

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

September 11, 2003

City Of Lincoln, IL)	
)	
Petitioner,)	
)	
v.)	
)	IEPA-03-001
ILLINOIS ENVIRONMENTAL PROTECTION)	
AGENCY,)	(Provisional Variance- Water)
)	
Respondent.)	
)	

Re: Provisional Variance From 35 Ill. Adm. Code 302.212 For Ammonia Nitrogen,
304.120(b) For CBOD₅, And 304.141(a) For Suspended Solids
NPDES Permit # IL0029564

Dear Mr. Eaton:

The Agency has completed its technical review of the attached provisional variance request submitted by the City of Lincoln on September 2, 2003. Based on the review, the Agency GRANTS the requested provisional variance subject to specific conditions set forth below for a period of 45 days.

The City of Lincoln seeks a provisional variance to allow yard piping modifications around the aeration basins and tertiary filters as part of a major upgrade at its wastewater treatment plant. Units that will remain in operation during the term of the provisional variance include: primary clarifiers; trickling filter; secondary clarifiers; excess flow clarifier; excess flow chlorine tank; and effluent flow measurement/sampling facilities. Upon completion of improvements, the wastewater treatment facility will be equipped to comply with more stringent effluent limitations for ammonia nitrogen. In addition, the current design average flow will be increased from 3.35 millions gallons per day (MGD) to 4.19 MGD.

The Agency's review of the requested provisional variance has concluded the following:

1. The environmental impact from the proposed activity should be minimal;
2. No other reasonable alternative appears available;
3. No public water supplies should be effected;
4. No federal regulations will preclude the granting of this request; and

5. The City will face an arbitrary and unreasonable hardship if the request is not granted.

The Agency hereby GRANTS the City of Lincoln a provisional variance from 35 Ill. Adm. Code 302.212 for ammonia nitrogen, from 35 Ill. Adm. Code 304.120(b) for CBOD₅, and from 304.141(a) for total suspended solids for a period of 45 days beginning September 15, 2003 subject to the following specific conditions:

- A. During the variance period, the City's effluent shall meet the monthly average concentrations of 40 mg/l for CBOD₅, 50 mg/l for total suspended solids, and 15 mg/l for ammonia nitrogen.
- B. The City shall notify Roger Callaway of the Agency by telephone at 217/782-9720 when construction starts and again when construction is completed. Written confirmation of each notice shall be sent within five days to the following address:

Illinois Environmental Protection Agency
Bureau of Water – Water Pollution Control
Attention: Roger Callaway
1021 North Grand Avenue East, MC #19
P.O. Box 19276
Springfield, Illinois 62794-9276

- C. The City shall sign a certificate of acceptance of this provisional variance and forward that certificate to Roger Callaway at the address indicated above within ten days of the date of this order. The certification should take the following form:

I (We) _____, hereby accept and agree to be bound by all terms and conditions of the provisional variance granted by the Agency in _____ dated _____.

Petitioner

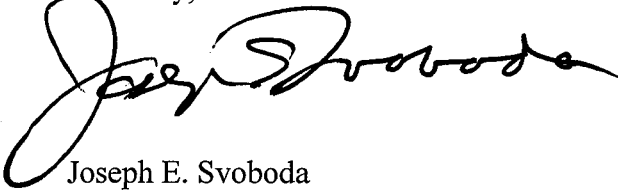
Authorized Agent

Title

Date

- D. The City shall continue to monitor and maintain compliance with all other parameters and conditions specified in its National Pollutant Elimination Permit No. IL 0029564.

Sincerely,

A handwritten signature in black ink, appearing to read "Joe Svoboda", with a large, stylized initial "J" that loops around the first part of the name.

