

STATE OF MISSOURI  
**DEPARTMENT OF NATURAL RESOURCES**

MISSOURI CLEAN WATER COMMISSION



**MISSOURI STATE OPERATING PERMIT**

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92<sup>nd</sup> Congress) as amended,

Permit No. MO-0108227

Owner: City of Chillicothe  
Address: 920 Washington Street, Chillicothe, MO 64601

Continuing Authority: Same as above  
Address: Same as above

Facility Name: Chillicothe Wastewater Treatment Plant  
Facility Address: 15320 Hwy 65 South, Chillicothe, MO 64601

Legal Description: See Pages 2 & 3  
UTM Coordinates: See Pages 2 & 3

Receiving Stream: See Pages 2 & 3  
First Classified Stream and ID: See Pages 2 & 3  
USGS Basin & Sub-watershed No.: See Pages 2 & 3

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

**FACILITY DESCRIPTION**

See Pages 2 & 3

This permit authorizes only wastewater and stormwater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 621.250 RSMo, Section 640.013 RSMo and Section 644.051.6 of the Law.

June 1, 2015  
Effective Date

Sara Parker Pauley, Director, Department of Natural Resources

June 30, 2017  
Expiration Date

John Madros, Director, Water Protection Program

**FACILITY DESCRIPTION (continued):**

**Outfall #001** – POTW – SIC #4952 – Class “A” Operator Required

Single-cell peak flow detention basin / influent pump station / dual channel grit removal / mechanical screening / bar screen / two oxidation ditches / three secondary clarifiers / chlorination / dechlorination / partial irrigation / two sludge holding tanks / four sludge sand filter drying beds/ sludge is land applied

Design population equivalent is 29,400.  
Design flow is 3.0 MGD.  
Actual flow is 1.5 MGD.  
Design sludge production is 617 dry tons/year.

Legal Description: SW ¼, NW ¼, Sec. 13, T57N, R24W, Livingston County  
UTM Coordinates: X=452541, Y=4400845  
Receiving Stream: Coon Creek (C)  
First Classified Stream and ID: 8-20-13 MUDD V1.0 (C) (3960)  
USGS Basin & Sub-watershed No.: (10280101-1708)

**Outfall #002** – POTW – SIC #4952

Alternative discharge point / storage basin with outfall pipe. Treated effluent from the wastewater treatment plan can be sent to the storage basin instead of to Outfall #001. Water from storage basin is used to irrigate row crops.

Legal Description: SW ¼, NW ¼, Sec. 13, T57N, R24W, Livingston County  
UTM Coordinates: X=452357, Y=4400917  
Receiving Stream: Tributary to Coon Creek  
First Classified Stream and ID: 8-20-13 MUDD V1.0 (C) (3960)  
USGS Basin & Sub-watershed No.: (10280101-1708)

**Permitted Feature #003** – POTW – SIC #4952

Single cell storage basin / wastewater irrigation

Legal Description: SW ¼, NW ¼, Sec. 13, T57N, R24W, Livingston County  
UTM Coordinates: X=452324, Y=4400861  
Receiving Stream: Tributary to Coon Creek  
First Classified Stream and ID: 8-20-13 MUDD V1.0 (C) (3960)  
USGS Basin & Sub-watershed No.: (10280101-1708)

**Receiving Stream Watershed:** a gaining stream setting

**Facility Type:**

Partial irrigation Storage and Irrigation System

**Storage Basin/Tank:**

Freeboard for basin: 2 feet  
Storage volume (minimum to maximum water levels) 4.0 million gallons

**Land Application:**

Irrigation areas: 155 acres at design loading (230 acres total available)  
Application rates: 0.2 inch/hour; 1 inch/day; 2 inches/week; 12 inches/year  
Field slopes: less than 3 percent  
Equipment type: center pivot  
Vegetation: row crops  
Application rate is based on: hydraulic loading rate

**Permitted Feature #004** – Center Pivot Land Application Field

Legal Description: NW ¼, SE ¼, Sec. 12, T57N, R24W, Livingston County  
UTM Coordinates: X=453325, Y=4401880  
Receiving Stream: Tributary to Coon Creek  
First Classified Stream and ID: Coon Creek (C) (3960)  
USGS Basin & Sub-watershed No.: (10280101-1708)

**FACILITY DESCRIPTION (continued):**

**Permitted Feature #005** – Instream Monitoring

Downstream location at road crossing over Coon Creek on the road to the Peak Flow Basin

Legal Description:	NE ¼, NW ¼, Sec. 13, T57N, R24W, Livingston County
UTM Coordinates:	X=452812, Y=4401009
Receiving Stream:	Coon Creek (C)
First Classified Stream and ID:	8-20-13 MUDD V1.0 (C) (3960)
USGS Basin & Sub-watershed No.:	(10280101-1708)

OUTFALL #001	TABLE A-1. INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS				PAGE NUMBER 4 of 15	
	PERMIT NUMBER MO-0108227					
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The interim effluent limitations shall become effective upon <b>June 1, 2015</b> , and remain in effect through <b>May 31, 2017</b> . Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	UNITS	INTERIM EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/day	24 hr. total
Biochemical Oxygen Demand <sub>5</sub>	mg/L		45	30	five/month	composite**
Total Suspended Solids	mg/L		45	30	five/month	composite**
<i>E. coli</i> (Note 1, Page 8)	#/100 ml		630	126	five/month	grab
pH – Units	SU	***		***	five/month	grab
Ammonia as N (April 1 – Sept 30) (Oct 1 – March 31)	mg/L	3.7 8.4		1.4 2.8	five/month	grab
Total Residual Chlorine (Notes 1 & 2, Page 8)	µg/L	17 (130 ML)		8 (130 ML)	five/month	grab
Oil & Grease	mg/L	15		10	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <b>MONTHLY</b> ; THE FIRST REPORT IS DUE <b>JULY 28, 2015</b> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
EFFLUENT PARAMETER(S)	UNITS	DAILY MINIMUM	WEEKLY AVERAGE MINIMUM	MONTHLY AVERAGE MINIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
Dissolved Oxygen (Note 1, Page 8)	mg/L	*		*	five/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <b>MONTHLY</b> ; THE FIRST REPORT IS DUE <b>JULY 28, 2015</b> .						
EFFLUENT PARAMETER(S)	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Cadmium, Total Recoverable	µg/L	*		*	once/quarter****	grab
Iron, Total Recoverable	µg/L	*		*	once/quarter****	grab
Lead, Total Recoverable	µg/L	*		*	once/quarter****	grab
Cyanide, amenable to chlorination (Note 6, Page 8)	µg/L	*		*	once/quarter****	grab
Total Phosphorus	mg/L	*		*	once/quarter****	grab
Total Nitrogen	mg/L	*		*	once/quarter****	grab
MONITORING REPORTS SHALL BE SUBMITTED <b>QUARTERLY</b> ; THE FIRST REPORT IS DUE <b>OCTOBER 28, 2015</b> .						

\* Monitoring requirement only.

\*\* A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

\*\*\* pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.5-9.0 pH units.

\*\*\*\* See table on Page 7 for quarterly sampling.

OUTFALL #001	TABLE A-2. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS				PAGE NUMBER 5 of 15	
	PERMIT NUMBER MO-0108227					
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on <b>June 1, 2017</b> , and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/day	24 hr. total
Biochemical Oxygen Demand <sub>5</sub>	mg/L		45	30	five/month	composite**
Total Suspended Solids	mg/L		45	30	five/month	composite**
<i>E. coli</i> (Note 1, Page 8)	#/100 ml		630	126	five/month	grab
pH – Units	SU	***		***	five/month	grab
Ammonia as N (April 1 – Sept 30) (Oct 1 – March 31)	mg/L	3.7 8.4		1.4 2.8	five/month	grab
Total Residual Chlorine (Notes 1 & 2, Page 8)	µg/L	17 (130 ML)		8 (130 ML)	five/month	grab
Oil & Grease	mg/L	15		10	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>JULY 28, 2017</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
EFFLUENT PARAMETER(S)	UNITS	DAILY MINIMUM	WEEKLY AVERAGE MINIMUM	MONTHLY AVERAGE MINIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
Dissolved Oxygen (Note 1, Page 8)	mg/L	*		*	five/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>JULY 28, 2017</u> .						
EFFLUENT PARAMETER(S)	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Iron, Total Recoverable	µg/L	*		*	once/quarter****	grab
Cadmium, Total Recoverable	µg/L	0.6		0.3	once/quarter****	grab
Cyanide, amenable to chlorination (Note 6, Page 8)	µg/L	9.2 (20 ML)		3.3 (20 ML)	once/quarter****	grab
Lead, Total Recoverable	µg/L	9.7		4.8	once/quarter****	grab
Total Phosphorus	mg/L	*		*	once/quarter****	grab
Total Nitrogen	mg/L	*		*	once/quarter****	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>OCTOBER 28, 2017</u> .						

\* Monitoring requirement only.

\*\* A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

\*\*\* pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.5-9.0 pH units.

\*\*\*\* See table on Page 7 for quarterly sampling.

OUTFALL #001	TABLE A-3. WHOLE EFFLUENT TOXICITY FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS			PAGE NUMBER 6 of 15		
				PERMIT NUMBER MO-0108227		
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on <b>June 1, 2015</b> , and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Acute Whole Effluent Toxicity (Note 7, Page 8)	TU <sub>a</sub>	*			once/year	composite**
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>OCTOBER 28, 2015</u> .						

\* Monitoring requirement only.

\*\* A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

OUTFALL #002	TABLE A-4. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS					
	The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective upon <b>June 1, 2015</b> , and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:					
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/day/event *****	24 hr. estimate
Biochemical Oxygen Demand <sub>5</sub>	mg/L		45	30	once/week/event *****	grab
Total Suspended Solids	mg/L		45	30	once/week/event *****	grab
<i>E. coli</i> (Note 1, Page 8)	#/100 ml		630	126	once/week/event *****	grab
pH – Units	SU	***		***	once/week/event *****	grab
Ammonia as N (April 1 – Sept 30)	mg/L	3.7		1.4	once/week/event *****	grab
(Oct 1 – March 31)		8.4		2.8		
Oil & Grease	mg/L	15		10	once/week/event *****	grab
Total Residual Chlorine (Notes 1 & 2, Page 8)	µg/L	17 (130ML)		8 (130ML)	once/week/event *****	grab
MONITORING REPORTS SHALL BE SUBMITTED BY THE 28 <sup>TH</sup> DAY OF THE MONTH AFTER THE DISCHARGE CEASES; THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						

\* Monitoring requirement only.

\*\*\* pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.5-9.0 pH units.

\*\*\*\*\* Flow shall be measured on a basis of once per day per discharging event, excluding catastrophic flooding events.

\*\*\*\*\* One sample shall be collected per week per discharging event, excluding catastrophic flooding events.

PERMITTED FEATURE #003	TABLE A-5. IRRIGATION SYSTEM MONITORING REQUIREMENTS				PAGE NUMBER 7 of 15	
	PERMIT NUMBER MO-0108227					
The permittee is authorized to conduct land application of wastewater as specified in the application for this permit. The final limitations shall become effective on <b>June 1, 2015</b> , and remain in effect until expiration of the permit. The land application of wastewater shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	UNITS	FINAL LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Storage Basin Operational Monitoring						
Storage Basin Freeboard (Note 3, Page 8)	feet	*			once/month	measured
Precipitation	inches	*			daily	total
Irrigated Wastewater (Note 4, Page 8)						
Total Kjeldahl Nitrogen as N (Note 5, Page 8)	mg/L	*			once/year	grab
Nitrate Nitrogen as N (Note 5, Page 8)	mg/L	*			once/year	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2016</u> .						

\* Monitoring requirement only.

PERMITTED FEATURE #004	TABLE A-6. LAND APPLICATION MONITORING REQUIREMENTS					
	The permittee is authorized to conduct land application of wastewater as specified in the application for this permit. The final limitations shall become effective on <b>June 1, 2015</b> , and remain in effect until expiration of the permit. The land application of wastewater shall be controlled, limited and monitored by the permittee as specified below:					
EFFLUENT PARAMETER(S)	UNITS	FINAL LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Land Application Operational Monitoring						
Irrigation Period	hours	*			daily	total
Volume Irrigated	gallons	*			daily	total
Application Area	acres	*			daily	total
Application Rate	inches	*			daily	total
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2016</u> .						

\* Monitoring requirement only.

\*\* A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

\*\*\* pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.5-9.0 pH units.

\*\*\*\* See table below for quarterly sampling.

Minimum Sampling Requirements			
Quarter	Months	Effluent Parameters	Report is Due
First	January, February, March	Sample at least once during any month of the quarter	April 28 <sup>th</sup>
Second	April, May, June	Sample at least once during any month of the quarter	July 28 <sup>th</sup>
Third	July, August, September	Sample at least once during any month of the quarter	October 28 <sup>th</sup>
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28 <sup>th</sup>

Note 1 - Effluent limitations and monitoring requirements for *E. coli*, Total Residual Chlorine, and Dissolved Oxygen are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

Note 2 - This permit contains a Total Residual Chlorine (TRC) limit. This effluent limit is below the minimum quantification level (ML) of the most common and practical EPA approved CLTRC methods. The Department has determined the current acceptable ML for total residual chlorine to be 130 µg/L when using the DPD Colorimetric Method #4500 – CL G. from Standard Methods for the Examination of Waters and Wastewater. The permittee will conduct analyses in accordance with this method, or equivalent, and report actual analytical values. Measured values greater than or equal to the minimum quantification level of 130 µg/L will be considered violations of the permit and values less than the minimum quantification level of 130 µg/L will be considered to be in compliance with the permit limitation. The minimum quantification level does not authorize the discharge of chlorine in excess of the effluent limits stated in the permit.

- (a) Disinfection is required during the recreational season from April 1 through October 31. Do not chlorinate during the non-recreational months.
- (b) Do not chemically de-chlorinate **if it is not needed to meet the limits in your permit.**
- (c) If no chlorine was used in a given sampling period, an actual analysis is not necessary. Simply report as “0 µg/L” TRC

Note 3 - Storage Basin freeboard shall be reported as Storage Basin water level in feet below the overflow level. See Special Condition #22 for Wastewater Irrigation System requirements.

Note 4 - Wastewater that is irrigated shall be sampled at the irrigation pump or wet well. If irrigation did not occur during the report period, report as “No Irrigation”.

Note 5 - Monitor once during the months of March through November.

Note 6 – This effluent limit is below the accepted minimum quantification level (ML). The Department has determined the current acceptable ML of Cyanide amenable to chlorination to be 20 µg/L when using Method #9102A from the U.S.EPA National Exposure Research Laboratory. This method is used to determine the concentration of inorganic cyanide that is present as either soluble salts or complexes in wastes or leachate. The permittee will conduct analyses in accordance with this method, or equivalent, and report actual analytical values. Measured values greater than or equal to the minimum quantification level of 20 µg/L will be considered violations of the permit and values less than the minimum quantification level of 20 µg/L will be considered to be in compliance with the permit limitation. The minimum quantification level does not authorize the discharge of Cyanide in excess of the effluent limits stated in the permit.

Note 7 – See Special Condition #25 for additional requirements.

**TABLE B.  
 INFLUENT MONITORING REQUIREMENTS**

The facility is required to meet a removal efficiency of 85% or more as a monthly average. The monitoring requirements shall become effective on **June 1, 2015**, and remain in effect until expiration of the permit. To determine removal efficiencies, the influent wastewater shall be monitored by the permittee as specified below:

SAMPLING LOCATION AND PARAMETER(S)	UNITS	MONITORING REQUIREMENTS	
		MEASUREMENT FREQUENCY	SAMPLE TYPE
Biochemical Oxygen Demand <sub>5</sub>	mg/L	once/month	composite**
Total Suspended Solids	mg/L	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE JULY 28, 2015.

\*\* A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

<b>PERMITTED FEATURE #005</b>	<b>TABLE C. INSTREAM MONITORING REQUIREMENTS</b>			PAGE NUMBER 9 of 15		
				PERMIT NUMBER MO-0108227		
The final limitations shall become effective on <b>June 1, 2015</b> , and remain in effect until expiration of the permit. The parameter(s) listed below shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	UNITS	FINAL LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Hardness, Total	mg/L	*		*	monthly	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>JULY 28, 2015</u> .						

