATE

PURPOSE: FIND THE POINTS DOWNSTREAM FROM EACH OF GALVA'S STP'S WHERE THE BORON CONCENTRATIONS WILL GO BELOW 1 mg/L.

@ SW STP

* USING ISWS STREAM MODELING DATA FOR STREAM FLOWS, 7 DAY, 10 YEAR - DATA ATTACHED



→ FOR 2006, THE LOWEST AVG. MONTHLY FLOW FROM SW STP = 0.01 MGD
→ FROM NOVEMBER DMR - ATTACHED
→ FOR 2006, THE HIGHEST BORON CONCENTRATION = 3.0 mg/L
→ 9/20/06 - ATTACHED

EQ. $$C_{\text{BORON ADDED}} = \frac{Q_{\text{SW STP}} \times C_{\text{SW STP}}}{Q_{\text{SW STP}} + Q_{\text{STREAM}}}$$

BRUNER, COOPER & ZUCK, INC.
Civil Engineers
Land Surveyors
GALESBURG, ILLINOIS 61401

JOB _____
DESCRIPTION _____
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____

TRIAL #1 - MUD RUN @ JUST BEFORE CONFLUENCE W/ WALNUT CR.

$$C = \frac{(0.015)(3)}{0.03} = 1.5 \text{ mg/L} > 1 \text{ mg/L}$$ X

TRIAL #2 - AFTER MIXING IN WALNUT

$$C = \frac{(0.015)(3)}{0.20} = 0.225 \text{ mg/L}$$ ✓

∴ SO FOR SWD STP → BORON CONCENTRATIONS WILL GO BELOW 1 mg/L JUST AFTER THE POINT WHERE MUD RUN DISCHARGES INTO WALNUT CREEK DURING 7 DAY - 10 YEAR LOW FLOW PERIODS.

Illinois Streamflow Assessment Model

Results for River Mile(s) **0.00** - on **Mud Run - LTU** in the **Spoon** Watershed.

Drainage Area: 14.40 (sq. mi)

Low Flow Frequency

Duration (Days)	Recurrence (years) 2	10	25	50	
1	0.21	0.02	0.00	0.00	graph
7	0.47	0.03	0.00	0.00	graph
15	0.5	0.1	0.0	0.0	graph
31	0.7	0.2	0.1	0.0	graph
61	1.0	0.3	0.2	0.1	graph
91	1.3	0.4	0.2	0.2	graph

Flow statistics are computed using a base period of 1949-1997.

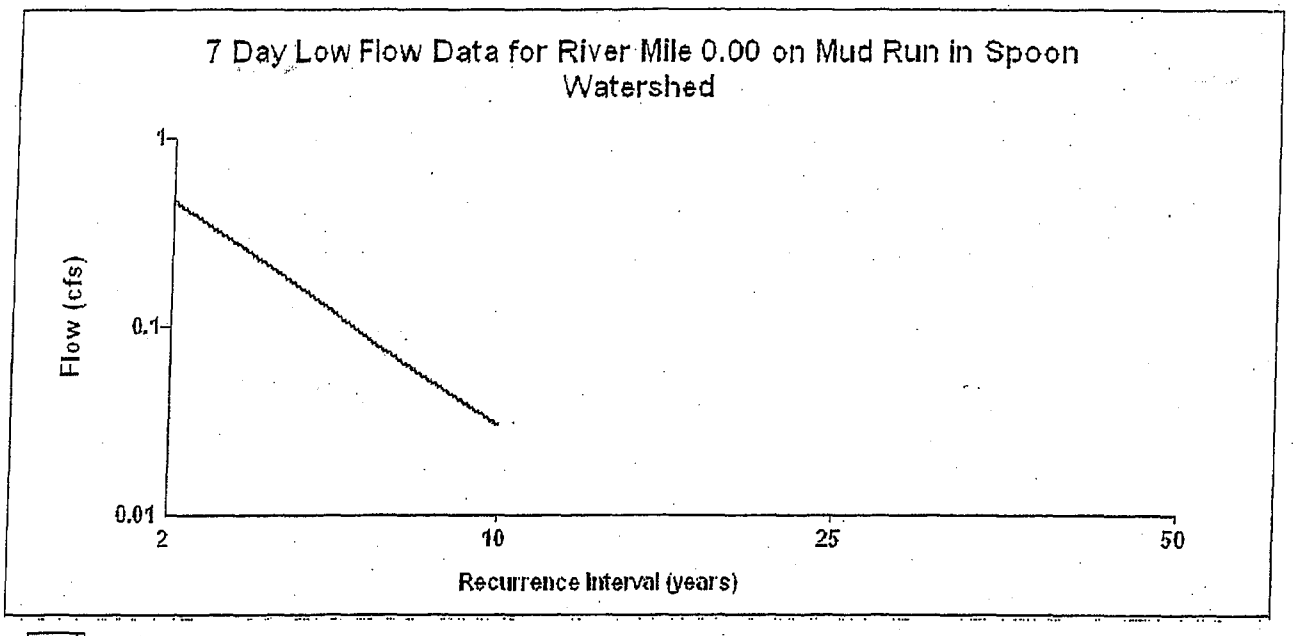
Change Watershed || Change Stream || Change River Mile || Change Flow Parameter