Joseph E. Svoboda
Chief Legal Counsel

Enclosure

CC: IPCB, Clerk

RECEIVED
SEP 02 2003

ENVIRONMENTAL
MANAGEMENT
CORPORATION

EMC

September 1, 2003

150 WEST KICKAPOO
LINCOLN, IL 62656
(217) 732-4030

Illinois Environmental Protection Agency
Division of Water Pollution Control
P. O. Box 19276 MC #19
Springfield, Illinois 62706

Attention: Roger Callaway

Re: City of Lincoln, IL
Provisional Variance Application
NPDES Permit # IL0029564

Dear Roger:


By this submittal, the City of Lincoln, IL is submitting an Application for Provisional Variances for the Wastewater Treatment Facility. The provisional variance is intended to allow the City to make required yard piping modifications around the existing Aeration Basins and Tertiary Clarifiers in conjunction with the Wastewater Treatment System Improvements Project. The City intends to begin the modifications on or about September 15, 2003. The intent of the project is more fully described in the attached Application for Provisional Variances. Enclosed please find the following documents associated with the City's Application for Provisional Variances:

- | | |
|--|----------------|
| 1. Application for Provisional Variance | Two (2) Copies |
| 2. Attachment A - Basis of Design | Two (2) Copies |
| 3. Attachment B - Process Flow Schematic | Two (2) Copies |
| 4. Attachment C - Facility Plan | Two (2) Copies |
| 5. Attachment D - Yard Piping Plan | Two (2) Copies |

The City of Lincoln requests that the Agency issue a Provisional Variance to the NPDES permit for the referenced project. If you have any questions regarding this request, please do not hesitate to contact our consultant for the project, Joseph Pisula, at Donohue & Associates, Inc. at 217-352-9990. Please forward a copy of the variance response documents to Donohue at the following office: 115 North Neil Street, Suite 213, Champaign, IL 61820-4080.

Very truly yours,

CITY OF LINCOLN



Grant Eaton
WWTF Facility Operator

Cc: Donohue & Associates, Inc.

Provisional Variance Application
for the
City of Lincoln, Illinois
Wastewater Treatment System Improvements
NPDES Permit No. IL0029564
September, 2003

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I. Applicable Regulations (35 Ill. Adm. Code 180.202-b-1)

By this Provisional Variance Application, the City of Lincoln formally requests that the Illinois EPA grant the City temporary relief from the CBOD₅, suspended solids, and ammonia nitrogen discharge standards for the plant as defined in 35 Ill. Adm. Code 302. The current NPDES permit for the facility stipulates that the following averages for CBOD₅ and suspended solids to not exceed:

Parameter	CBOD ₅	Suspended Solids
Monthly Average	20 mg/l	25 mg/l
Weekly Average	40 mg/l	45 mg/l

The current NPDES permit for the facility stipulates that the following averages for ammonia nitrogen to not exceed:

Parameter	April thru October Ammonia Nitrogen	November thru March Ammonia Nitrogen
Monthly Average	3.4 mg/l	5.2 mg/l
Daily Maximum	7.3 mg/l	10.3 mg/l

Under this variance, it is proposed that during the variance period, the monthly average for CBOD₅ and suspended solids in the plant effluent be revised to not exceed the following:

Parameter	Revised CBOD ₅	Revised Suspended Solids
Monthly Average	40 mg/l	50 mg/l

Under this variance, it is proposed that during the variance period, the monthly average for ammonia nitrogen in the plant effluent be revised to not exceed the following:

Parameter	April thru October Ammonia Nitrogen
Monthly Average	15 mg/l

II. Project Description (35 Ill. Adm. Code 180.202-b-2)

The City of Lincoln is located in Logan County approximately 35 miles northwest of Springfield, Illinois. Lincoln's 2000 population was 15,369 persons based on US Census data. The project consists of an expansion to the City's wastewater plant from its current flow capacity of 3.35 million gallons per day (MGD) to a 4.19 MGD capacity. Currently the plant receives an annual average of 3.6 MGD of flow. The plant upgrade is also being implemented in order to comply with more stringent IEPA effluent discharge limits for ammonia nitrogen that were imposed in November 2001. The project will have a useful life of 20 years.

The project consists of general construction work, including the following additional facilities: activated sludge aeration basins, a secondary clarifier tank, sludge dewatering equipment and its building, and a new preliminary treatment facility. Modifications to the existing wastewater facilities are proposed to include code-related improvements to the existing buildings and tankage, plus associated electrical, mechanical, structural, piping ventilating, and instrumentation and control systems upgrades.

The Lincoln Wastewater Treatment Facility discharges to the Salt Creek. The Salt Creek has a 7-day, 10-year low flow of 33.3 cfs (21.52 MGD) upstream of the plant discharge as indicated by data provided by the Illinois State Water Survey.