\* Monitoring requirement only.

D. STANDARD CONDITIONS

In addition to specified conditions stated herein, this permit is subject to the attached Parts I, II, & III standard conditions dated August 1, 2014, May 1, 2013, and March 1, 2015, and hereby incorporated as though fully set forth herein.

E. SPECIAL CONDITIONS

1. This permit establishes final ammonia limitations based on Missouri’s current Water Quality Standard. On August 22, 2013, the U.S. Environmental Protection Agency (EPA) published a notice in the Federal Register announcing of the final national recommended ambient water quality criteria for protection of aquatic life from the effects of ammonia in freshwater. The EPA’s guidance, Final Aquatic Life Ambient Water Quality Criteria for Ammonia – Fresh Water 2013, is not a rule, nor automatically part of a state’s water quality standards. States must adopt new ammonia criteria consistent with EPA’s published ammonia criteria into their water quality standards that protect the designated uses of the water bodies. The Department of Natural Resources has initiated stakeholder discussions on how to best incorporate these new criteria into the State’s rules. A date for when this rule change will occur has not been determined. Also, refer to Section VI of this permit’s factsheet for further information including estimated future effluent limits for this facility. It is recommended the permittee view the Department’s 2013 EPA criteria Factsheet located at <http://dnr.mo.gov/pubs/pub2481.htm>
2. This permit may be reopened and modified, or alternatively revoked and reissued, to:
  - (a) Comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
    - (1) contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
    - (2) controls any pollutant not limited in the permit.
  - (b) Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri’s Water Quality Standards.
  - (c) Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri’s list of waters of the state not fully achieving the state’s water quality standards, also called the 303(d) list.
  - (d) Incorporate the requirement to develop a pretreatment program pursuant to 40 CFR 403.8(a) when the Director of the Water Protection Program determines that a pretreatment program is necessary due to any new introduction of pollutants into the Publically Owned Treatment Works or any substantial change in the volume or character of pollutants being introduced.

The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.

3. All outfalls must be clearly marked in the field.
4. Permittee will cease discharge by connection to a facility with an area-wide management plan per 10 CSR 20-6.010(3)(B) within 90 days of notice of its availability.

E. SPECIAL CONDITIONS (continued)

5. Water Quality Standards

- (a) To the extent required by law, discharges to waters of the state shall not cause a violation of water quality standards rule under 10 CSR 20-7.031, including both specific and general criteria.
- (b) General Criteria. The following general water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
  - (1) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;
  - (2) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
  - (3) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
  - (4) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;
  - (5) There shall be no significant human health hazard from incidental contact with the water;
  - (6) There shall be no acute toxicity to livestock or wildlife watering;
  - (7) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;
  - (8) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.

6. Changes in existing pollutants or the addition of new pollutants to the treatment facility

The permittee must provide adequate notice to the Director of the following:

- (a) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging those pollutants; and
- (b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
- (c) For purposes of this paragraph, adequate notice shall include information on:
  - (1) the quality and quantity of effluent introduced into the POTW, and
  - (2) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

7. Report as no-discharge when a discharge does not occur during the report period.

8. It is a violation of the Missouri Clean Water Law to fail to pay fees associated with this permit (644.055 RSMo).

9. The permittee shall comply with any applicable requirements listed in 10 CSR 20-9, unless the facility has received written notification that the Department has approved a modification to the requirements. The monitoring frequencies contained in this permit shall not be construed by the permittee as a modification of the monitoring frequencies listed in 10 CSR 20-9. If a modification of the monitoring frequencies listed in 10 CSR 20-9 is needed, the permittee shall submit a written request to the Department for review and, if deemed necessary, approval.

10. Bypasses are not authorized at this facility unless they meet the criteria in 40 CFR 122.41(m). If a bypass occurs, the permittee shall report in accordance to 40 CFR 122.41(m)(3)(i), and with Standard Condition Part I, Section B, subsection 2.b. Bypasses are to be reported to the Northeast Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. Blending, which is the practice of combining a partially-treated wastewater process stream with a fully-treated wastewater process stream prior to discharge, is not considered a form of bypass. If the permittee wishes to utilize blending, the permittee shall file an application to modify this permit to facilitate the inclusion of appropriate monitoring conditions.

11. The facility must be sufficiently secured to restrict entry by children, livestock and unauthorized persons as well as to protect the facility from vandalism.

E. SPECIAL CONDITIONS (continued)

12. The permittee shall develop and implement a program for maintenance and repair of the collection system. The recommended guidance is the US EPA's Guide For Evaluating Capacity, Management, Operation, And Maintenance (CMOM) Programs At Sanitary Sewer Collection Systems (Document number EPA 305-B-05-002). The permittee shall submit a report to the Northeast Regional Office annually, by **January 28<sup>th</sup>**, for the previous calendar year. The report shall contain the following information:
  - (a) A list of all:
    - (1) Sanitary Sewer Overflows (SSO) that occurred for the previous year, including SSOs that do not reach waters of the state and;
    - (2) Building backups in which the backup is attributable to the public sewer system.
    - (3) This does not include SSOs that occur due to routine maintenance of sewer lines.
    - (4) This list shall also include the following information for each individual SSO:
      - i. The location of each SSO (GPS, 911 address, manhole number, etc.)
      - ii. What portion of the collection system did the SSO occur at (manhole, lamphole, sewer cleanout, etc.)
      - iii. The estimated volume (gallons) of each SSO.
      - iv. The estimated duration of each SSO.
      - v. If the SSO entered waters of the state, and include the name of receiving water. If the SSO entered a drainageway, use the first named stream that the drainageway enters (e.g. first named stream = Dry Creek; Report = Tributary to Dry Creek).
      - vi. Cause for the SSO.
      - vii. How each SSO was mitigated.
      - viii. What actions were taken to prevent a reoccurrence of each SSO.
  - (b) A summary of the efforts to locate and eliminate sources of excessive infiltration and inflow into the collection system serving the facility for the previous year.
  - (c) A summary of the general maintenance and repairs to the collection system serving the facility for the previous year.
  - (d) A summary of any planned maintenance and repairs to the collection system serving the facility for the upcoming calendar year. This list shall include locations (GPS, 911 address, manhole number, etc.) and actions to be taken.
13. A least one gate must be provided to access the wastewater treatment facility and provide for maintenance and mowing. The gate shall remain closed except when temporarily opened by; the permittee to access the facility, perform operational monitoring, sampling, maintenance, mowing, or for inspections by the Department. The gate shall be closed and locked when the facility is not staffed.
14. At least one (1) warning sign shall be placed on each side of the facility enclosure in such positions as to be clearly visible from all directions of approach. There shall also be one (1) sign placed for every five hundred feet (500') (150 m) of the perimeter fence. A sign shall also be placed on each gate. Minimum wording shall be SEWAGE TREATMENT FACILITY—KEEP OUT. Signs shall be made of durable materials with characters at least two inches (2") high and shall be securely fastened to the fence, equipment or other suitable locations.
15. An Operation and Maintenance (O & M) manual shall be maintained by the permittee and made available to the operator. The O & M manual shall include key operating procedures and a brief summary of the operation of the facility.
16. An all-weather access road shall be provided to the treatment facility.
17. The discharge from the wastewater treatment facility shall be conveyed to the receiving stream via a closed pipe or a paved or rip-rapped open channel. Sheet or meandering drainage is not acceptable. The outfall sewer shall be protected against the effects of floodwater, ice or other hazards as to reasonably insure its structural stability and freedom from stoppage. The outfall shall be maintained so that a sample of the effluent can be obtained at a point after the final treatment process and before the discharge mixes with the receiving waters.
18. Land application of biosolids shall be conducted in accordance with Standard Conditions III and a Department approved biosolids management plan. Land application of biosolids during frozen, snow covered, or saturated soil conditions in accordance with the additional requirements specified in WQ426 shall occur only with prior notification to the Northeast Regional Office.
19. A minimum of two (2) feet freeboard must be maintained in the storage basins. A lagoon level gauge, which clearly marks the minimum freeboard level, shall be provided in each lagoon cell
20. The berms of the storage basins shall be mowed and kept free of any deep-rooted vegetation, animal dens, or other potential sources of damage to the berms.

E. SPECIAL CONDITIONS (continued)

21. The facility shall ensure that adequate provisions are provided to prevent surface water intrusion into the storage basins and to divert stormwater runoff around the storage basins and protect embankments from erosion.
22. Wastewater Irrigation System.
- (a) Discharge Reporting. Any unauthorized discharge from the storage basin(s) or irrigation system shall be reported to the Department as soon as possible but always within 24 hours. Discharge is allowed only as described in the Facility Description and Effluent Limitations sections of this permit.
  - (b) Storage Basin Operating Levels - No-discharge Systems. The minimum and maximum operating water levels for the storage basin(s) shall be clearly marked. Each storage basin shall be operated so that the maximum water elevation does not exceed one foot below the Emergency Spillway except due to exceedances of the 1-in-10 year, 365-day or 25-year, 24-hour storm events according to National Weather Service data. Wastewater shall be land applied whenever feasible based on soil and weather conditions and permit requirements.
  - (c) Emergency Spillway. Lagoons and earthen storage basins should have an emergency spillway to protect the structural integrity of earthen structures during operation at near full water levels and in the event of overflow conditions. The spillway shall be at least one foot below top of berm.
  - (d) General Irrigation Requirements. The wastewater irrigation system shall be operated so as to provide uniform distribution of irrigated wastewater over the entire irrigation site. A complete ground cover of vegetation shall be maintained on the irrigation site unless the system is approved for row crop irrigation. The wastewater irrigation system shall be capable of irrigating the annual design flow during an application period of less than 100 days or 800 hours per year. If the facility determines that night time irrigation is needed, the facility shall submit a night time land application plan to the Department's Water Protection Program for review and approval. Night time irrigation shall only occur when the Department has approved the night time land application plan. At a minimum, the plan should include; 1) the use of telemetry on the center pivot system. Telemetry can include sensors on the center pivots in order to gauge pressure changes, sensors on the wheel motors in the event that the pivot stops moving, sensors that will determine if the system is distributing the wastewater evenly, and sensors attached to rain gauges that would shut off the system in the event of precipitation, 2) The telemetry shall be able to shut off the system if errors occur and also notify the operator by phone. If notification is made to the operator, the operator shall conduct an onsite investigation within 30 minutes of notification, 2) a daily check of the irrigation system by the certified wastewater operator to ensure the system is working properly, and 3) at a minimum once per year test of the irrigation telemetry system.
  - (e) Saturated/Frozen Conditions. There shall be no irrigation during ground frost, frozen, snow covered, or saturated soil conditions, or when precipitation is imminent or occurring.
  - (f) Buffer Zones. There shall be no irrigation within 300 feet of any down gradient pond, lake, sinkhole, losing stream or water supply withdrawal; 100 feet of gaining streams or tributaries; 150 feet of dwelling or public use areas; or 50 feet of the property line.
  - (g) Public Access Restrictions. Public access shall not be allowed to public use area irrigation sites when application is occurring.
  - (h) Nitrogen Loading Rates. Wastewater irrigation rates shall not exceed a nitrogen application rate of 150 pounds total nitrogen per acre per year, and the applied wastewater shall not exceed ten (10) mg/l of nitrate nitrogen as N.
  - (i) Equipment Checks during Irrigation. The irrigation system and application site shall be visually inspected at least once/day during wastewater irrigation to check for equipment malfunctions and runoff from the irrigation site.
23. Land Application Sites. To add additional land application sites or convert any of the land to public use areas, a construction permit and permit modification may be required. The facility shall contact the Department for a written determination. Additionally, the O&M Manual shall be updated to include the additional land application site(s) and a copy of the updated sections of the O&M Manual shall be submitted to the Northeast Regional Office in accordance with Special Condition #15.
24. Special Condition for a POTW to Implement an Approved Pretreatment Program
- The permittee shall implement and enforce its approved pretreatment program in accordance with the requirements of 10 CSR 20-6.100. The approved pretreatment program is hereby incorporated by reference. The permittee shall submit to the Department on or before **March 31<sup>st</sup>** of each year a report briefly describing its pretreatment activities during the previous calendar year. At a minimum, the report shall include the following:
- (a) An updated list of the Permittee's Industrial Users, including their names and addresses, or a list of deletions and additions keyed to a previously submitted list. The Permittee shall provide a brief explanation of each deletion. This list shall identify which Industrial Users are subject to categorical pretreatment Standards and specify which Standards are applicable to each Industrial User. The list shall indicate which Industrial Users are subject to local standards that are more stringent than the categorical Pretreatment Standards. The Permittee shall also list the Industrial Users that are subject only to local Requirements;
  - (b) A summary of the status of Industrial User compliance over the reporting period;

E. SPECIAL CONDITIONS (continued)

- (c) A summary of compliance and enforcement activities (including inspections) conducted by the Permittee during the reporting period; and
- (d) Any other relevant information requested by the Department.

Pursuant to 40 CFR 122.44(j)(2)(ii), the permittee shall submit to the Department a written technical evaluation of the need to revise local limits under 40 CFR 403.5(c)(1) along with the application for renewal of this permit.

25. Acute Whole Effluent Toxicity (WET) tests shall be conducted as follows:

SUMMARY OF ACUTE WET TESTING FOR THIS PERMIT					
OUTFALL	AEC	Acute Toxic Unit (TU <sub>a</sub> )	FREQUENCY	SAMPLE TYPE	MONTH
001	100%	*	once/year	24 hr. composite	Any

\*Monitoring only

Dilution Series						
100%	50%	25%	12.5%	6.25%	(Control) 100% upstream, if available	(Control) 100% Lab Water, also called synthetic water

- a) Freshwater Species and Test Methods
  - i. Species and short-term test methods for estimating the acute toxicity of NPDES effluents are found in the fifth edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). The permittee shall concurrently conduct 48-hour static non-renewal toxicity tests with the following vertebrate species:
    - The fathead minnow, *Pimephales promelas* (Acute Toxicity Test Method 2000.0).
 And the following invertebrate species:
    - The daphnid, *Ceriodaphnia dubia* (Acute Toxicity Test Method 2002.0).
  - ii. Chemical and physical analysis of an upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available, synthetic laboratory control water may be used.
  - iii. Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
  - iv. Any and all chemical or physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% Effluent concentration in addition to analysis performed upon any other effluent concentration.
  - v. All chemical analyses shall be performed and results shall be recorded in the appropriate field of the report form. The parameters for chemical analysis include Temperature (°C), pH (SU), Conductivity (µmohs/cm), Dissolved Oxygen (mg/L), Total Residual Chlorine (mg/L), Un-ionized Ammonia (mg/L), Total Alkalinity (mg/L), Total Recoverable Cadmium, Total Recoverable Lead, Cyanide amenable to chlorination, and Total Hardness (mg/L).
- b) Reporting of Acute Toxicity Monitoring Results
  - i. WET test results shall be submitted to the Northeast Regional Office, or by eDMR, with the permittee's Discharge Monitoring Reports annually by **October 28, 2015**. The submittal shall include:
    1. A full laboratory report for all toxicity testing.
    2. Copies of chain-of-custody forms.
    3. The WET form provided by the Department upon permit issuance.
  - ii. The report must include a quantification of acute toxic units (TU<sub>a</sub> = 100/LC<sub>50</sub>) reported according to the test methods manual chapter on report preparation and test review. The Lethal Concentration, 50 Percent (LC<sub>50</sub>) is the toxic or effluent concentration that would cause death in 50 percent of the test organisms over a specified period of time.
- c) Permit Reopener for Acute Toxicity
 

In accordance with 40 CFR Parts 122 and 124, this permit may be modified to include effluent limitations or permit conditions to address acute toxicity in the effluent or receiving waterbody, as a result of the discharge; or to implement new, revised, or newly interpreted water quality standards applicable to acute toxicity.