ILSAM Home | Data Disclaimer | Definitions | References

| Home | Highlights | Staff | Data | Information | Centers | Site Map |

State of Illinois | University of Illinois | Department of Natural Resources

Illinois Streamflow Assessment Model



= Flow

Change Watershed || Change Stream || Change River Mile || Change Flow Parameter || Back to Low Flow Frequency Data

ILSAM Home | Data Disclaimer | Definitions | References

| Home | Highlights | Staff | Data | Information | Centers | Site Map |

State of Illinois | University of Illinois | Department of Natural Resources

Illinois Streamflow Assessment Model

Results for River Mile(s) **31.70 - at Mud Run (LTU)** on **Walnut Creek - LT** in the **Spoon** Watershed.

Drainage Area: 53.30 (sq. mi)

Low Flow Frequency

Duration (Days)	Recurrence (years) 2	10	25	50	
1	0.7	0.1	0.0	0.0	graph
7	1.1	0.2	0.0	0.0	graph
15	1.4	0.3	0.1	0.1	graph
31	1.9	0.6	0.2	0.1	graph
61	2.8	0.9	0.4	0.3	graph
91	3.9	1.2	0.6	0.5	graph

Flow statistics are computed using a base period of 1949-1997.

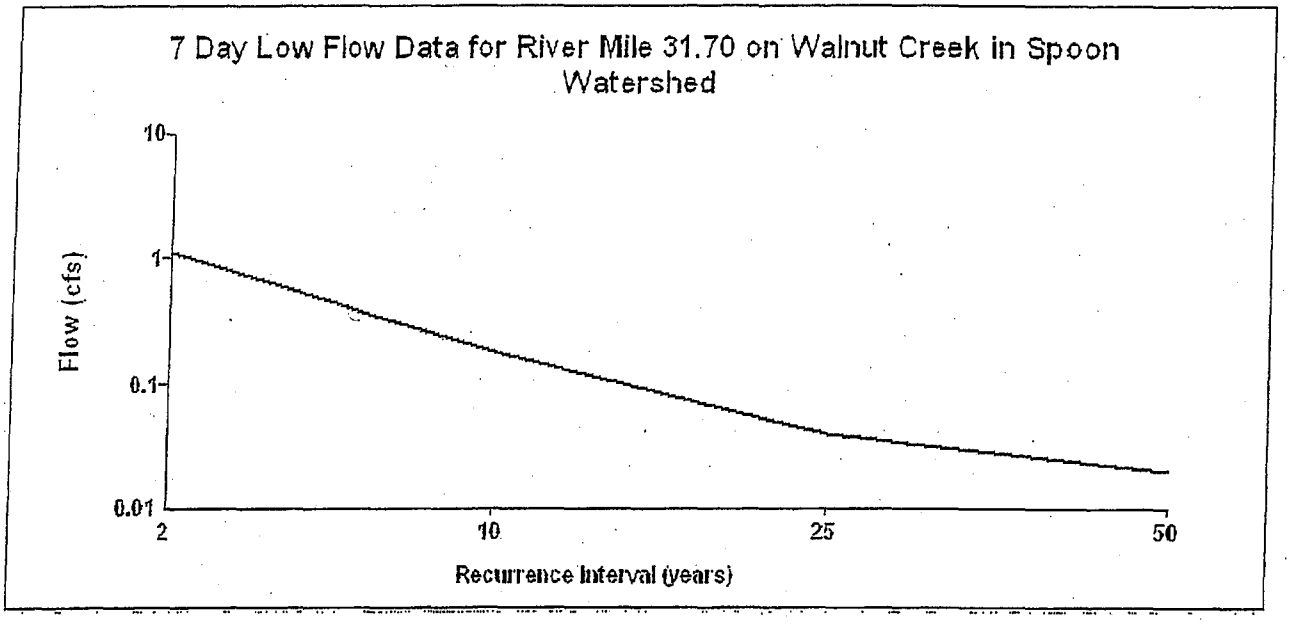
Change Watershed || Change Stream || Change River Mile || Change Flow Parameter