III. Quantity & Types of Materials (35 Ill. Adm. Code 180.202-b-3)

Not Applicable

IV. Quantity & Types Emissions (35 Ill. Adm. Code 180.202-b-4)

The Project involves modifying the process piping around the existing Aeration Basins and Tertiary Clarifiers. Additionally the Tertiary Clarifier Flow Splitter Structure (Structure 506) will be modified to bring it into compliance with current environmental regulations. The General Contractor (Femily Dickerson) on the Project anticipates that the Aeration Basins and Tertiary Clarifiers will need to be bypassed for 22 working days (30 calendar days) to complete the required piping modifications. Modifications to the Tertiary Clarifier Flow Splitter Structure will be completed during the same time that the piping modifications are being made. It is expected that the concentration of CBOD₅, suspended solids, and ammonia in the plant's effluent will increase during the project, due to bypassing flows around the Aeration Basins and Tertiary Clarifiers.

As the calculations in Attachment "A" indicate, it is expected that the Trickling Filter and Primary Clarification will achieve 61% removal of the BOD in the raw influent wastewater. Effluent CBOD₅ concentrations are estimated at 40 mg/l based on an assumed influent CBOD₅ concentration of 118 mg/l.

Effluent suspended solids concentrations are estimated at 50 mg/l based on an assumed suspended solids concentration of 170 mg/l into the trickling filter's secondary clarifiers.

Bypassing the activated sludge process will result in the loss of the nitrification process in the Aeration Basins. The 1935 era trickling filters were not designed for nitrification and will not reduce the influent ammonia concentrations. Based on the significant impacts to the facility's nitrification process effluent ammonia nitrogen concentrations are estimated at 15 mg/l based on an assumed influent ammonia nitrogen concentration of 15 mg/l.

V. Drinking Water Regulations Variance (35 Ill. Adm. Code 180.202-b-5)

The Project involves improvements to the City's Wastewater Treatment System. No project activities are related to the City's public water supply. Therefore this portion of the Illinois Administrative Code is not applicable to this project.

VI. Assessment of Adverse Environmental Impacts (35 Ill. Adm. Code 180.202-b-6)

The modifications to the yard piping around the Aerations Basins and modifications to the Tertiary Clarifier Splitter Box (Structure 506) are expected to take place around September 15, 2003, during dry weather conditions. During these times it expected that the influent flows and loadings should be below the original design loadings of the plant. With the existing Primary Clarifiers, Trickling Filter, and Secondary Clarifiers in operation, the project construction sequencing attempts to minimize impacts on the facility's treatment process.

Also important to note is that Illinois EPA has indicated that the Salt Creek is not listed on the 303(d) list as a protected water of the State of Illinois. Therefore, it is not expected at this time that any Total Maximum Daily Load (TMDL) limitations will be put in place for this stream.

VII. Hardship Statement (35 Ill. Adm. Code 180.202-b-7)

The Project involves yard piping modifications around the existing Aeration Basins and Tertiary Clarifiers. Additionally, the existing Tertiary Clarifier Flow Splitter Structure will be modified to bring it into compliance with current environmental regulations. The yard piping and flow splitter modifications are estimated by the General Contractor (Family-Dickerson) to take 22 working days (30 calendar days) to complete. During this time, the facility's capacity to remove CBOD₅, suspended solids, and ammonia nitrogen will be reduced.

A detailed construction sequencing schedule was provided as part of the construction documents for the Project. The construction sequencing schedule required that the Contractor provide bypass pumping from the Aeration Basins to the Secondary Clarifiers while the Secondary Clarifier Flow Splitter (Structure 506) was out of service. The modifications to the Flow Splitter are required to bring the structure in compliance with current environmental regulations. Modifications to the Splitter Structure are structural in nature and require all flow to the structure to be shut-off while the modifications are completed.