E. SPECIAL CONDITIONS (continued)

26. Reporting of Non-Detects:
- (a) An analysis conducted by the permittee or their contracted laboratory shall be conducted in such a way that the precision and accuracy of the analyzed result can be enumerated.
  - (b) The permittee shall not report a sample result as “Non-Detect” without also reporting the detection limit of the test. Reporting as “Non Detect” without also including the detection limit will be considered failure to report, which is a violation of this permit.  
The permittee shall provide the “Non-Detect” sample result using the less than sign and the minimum detection limit (e.g. <10).
  - (c) The permittee shall use one-half of the detection limit for the non-detect result when calculating monthly averages.
  - (d) See Standard Conditions Part I, Section A, #4 regarding proper detection limits used for sample analysis.
27. Stormwater Pollution Prevention Plan (SWPPP): A SWPPP must be developed and implemented within 180 days of the effective date of the permit. Through implementation of the SWPPP, the permittee shall minimize the release of pollutants in stormwater from the facility to the waters of the state. The SWPPP shall be developed in consultation with the concepts and methods described in the following document: Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators, (Document number EPA 833-B-09-002) published by the United States Environmental Protection Agency (USEPA) in February 2009.
- (a) The SWPPP must identify any stormwater outfall from the facility and Best Management Practices (BMPs) used to prevent or reduce the discharge of contaminants in stormwater. The stormwater outfalls shall either be marked in the field or clearly marked on a map and maintained with the SWPPP.
  - (b) The SWPPP must include a schedule and procedures for a once per month routine site inspection.
    - i. The monthly routine inspection shall be documented in a brief written report, which shall include:
      - i. The person(s) conducting the inspection.
      - ii. The inspection date and time.
      - iii. Weather information for the day of the inspection.
      - iv. Precipitation information for the entire period since the last inspection.
      - v. Description of the discharges observed, including visual quality of the discharges (sheen, turbid, etc.).
      - vi. Condition of BMPs
      - vii. If BMPs were replaced or repaired.
      - viii. Observations and evaluations of BMP effectiveness.
    - ii. Any deficiency observed during the routine inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
    - iii. The routine inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.
    - iv. The routine inspection reports shall be made available to Department personnel upon request.
  - (c) The SWPPP must include a schedule and procedures for a once per year comprehensive site inspection.
    - (1) The annual comprehensive inspection shall be documented in a written report, which shall include:
      - i. The person(s) conducting the inspection.
      - ii. The inspection date and time.
      - iii. Findings from the areas of your facility that were examined;
      - iv. All observations relating to the implementation of your control measures including:
        - 1. Previously unidentified discharges from the site,
        - 2. Previously unidentified pollutants in existing discharges,
        - 3. Evidence of, or the potential for, pollutants entering the drainage system;
        - 4. Evidence of pollutants discharging to receiving waters at all facility outfall(s), and the condition of and around the outfall, and
        - 5. Additional control measures needed to address any conditions requiring corrective action identified during the inspection.
      - v. Any required revisions to the SWPPP resulting from the inspection;
      - vi. Any incidence of noncompliance observed or a certification stating that the facility is in compliance with Special Condition E. 27.
    - (2) Any deficiency observed during the comprehensive inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
    - (3) The comprehensive inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.
    - (4) The comprehensive inspection reports shall be made available to Department personnel upon request.
  - (d) The SWPPP must be kept on-site and should not be sent to the Department unless specifically requested.
  - (e) The SWPPP must be reviewed and updated at a minimum once per permit cycle, as site conditions or control measures change.

E. SPECIAL CONDITIONS (continued)

28. The permittee shall select, install, use, operate, and maintain the Best Management Practices prescribed in the SWPPP.
- (a) Permittee shall adhere to the following minimum Best Management Practices (BMPs):
- i. Minimize the exposure of industrial material storage areas, loading and unloading areas, dumpsters and other disposal areas, maintenance activities, and fueling operations to rain, snow, snowmelt, and runoff, by locating industrial materials and activities inside or protecting them with storm resistant coverings, if warranted and practicable.
  - ii. Provide good housekeeping practices on the site to prevent potential pollution sources from coming into contact with stormwater and provide collection facilities and arrange for proper disposal of waste products, including sludge.
  - iii. Implement a maintenance program to ensure that the structural control measures and industrial equipment is kept in good operating condition and to prevent or minimize leaks and other releases of pollutants.
  - iv. Prevent or minimize the spillage or leaks of fluids, oil, grease, fuel, etc. from equipment and vehicle maintenance, equipment and vehicle cleaning, or activities.
  - v. Provide sediment and erosion control sufficient to prevent or control sediment loss off of the property. This could include the use of straw bales, silt fences, or sediment basins, if needed.
  - vi. Provide stormwater runoff controls to divert, infiltrate, reuse, contain, or otherwise minimize pollutants in the stormwater discharge.
  - vii. Enclose or cover storage piles of salt or piles containing salt, used for deicing or other commercial or industrial purposes.
  - viii. Provide training to all employees who; work in areas where industrial materials or activities are exposed to stormwater, are responsible for stormwater inspections, are members of the Pollution Prevention Team. Training must cover the specific control measures and monitoring, inspection, planning, reporting and documentation requirements of this permit. Training is recommended annually for any applicable staff and whenever a new employee is hired who meets the description above.
  - ix. Eliminate and prevent unauthorized non-stormwater discharges at the facility.
  - x. Minimize generation of dust and off-site tracking of raw, final, or waste materials by implementing appropriate control measures.

F. SCHEDULE OF COMPLIANCE

The facility shall attain compliance with final effluent limitations as soon as reasonably achievable or no later than **2 years** of the effective date of this permit.

1. Within **2 years** of the effective date of this permit, the permittee shall attain compliance with the final effluent limits.

**MISSOURI DEPARTMENT OF NATURAL RESOURCES  
FACT SHEET  
FOR THE PURPOSE OF RENEWAL  
OF  
MO-0108227  
CHILLICOTHE WASTEWATER TREATMENT PLANT**

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of storm water from certain point sources. All such discharges are unlawful without a permit (Section 301 of the "Clean Water Act"). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Director of the Missouri Department of Natural Resources (Department) under an approved program, operating in accordance with federal and state laws (Federal "Clean Water Act" and "Missouri Clean Water Law" Section 644 as amended). MSOPs are issued for a period of five (5) years unless otherwise specified.

As per [40 CFR Part 124.8(a)] and [10 CSR 20-6.020(1)2.] a Factsheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the Missouri State Operating Permit (operating permit) listed below.

A Factsheet is not an enforceable part of an operating permit.

This Factsheet is for a Major

**Part I – Facility Information**

Facility Type: POTW - SIC #4952

Facility Description:

Single-cell peak flow detention basin / influent pump station / dual channel grit removal / mechanical screening / bar screen / two oxidation ditches / three secondary clarifiers / chlorination / dechlorination / partial irrigation / two sludge holding tanks / four sludge sand filter drying beds/ sludge is land applied

Single cell storage basin / wastewater irrigation / center pivot

The facility has to ability to route treated wastewater to a storage basin prior to discharge from Outfall #001. The treated wastewater is irrigated onto row crops via center pivot. The storage basin has an outfall pipe and is designated as Outfall #002.

Have any changes occurred at this facility or in the receiving water body that effects effluent limit derivation?

- No.

Application Date: 03/21/2013

Expiration Date: 09/18/2013

**PERMITTED FEATURE(S) TABLE:**

PERMITTED FEATURES	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#001	4.65	Secondary	Domestic
#002	NA	Secondary	Domestic
#003	NA	Secondary	Domestic
#004	NA	Land Application	Domestic
#005	NA	Instream	NA

Facility Performance History:

This facility was last inspected on February 4 and 5, 2013. The conditions of the facility at the time of inspection were found to be satisfactory.

**Part II – Operator Certification Requirements**

Applicable ; This facility is required to have a certified operator.

As per [10 CSR 20-6.010(8) Terms and Conditions of a Permit], permittees shall operate and maintain facilities to comply with the Missouri Clean Water Law and applicable permit conditions and regulations. Operators or supervisors of operations at regulated wastewater treatment facilities shall be certified in accordance with [10 CSR 20-9.020(2)] and any other applicable state law or regulation. As per [10 CSR 20-9.020(2)(A)], requirements for operation by certified personnel shall apply to all wastewater treatment systems, if applicable, as listed below:

Check boxes below that are applicable to the facility;

- Owned or operated by or for:
  - Municipalities
  - Public Sewer District:
  - County
  - Public Water Supply Districts:
  - Private sewer company regulated by the Public Service Commission:
  - State or Federal agencies:

Each of the above entities are only applicable if they have a Population Equivalent greater than two hundred (200) and/or fifty (50) or more service connections.

This facility currently requires an operator with an A Certification Level. Please see **Appendix - Classification Worksheet**. Modifications made to the wastewater treatment facility may cause the classification to be modified.

Operator’s Name: Kent A. Spainhour  
 Certification Number: 2192  
 Certification Level: A

The listing of the operator above only signifies that staff drafting this operating permit have reviewed appropriate Department records and determined that the name listed on the operating permit application has the correct and applicable Certification Level.

**Part III– Operational Monitoring**

Applicable ; As per [10 CSR 20-9.010(4)], the facility is required to conduct operational monitoring.

**Part IV – Receiving Stream Information**

10 CSR 20-7.031 Missouri Water Quality Standards, the Department defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1<sup>st</sup> classified receiving stream’s beneficial water uses to be maintained are located in the Receiving Stream Table located below in accordance with [10 CSR 20-7.031(3)].

**RECEIVING STREAM(S) TABLE: OUTFALLS #001 & #002**

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
8-20-13 MUDD V1.0 (Coon Creek)	C	3960	IRR, LWW, AQL, HHP, WBC-B, SCR	10280101-1708	0
Grand River	P	430	IRR, LWW, AQL, WBC-A, SCR, DWS		1.2

\* - Irrigation (IRR), Livestock & Wildlife Watering (LWW), Protection of Warm Water Aquatic Life (AQL), Human Health Protection (HHP), Cool Water Fishery (CLF), Cold Water Fishery (CDF), Whole Body Contact Recreation (WBC), Secondary Contact Recreation (SCR), Drinking Water Supply (DWS), Industrial (IND), Groundwater (GRW).

**RECEIVING STREAM(S) LOW-FLOW VALUES:**

RECEIVING STREAM (C, P)	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Coon Creek (C)	0	0	0

**MIXING CONSIDERATIONS**

**MIXING CONSIDERATIONS TABLE:**

MIXING ZONE (CFS) [10 CSR 20-7.031(5)(A)...]			ZONE OF INITIAL DILUTION (CFS) [10 CSR 20-7.031(5)(A)...]		
1Q10	7Q10	30Q10	1Q10	7Q10	30Q10
0	0	0	0	0	N/A

**RECEIVING STREAM MONITORING REQUIREMENTS:**

**Permitted Feature #005 (Downstream)**

PARAMETER	SAMPLING FREQUENCY	SAMPLE TYPE	LOCATION
Total Hardness	monthly	grab	Downstream location at road crossing over Coon Creek on the road to the Peak Flow Basin Legal Description: NE ¼, NW ¼, Sec. 13, T57N, R24W, Livingston County UTM Coordinates: X=452812, Y=4401009

Receiving Water Body's Water Quality

No stream surveys have been conducted for this facility.

**Part V – Rationale and Derivation of Effluent Limitations & Permit Conditions**

**ALTERNATIVE EVALUATIONS FOR NEW FACILITIES:**

As per [10 CSR 20-7.015(4)(A)], discharges to losing streams shall be permitted only after other alternatives including land application, discharges to a gaining stream and connection to a regional wastewater treatment facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons.

Not Applicable ; The facility does not discharge to a Losing Stream as defined by [10 CSR 20-2.010(36)] & [10 CSR 20-7.031(1)(N)], or is an existing facility.

**ANTI-BACKSLIDING:**

A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(c); 40 CFR Part 122.44(I)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

- Limitations in this operating permit for the reissuance of this permit conform to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, and 40 CFR Part 122.44.

- Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance. Effluent limitations were recalculated for Ammonia, Phenol, Methylene Chloride, and Temperature was removed from the permit as it did not show a reasonable potential to violate Water Quality Standards, and recalculation of limits, Oil & Grease sampling and reporting frequency was reduced to quarterly as the facility has not shown a potential to violate Water Quality Standards.
- The Department determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b). This permit changes WET test requirements for the facility from a pass/fail requirement to monitoring only for toxic units. This change reflects modifications to Missouri's Effluent Regulation found at 10 CSR 20-7.015. 40 CFR 122.44(d)(1)(ii) requires the Department to establish effluent limitations that control all parameters which have the reasonable potential to cause or contribute to an excursion above any state water quality standard, including state narrative criteria. The previous permit imposed a pass/fail limitation without collecting sufficient data to make a reasonable potential determination. Furthermore, the method of reporting associated with the pass/fail limitation prevented the Department from gathering the data necessary to make a finding of reasonable potential. Implementation of the toxic unit monitoring requirement will allow the Department to implement numeric acute criteria in accordance with water quality standards established under §303 of the CWA.

**ANTIDEGRADATION:**

In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(2)], the Department is to document by means of Antidegradation Review that the use of a water body's available assimilative capacity is justified. Degradation is justified by documenting the socio-economic importance of a discharging activity after determining the necessity of the discharge.

- No degradation proposed and no further review necessary. Facility did not apply for authorization to increase pollutant loading or to add additional pollutants to their discharge.

**AREA-WIDE WASTE TREATMENT MANAGEMENT & CONTINUING AUTHORITY:**

As per [10 CSR 20-6.010(3)(B)], ...An applicant may utilize a lower preference continuing authority by submitting, as part of the application, a statement waiving preferential status from each existing higher preference authority, providing the waiver does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or any other regional sewage service and treatment plan approved for higher preference authority by the Department.

**BIOSOLIDS & SEWAGE SLUDGE:**

Biosolids are solid materials resulting from domestic wastewater treatment that meet federal and state criteria for beneficial uses (i.e. fertilizer). Sewage sludge is solids, semi-solids, or liquid residue generated during the treatment of domestic sewage in a treatment works; including but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works. Additional information regarding biosolids and sludge is located at the following web address:

<http://dnr.mo.gov/env/wpp/pub/index.html>, items WQ422 through WQ449.

- Permittee land applies biosolids in accordance with Standard Conditions III and a Department approved biosolids management plan.

**COMPLIANCE AND ENFORCEMENT:**

Enforcement is the action taken by the Water Protection Program (WPP) to bring an entity into compliance with the Missouri Clean Water Law, its implementing regulations, and/or any terms and conditions of an operating permit. The primary purpose of the enforcement activity in the WPP is to resolve violations and return the entity to compliance.

Not Applicable ; The permittee/facility is not currently under Water Protection Program enforcement action.

**PRETREATMENT PROGRAM:**

The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a Publicly Owned Treatment Works [40 CFR Part 403.3(q)].

Pretreatment programs are required at any POTW (or combination of POTW operated by the same authority) and/or municipality with a total design flow greater than 5.0 MGD and receiving industrial wastes that interfere with or pass through the treatment works or are otherwise subject to the pretreatment standards. Pretreatment programs can also be required at POTWs/municipals with a design flow less than 5.0 MGD if needed to prevent interference with operations or pass through.

Several special conditions pertaining to the permittee's pretreatment program may be included in the permit, and are as follows:

- Implementation and enforcement of the program,
- Annual pretreatment report submittal,
- Submittal of list of industrial users,
- Technical evaluation of need to establish local limitations, and
- Submittal of the results of the evaluation

Applicable ; This permittee has an approved pretreatment program in accordance with the requirements of [40 CFR Part 403] and [10 CSR 20-6.100] and is expected to implement and enforce its approved program.

**REASONABLE POTENTIAL ANALYSIS (RPA):**

Federal regulation [40 CFR Part 122.44(d)(1)(i)] requires effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard.

In accordance with [40 CFR Part 122.44(d)(iii)] if the permit writer determines that any given pollutant has the reasonable potential to cause, or contribute to an in-stream excursion above the WQS, the permit must contain effluent limits for that pollutant.

Applicable ; A RPA was conducted on appropriate parameters. Please see **APPENDIX – RPA RESULTS**.

**REMOVAL EFFICIENCY:**

Removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD<sub>5</sub>) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals.