ILSAM Home | Data Disclaimer | Definitions | References

| Home | Highlights | Staff | Data | Information | Centers | Site Map |

State of Illinois | University of Illinois | Department of Natural Resources

Illinois Streamflow Assessment Model



= Flow

Change Watershed || Change Stream || Change River Mile || Change Flow Parameter || Back to Low Flow Frequency Data

ILSAM Home | Data Disclaimer | Definitions | References

| Home | Highlights | Staff | Data | Information | Centers | Site Map |

State of Illinois | University of Illinois | Department of Natural Resources

PDC Laboratories, Inc.
P.O. Box 9071 • Peoria, IL 61612-9071
(309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689

ACCREDITED IN ACCORDANCE WITH nelac

Laboratory Results

City of Galva
210 Front Street
P.O. Box 171
Galva, IL 61434
Attn : Mr. Larry Lawson

Date Received : 09/26/06 09:15
Report Date : 10/03/06
Customer # : 275382
P.O. Number :
Facility :

Sample No: 06094147-1 Collect Date : 09/20/06 08:30
Client ID : DIXLINE Site : DIXLINE Locator : GRAB

Parameter	Qualifier	Result	Analysis Date	Analyst
M 4500 CN C/SW9012A				
Cyanide, Total	<	0.005 mg/l	10/02/06 09:24	Ignay

Sample No: 06094147-2 Collect Date : 09/20/06 08:30
Client ID : DIXLINE Site : DIXLINE Locator : COMPOSITE

Parameter	Qualifier	Result	Analysis Date	Analyst
PA 200.7				
Sample Preparation			10/02/06 07:30	DAB
PA 200.7 R4.4				
Copper	<	0.01 mg/l	10/03/06 08:30	JVH
Nickel		0.22 mg/l	10/03/06 08:30	JVH
Zinc		0.016 mg/l	10/03/06 08:30	JVH

Sample No: 06094147-3 Collect Date : 09/13/06 08:00
Client ID : SW WWTP Site : SW WWTP Locator : GRAB

Parameter	Qualifier	Result	Analysis Date	Analyst
PA 200.7				
Sample Preparation			10/02/06 07:30	DAB
PA 200.7 R4.4				
Boron		1.5 mg/l	10/03/06 08:30	JVH
Copper	<	0.01 mg/l	10/03/06 08:30	JVH
Nickel		0.026 mg/l	10/03/06 08:30	JVH

Sample No: 06094147-4 Collect Date : 09/15/06 08:00
Client ID : SW WWTP Site : SW WWTP Locator : GRAB