The General Contractor (Family Dickerson) for the project has expressed concerns regarding the ability to complete the required yard piping modifications while the Aeration Basins and Tertiary

Clarifiers remain in operation. Family Dickerson has stated that they believe it is necessary to bypass flows around the entire activated sludge process while the yard piping modifications are completed. Presently there is no way to isolate the pipes and these pipes must remain in service for the Activated Sludge Process to operate. Thus, bypass pumping around the Tertiary Clarifier Flow Splitter Box will not facilitate the required yard piping improvements necessary for the project.

The provision of temporary wastewater treatment facilities to replace that capacity would place a severe hardship on the City. Such facilities could include a temporary package wastewater treatment plant or the trucking of the City's wastewater to another wastewater treatment facility. The cost of those options could easily exceed the City's annual budget for operating the facility. Therefore, the implementation of these temporary treatment methods is considered not financially feasible.

VIII. Description of Compliance Procedures and Timetable (35 Ill. Adm. Code 180.202-b-8)

A. Compliance Procedures

To ensure that proper treatment of the wastewater occurs during the project, the Contractor will be required to follow the work sequence detailed in the Project Documents. The Activated Sludge Process Facilities will be taken out of operation to make the modifications to it for a period of 22 working days (30 calendar days) in conjunction with the Improvements Project. All plant flows up to 6.3-MGD will be treated utilizing the existing Primary Clarifiers, Trickling Filter, Secondary Clarifiers, Excess Flow Clarifier, Excess Flow Chlorine Contact Tank, and Effluent Flow Measurement/Sampling Facilities. The Aeration Basins, Tertiary Clarifier Flow Splitter and Tertiary Clarifiers will be taken out of operation to facilitate the yard piping modifications necessary for these structures in conjunction with the Improvements Project. Wastewater flows in excess of 6.3 MGD would be captured and treated by the existing Excess Flow Facilities. Doing this will ensure that the facility's treatment process continues to operate effectively and environmental impacts are minimized.

B. Timetable

The Contractor has been directed to complete the modifications to the yard piping and Tertiary Clarifier Flow Splitter (Structure 506) within 22 working days (30 calendar days) after commencing work on those modifications. It is expected that the modifications will begin around September 15, 2003.

VIII. Alternative Methods of Compliance (35 Ill. Adm. Code 180.202-b-9)

Alternative methods of compliance include a temporary package wastewater treatment plant or the trucking of the City's wastewater to another wastewater treatment facility. The cost of those

options could easily exceed the City's annual budget for operating the facility. Therefore, the implementation of these alternative methods of compliance is considered not financially feasible.

IX. Variance Duration (35 Ill. Adm. Code 180.202-b-10)

The City of Lincoln formally requests that the Provisional Variance be issued for a duration of 45 consecutive calendar days.

X. Previous Variances (35 Ill. Adm. Code 180.202-b-11)

The City of Lincoln has not requested, nor has received any provisional variances for its wastewater system within the previous calendar year.

XI. Status of Current Permit (35 Ill. Adm. Code 180.202-b-12)

The City's Wastewater Treatment Facility is currently operating under NPDES Permit No. IL0029564, which was made effective on October 1, 2001. That permit remains in effect until September 30, 2006.

ATTACHMENT "A"
Basis of Design
Current Conditions and Facilities

Client: Environmental Management Corporation

Project: Wastewater Treatment and Sewer System Improvements - Variance Permit

Donohue Project No. 10479

Revised: May 29, 2003

Task: Process Calculations - Current Flows & Facilities

I. Raw Wastewater Flows and Loadings

A. Compile Present Day Flows and loads

1996-98 Population Equivalent of plant, based on BOD =	19,412
1996-98 Population Equivalent of plant, based on SS =	23,730
1996-99 Design Avg. Flow =	3.35 MGD (same as listed on NPDES permit)
1996-99 Maximum Monthly Flow =	4.19 MGD
Maximum Weekly Flow =	5.03 MGD
Maximum Daily Flow =	6.30 MGD (Pump Capacity)
Design Peak Hourly Flow =	6.30 MGD (Pump Capacity)
1996-99 BOD load at avg day =	3,300 lb CBOD/day
1996-99 SS load at avg day =	4,746 lb SS/day
1996-99 NH3-N load at avg. day =	428 lb NH3-N/day
Est. 1996-99 Avg Daily TKN load =	570 lb TKN/day
Est. 1996-99 Avg. Daily Phos. load =	279 lb P/day
1996-98 Max Daily BOD load =	6,635 lb CBOD/day
1996-98 Max. Daily SS load =	11,729 lb SS/day
Max Daily NH3-N load =	871 lb NH3-N/day
Est. 1996-98 Max. Daily TKN load =	1,162 lb TKN/day
Est. 1996-98 Max. Daily Phos. load =	647 lb P/day