Applicable ; Secondary Treatment is 85% removal [40 CFR Part 133.102(a)(3) & (b)(3)].

**SANITARY SEWER OVERFLOWS (SSO) AND INFLOW AND INFILTRATION (I&I):**

Sanitary Sewer Overflows (SSOs) are defined as untreated sewage releases and are considered bypassing under state regulation [10 CSR 20-2.010(11)] and should not be confused with the federal definition of bypass. SSOs result from a variety of causes including blockages, line breaks, and sewer defects that can either allow wastewater to backup within the collection system during dry weather conditions or allow excess stormwater and groundwater to enter and overload the collection system during wet weather conditions. SSOs can also result from lapses in sewer system operation and maintenance, inadequate sewer design and construction, power failures, and vandalism. SSOs include overflows out of manholes, cleanouts, broken pipes, and other into waters of the state and onto city streets, sidewalks, and other terrestrial locations.

Inflow and Infiltration (I&I) is defined as unwanted intrusion of stormwater or groundwater into a collection system. This can occur from points of direct connection such as sump pumps, roof drain downspouts, foundation drains, and storm drain cross-connections or through cracks, holes, joint failures, faulty line connections, damaged manholes, and other openings in the collection system itself. I&I results from a variety of causes including line breaks, improperly sealed connections, cracks caused by soil erosion/settling, penetration of vegetative roots, and other sewer defects. In addition, excess stormwater and groundwater entering the collection system from line breaks and sewer defects have the potential to negatively impact the treatment facility.

Missouri RSMo §644.026.1.(13) mandates that the Department issue permits for discharges of water contaminants into the waters of this state, and also for the operation of sewer systems. Such permit conditions shall ensure compliance with all requirements as established by sections 644.006 to 644.141. Standard Conditions Part I, referenced in the permit, contains provisions requiring proper operation and maintenance of all facilities and systems of treatment and control. Missouri RSMo §644.026.1.(15) instructs the Department to require proper maintenance and operation of treatment facilities and sewer systems and proper disposal of residual waste from all such facilities. To ensure that public health and the environment are protected, any noncompliance which may endanger public health or the environment must be reported to the Department within 24 hours of the time the permittee becomes aware of the noncompliance. Standard Conditions Part I, referenced in the permit, contains the reporting requirements for the permittee when bypasses and upsets occur. The permit also contains requirements for permittees to develop and implement a program for maintenance and repair of the collection system. The permit requires that the permittee submit an annual report to the Department for the previous calendar year that contains a list of all SSOs and building backups (locations, features of collection system where the SSO/building backup occurred, volumes, durations, receiving stream, causes, mitigation efforts, and actions to prevent reoccurrences), a summary of efforts taken by the permittee to locate and eliminate sources of excess I & I, a summary of general maintenance and repairs to the collection system, and a summary of any planned maintenance and repairs to the collection system for the upcoming calendar year.

- At this time, the Department recommends the US EPA's Guide for Evaluating Capacity, Management, Operation and Maintenance (CMOM) Programs At Sanitary Sewer Collection Systems (Document # EPA 305-B-05-002). The CMOM identifies some of the criteria used by the EPA to evaluate a collection system's management, operation, and maintenance and was intended for use by the EPA, state, regulated community, and/or third party entities. The CMOM is applicable to small, medium, and large systems; both public and privately owned; and both regional and satellite collection systems. The CMOM does not substitute for the Clean Water Act, the Missouri Clean Water Law, and both federal and state regulations, as it is not a regulation.

### **SCHEDULE OF COMPLIANCE (SOC):**

Per 644.051.4 RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement, or if prohibited by other statute or regulation. A SOC includes an enforceable sequence of interim requirements (actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the Clean Water Act, and 40 CFR §122.2. For new effluent limitations, the permit includes interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR § 122.47(a)(1) and 10 CSR 20-7.031(10), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, a SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

A SOC is not allowed:

- For effluent limitations based on technology-based standards established in accordance with federal requirements, if the deadline for compliance established in federal regulations has passed. 40 CFR § 125.3.
- For a newly constructed facility in most cases. Newly constructed facilities must meet applicable effluent limitations when discharge begins, because the facility has installed the appropriate control technology as specified in a permit or antidegradation review. A SOC is allowed for a new water quality based effluent limit that was not included in a previously public noticed permit or antidegradation review, which may occur if a regulation changes during construction.
- To develop a TMDL, UAA, or other study associated with development of a site specific criterion. A facility is not prohibited from conducting these activities, but a SOC may not be granted for conducting these activities.

In order to provide guidance to Permit Writers in developing SOCs, and attain a greater level of consistency, on October 25, 2012 the Department issued a policy on development of SOCs. This policy provides guidance to Permit Writers on the standard time frames for schedules for common activities, and guidance on factors that may modify the length of the schedule such as an affordability analysis.

Applicable ; The time given for effluent limitations of this permit listed under Interim Effluent Limitation and Final Effluent Limitations were established in accordance with [10 CSR 20-7.031(10)]. The facility has been given a schedule of compliance to meet final effluent limits for Cadmium, TR, Cyanide, amenable to chlorination, and Lead. The two year schedule of compliance allowed for this facility should provide adequate time to sample and evaluate industrial contributions to the wastewater treatment collection system and determine if more stringent pretreatment limitations are required.

### **STORMWATER POLLUTION PREVENTION PLAN (SWPPP):**

In accordance with 40 CFR 122.44(k) *Best Management Practices (BMPs)* to control or abate the discharge of pollutants when: (1) Authorized under section 304(e) of the Clean Water Act (CWA) for the control of toxic pollutants and hazardous substances from ancillary industrial activities; (2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; (3) Numeric effluent limitations are infeasible; or (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (Document number EPA 833-B-09-002) [published by the United States Environmental Protection Agency (USEPA) in February 2009], BMPs are measures or practices used to reduce the amount of pollution entering (regarding this operating permit) waters of the state. BMPs may take the form of a process, activity, or physical structure.

Additionally in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to (1) identify sources of pollution or contamination, and (2) select and carry out actions which prevent or control the pollution of stormwater discharges.

- 10 CSR 20-6.200 and 40 CFR 122.26 includes treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that is located within the confines of the facility, with a design flow of 1.0 mgd or more, or are required to have an approved pretreatment program under 40 CFR part 403, as an industrial activity in which permit coverage is required.

In lieu of requiring sampling in the site-specific permit, the facility is required to develop and implement a Stormwater Pollution Prevention Plan. A facility can apply for conditional exclusion for "no exposure" of industrial activities and materials to stormwater by submitting to the Department a completed NPDES Form 3510-11 – No Exposure Certification for Exclusion from NPDES Stormwater Permitting. That document and additional information may be found at <http://water.epa.gov/polwaste/npdes/stormwater/Conditional-No-Exposure-Exclusion.cfm>. Upon approval on the "No Exposure", the permit can be modified to remove the SWPPP requirements. If the facility chooses to retain the conditional exclusion for "no exposure", the facility is required to renew the "No Exposure" exemption during the permit renewal period by submitting NPDES Form 3510-11 with Form B2.

**VARIANCE:**

As per the Missouri Clean Water Law § 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law §§644.006 to 644.141 or any standard, rule or regulation promulgated pursuant to Missouri Clean Water Law §§644.006 to 644.141.

Not Applicable ; This operating permit is not drafted under premises of a petition for variance.

**WASTELOAD ALLOCATIONS (WLA) FOR LIMITS:**

As per [10 CSR 20-2.010(78)], the amount of pollutant each discharger is allowed by the Department to release into a given stream after the Department has determined total amount of pollutant that may be discharged into that stream without endangering its water quality.

Applicable ; Wasteload allocations were calculated where applicable using water quality criteria or water quality model results and the dilution equation below:

$$C_e = \frac{(Q_e + Q_s)C - (C_s \times Q_s)}{(Q_e)} \quad (\text{EPA/505/2-90-001, Section 4.5.5})$$

Where C = downstream concentration  
Cs = upstream concentration  
Qs = upstream flow  
Ce = effluent concentration  
Qe = effluent flow

Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and stream volume of flow at the edge of the mixing zone (MZ). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration) and stream volume of flow at the edge of the zone of initial dilution (ZID).

Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

Number of Samples "n":

Additionally, in accordance with the TSD for water quality-based permitting, effluent quality is determined by the underlying distribution of daily values, which is determined by the Long Term Average (LTA) associated with a particular Wasteload Allocation (WLA) and by the Coefficient of Variation (CV) of the effluent concentrations. Increasing or decreasing the monitoring frequency does not affect this underlying distribution or treatment performance, which should be, at a minimum, be targeted to comply with the values dictated by the WLA. Therefore, it is recommended that the actual planned frequency of monitoring normally be used to determine the value of "n" for calculating the AML. However, in situations where monitoring frequency is once per month or less, a higher value for "n" must be assumed for AML derivation purposes. Thus, the statistical procedure being employed using an assumed number of samples is "n = 4" at a minimum. For Total Ammonia as Nitrogen, "n = 30" is used.

**WLA MODELING:**

There are two general types of effluent limitations, technology-based effluent limits (TBELs) and water quality based effluent limits (WQBELs). If TBELs do not provide adequate protection for the receiving waters, then WQBEL must be used.

Not Applicable ; A WLA study was either not submitted or determined not applicable by Department staff.

**WATER QUALITY STANDARDS:**

Per [10 CSR 20-7.031(3)], General Criteria shall be applicable to all waters of the state at all times including mixing zones. Additionally, [40 CFR 122.44(d)(1)] directs the Department to establish in each NPDES permit to include conditions to achieve water quality established under Section 303 of the Clean Water Act, including State narrative criteria for water quality.

**WHOLE EFFLUENT TOXICITY (WET) TEST:**

A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with or through synergistic responses when mixed with receiving stream water.

Applicable ; Under the federal Clean Water Act (CWA) §101(a)(3), requiring WET testing is reasonably appropriate for site-specific Missouri State Operating Permits for discharges to waters of the state issued under the National Pollutant Discharge Elimination System (NPDES). WET testing is also required by 40 CFR 122.44(d)(1). WET testing ensures that the provisions in the 10 CSR 20-6.010(8)(A)7. and the Water Quality Standards 10 CSR 20-7.031(3)(D),(F),(G),(I)2.A & B are being met. Under [10 CSR 20-6.010(8)(A)4], the Department may require other terms and conditions that it deems necessary to assure compliance with the Clean Water Act and related regulations of the Missouri Clean Water Commission. In addition the following MCWL apply: §§644.051.3 requires the Department to set permit conditions that comply with the MCWL and CWA; 644.051.4 specifically references toxicity as an item we must consider in writing permits (along with water quality-based effluent limits, pretreatment, etc...); and 644.051.5 is the basic authority to require testing conditions. WET test will be required by facilities meeting the following criteria:

- Facility is a designated Major.
- Facility continuously or routinely exceeds its design flow.
- Facility (industrial) that alters its production process throughout the year.
- Facility handles large quantities of toxic substances, or substances that are toxic in large amounts.
- Facility has Water Quality-based Effluent Limitations for toxic substances (other than NH<sub>3</sub>)
- Facility is a municipality or domestic discharger with a Design Flow ≥ 22,500 gpd.
- Other – please justify.

**40 CFR 122.41(M) - BYPASSES:**

The federal Clean Water Act (CWA), Section 402 prohibits wastewater dischargers from “bypassing” untreated or partially treated sewage (wastewater) beyond the headworks. A bypass is defined as an intentional diversion of waste streams from any portion of a treatment facility, [40 CFR 122.41(m)(1)(i)]. Additionally, Missouri regulation 10 CSR 20-7.015(9)(G) states a bypass means the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending, to waters of the state. Only under exceptional and specified limitations do the federal regulations allow for a facility to bypass some or all of the flow from its treatment process. Bypasses are prohibited by the CWA unless a permittee can meet all of the criteria listed in 40 CFR 122.41(m)(4)(i)(A), (B), & (C). Any bypasses from this facility are subject to the reporting required in 40 CFR 122.41(l)(6) and per Missouri’s Standard Conditions I, Section B, part 2.b. Additionally, Anticipated Bypasses include bypasses from peak flow basins or similar devices designed for peak wet weather flows.

Not Applicable ; This facility does not anticipate bypassing.

**303(d) LIST & TOTAL MAXIMUM DAILY LOAD (TMDL):**

Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

Not Applicable ; This facility does not discharge to a 303(d) listed stream.

## **Part VI –2013 Water Quality Criteria for Ammonia**

Upcoming changes to the Water Quality Standard for ammonia may require significant upgrades to wastewater treatment facilities.

On August 22, 2013, the U.S. Environmental Protection Agency (EPA) finalized new water quality criteria for ammonia, based on toxicity studies of mussels and gill breathing snails. Missouri's current ammonia criteria are based on toxicity testing of several species, but did not include data from mussels or gill breathing snails. Missouri is home to 69 of North America's mussel species, which are spread across the state. According to the Missouri Department of Conservation nearly two-thirds of the mussel species in Missouri are considered to be "of conservation concern". Nine species are listed as federally endangered, with an additional species currently proposed as endangered and another species proposed as threatened.

The adult forms of mussels that are seen in rivers, lakes, and streams are sensitive to pollutants because they are sedentary filter feeders. They vacuum up many pollutants with the food they bring in and cannot escape to new habitats, so they can accumulate toxins in their bodies and die. But very young mussels, called glochidia, are exceptionally sensitive to ammonia in water. As a result of a citizen suit, the EPA was compelled to conduct toxicity testing and develop ammonia water quality criteria that would be protective if young mussels may be present in a waterbody. These new criteria will apply to any discharge with ammonia levels that may pose a reasonable potential to violate the standards. Nearly all discharging domestic wastewater treatment facilities (cities, subdivisions, mobile home parks, etc.), as well as certain industrial and stormwater dischargers with ammonia in their effluent, will be affected by this change in the regulations.

When new water quality criteria are established by the EPA, states must adopt them into their regulations in order to keep their authorization to issue permits under the National Pollutant Discharge Elimination System (NPDES). States are required to review their water quality standards every three years, and if new criteria have been developed they must be adopted. States may be more protective than the Federal requirements, but not less protective. Missouri does not have the resources to conduct the studies necessary for developing new water quality standards, and therefore our standards mirror those developed by the EPA; however, we will utilize any available flexibility based on actual species of mussels that are native to Missouri and their sensitivity to ammonia.

Many treatment facilities in Missouri are currently scheduled to be upgraded to comply with the current water quality standards. But these new ammonia standards may require a different treatment technology than the one being considered by the permittee. It is important that permittees discuss any new and upcoming requirements with their consulting engineers to ensure that their treatment systems are capable of complying with the new requirements. The Department encourages permittees to construct treatment technologies that can attain effluent quality that supports the EPA ammonia criteria.

Ammonia toxicity varies by temperature and by pH of the water. Assuming a stable pH value, but taking into account winter and summer temperatures, Missouri includes two seasons of ammonia effluent limitations. Current effluent limitations in this permit are:

Summer – 3.7 mg/L daily maximum, 1.4 mg/L monthly average.

Winter – 8.4 mg/L daily maximum, 2.8 mg/L monthly average.

Under the new EPA criteria, where mussels of the family Unionidae are present or expected to be present, the estimated effluent limitations for a facility in a location such as this that discharges to a receiving stream with no mixing will be:

Summer – 1.7 mg/L daily maximum, 0.6 mg/L monthly average.

Winter – 5.6 mg/L daily maximum, 2.1 mg/L monthly average.

Actual effluent limits will depend in part on the actual performance of the facility.

Operating permits for facilities in Missouri must be written based on current statutes and regulations. Therefore permits will be written with the existing effluent limitations until the new standards are adopted. To aid permittees in decision making, an advisory will be added to permit Fact Sheets notifying permittees of the expected effluent limitations for ammonia. When setting schedules of compliance for ammonia effluent limitations, consideration will be given to facilities that have recently constructed upgraded facilities to meet the current ammonia limitations.

For more information on this topic feel free to contact the Missouri Department of Natural Resources, Water Protection Program, Water Pollution Control Branch, Operating Permits Section at (573) 751-1300.