Parameter	Qualifier	Result	Analysis Date	Analyst
A 200.7				
Sample Preparation			10/02/06 07:30	DAB
PA 200.7 R4.4				
Boron		1.5 mg/l	10/03/06 08:30	JVH
Copper	<	0.01 mg/l	10/03/06 08:30	JVH
Nickel		0.025 mg/l	10/03/06 08:30	JVH

PDC Laboratories, Inc.
P.O. Box 9071 • Peoria, IL 61612-9071
(309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689

ACCREDITED IN ACCORDANCE WITH nelac

Laboratory Results

City of Galva
210 Front Street
P.O. Box 171
Galva, IL 61434
Attn : Mr. Larry Lawson

Date Received : 09/26/06 09:15
Report Date : 10/03/06
Customer # : 275382
P.O. Number :
Facility :

Sample No: 06094147-5 Collect Date : 09/20/06 08:00
Client ID : SW WWTP Site : SW WWTP Locator : GRAB

Parameter	Qualifier	Result	Analysis Date	Analyst
EPA 200.7				
Sample Preparation			10/02/06 07:30	DAB
EPA 200.7 R4.4				
Boron		3 mg/l	10/03/06 08:30	JVH
Copper		0.11 mg/l	10/03/06 08:30	JVH
Nickel		0.17 mg/l	10/03/06 08:30	JVH

Sample No: 06094147-6 Collect Date : 09/22/06 08:00
Client ID : SW WWTP Site : SW WWTP Locator : GRAB

Parameter	Qualifier	Result	Analysis Date	Analyst
EPA 200.7				
Sample Preparation			10/02/06 07:30	DAB
EPA 200.7 R4.4				
Boron		1.4 mg/l	10/03/06 08:30	JVH
Copper	<	0.01 mg/l	10/03/06 08:30	JVH
Nickel		0.024 mg/l	10/03/06 08:30	JVH

PDC Laboratories participates in the following laboratory accreditation/certification and proficiency programs. Endorsement by the Federal or State Government or their agencies is not implied.

NELAC Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
State of Illinois Bacteriological Analysis in Drinking Water Certified Lab Registry No. 17533
Drinking Water Certifications: Indiana (C-IL-040); Kansas (E-10338); Kentucky (90058); Missouri (00870); Wisconsin (998294430)
Wastewater Certifications: Arkansas; Iowa (240); Kansas (E-10338); Wisconsin (99829443)
Hazardous/Solid Waste Certifications: Arkansas; Kansas (E-10338); Wisconsin (998294430)
UST Certification: Iowa (240)

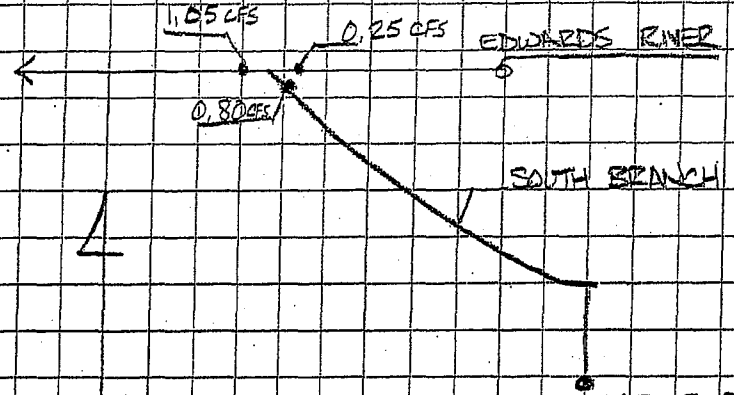
Certified by: Julia Rada
Julia Rada, Project Manager

BRUNER, COOPER & ZUCK, INC.
Civil Engineers
Land Surveyors
GALESBURG, ILLINOIS 61401

JOB _____
DESCRIPTION _____
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____