RESULTING DESIGN AVG. RAW INFLUENT CONCENTRATIONS

118	mg/l BOD
170	mg/l SS
15	mg/l NH3-N
10	mg/l P (estimated)

II. First analyze capabilities of Bio-roughing side of Treatment Processes

NOTE: Plant upgrade in 1977 routes 75% of the flow through Bio-roughing stage first before discharge into Act. Sludge System

A1. Flow and loading split into Raw Sewage Pumps inside "Pump & Service Bldg"

Percentage of split to bio-roughing side = 100.0%

ATTACHMENT "A"

Basis of Design

Current Conditions and Facilities		
Bio-roughing side Current Design Avg. Flow =	3.35	MGD
Design Maximum Monthly Flow =	4.19	MGD
Maximum Weekly Flow =	5.03	MGD
Maximum Daily Flow =	6.30	MGD (Pump Capacity)
Design Peak Hr. Q to bio-roughing side =	6.30	MGD (Pump Capacity)
Peak Instantaneous Flow =	0.00	0
BOD load to bio-rough side at Design Avg Flow =	3,300	lb CBOD/day
SS load to bio-rough side at Design Avg Flow =	4,746	lb SS/day
NH3-N load to bio-rough side at Design Avg. Flow =	428	lb NH3-N/day
BOD load that bypasses bio-rough side at Design Avg Flow =	0	lb CBOD/day
SS load that bypasses bio-rough side at Design Avg Flow =	0	lb SS/day
NH3-N load that bypasses bio-rough side at Design Avg Flow =	0	lb NH3-N/day
BOD load to bio-rough side at Max. Daily Flow =	6,635	lb CBOD/day
SS load to bio-rough side at Max. Daily Flow =	11,729	lb SS/day
NH3-N load to bio-rough side at Max. Daily Flow =	871	lb NH3-N/day
BOD that bypasses bio-rough side at Max. Daily Flow =	0	lb CBOD/day
SS that bypasses bio-rough side at Max. Daily Flow =	0	lb SS/day
NH3-N that bypasses bio-rough side at Max. Daily Flow =	0	lb NH3-N/day

A-2. Pumping Capacity In Pump and Service Building

Pump #1 =	556	gpm
Pump #2 =	1,042	gpm
Pump #3 =	1,389	gpm
Pump #4 =	1,389	gpm
Pump total capacity =	4,375	gpm
(with no units out of service)	6.3	MGD
Pump firm capacity =	2985.92	gpm
(with largest unit out of service)	4.3	MGD

B-1. Compute BOD reduction in Primary Clarifiers at max. permitted Design Avg. Flow

BOD load to bio-rough side at Design Avg Flow =	3,300	lb CBOD/day
Avg Flow to Primary Clarifiers =	3.35	MGD
Total primary clarifier surface area =	2,080	SF
SSR at Design Avg. Flow =	1,611	gpd/SF
CBOD removal in Primary Clarifiers at Design Avg. Flow =	26%	from chart - IEPA Stds. App. E, Fig. 2
BOD load out of Primaries at max. permitted Avg. Q =	2,442	lb CBOD/day

B-2. Compute BOD reduction in Primary Clarifiers at Max. Daily Flow

ATTACHMENT "A"

Basis of Design

BOD load to bio-rough side at Max. Daily Flow = ^{Current Conditions and Facilities} 6,635 lb CBOD/day

Peak Hour Flow to Primary Clarifiers = 6,300,000 gpd

Total primary clarifier surface area = 2,080 SF

SSR at Max. Daily Flow = 3,029 gpd/SF

CBOD removal in Primary Clarifiers at Max. Daily Flow = 20.0% from chart - IEPA Stds. App. E, Fig. 2