**Part VII – Effluent Limits Determination**

**APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:**

As per Missouri’s Effluent Regulations [10 CSR 20-7.015], the waters of the state are divided into the below listed seven (7) categories. Each category lists effluent limitations for specific parameters, which are presented in each outfall’s Effluent Limitation Table and further discussed in the Derivation & Discussion of Limits section.

- Missouri or Mississippi River [10 CSR 20-7.015(2)]:
- Lake or Reservoir [10 CSR 20-7.015(3)]:
- Losing [10 CSR 20-7.015(4)]:
- Metropolitan No-Discharge [10 CSR 20-7.015(5)]:
- Special Stream [10 CSR 20-7.015(6)]:
- Subsurface Water [10 CSR 20-7.015(7)]:
- All Other Waters [10 CSR 20-7.015(8)]:

**OUTFALL #001 – MAIN FACILITY OUTFALL**

Effluent limitations derived and established in the below Effluent Limitations Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including effluent limitations, of this operating permit.

**EFFLUENT LIMITATIONS TABLE:**

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Modified	Previous Permit Limitations
Flow	MGD	1	*		*	No	*/*
BOD <sub>5</sub>	mg/L	1		45	30	No	45/30
TSS	mg/L	1		45	30	No	45/30
pH	SU	1	6.5 – 9.0			Yes	6.0 – 9.0
Ammonia as N (April 1 – Sept 30)	mg/L	2, 3	3.7		1.4	Yes	3.5/1.5
Ammonia as N (Oct 1 – March 31)	mg/L	2, 3	8.4		2.8	Yes	7.6/2.9
Dissolved Oxygen (DO)**	mg/L	3, 7	*		*	Yes	****
Escherichia coli	***	1, 3		630	126	Yes	Previously Fecal Coliform
Chlorine, Total Residual	µg/L	1, 3	17		8	No	17/8
Oil & Grease (mg/L)	mg/L	1, 3	15		10	No	15/10
Cadmium, TR	µg/L	1, 3	0.6		0.3	Yes	****
Iron, TR	µg/L	1, 7	*		*	Yes	****
Lead, TR	µg/L	1, 3	9.7		4.8	Yes	****
Cyanide, amenable to chlorination	µg/L	1, 3	9.2		3.3	Yes	*/*
Total Phosphorus	mg/L	1, 2	*		*	Yes	****
Total Nitrogen	mg/L	1, 2	*		*	Yes	****
Whole Effluent Toxicity (WET) Test	TUa	1, 9	*			Yes	Pass/Fail

\* - Monitoring requirement only.  
 \*\* - For DO the Daily Maximum is a Daily Minimum and the Monthly Average is a Monthly Average Minimum.  
 \*\*\* - # of colonies/100mL; the Monthly Average for *E. coli* is a geometric mean.  
 \*\*\*\* - Parameter not previously established in previous state operating permit.

**Basis for Limitations Codes:**

- 1. State or Federal Regulation/Law
- 2. Water Quality Standard (includes RPA)
- 3. Water Quality Based Effluent Limits
- 4. Antidegradation Review
- 5. Antidegradation Policy
- 6. Water Quality Model
- 7. Best Professional Judgment
- 8. TMDL or Permit in lieu of TMDL
- 9. WET Test Policy

**OUTFALL #001 – DERIVATION AND DISCUSSION OF LIMITS:**

- **Flow.** In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification.

- **Biochemical Oxygen Demand (BOD<sub>5</sub>).**

– Effluent limitations have been retained from previous state operating permit, please see the **APPLICABLE DESIGNATION OF WATERS OF THE STATE** sub-section of the **Receiving Stream Information.**

- **Total Suspended Solids (TSS).**

– Effluent limitations have been retained from previous state operating permit, please see the **APPLICABLE DESIGNATION OF WATERS OF THE STATE** sub-section of the **Receiving Stream Information.**

- **pH.** – 6.5-9.0 SU. Technology based effluent limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed due to the classification of the receiving stream, therefore the water quality standard must be met at the outfall.

- **Total Ammonia Nitrogen.** Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(4)(B)7.C. & Table B3] default pH 7.8 SU Background total ammonia nitrogen = 0.01 mg/L. No mixing considerations allowed; therefore, WLA = appropriate criterion.

Season	Temp (°C)	pH (SU)	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
Summer	26	7.8	1.5	12.1
Winter	6	7.8	3.1	12.1

**Summer: April 1 – September 30**

Chronic WLA:  $C_e = ((4.65 + 0.0)1.5 - (0.0 * 0.01))/4.65$   
 $C_e = 1.5 \text{ mg/L}$

Acute WLA:  $C_e = ((4.65 + 0.0)12.1 - (0.0 * 0.01))/4.65$   
 $C_e = 12.1 \text{ mg/L}$

$LTA_c = 1.5 \text{ mg/L} (0.777) = 1.17 \text{ mg/L}$

[CV = 0.61, 99<sup>th</sup> Percentile, 30 day avg.]

$LTA_a = 12.1 \text{ mg/L} (0.317) = 3.83 \text{ mg/L}$

[CV = 0.61, 99<sup>th</sup> Percentile]

Use most protective number of  $LTA_c$  or  $LTA_a$ .

MDL = 1.17 mg/L (3.16) = 3.7 mg/L

[CV = 0.61, 99<sup>th</sup> Percentile]

AML = 1.17 mg/L (1.19) = 1.4 mg/L

[CV = 0.61, 95<sup>th</sup> Percentile, n =30]

**Winter: October 1 – March 31**

Chronic WLA:  $C_e = ((4.65 + 0.0)3.1 - (0.0 * 0.01))/4.65$   
 $C_e = 3.1 \text{ mg/L}$

Acute WLA:  $C_e = ((4.65 + 0.0)12.1 - (0.0 * 0.01))/4.65$   
 $C_e = 12.1 \text{ mg/L}$

$LTA_c = 3.1 \text{ mg/L} (0.744) = 2.31 \text{ mg/L}$

[CV = 0.72, 99<sup>th</sup> Percentile, 30 day avg.]

$LTA_a = 12.1 \text{ mg/L} (0.274) = 3.32 \text{ mg/L}$

[CV = 0.72, 99<sup>th</sup> Percentile]

Use most protective number of  $LTA_c$  or  $LTA_a$ .

MDL = 2.31 mg/L (3.65) = 8.4 mg/L

[CV = 0.72, 99<sup>th</sup> Percentile]

AML = 2.31 mg/L (1.23) = 2.8 mg/L

[CV = 0.72, 95<sup>th</sup> Percentile, n =30]

- **Dissolved Oxygen.** Monitoring requirement only. Monitoring for dissolved oxygen is included to determine whether reasonable potential to exceed water quality standards.

- **Escherichia coli (E. coli)**. Monthly average of 126 per 100 ml as a geometric mean and Weekly Average of 630 during the recreational season (April 1 – October 31), to protect Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.031(4)(C). An effluent limit for both monthly average and weekly average is required by 40 CFR 122.45(d).
- **Total Residual Chlorine (TRC)**. Warm-water Protection of Aquatic Life CCC = 10 µg/L, CMC = 19 µg/L [10 CSR 20-7.031, Table A]. Background TRC = 0.0 µg/L.

Chronic WLA:  $C_e = ((4.65 + 0.0)10 - (0.0 * 0.0))/4.65$   
 $C_e = 10 \mu\text{g/L}$

Acute WLA:  $C_e = ((4.65 + 0.0)19 - (0.0 * 0.0))/4.65$   
 $C_e = 19 \mu\text{g/L}$

$LTA_c = 10 (0.527) = 5.3 \mu\text{g/L}$   
 $LTA_a = 19 (0.321) = 6.1 \mu\text{g/L}$

[CV = 0.6, 99<sup>th</sup> Percentile]  
[CV = 0.6, 99<sup>th</sup> Percentile]

Use most protective number of  $LTA_c$  or  $LTA_a$ .

MDL = 5.3 (3.114) = 17 µg/L  
AML = 5.3 (1.552) = 8 µg/L

[CV = 0.6, 99<sup>th</sup> Percentile]  
[CV = 0.6, 95<sup>th</sup> Percentile, n = 4]

- **Oil & Grease**. Conventional pollutant, effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum.
- **Cyanide, Amenable to Chlorination**. Protection of Aquatic Life CCC = 5 µg/L, CMC = 22 µg/L, Background CN = 0 µg/L

Chronic WLA:  $C_e = ((4.65 + 0.0)5 - (0.0 * 0.0))/4.65$   
 $C_e = 5 \mu\text{g/L}$

Acute WLA:  $C_e = ((4.65 + 0.0)22 - (0.0 * 0.0))/4.65$   
 $C_e = 22 \mu\text{g/L}$

$LTA_c = 5 (0.291) = 1.45 \mu\text{g/L}$   
 $LTA_a = 22 (0.158) = 3.5 \mu\text{g/L}$

[CV = 1.345, 99<sup>th</sup> Percentile]  
[CV = 1.345, 99<sup>th</sup> Percentile]

Use most protective number of  $LTA_c$  or  $LTA_a$ .

MDL = 1.45 (6.35) = 9.2 µg/L  
AML = 1.45 (2.27) = 3.3 µg/L

[CV = 1.345, 99<sup>th</sup> Percentile]  
[CV = 1.345, 95<sup>th</sup> Percentile, n = 4]

Note 1 – This effluent limit is below the accepted minimum quantification level (ML). The Department has determined the current acceptable ML of Cyanide amenable to chlorination to be 20 µg/L when using Method #9102A from the U.S.EPA National Exposure Research Laboratory. This method is used to determine the concentration of inorganic cyanide that is present as either soluble salts or complexes in wastes or leachate. The permittee will conduct analyses in accordance with this method, or equivalent, and report actual analytical values. Measured values greater than or equal to the minimum quantification level of 20 µg/L will be considered violations of the permit and values less than the minimum quantification level of 20 µg/L will be considered to be in compliance with the permit limitation. The minimum quantification level does not authorize the discharge of Cyanide in excess of the effluent limits stated in the permit.

- **Total Phosphorus and Total Nitrogen**. Monitoring required for facilities greater than 100,000 gpd design flow per 10 CSR 20-7.015(9)(D)7.
- **Temperature and Phenol**. These parameters were removed from the permit as they did not show a reasonable potential to violate Water Quality standards.

**Metals**

Effluent limitations for total recoverable metals were developed using methods and procedures outlined in the “Technical Support Document For Water Quality-based Toxic Controls” (EPA/505/2-90-001) and “The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From A Dissolved Criterion” (EPA 823-B-96-007). General warm-water fishery criteria apply and a water hardness of 162 mg/L is used in the conversion below.

Due to the absence of contemporaneous effluent and instream data for total recoverable metals, dissolved metals, hardness, and total suspended solids with which to calculate metals translators, partitioning between the dissolved and absorbed phases was assumed to be minimal (Section 5.7.3, EPA/505/2-90-001). Freshwater criteria conversion factors for dissolved metals were used as the metals translator as recommended in guidance (Section 1.3, 1.5.3, and Table 1, EPA 823-B-96-007). If concurrent site-specific data for total recoverable metals, dissolved metals, hardness, and total suspended solids are provided to the Department, partitioning evaluations may be considered and site-specific translators developed.

METAL	CONVERSION FACTORS	
	ACUTE	CHRONIC
Cadmium	0.924	0.889
Lead	0.7207	0.7207

Conversion factors for Cd and Pb are hardness dependent. Values calculated using equation found in Section 1.3 of EPA 823-B-96-007 and hardness = 162 mg/L.

- **Cadmium, Total Recoverable.** Protection of Aquatic Life Chronic Criteria = 0.3 µg/L, Acute Criteria = 7.6 µg/L.

Chronic =  $0.343/0.889 = 0.39 \mu\text{g/L}$

Acute =  $7.6/0.924 = 8.23 \mu\text{g/L}$

Chronic WLA:  $C_e = ((4.65 + 0.0)0.39 - (0.0 * 0.0))/4.65$

$C_e = 0.39 \mu\text{g/L}$

Acute WLA:  $C_e = ((4.65 + 0.0)8.23 - (0.0 * 0.0))/4.65$

$C_e = 8.23 \mu\text{g/L}$

$LTA_c = 0.39(0.527) = 0.2 \mu\text{g/L}$

[CV = 0.6, 99<sup>th</sup> Percentile]

$LTA_a = 8.23 (0.321) = 2.6 \mu\text{g/L}$

[CV = 0.6, 99<sup>th</sup> Percentile]

Use most protective number of  $LTA_c$  or  $LTA_a$ .

MDL =  $0.2 (3.114) = 0.6 \mu\text{g/L}$

[CV = 0.6, 99<sup>th</sup> Percentile]

AML =  $0.2 (1.552) = 0.3 \mu\text{g/L}$

[CV = 0.6, 95<sup>th</sup> Percentile, n = 4]

- **Lead, Total Recoverable.** Protection of Aquatic Life Chronic Criteria = 4.238 µg/L, Acute Criteria = 108.6942 µg/L.

Chronic =  $4.238/0.7207 = 5.88 \mu\text{g/L}$

Acute =  $108.6942/0.7207 = 150.82 \mu\text{g/L}$

Chronic WLA:  $C_e = ((4.65 + 0.0)5.88 - (0.0 * 0.0))/4.65$

$C_e = 5.88 \mu\text{g/L}$

Acute WLA:  $C_e = ((4.65 + 0.0)150.82 - (0.0 * 0.0))/4.65$

$C_e = 150.82 \mu\text{g/L}$

$LTA_c = 5.88 (0.527) = 3.1 \mu\text{g/L}$

[CV = 0.6, 99<sup>th</sup> Percentile]

$LTA_a = 150.82 (0.321) = 48.4 \mu\text{g/L}$

[CV = 0.6, 99<sup>th</sup> Percentile]

Use most protective number of  $LTA_c$  or  $LTA_a$ .

MDL =  $3.1 (3.114) = 9.7 \mu\text{g/L}$

[CV = 0.6, 99<sup>th</sup> Percentile]

AML =  $3.1(1.552) = 4.8 \mu\text{g/L}$

[CV = 0.6, 95<sup>th</sup> Percentile, n = 4]

**Iron, Total Recoverable.** Monitoring requirement only. This facility receives process wastewater from metal fabrication facilities. Monitoring is required to determine if reasonable potential exists for this facility's discharge to exceed water quality standards for Iron, Total Recoverable.

**Whole Effluent Toxicity**

**Acute Whole Effluent Toxicity.** Monitoring requirement only. Monitoring is required to determine if reasonable potential exists for this facility's discharge to exceed water quality standards. /The permit writer has determined that this facility has reasonable potential to cause toxicity in the receiving stream.

Acute and/or Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Waters of the State lacking designated uses, Class C, Class P (with default Mixing Considerations), or Lakes [10 CSR 20-7.031(5)(A)4.B.(IV)(b)] are 100%, 50%, 25%, 12.5%, & 6.25%.

**Minimum Sampling and Reporting Frequency Requirements.**

PARAMETER	SAMPLING FREQUENCY	REPORTING FREQUENCY
Flow	once/day	once/month
BOD <sub>5</sub>	five/month	once/month
TSS	five/month	once/month
pH	five/month	once/month
Ammonia as N	five/month	once/month
<i>E. coli</i>	five/month	once/month
Total Residual Chlorine	five/month	once/month
Dissolved Oxygen	five/month	once/month
Oil & Grease	once/month	once/month
Cyanide	once/quarter	once/quarter
Cadmium, TR	once/quarter	once/quarter
Lead, TR	once/quarter	once/quarter
Iron, TR	once/quarter	once/quarter
Total Phosphorus	once/quarter	once/quarter
Total Nitrogen	once/quarter	once/quarter

**Sampling Frequency Justification:**

Sampling and Reporting Frequency was retained from previous permit.

**Sampling Type Justification**

As per 10 CSR 20-7.015, BOD<sub>5</sub>, TSS, and WET test samples collected for mechanical plants shall be a 24 hour composite sample. Grab samples, however, must be collected for pH, Ammonia as N, *E. coli*, TRC, Oil & Grease, Cyanide, Cadmium, Lead, Iron, and Total Phosphorus. This is due to the holding time restriction for *E. coli*, the volatility of Ammonia and TRC, and the fact that pH and DO cannot be preserved and must be sampled in the field. As Ammonia, Oil & Grease, Cyanide, Cadmium, Lead, Iron, and Total Phosphorus samples must be immediately preserved, these samples are to be collected as a grab.