@ NE STP

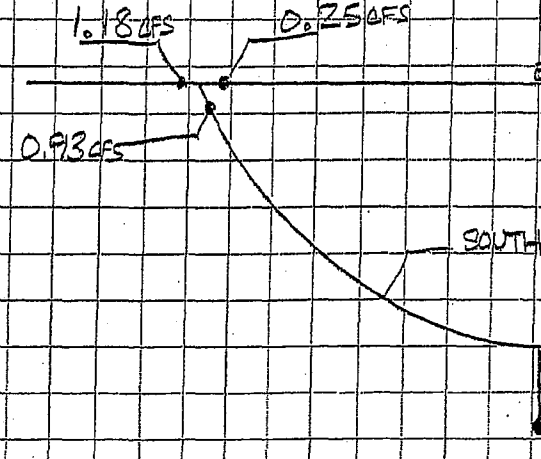
* NO ISWS DATA AVAILABLE - MUST USE 7Q10 MAP



N

NE STP = 0.24 MGD = 0.37 CFS
FROM 7Q10 MAP 0.24 CFS
* USE 0.37 CFS - BUT ADD 0.13 CFS TO 7Q10 FLOWS TO ADJUST FOR ADDITIONAL FLOW

REVISED DIAGRAM



BRUNER, COOPER & ZUCK, INC.
Civil Engineers
Land Surveyors
GALESBURG, ILLINOIS 61401

JOB _____
DESCRIPTION _____
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____

TRIAL #1 - JUST BEFORE DISCHARGE INTO MAIN BRANCH OF EDWARDS RIVER

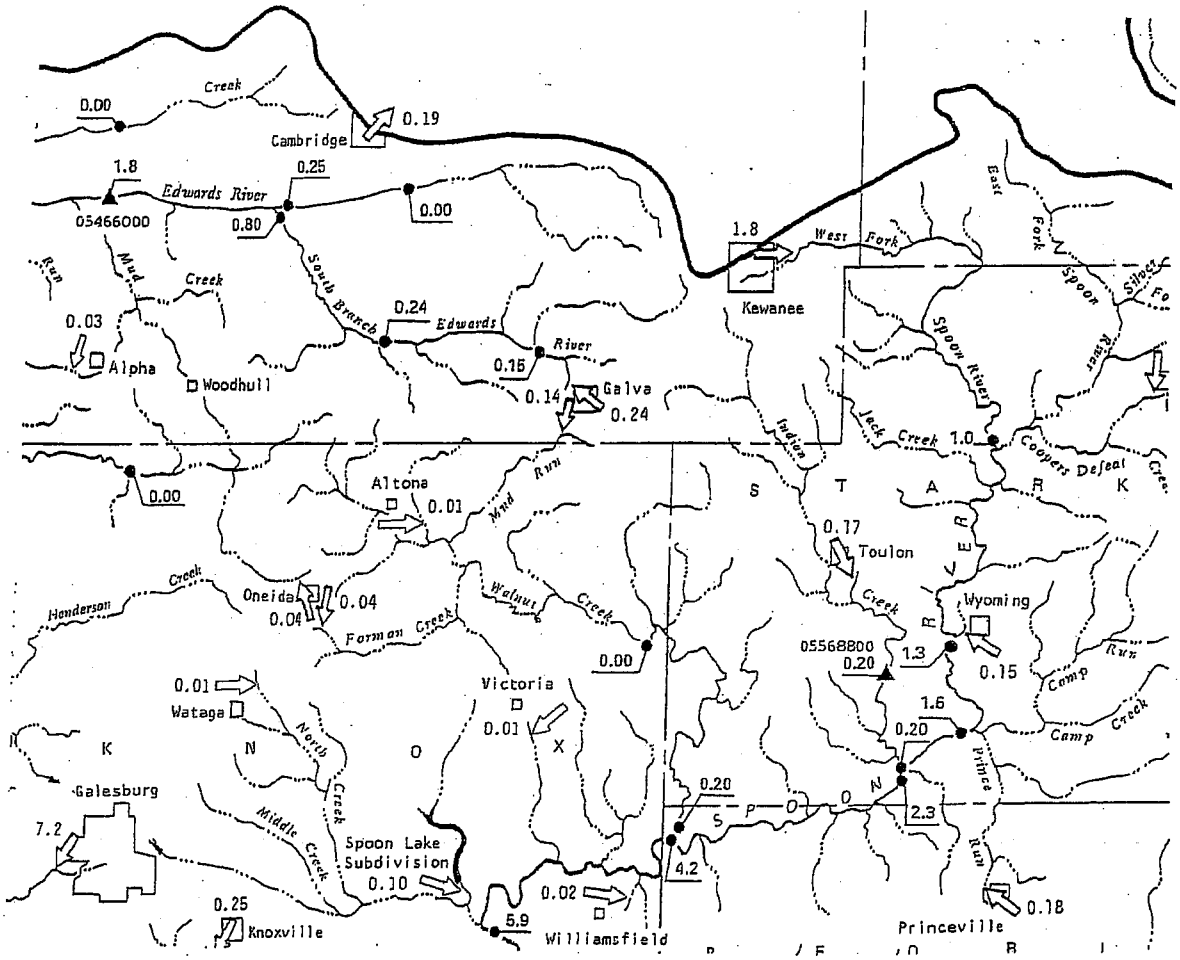
$$C = \frac{(0.37)\times(3)}{0.93} = 1.19 \text{ mg/L} > 1 \quad \times$$