BOD load out of Primaries at Max. Daily Q = 5,308 lb CBOD/day

C-1. Flows and loadings into Trickling Filters at Daily Average Flow

As per 35 Ill. Adm. Code 370.900-h-2, use NRC formula on page 706 of WEF MOP 8 (1992)

Nat'l Research Council (NRC) formula:

$$E1 = 100 \div (1 + 0.0085 \times (W1 \div VF)^{0.5})$$

E1 = percent BOD removal efficiency

W1 = BOD loading into trickling filter, ppd

V = volume of TF media, acre-ft

F = number of passes of the organic mat'l

$$= (1 + R/Q) \div [(1 + (1 - P) \times R/Q)^F]$$

P = weighting factor, 0.9 for military TF plants

R/Q = recirculation ratio (recirc Q \div plant flow Q)

BOD load out of Primaries at max. permitted Avg. Q = 2,442 lb CBOD/day

W1 = 2,442 lb CBOD/day

V = media area x media depth

No. of trickling filter units = 1

Each trickling filter's diameter = 135 feet

Surface area of one trickling filter unit = 14,314 SF

Total surface area of both trickling filter units = 14,314 SF

= 0.33 acres

Depth of each trickling filter's media = 5.00 feet

V (volume of TF media) = 1.64 acre-feet

P = 0.9

R/Q = 1.20 recirc cap. is 3.0 MGD when plant ADF is 2.5 MGD

ATTACHMENT "A"
Basis of Design
Current Conditions and Facilities

$E1 = 69.7$ percent BOD removal in trickling filters

REALITY CHECK

Compute applied BOD load per volume of media = $W \div (VF)$
 = 847 lb BOD per day per acre-ft
 = 34.12 lb BOD per 1000 cu-ft

BOD load out of Secondary Clarifiers at Design Avg. Q = 739 lb CBOD per day
 = 26 mg/l CBOD

C-2. Flows and loadings into Trickling Filters at Max. Daily Flow

As per 35 Ill. Adm. Code 370.900-h-2, use NRC formula on page 706 of WEF MOP 8 (1992)
Nat'l Research Council (NRC) formula:

$E1 = 100 \div (1 + 0.0085 \times (W1 \div VF)^{0.5})$

- E1 = percent BOD removal efficiency
- W1 = BOD loading into trickling filter, ppd
- V = volume of TF media, acre-ft
- F = number of passes of the organic mat'l
- = $(1 + R/Q) \div [(1 + (1 - P) \times R/Q)^2]$
- P = weighting factor, 0.9 for military TF plants
- R/Q = recirculation ratio (recirc Q \div plant flow Q)

BOD load out of Primaries at Max. Daily Q = 5,308 lb CBOD/day
 W1 = 5,308 lb CBOD/day

V = media area x media depth

No. of trickling filter units = 1
 Each trickling filter's diameter = 135 feet
 Surface area of one trickling filter unit = 14,314 SF
 Total surface area of both trickling filter units = 14,314 SF
 = 0.33 acres

Depth of each trickling filter's media = 5.00 feet

V (volume of TF media) = 1.64 acre-feet

P = 0.9

R/Q = 1.20

F = 1.75

ATTACHMENT "A"

Basis of Design

E1 = 61.0 percent BOD removal in trickling filters
Current Conditions and Facilities

BOD load out of Secondary Clarifiers at Max. Daily Q = 2,071 lb CBOD per day
39 mg/l CBOD

C-3. Flow and loading into Secondary Clarifiers

No. of Secondary Clarifiers =	2
Secondary Clarifier #1's diameter =	40 feet
Surface area of Secondary Clarifier #1 =	1,257 SF
Percent of total =	39%
Secondary Clarifier #2's diameter =	50 feet
Surface area of Secondary Clarifier #2 =	1,963 SF
Percent of total =	61%
Total Secondary Clarifier surface area =	3,220 SF
Average Flow to Secondary Clarifiers =	3,350,000.00 gpd
Existing Surface Settling Rate (SSR) =	1,040 gpd/SF
Design Peak Hr. Q to bio-roughing side =	6.30 MGD
=	6,300,000 gpd
Existing Surface Settling Rate (SSR) =	1,956 gpd/SF

ATTACHMENT "B" PROCESS FLOW SCHEMATIC