**WET Test Sampling Frequency Justification.** WET Testing schedules and intervals are established in accordance with the Department's Permit Manual; Section 5.2 *Effluent Limits / WET Testing for Compliance Bio-monitoring*. It is recommended that WET testing be conducted during the period of lowest stream flow.

**Acute Whole Effluent Toxicity**

- No less than **ONCE/YEAR:**
  - Facility is designated as a Major facility or has a design flow  $\geq$  1.0 MGD.
  - Facility continuously or routinely exceeds their design flow.
  - Facility exceeds its design population equivalent (PE) for BOD<sub>5</sub> whether or not its design flow is being exceeded.
  - Facility has Water Quality-based effluent limitations for toxic substances (other than NH<sub>3</sub>).

**OUTFALL #002 – IRRIGATION STORAGE BASIN EMERGENCY DISCHARGE**

Effluent limitations derived and established in the below Effluent Limitations Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including effluent limitations, of this operating permit.

**EFFLUENT LIMITATIONS TABLE:**

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Modified	Previous Permit Limitations
Flow	MGD	1	*		*	No	*/*
BOD <sub>5</sub>	mg/L	1		45	30	No	45/30
TSS	mg/L	1		45	30	No	45/30
pH	SU	1	6.5 – 9.0			Yes	6.0 – 9.0
Ammonia as N (April 1 – Sept 30)	mg/L	2, 3	3.7		1.4	Yes	3.5/1.5
Ammonia as N (Oct 1 – March 31)	mg/L	2, 3	8.4		2.8	Yes	7.6/2.9
Escherichia coli	**	1, 3		630	126	Yes	Previously Fecal Coliform
Chlorine, Total Residual	µg/L	1, 3	17		8	No	17/8
Oil & Grease (mg/L)	mg/L	1, 3	15		10	No	15/10

\* - Monitoring requirement only.

\*\* - # of colonies/100mL; the Monthly Average for *E. coli* is a geometric mean.

**Basis for Limitations Codes:**

- |  |                                   |
|--|-----------------------------------|
| 1. State or Federal Regulation/Law       | 6. Water Quality Model            |
| 2. Water Quality Standard (includes RPA) | 7. Best Professional Judgment     |
| 3. Water Quality Based Effluent Limits   | 8. TMDL or Permit in lieu of TMDL |
| 4. Antidegradation Review                | 9. WET Test Policy                |
| 5. Antidegradation Policy                |                                   |

**OUTFALL #002 – DERIVATION AND DISCUSSION OF LIMITS:**

- **Flow.** In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification.
- **Biochemical Oxygen Demand (BOD<sub>5</sub>).**
  - Effluent limitations have been retained from previous state operating permit, please see the **APPLICABLE DESIGNATION OF WATERS OF THE STATE** sub-section of the **Receiving Stream Information.**
- **Total Suspended Solids (TSS).**
  - Effluent limitations have been retained from previous state operating permit, please see the **APPLICABLE DESIGNATION OF WATERS OF THE STATE** sub-section of the **Receiving Stream Information.**
- **pH.** – 6.5-9.0 SU. Technology based effluent limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed due to the classification of the receiving stream, therefore the water quality standard must be met at the outfall.
- **Total Ammonia Nitrogen.** This outfall receives water that normally is discharged from Outfall #001; therefore the same Ammonia limitations for Outfall #001 are applied to this outfall.
- **Dissolved Oxygen.** Monitoring requirement only. Monitoring for dissolved oxygen is included to determine whether reasonable potential to exceed water quality standards.

- **Escherichia coli (E. coli)**. Monthly average of 126 per 100 ml as a geometric mean and Weekly Average of 630 during the recreational season (April 1 – October 31), to protect Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.031(4)(C). An effluent limit for both monthly average and weekly average is required by 40 CFR 122.45(d).
- **Total Residual Chlorine (TRC)**. This outfall receives water that normally is discharged from Outfall #001; therefore the same TRC limitations for Outfall #001 are applied to this outfall.
- **Oil & Grease**. Conventional pollutant, effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum.

**Methylene Chloride, Phenol, Temperature** – These parameters did not show a reasonable potential to violate Water Quality Standards and were removed from the permit.

**Minimum Sampling and Reporting Frequency Requirements.**

PARAMETER	SAMPLING FREQUENCY	REPORTING FREQUENCY
Flow	once/day/event	once/month
BOD <sub>5</sub>	once/week/event	once/month
TSS	once/week/event	once/month
pH	once/week/event	once/month
Ammonia as N	once/week/event	once/month
<i>E. coli</i>	once/week/event	once/month
Total Residual Chlorine	once/week/event	once/month
Oil & Grease	once/week/event	once/month

**Sampling Frequency Justification:**

Sampling and Reporting Frequency was retained from previous permit.

**Sampling Type Justification**

As per 10 CSR 20-7.015, BOD<sub>5</sub> and TSS collected for lagoons may be grab samples. Grab samples must be collected for pH, Ammonia as N, *E. coli*, TRC, and Oil & Grease. This is due to the holding time restriction for *E. coli*, the volatility of Ammonia and TRC, and the fact that pH cannot be preserved and must be sampled in the field. As Ammonia and Oil & Grease samples must be immediately preserved with acid, these samples are to be collected as a grab. For further information on sampling and testing methods please review 10 CSR 20-7.015(9)(A) 2.

**PERMITTED FEATURE #003 – STORAGE BASIN**

Irrigation limitations derived and established in the below Irrigation Limitations Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including effluent limitations, of this operating permit

**STORAGE BASIN TABLE:**

PARAMETER	UNIT	BASIS FOR LIMITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MODIFIED	PREVIOUS PERMIT LIMITATIONS
Freeboard	feet	1	*			No	*
Precipitation	inches	1	*			No	*
Total Kjeldahl Nitrogen	mg/L	1	*			Yes	**
Nitrate Nitrogen as N	mg/L	1	*			Yes	**
Monitoring Frequency	Please see Minimum Sampling and Reporting Frequency Requirements in the Derivation and Discussion Section below.						

\* - Monitoring requirement only.

\*\* - Parameter not previously established in previous state operating permit.

**Basis for Limitations Codes:**

- |  |                                   |
|--|-----------------------------------|
| 1. State or Federal Regulation/Law       | 6. Water Quality Model            |
| 2. Water Quality Standard (includes RPA) | 7. Best Professional Judgment     |
| 3. Water Quality Based Effluent Limits   | 8. TMDL or Permit in lieu of TMDL |
| 4. Antidegradation Review                | 9. WET Test Policy                |
| 5. Antidegradation Policy                |                                   |

**PERMITTED FEATURE #003 – DERIVATION AND DISCUSSION OF LIMITS:**

- **Freeboard.** Monitoring requirement only.
- **Precipitation.** Monitoring requirement only.
- **Total Kjeldahl Nitrogen.** Monitoring requirement only. Monitoring for Total Kjeldahl Nitrogen as N is included to determine nutrient loading rates on the land application fields. [10 CSR 20-8.020(15)(F)7.]
- **Nitrate Nitrogen as N.** Monitoring requirement only. Monitoring for Nitrate Nitrogen as N is included to determine nutrient loading rates on the land application fields. [10 CSR 20-8.020(15)(F)7.]

**Minimum Sampling and Reporting Frequency Requirements.**

PARAMETER	SAMPLING FREQUENCY	REPORTING FREQUENCY
Freeboard	once/month	once/year
Precipitation	once/day	once/year
Total Kjeldahl Nitrogen	once/year	once/year
Nitrate Nitrogen as N	once/year	once/year

**PERMITTED FEATURE #004 – IRRIGATION FIELD**

PARAMETER	UNIT	BASIS FOR LIMITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MODIFIED	PREVIOUS PERMIT LIMITATIONS
Irrigation Period	hours	1	*			No	*
Volume Irrigated	gallons	1	*			No	*
Application Area	acres	1	*			No	*
Application Rate	inches	1	*			No	*
Monitoring Frequency	Please see Minimum Sampling and Reporting Frequency Requirements in the Derivation and Discussion Section below.						

\* - Monitoring requirement only.

\*\* - Parameter not previously established in previous state operating permit.

\*\*\* - # of colonies/100mL; the Monthly Average for Fecal Coliform is a geometric mean.

**Basis for Limitations Codes:**

- |  |                                   |
|--|-----------------------------------|
| 1. State or Federal Regulation/Law       | 6. Water Quality Model            |
| 2. Water Quality Standard (includes RPA) | 7. Best Professional Judgment     |
| 3. Water Quality Based Effluent Limits   | 8. TMDL or Permit in lieu of TMDL |
| 4. Antidegradation Review                | 9. WET Test Policy                |
| 5. Antidegradation Policy                |                                   |

- **Irrigation Period.** Monitoring requirement only. Monitoring for the Irrigation Period is included to determine if proper application is occurring on the land application fields.
- **Volume Irrigated.** Monitoring requirement only. Monitoring for the Volume Irrigated is included to determine if proper application is occurring on the land application fields.
- **Application Area.** Monitoring requirement only. Monitoring for the Application Area is included to determine if proper application is occurring on the land application fields.
- **Application Rate.** Monitoring requirement only. Monitoring for the Application Rate is included to determine if proper application is occurring on the land application fields.

**Minimum Sampling and Reporting Frequency Requirements.**

PARAMETER	SAMPLING FREQUENCY	REPORTING FREQUENCY
Irrigation Period	once/day	once/year
Volume Irrigated	once/day	once/year
Application Area	once/day	once/year
Application Rate	once/day	once/year

**Sampling Frequency Justification:**

Sampling and Reporting Frequency was retained from previous permit.

**Sampling Type Justification**

Due to the monitoring being conducted during irrigation, totals are more appropriate.

**PERMITTED FEATURE #005 – INSTREAM MONITORING (DOWNSTREAM)**

**INSTREAM MONITORING TABLE:**

PARAMETER	UNIT	BASIS FOR LIMITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MODIFIED	PREVIOUS PERMIT LIMITATIONS
Hardness, TR	feet	7	*		*	YES	**
Monitoring Frequency	Please see Minimum Sampling and Reporting Frequency Requirements in the Derivation and Discussion Section below.						

\* - Monitoring requirement only.

\*\* - Parameter not previously established in previous state operating permit.

**Basis for Limitations Codes:**

- |  |                                   |
|--|-----------------------------------|
| 1. State or Federal Regulation/Law       | 6. Water Quality Model            |
| 2. Water Quality Standard (includes RPA) | 7. Best Professional Judgment     |
| 3. Water Quality Based Effluent Limits   | 8. TMDL or Permit in lieu of TMDL |
| 4. Antidegradation Review                | 9. WET Test Policy                |
| 5. Antidegradation Policy                |                                   |

**PERMITTED FEATURE #005 – DERIVATION AND DISCUSSION OF LIMITS:**

- **Hardness, Total.** Monitoring requirement only. This data will provide the ability to more accurately calculate Water Quality Standards during the next permit renewal.

**Minimum Sampling and Reporting Frequency Requirements.**

PARAMETER	SAMPLING FREQUENCY	REPORTING FREQUENCY
Hardness, Total	once/month	once/month

**Sampling Frequency Justification:**

Monthly testing will provide adequate data points for future limit calculations.

**Sampling Type Justification**

As hardness samples must be immediately preserved with acid, this sample is to be collected as a grab.

**Part VIII – Cost Analysis for Compliance**

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a “finding of affordability” upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. Where permit modifications, permit renewals, or sewer extensions do not impose new requirements and/or do not require rate increases, the cost analysis for compliance may receive a less detailed review. Permits that do not include new requirements may be deemed affordable.

Applicable; The Department is required to determine findings of affordability because the permit applies to a **combined or separate sanitary sewer system for a publically-owned treatment works.**

**Cost Analysis for Compliance** - The Department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of Department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects that the Department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644.145.3. See **Appendix – Cost Analysis for Compliance.**

## **Part IX– Administrative Requirements**

On the basis of preliminary staff review and the application of applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the operating permit. The proposed determinations are tentative pending public comment.

### **PERMIT SYNCHRONIZATION:**

The Department of Natural Resources is currently undergoing a synchronization process for operating permits. Permits are normally issued on a five-year term, but to achieve synchronization many permits will need to be issued for less than the full five years allowed by regulation. The intent is that all permits within a watershed will move through the Watershed Based Management (WBM) cycle together will all expire in the same fiscal year. This will allow further streamlining by placing multiple permits within a smaller geographic area on public notice simultaneously, thereby reducing repeated administrative efforts. This will also allow the Department to explore a watershed based permitting effort at some point in the future. This permit, when issued, will expire in the 4<sup>th</sup> Quarter 2019.

### **PUBLIC NOTICE:**

The Department shall give public notice that a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest in and water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and permittee must be notified of the denial in writing. The Department must issue public notice of a pending operating permit or of a new or reissued statewide general permit. The public comment period is the length of time not less than 30 days following the date of the public notice which interested persons may submit written comments about the proposed permit. For persons wanting to submit comments regarding this proposed operating permit, then please refer to the Public Notice page located at the front of this draft operating permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- The Public Notice period for this operating permit was from May 9, 2014 to June 9, 2014. Responses to the Public Notice of this operating permit did warrant the modification of the Fact Sheet. The Reasonable Potential Analysis Appendix of the Fact Sheet was updated to show two samples analyzed for Lead and Cadmium. The permit was again on Public Notice from August 15, 2014 to September 15, 2014. No responses received from that public notice period. Due to a change to the land application requirement section, this permit is being placed on public notice again. The Public Notice period for this operating permit is tentatively scheduled to begin in April 2015 or is in process. No responses were received from the Public Notice period from March 27, 2015 to April 27, 2015.