TRIAL #2 - JUST AFTER CONFLUENCE W/ MAIN BRANCH OF EDWARDS RIVER

$$C = \frac{(0.37)\times(3)}{1.18} = 0.94 \text{ mg/L} < 1 \quad \checkmark$$

∴ FOR NE STP → DILUTION BELOW 1 mg/L WILL OCCUR JUST AFTER THE POINT WHERE THE SOUTH BRANCH OF THE EDWARDS RIVER MIXES WITH THE EDWARDS RIVER.

ISWS 7Q10 MAP 4 - SPOON RIVER REGION



APPENDIX E

CITY OF GALVA
TEST RESULTS: SW STP BORON CONCENTRATIONS

BORON TEST RESULTS
SW S.T.P.
CITY OF GALVA

Year	Sample Date	Boron (mg/L)
2004	9/1/2004	1.10
	9/3/2004	1.10
	9/8/2004	1.10
	9/10/2004	1.10
	9/15/2004	1.20
	9/17/2004	1.20
	9/22/2004	1.20
	9/25/2004	1.20
	9/27/2004	1.20
	10/1/2004	1.20
	10/6/2004	1.20
	10/5/2004	1.20
	10/13/2004	1.20
	10/15/2004	1.20
	10/20/2004	1.20
	10/22/2004	1.20
	11/3/2004	0.86
	11/5/2004	0.81
	11/10/2004	0.78
	11/12/2004	0.77
	11/17/2004	0.79
	11/19/2004	0.78
	11/24/2004	0.78
	11/26/2004	0.76
	12/15/2004	0.61
	12/17/2004	0.62
	12/22/2004	0.67
	12/24/2004	0.69
2005	1/5/2005	0.61
	1/7/2005	0.61
	1/12/2005	0.62
	1/14/2005	0.51
	1/19/2005	0.45
	1/21/2005	0.43
	1/26/2005	0.48
	1/26/2005	0.48
	2/2/2005	0.50
	2/9/2005	0.57
	2/11/2005	0.59
	2/16/2005	0.59
	2/18/2005	0.58
	2/23/2005	0.60
	2/25/2005	0.60
	3/2/2005	0.60
	3/4/2005	0.63
	3/9/2005	0.64
	3/11/2005	0.66
	3/16/2005	0.68
	3/25/2005	0.69
	3/30/2005	0.66