**DATE OF FACT SHEET:** APRIL 18, 2014; **UPDATED:** AUGUST 4, 2014; **UPDATED** MARCH 10, 2015

### **COMPLETED BY:**

**BRANT FARRIS, ENVIRONMENTAL SPECIALIST III**  
**MISSOURI DEPARTMENT OF NATURAL RESOURCES**  
**WATER PROTECTION PROGRAM**  
**OPERATING PERMITS SECTION - DOMESTIC WASTEWATER UNIT**  
**(660) 385-8061**  
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**Appendices**

**APPENDIX - CLASSIFICATION WORKSHEET:**

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
Maximum Population Equivalent (P.E.) served (Max 10 pts.)	1 pt./10,000 PE or major fraction thereof.	3
Maximum: 10 pt Design Flow (avg. day) or peak month; use greater (Max 10 pts.)	1 pt. / MGD or major fraction thereof.	3
<b>EFFLUENT DISCHARGE RECEIVING WATER SENSITIVITY:</b>		
Missouri or Mississippi River	0	
All other stream discharges except to losing streams and stream reaches supporting whole body contact	1	
Discharge to lake or reservoir outside of designated whole body contact recreational area	2	
Discharge to losing stream, or stream, lake or reservoir area supporting whole body contact recreation	3	3
<b>PRELIMINARY TREATMENT - Headworks</b>		
Screening and/or comminution	3	3
Grit removal	3	3
Plant pumping of main flow (lift station at the headworks)	3	3
<b>PRIMARY TREATMENT</b>		
Primary clarifiers	5	
Combined sedimentation/digestion	5	
Chemical addition (except chlorine, enzymes)	4	
<b>REQUIRED LABORATORY CONTROL – performed by plant personnel (highest level only)</b>		
Push – button or visual methods for simple test such as pH, Settleable solids	3	
Additional procedures such as DO, COD, BOD, titrations, solids, volatile content	5	
More advanced determinations such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	7	7
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph	10	
<b>ALTERNATIVE FATE OF EFFLUENT</b>		
Direct reuse or recycle of effluent	6	
Land Disposal – low rate	3	3
High rate	5	
Overland flow	4	
<b>Total from page ONE (1)</b>	----	28

**APPENDIX - CLASSIFICATION WORKSHEET (CONTINUED):**

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
<b>VARIATION IN RAW WASTE (highest level only) (DMR exceedances and Design Flow exceedances)</b>		
Variation do not exceed those normally or typically expected	0	
Recurring deviations or excessive variations of 100 to 200 % in strength and/or flow	2	
Recurring deviations or excessive variations of more than 200 % in strength and/or flow	4	4
Raw wastes subject to toxic waste discharge	6	
<b>SECONDARY TREATMENT</b>		
Trickling filter and other fixed film media with secondary clarifiers	10	
Activated sludge with secondary clarifiers (including extended aeration and oxidation ditches)	15	15
Stabilization ponds without aeration	5	5
Aerated lagoon	8	
Advanced Waste Treatment Polishing Pond	2	
Chemical/physical – without secondary	15	
Chemical/physical – following secondary	10	
Biological or chemical/biological	12	
Carbon regeneration	4	
<b>DISINFECTION</b>		
Chlorination or comparable	5	5
Dechlorination	2	2
On-site generation of disinfectant (except UV light)	5	
UV light	4	
<b>SOLIDS HANDLING - SLUDGE</b>		
Solids Handling Thickening	5	
Anaerobic digestion	10	
Aerobic digestion	6	
Evaporative sludge drying	2	2
Mechanical dewatering	8	8
Solids reduction (incineration, wet oxidation)	12	
Land application	6	6
<b>Total from page TWO (2)</b>	----	47
<b>Total from page ONE (1)</b>	---	28
<b>Grand Total</b>	---	75

- A: 71 points and greater
- B: 51 points – 70 points
- C: 26 points – 50 points
- D: 0 points – 25 points

**APPENDIX – RPA RESULTS:**

**OUTFALL #001**

Parameter	CMC*	RWC Acute*	CCC*	RWC Chronic*	n**	Range max/min	CV***	MF	RP Yes/No
Total Ammonia as Nitrogen (Summer) mg/L	12.1	7.22	1.5	7.22	26.00	3.4/0.1	0.61	2.12	YES
Total Ammonia as Nitrogen (Winter) mg/L	12.1	7.88	3.1	7.88	30.00	3.5/0.06	0.72	2.25	YES
Cadmium, Total Recoverable	8.2	15.89	0.4	15.89	2.00	2.5/2.5	0.60	6.36	YES
Lead, Total Recoverable	20.8	33.69	5.9	33.69	2.00	5.3/2.5	0.60	6.36	YES
Cyanide	22.0	174.64	5.0	174.64	21.00	55/2.5	1.35	3.18	YES
Phenol	102,000	80.68	2560	80.68	20	80/25	0.44	1.01	NO

N/A – Not Applicable

\* - Units are (µg/L) unless otherwise noted.

\*\* - If the number of samples is 10 or greater, then the CV value must be used in the WQBEL for the applicable constituent. If the number of samples is < 10, then the default CV value must be used in the WQBEL for the applicable constituent.

\*\*\* - Coefficient of Variation (CV) is calculated by dividing the Standard Deviation of the sample set by the Mean of the same sample set.

RWC – Receiving Water Concentration. It is the concentration of a toxicant or the parameter toxicity in the receiving water after mixing (if applicable).

n – Is the number of samples.

MF – Multiplying Factor. 99% Confidence Level and 99% Probability Basis.

RP – Reasonable Potential. It is where an effluent is projected or calculated to cause an excursion above a water quality standard based on a number of factors including, as a minimum, the four factors listed in 40 CFR 122.44(d)(1)(ii).

Reasonable Potential Analysis is conducted as per (TSD, EPA/505/2-90-001, Section 3.3.2). A more detailed version including calculations of this RPA is available upon request.

**APPENDIX – COST ANALYSIS FOR COMPLIANCE:**

**Missouri Department of Natural Resources  
Water Protection Program  
Cost Analysis for Compliance  
(In accordance with RSMo 644.145)**

**Chillicothe WWTP, Permit Renewal  
City of Chillicothe  
Missouri State Operating Permit #MO-0108227**

Section 644.145 RSMo requires DNR to make a “finding of affordability” when “issuing permits under” or “enforcing provisions of” state or federal clean water laws “pertaining to any portion of a combined or separate sanitary sewer system for publicly-owned treatment works.”

The Department is required to issue a permit with final effluent limits in accordance with 644.051.1.(1) RSMo, 644.051.1.(2) RSMo, and the Clean Water Act. The practical result of many affordability findings will be to allow longer compliance schedules to mitigate adverse impact to distressed populations resulting from the costs of upgrading the wastewater treatment facility.

This cost analysis is based on data available to the Department as provided by the permittee and data obtained from readily available sources. A request for information was sent to the permittee, seeking data for input into this analysis prior to its development. For the most accurate analysis, it is essential that the permittee provides the Department with current information about the City’s financial and socioeconomic situation.

**Facility Description:** Single-cell peak flow detention basin / influent pump station / dual channel grit removal / mechanical screening / bar screen / two oxidation ditches / three secondary clarifiers / chlorination / dechlorination / partial irrigation / two sludge holding tanks / four sludge sand filter drying beds/ sludge is land applied / single cell storage basin / wastewater irrigation / center pivot field

Receiving Stream:	Unnamed tributary to Coon Creek (U)
First Classified Stream and ID:	Grand River (P) (430)
USGS Basin & Sub-watershed No.:	(10280101-1708)

Residential Connections:	<u>3256</u>
Commercial Connections:	<u>588</u>
Total Connections: <sup>1</sup>	<u>3844</u>

**New Permit Requirements or Requirements Now Being Enforced:**

Permit No. #MO-0108227 expired on September 18, 2013. The Department received an application for renewal on March 21, 2013. The permit requires compliance with new effluent limitations for Total Recoverable Cadmium, Total Recoverable Lead, and Cyanide. The permit also includes instream monitoring for Total Hardness, sampling requirements for Total Recoverable Iron, Total Recoverable Lead and Total Recoverable Cadmium that were not included in the previous permit, Dissolved Oxygen monitoring, and Total Kjeldahl Nitrogen and Nitrate Nitrogen as N.

**Anticipated Costs Associated with Complying with the New Requirements:**

No additional costs are estimated for the facility to meet the effluent limitations for Total Recoverable Cadmium, Total Recoverable Lead, and Cyanide as the facility can meet the new limits by evaluating industrial contributions to the wastewater treatment collection system and enact more stringent pretreatment limitations if

necessary. Estimated costs for new monitoring of Total Hardness is \$240 per year, Total Recoverable Iron is \$120, Total Recoverable Lead is \$120, Total Recoverable Cadmium is \$124, Total Kjeldahl Nitrogen is \$33, and Nitrate Nitrogen is \$20. These costs were calculated based on if the facility had to send tests for these items to a laboratory instead of conducting the tests in-house. The facility already has to conduct Dissolved Oxygen measurements, so there will be no significant costs to the facility for the added monitoring.

**(1) A community’s financial capability and ability to raise or secure necessary funding;**

Current User Rates: <sup>1</sup>	<u>\$24.25</u>
Rate Capacity or Pay as You Go Option:	<u>NA</u>
Municipal Bond Rating (if applicable):	<u>NA</u>
Bonding Capacity:	<u>NA</u>
<i>(General Obligation Bond capacity allowed by constitution: cities=up to 20% of taxable tangible property sewer districts=up to 5% of taxable tangible property)</i>	
Current outstanding debt: <sup>1</sup>	<u>\$1,302,000</u>
Other indicators:	<u>NA</u>

The Department considers Integrated Planning a very important tool when balancing multiple new environmental requirements. Please contact the community services coordinator by email at [Hannah.Humphrey@dnr.mo.gov](mailto:Hannah.Humphrey@dnr.mo.gov) for further guidance on financial planning. The Department has relied heavily on readily available data to complete this analysis.

**(2) Affordability of pollution control options for the individuals or households of the community;**

Current annual operating costs (exclude depreciation): <sup>1</sup>	<u>\$904,216</u>
Current monthly user rate: <sup>1</sup>	<u>\$24.25</u>
Estimated capital cost of pollution control options:	<u>\$0</u>
Annual Cost of Additional (Operating Costs & Debt Service):	<u>\$657</u>
Estimated Resulting User Rate and/or Cost per Household per month:	<u>\$24.43</u>
Median Household Income: <sup>4</sup>	<u>\$37,359</u>
Rate and/or Cost per Household as a Percent of Median Household Income: <sup>4</sup>	<u>0.8%</u>

If increase user rates are required to finance the new permit requirements, the rates could be 0.8 % of the MHI, and result in a low financial impact.

**(3) An evaluation of the overall costs and environmental benefits of the control technologies;**

The new permit limits are not anticipated to cost any additional money. The environmental benefit of effluent limitations for Total Recoverable Cadmium, Total Recoverable Lead, and Cyanide is improving conditions for aquatic life in the receiving stream as these parameters are toxic to aquatic life.

**(4) Inclusion of ongoing costs of operating and maintaining the existing wastewater collection and treatment system, including payments on outstanding debts for wastewater collection and treatment systems when calculating projected rates:**

The community reported their outstanding debt for their current wastewater collection and treatment systems to be \$1,302,000. The community did not provide the Department with information regarding how much each user pays monthly toward payments on the current outstanding debt

**(5) An inclusion of ways to reduce economic impacts on distressed populations in the community, including but not limited to low and fixed income populations. This requirement includes but is not limited to:**

- (a) Allowing adequate time in implementation schedules to mitigate potential adverse impacts on distressed populations resulting from the costs of the improvements and taking into consideration local community economic considerations.
- (b) Allowing for reasonable accommodations for regulated entities when inflexible standards and fines would impose a disproportionate financial hardship in light of the environmental benefits to be gained.

Potentially Distressed Populations – City of Chillicothe	
Unemployment <sup>2</sup>	6.0%
Median Household Income (MHI) <sup>3</sup>	\$37,359
Percent Change in MHI (1990-2011)	+76.9%
Percent Population Growth/Decline (1990-2011) <sup>4</sup>	+2.6%
Change in Median Age in Years (1990-2011)	+3
Percent of Households in Poverty <sup>5</sup>	22.6%
Percent of Households Relying on Food Stamps	12.5%

Opportunity for cost savings or cost avoidance:

None noted

Opportunity for changes to implementation/compliance schedule, new technology, site specific criteria, use attainability analysis:

None noted

**(6) An assessment of other community investments relating to environmental improvements;**

The City reported that in since 2008, the City has spent over \$3,454,100 on sewer collection system rehabilitation. The facility was provided \$2,075,000 in ARRA Grant Match money for the work done in 2010-2011.

- (7) **An assessment of factors set forth in the United States Environmental Protection Agency's guidance, including but not limited to the "Combined Sewer Overflow Guidance for Financial Capability Assessment and Schedule Development" that may ease the cost burdens of implementing wet weather control plans, including but not limited to small system considerations, the attainability of water quality standards, and the development of wet weather standards;**

**Secondary indicators for consideration:**

Indicators	Strong (3 points)	Mid-Range (2 points)	Weak (1 point)	Score
Bond Rating Indicator	Above BBB or Baa	BBB or Baa	Below BBB or Baa	Not provided
Overall Net Debt as a % of Full Market Property Value	Below 2%	2% - 5%	Above 5%	Not provided
Unemployment Rate	>1% below Missouri average	± 1% of Missouri average	>1% above Missouri average	3
Median Household Income	More than 25% above Missouri MHI	± 25% of Missouri MHI	More than 25% below Missouri average	2
Percent of Households in Poverty*	>10% below Missouri average of 14.0%	± 10% of Missouri average of 14.0%	>10% above Missouri average of 14.0%	2
Percent of Households Relying on Food Stamps*	>5% below Missouri average of 11.4%	± 5% of Missouri average of 11.4%	>5% above Missouri average of 11.4%	2
Property Tax Revenues as a % of Full Market Property Value	Below 2%	2% - 4%	Above 4%	Not provided
Property Tax Collection Rate	Above 98%	94% - 98%	Below 94%	Not provided

Secondary Indicators Average Score: 2.25

Residential Indicator (from Criteria #2 above): 0.8%

**Financial Capability Matrix:**

Financial Capability Indicators Score from above ↓	Residential Indicator (User rate as a % of MHI)		
	Low (Below 1%)	Mid-Range (Between 1.0% and 2.0%)	High (Above 2.0%)
Weak (below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (1.5 – 2.5)	Low Burden	Medium Burden	High Burden
Strong (above 2.5)	Low Burden	Low Burden	Medium Burden

Estimated Financial Burden: Low Burden

The resulting financial burden has been determined by comparing the Financial Capability Indicator score (FC) with the Residential Indicator (RI) stated in Criteria #2.

- (8) **An assessment of any other relevant local community economic condition.**

The community did not report any other relevant local economic conditions.

## **Conclusion and Finding**

As a result of new regulations, the Department is proposing modifications to the current operating permit that will require the WWTF to meet new effluent limitations for Total Recoverable Cadmium, Total Recoverable Lead, and Cyanide. The permit also includes instream monitoring for Total Hardness, sampling requirements for Total Recoverable Iron, Total Recoverable Lead and Total Recoverable Cadmium that were not included in the previous permit, Dissolved Oxygen monitoring, and Total Kjeldahl Nitrogen and Nitrate Nitrogen as N. The Department identified the actions for which cost analysis for compliance is required under Section 644.145 RSMo.

The Department estimates the new sampling requirements will cost the City of Chillicothe an estimated \$657 per year. Should this cost be financed through user fees, it may require user fees of 0.8% of the community's MHI.

The Department considered all eight (8) of the criteria presented in subsection 644.145.3 when evaluating the affordability of the relevant actions. It is anticipated by the Department that cost per user will be increased to an affordable amount which mitigates the cost of compliance of the new requirements. This determination is based on readily available data and may overestimate the financial impact on the community.

## Reference Page

- <sup>1</sup> The information was obtained from the Affordability Information Request form.
- <sup>2</sup> Unemployment data from Missouri Department of Economic Development (July 2014) – <http://www.missourieconomy.org/pdfs/ure11407.pdf>
- <sup>3</sup> Median Household Income data from American Community Survey – Median income in the past 12 months – <http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?ftp=table>
- <sup>4</sup> 2011 Census Bureau Population Data - <http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?ftp=table>  
2000 Census Bureau Population Data - <http://www.census.gov/popest/data/cities/totals/2009/tables/SUB-EST2009-04-29.xls>  
1990 Census Bureau Population Data - <http://www.census.gov/prod/cen1990/cp1/cp-1-27.pdf>
- <sup>5</sup> Poverty data – American Community Survey - <http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>



STANDARD CONDITIONS FOR NPDES PERMITS  
ISSUED BY  
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION  
REVISED  
AUGUST 1, 2014

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

## Part I – General Conditions

### Section A – Sampling, Monitoring, and Recording

1. **Sampling Requirements.**
  - a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
  - b. All samples shall be taken at the outfall(s) or Missouri Department of Natural Resources (Department) approved sampling location(s), and unless specified, before the effluent joins or is diluted by any other body of water or substance.
2. **Monitoring Requirements.**
  - a. Records of monitoring information shall include:
    - i. The date, exact place, and time of sampling or measurements;
    - ii. The individual(s) who performed the sampling or measurements;
    - iii. The date(s) analyses were performed;
    - iv. The individual(s) who performed the analyses;
    - v. The analytical techniques or methods used; and
    - vi. The results of such analyses.
  - b. If the permittee monitors any pollutant more frequently than required by the permit at the location specified in the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reported to the Department with the discharge monitoring report data (DMR) submitted to the Department pursuant to Section B, paragraph 7.
3. **Sample and Monitoring Calculations.** Calculations for all sample and monitoring results which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.
4. **Test Procedures.** The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 unless alternates are approved by the Department. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. The facility shall ensure that the selected methods are able to quantify the presence of pollutants in a given discharge at concentrations that are low enough to determine compliance with Water Quality Standards in 10 CSR 20-7.031 or effluent limitations unless provisions in the permit allow for other alternatives. A method is “sufficiently sensitive” when; 1) the method minimum level is at or below the level of the applicable water quality criterion for the pollutant or, 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility’s discharge is high enough that the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015. These methods are also required for parameters that are listed as monitoring only, as the data collected may be used to determine if limitations need to be established. A permittee is responsible for working with their contractors to ensure that the analysis performed is sufficiently sensitive.
5. **Record Retention.** Except for records of monitoring information required by the permit related to the permittee’s sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR part 503), 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 the permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

6. **Illegal Activities.**
  - a. The Federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four (4) years, or both.
  - b. The Missouri Clean Water Law provides that any person or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than six (6) months, or by both. Second and successive convictions for violation under this paragraph by any person shall be punished by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

### Section B – Reporting Requirements

1. **Planned Changes.**
  - a. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility when:
    - i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
    - ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1);
    - iii. The alteration or addition results in a significant change in the permittee’s sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
    - iv. Any facility expansions, production increases, or process modifications which will result in a new or substantially different discharge or sludge characteristics must be reported to the Department 60 days before the facility or process modification begins. Notification may be accomplished by application for a new permit. If the discharge does not violate effluent limitations specified in the permit, the facility is to submit a notice to the Department of the changed discharge at least 30 days before such changes. The Department may require a construction permit and/or permit modification as a result of the proposed changes at the facility.
2. **Non-compliance Reporting.**
  - a. The permittee shall report any noncompliance which may endanger health or the environment. Relevant information shall be provided orally or via the current electronic method approved by the Department, within 24 hours from the time the permittee becomes aware of the circumstances, and shall be reported to the appropriate Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. A written submission shall also be provided within five (5) business days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.