Year	Sample Date	Boron (mg/L)
2007	1/1/2007	0.63
	1/5/2007	0.62
	1/10/2007	0.63
	1/12/2007	0.62
	1/19/2007	0.63
	1/24/2007	0.63
	1/26/2007	0.62
	1/31/2007	0.66
	2/2/2007	0.68
	2/7/2007	0.78
	2/9/2007	0.82
	2/14/2007	0.86
	2/16/2007	0.85
	2/21/2007	0.85
	2/23/2007	0.77
	2/28/2007	0.68
	3/2/2007	0.60
	3/7/2007	0.52
	3/9/2007	0.52
	3/14/2007	0.52
	3/16/2007	0.61
	3/21/2007	0.64
	3/23/2007	0.62
	3/28/2007	0.56
	4/6/2007	0.58
	4/18/2007	0.60
	4/20/2007	0.67
	4/22/2007	0.68
	4/25/2007	0.63
	4/27/2007	0.67
	5/2/2007	0.63
	5/4/2007	0.68
	5/9/2007	0.66
	5/11/2007	0.64
	5/16/2007	0.66
	5/18/2007	0.68
	5/23/2007	0.71
	5/25/2007	0.71
	5/30/2007	0.67
	6/1/2007	0.66
	6/6/2007	0.65
	6/8/2007	0.68
	6/13/2007	0.69
	6/15/2007	0.73
	6/20/2007	0.73
	6/22/2007	0.74
	6/27/2007	0.76
	6/29/2007	0.76
	7/4/2007	0.73
	7/6/2007	0.72

BORON TEST RESULTS
SW S.T.P.
CITY OF GALVA

4/1/2005	0.65
4/6/2005	0.71
4/8/2005	0.68
4/13/2005	0.76
4/18/2005	0.68
4/20/2005	0.72
4/22/2005	0.74
4/27/2005	0.75
4/23/2005	0.79
5/4/2005	0.84
5/6/2005	0.90
5/11/2005	0.90
5/13/2005	0.88
5/18/2005	0.90
5/20/2005	0.90
5/25/2005	0.94
5/27/2005	1.00
6/1/2005	1.00
6/3/2005	1.00
6/8/2005	1.10
6/10/2005	1.10
6/15/2005	1.10
6/17/2005	1.10
6/22/2005	1.20
6/24/2005	1.20
6/29/2005	1.20
7/1/2005	1.30
7/6/2005	1.30
7/8/2005	1.20
7/13/2005	1.30
7/15/2005	1.20
7/20/2005	1.40
7/22/2005	1.40
7/27/2005	1.40
7/29/2005	1.40
8/3/2005	1.60
8/5/2005	1.50
8/10/2005	1.60
8/12/2005	1.50
8/31/2005	1.60
9/2/2005	1.60
9/7/2005	1.70
9/9/2005	1.50
9/14/2005	1.60
9/16/2005	1.60
9/28/2005	1.50
9/30/2005	1.50
10/5/2005	1.50
10/7/2005	1.50
10/12/2005	1.70
10/14/2005	1.60
10/13/2005	1.70
10/21/2005	1.70
10/26/2005	1.70
10/28/2005	1.70
7/11/2007	0.68
7/13/2007	0.70
7/18/2007	0.71
7/20/2007	0.78
7/25/2007	0.76
7/27/2007	0.76
8/1/2007	0.75
8/3/2007	0.78
8/10/2007	0.73
8/15/2007	0.80
8/17/2007	0.82
8/22/2007	0.85
8/24/2007	0.82
8/29/2007	0.72
8/31/2007	0.72
9/7/2007	0.73
9/9/2007	0.74
9/14/2007	0.78
9/19/2007	0.78
9/21/2007	0.80
9/26/2007	0.86
9/28/2007	0.86
10/3/2007	0.95
10/5/2007	0.88
10/12/2007	1.20
10/19/2007	1.20
10/24/2007	1.10
10/26/2007	1.10
10/31/2007	1.40
11/2/2007	1.20
11/7/2007	1.30
11/9/2007	1.30
11/14/2007	1.40
11/16/2007	1.50
11/21/2007	1.50
11/23/2007	1.50
11/28/2007	1.50
11/30/2007	1.60
12/5/2007	1.90
12/7/2007	1.70
12/12/2007	1.70
12/14/2007	1.70
12/19/2007	1.60
12/21/2007	1.60
12/26/2007	1.50
12/28/2007	1.40
2008 1/2/2008	1.30
1/4/2008	1.40
1/9/2008	0.98
1/11/2008	0.93
1/16/2008	0.86
1/18/2008	0.90
1/23/2008	0.96
1/25/2008	1.00
1/30/2008	1.00

BORON TEST RESULTS
SW S.T.P.
CITY OF GALVA

	11/2/2005	1.70
2006	1/6/2006	1.60
	1/11/2006	1.50
	1/13/2006	1.60
	1/18/2006	1.50
	1/20/2006	1.60
	1/25/2006	1.50
	1/27/2006	1.60
	2/1/2006	1.40
	2/3/2006	1.30
	2/8/2006	1.30
	2/10/2006	1.30
	2/15/2006	1.30
	2/17/2006	1.30
	2/22/2006	1.40
	2/24/2006	1.30
	3/1/2006	1.30
	3/3/2006	1.30
	3/15/2006	1.20
	3/17/2006	1.10
	3/22/2006	1.10
	3/23/2006	0.84
	3/24/2006	1.10
	3/31/2006	0.83
	4/5/2006	0.67
	4/7/2006	0.62
	4/12/2006	0.66
	4/14/2006	0.66
	4/21/2006	0.54
	4/26/2006	0.56
	5/3/2006	0.57
	5/5/2006	0.55
	5/10/2006	0.59
	5/24/2006	0.76
	5/26/2006	0.79
	5/31/2006	0.83
	6/2/2006	0.82
	6/7/2006	0.91
	6/9/2006	0.91
	6/14/2006	0.94
	6/16/2006	0.96
	6/19/2006	1.40
	6/24/2006	1.00
	6/28/2006	0.12
	6/30/2006	1.20
	7/5/2006	1.20
	7/7/2006	1.30
	7/12/2006	1.30
	7/14/2006	1.30
	7/21/2006	1.40
	7/26/2006	1.50
	7/28/2006	1.40
	8/4/2006	1.50
	8/9/2006	1.50
	8/11/2006	1.40
	2/1/2008	1.00
	2/6/2008	0.93
	2/8/2008	0.83
	2/13/2008	0.80
	2/15/2008	0.78
	2/22/2008	0.60
	2/24/2008	0.61
	2/27/2008	0.75
	2/29/2008	0.63
	3/6/2008	0.51
	3/8/2008	0.52
	3/12/2008	0.50
	3/14/2008	0.51
	3/19/2008	0.60
	3/21/2008	0.62
	3/26/2008	0.68
	3/28/2008	0.67
	4/2/2008	0.70
	4/4/2008	0.72
	4/9/2008	0.76
	4/16/2008	0.48
	4/25/2008	0.49
	4/30/2008	0.45
	5/2/2008	0.44
	5/7/2008	0.47
	5/9/2008	0.49
	5/14/2008	0.43
	5/16/2008	0.42
	5/21/2008	0.44
	5/23/2008	0.46
	5/28/2008	0.44
	5/30/2008	0.46

BORON TEST RESULTS
SW S.T.P.
CITY OF GALVA

8/16/2006	1.50
8/18/2006	1.50
8/23/2006	1.60
8/25/2006	1.60
8/30/2006	1.60
9/1/2006	1.60
9/13/2006	1.50
9/15/2006	1.50
9/20/2006	3.00
9/22/2006	1.40
9/27/2006	2.00
9/29/2006	1.60
10/4/2006	1.70
10/6/2006	1.60
10/11/2006	1.50
10/13/2006	1.60
10/18/2006	1.60
10/20/2006	1.50
10/25/2006	1.50
10/27/2006	1.60
11/1/2006	1.50
11/3/2006	1.50
11/8/2006	1.60
11/10/2006	1.60
11/15/2006	1.50
11/17/2006	1.60
11/22/2006	1.50
11/24/2006	1.50
11/29/2006	1.50
12/6/2006	1.20
12/8/2006	1.10
12/13/2006	0.95
12/15/2006	0.85
12/20/2006	0.74
12/22/2006	0.75
12/27/2006	0.66
12/29/2006	0.64