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- b. The following shall be included as information which must be reported within 24 hours under this paragraph.
    - i. Any unanticipated bypass which exceeds any effluent limitation in the permit.
    - ii. Any upset which exceeds any effluent limitation in the permit.
    - iii. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the permit required to be reported within 24 hours.
  - c. The Department may waive the written report on a case-by-case basis for reports under paragraph 2. b. of this section if the oral report has been received within 24 hours.
3. **Anticipated Noncompliance.** The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The notice shall be submitted to the Department 60 days prior to such changes or activity.
  4. **Compliance Schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date. The report shall provide an explanation for the instance of noncompliance and a proposed schedule or anticipated date, for achieving compliance with the compliance schedule requirement.
  5. **Other Noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs 2, 3, and 6 of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 2. a. of this section.
  6. **Other Information.** Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.
  7. **Discharge Monitoring Reports.**
    - a. Monitoring results shall be reported at the intervals specified in the permit.
    - b. Monitoring results must be reported to the Department via the current method approved by the Department, unless the permittee has been granted a waiver from using the method. If the permittee has been granted a waiver, the permittee must use forms provided by the Department.
    - c. Monitoring results shall be reported to the Department no later than the 28<sup>th</sup> day of the month following the end of the reporting period.
- b. Notice.
    - i. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.
    - ii. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section B – Reporting Requirements, paragraph 5 (24-hour notice).
  - c. Prohibition of bypass.
    - i. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless:
      1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
      2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
      3. The permittee submitted notices as required under paragraph 2. b. of this section.
    - ii. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three (3) conditions listed above in paragraph 2. c. i. of this section.
3. **Upset Requirements.**
    - a. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 3. b. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
    - b. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
      - i. An upset occurred and that the permittee can identify the cause(s) of the upset;
      - ii. The permitted facility was at the time being properly operated; and
      - iii. The permittee submitted notice of the upset as required in Section B – Reporting Requirements, paragraph 2. b. ii. (24-hour notice).
      - iv. The permittee complied with any remedial measures required under Section D – Administrative Requirements, paragraph 4.
    - c. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

## Section C – Bypass/Upset Requirements

1. **Definitions.**
  - a. *Bypass*: the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending.
  - b. *Severe Property Damage*: substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
  - c. *Upset*: an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
2. **Bypass Requirements.**
  - a. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. b. and 2. c. of this section.

## Section D – Administrative Requirements

1. **Duty to Comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
  - a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
  - b. The Federal Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed \$25,000 per day for each violation. The Federal Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement



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- imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than \$50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than \$500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than \$1,000,000 and can be fined up to \$2,000,000 for second or subsequent convictions.
- c. Any person may be assessed an administrative penalty by the EPA Director for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000. Penalties for Class II violations are not to exceed \$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.
- d. It is unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law, or any standard, rule or regulation promulgated by the commission. In the event the commission or the director determines that any provision of sections 644.006 to 644.141 of the Missouri Clean Water Law or standard, rules, limitations or regulations promulgated pursuant thereto, or permits issued by, or any final abatement order, other order, or determination made by the commission or the director, or any filing requirement pursuant to sections 644.006 to 644.141 of the Missouri Clean Water Law or any other provision which this state is required to enforce pursuant to any federal water pollution control act, is being, was, or is in imminent danger of being violated, the commission or director may cause to have instituted a civil action in any court of competent jurisdiction for the injunctive relief to prevent any such violation or further violation or for the assessment of a penalty not to exceed \$10,000 per day for each day, or part thereof, the violation occurred and continues to occur, or both, as the court deems proper. Any person who willfully or negligently commits any violation in this paragraph shall, upon conviction, be punished by a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one year, or both. Second and successive convictions for violation of the same provision of this paragraph by any person shall be punished by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.
2. **Duty to Reapply.**
- a. 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.
- b. A permittee with a currently effective site-specific permit shall submit an application for renewal at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
- c. A permittee with currently effective general permit shall submit an application for renewal at least 30 days before the existing permit expires, unless the permittee has been notified by the Department that an earlier application must be made. The Department may grant permission for a later submission date. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
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 or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.
5. **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 the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.
6. **Permit Actions.**
- a. Subject to compliance with statutory requirements of the Law and Regulations and applicable Court Order, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
- i. Violations of any terms or conditions of this permit or the law;
- ii. Having obtained this permit by misrepresentation or failure to disclose fully any relevant facts;
- iii. A change in any circumstances or conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
- iv. Any reason set forth in the Law or Regulations.
- b. 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. **Permit Transfer.**
- a. Subject to 10 CSR 20-6.010, an operating permit may be transferred upon submission to the Department of an application to transfer signed by the existing owner and the new owner, unless prohibited by the terms of the permit. Until such time the permit is officially transferred, the original permittee remains responsible for complying with the terms and conditions of the existing permit.
- b. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Missouri Clean Water Law or the Federal Clean Water Act.
- c. The Department, within 30 days of receipt of the application, shall notify the new permittee of its intent to revoke or reissue or transfer the permit.
8. **Toxic Pollutants.** The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Federal Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
9. **Property Rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.



STANDARD CONDITIONS FOR NPDES PERMITS  
ISSUED BY  
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION  
REVISED  
AUGUST 1, 2014

10. **Duty to Provide Information.** The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.
11. **Inspection and Entry.** The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon 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 the 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 purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.
12. **Closure of Treatment Facilities.**
  - a. Persons who cease operation or plan to cease operation of waste, wastewater, and sludge handling and treatment facilities shall close the facilities in accordance with a closure plan approved by the Department.
  - b. Operating Permits under 10 CSR 20-6.010 or under 10 CSR 20-6.015 are required until all waste, wastewater, and sludges have been disposed of in accordance with the closure plan approved by the Department and any disturbed areas have been properly stabilized. Disturbed areas will be considered stabilized when perennial vegetation, pavement, or structures using permanent materials cover all areas that have been disturbed. Vegetative cover, if used, shall be at least 70% plant density over 100% of the disturbed area.
13. **Signatory Requirement.**
  - a. All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
  - b. The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
  - c. The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.
14. **Severability.** The provisions of the permit are severable, and if any provision of the permit, or the application of any provision of the permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of the permit, shall not be affected thereby.



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REVISED  
MAY 1, 2013

PART II - SPECIAL CONDITIONS – PUBLICLY OWNED  
TREATMENT WORKS  
SECTION A – INDUSTRIAL USERS

**1. Definitions**

Definitions as set forth in the Missouri Clean Water Laws and approved by the Missouri Clean Water Commission shall apply to terms used herein.

Significant Industrial User (SIU). Except as provided in the *General Pretreatment Regulation* 10 CSR 20-6.100, the term Significant Industrial User means:

1. All Industrial Users subject to Categorical Pretreatment Standards; and
2. Any other Industrial User that: discharges an average of 25,000 gallons per day or more of process wastewater to the Publicly-Owned Treatment Works (POTW) (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority on the basis that the Industrial User has a reasonable potential for adversely affecting the POTW's or for violating any Pretreatment Standard or requirement.

Clean Water Act (CWA) is the the federal Clean Water Act of 1972, 33 U.S.C. § 1251 et seq. (2002).

**2. Identification of Industrial Discharges**

Pursuant to 40 CFR 122.44(j)(1), all POTWs shall identify, in terms of character and volume of pollutants, any Significant Industrial Users discharging to the POTW subject to Pretreatment Standards under section 307(b) of the CWA and 40 CFR 403.

**3. Application Information**

Applications for renewal or modification of this permit must contain the information about industrial discharges to the POTW pursuant to 40 CFR 122.21(j)(6)

**4. Notice to the Department**

Pursuant to 40 CFR 122.42(b), all POTWs must provide adequate notice of the following:

1. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging these pollutants; and
2. Any substantial change into the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
3. For purposes of this paragraph, adequate notice shall include information on:
  - i. the quality and quantity of effluent introduced into the POTW, and
  - ii. any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

For POTWs without an approved pretreatment program, the notice of industrial discharges which was not included in the permit application shall be made as soon as practicable. For POTWs with an approved pretreatment program, notice is to be included in the annual pretreatment report required in the special conditions of this permit. Notice may be sent to:

Missouri Department of Natural Resources  
Water Protection Program  
Attn: Pretreatment Coordinator  
P.O. Box 176  
Jefferson City, MO 65102

**STANDARD CONDITIONS FOR NPDES PERMITS**  
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**THE MISSOURI DEPARTMENT OF NATURAL RESOURCES**  
**MISSOURI CLEAN WATER COMMISSION**  
**March 1, 2015**

**PART III – SLUDGE AND BIOSOLIDS FROM DOMESTIC AND INDUSTRIAL WASTEWATER  
TREATMENT FACILITIES**

**SECTION A – GENERAL REQUIREMENTS**

1. This permit pertains to sludge requirements under the Missouri Clean Water Law and regulation for domestic wastewater and industrial process wastewater. This permit also incorporates applicable federal sludge disposal requirements under 40 CFR 503 for domestic wastewater. The Environmental Protection Agency (EPA) has principal authority for permitting and enforcement of the federal sludge regulations under 40 CFR 503 for domestic wastewater. EPA has reviewed and accepted these standard sludge conditions. EPA may choose to issue a separate sludge addendum to this permit or a separate federal sludge permit at their discretion to further address the federal requirements.
2. These PART III Standard Conditions apply only to sludge and biosolids generated at domestic wastewater treatment facilities, including public owned treatment works (POTW), privately owned facilities and sludge or biosolids generated at industrial facilities.
3. Sludge and Biosolids Use and Disposal Practices:
  - a. The permittee is authorized to operate the sludge and biosolids treatment, storage, use, and disposal facilities listed in the facility description of this permit.
  - b. The permittee shall not exceed the design sludge volume listed in the facility description and shall not use sludge disposal methods that are not listed in the facility description, without prior approval of the permitting authority.
  - c. The permittee is authorized to operate the storage, treatment or generating sites listed in the Facility Description section of this permit.
4. Sludge Received from other Facilities:
  - a. Permittees may accept domestic wastewater sludge from other facilities including septic tank pumpings from residential sources as long as the design sludge volume is not exceeded and the treatment facility performance is not impaired.
  - b. The permittee shall obtain a signed statement from the sludge generator or hauler that certifies the type and source of the sludge
5. These permit requirements do not supersede nor remove liability for compliance with county and other local ordinances.
6. These permit requirements do not supersede nor remove liability for compliance with other environmental regulations such as odor emissions under the Missouri Air Pollution Control Law and regulations.
7. This permit may (after due process) be modified, or alternatively revoked and reissued, to comply with any applicable sludge disposal standard or limitation issued or approved under Section 405(d) of the Clean Water Act under Chapter 644 RSMo.
8. In addition to STANDARD CONDITIONS, the Department may include sludge limitations in the special conditions portion or other sections of a site specific permit.
9. Alternate Limits in the Site Specific Permit.

Where deemed appropriate, the Department may require an individual site specific permit in order to authorize alternate limitations:

  - a. A site specific permit must be obtained for each operating location, including application sites.
  - b. To request a site specific permit, an individual permit application, permit fee, and supporting documents shall be submitted for each operating location. This shall include a detailed sludge/biosolids management plan or engineering report.
10. Exceptions to these Standard Conditions may be authorized on a case-by-case basis by the Department, as follows:
  - a. The Department will prepare a permit modification and follow permit notice provisions as applicable under 10 CSR 20-6.020, 40 CFR 124.10, and 40 CFR 501.15(a)(2)(ix)(E). This includes notification of the owner of the property located adjacent to each land application site, where appropriate.
  - b. Exceptions cannot be granted where prohibited by the federal sludge regulations under 40 CFR 503.

## **SECTION B – DEFINITIONS**

1. Best Management Practices include agronomic loading rates, soil conservation practices and other site restrictions.
2. Biosolids means organic fertilizer or soil amendment produced by the treatment of domestic wastewater sludge.
3. Biosolids land application facility is a facility where biosolids are spread onto the land at agronomic rates for production of food or fiber. The facility includes any structures necessary to store the biosolids until soil, weather, and crop conditions are favorable for land application.
4. Class A biosolids means a material that has met the Class A pathogen reduction requirements or equivalent treatment by a Process to Further Reduce Pathogens (PFRP) in accordance with 40 CFR 503.
5. Class B biosolids means a material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PFRP) in accordance with 40 CFR 503.
6. Domestic wastewater means wastewater originating from the sanitary conveniences of residences, commercial buildings, factories and institutions; or co-mingled sanitary and industrial wastewater processed by a (POTW) or a privately owned facility.
7. Industrial wastewater means any wastewater, also known as process water, not defined as domestic wastewater. Per 40 CFR Part 122, process water means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.
8. Mechanical treatment plants are wastewater treatment facilities that use mechanical devices to treat wastewater, including septic tanks, sand filters, extended aeration, activated sludge, contact stabilization, trickling filters, rotating biological discs, and other similar facilities. It does not include wastewater treatment lagoons and constructed wetlands for wastewater treatment.
9. Operating location as defined in 10 CSR 20-2.010 is all contiguous lands owned, operated or controlled by one (1) person or by two (2) or more persons jointly or as tenants in common.
10. Plant Available Nitrogen (PAN) is the nitrogen that will be available to plants during the growing seasons after biosolids application.
11. Public contact site is land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.
12. Sludge is the solid, semisolid, or liquid residue removed during the treatment of wastewater. Sludge includes septage removed from septic tanks or equivalent facilities. Sludge does not include carbon coal byproducts (CCBs)
13. Sludge lagoon is part of a mechanical wastewater treatment facility. A sludge lagoon is an earthen basin that receives sludge that has been removed from a wastewater treatment facility. It does not include a wastewater treatment lagoon or sludge treatment units that are not a part of a mechanical wastewater treatment facility.
14. Septage is the material pumped from residential septic tanks and similar treatment works (with a design population of less than 150 people). The standard for biosolids from septage is different from other sludges.

## **SECTION C – MECHANICAL WASTEWATER TREATMENT FACILITIES**

1. Sludge shall be routinely removed from wastewater treatment facilities and handled according to the permit facility description and sludge conditions of this permit.
2. The permittee shall operate the facility so that there is no sludge discharged to waters of the state.
3. Mechanical treatment plants shall have separate sludge storage compartments in accordance with 10 CSR 20, Chapter 8. Failure to remove sludge from these storage compartments on the required design schedule is a violation of this permit.

## **SECTION D – SLUDGE DISPOSED AT OTHER TREATMENT FACILITY OR CONTRACT HAULER**

1. This section applies to permittees that haul sludge to another treatment facility for disposal or use contract haulers to remove and dispose of sludge.
2. Permittees that use contract haulers are responsible for compliance with all the terms of this permit including final disposal, unless the hauler has a separate permit for sludge or biosolids disposal issued by the Department; or the hauler transports the sludge to another permitted treatment facility.
3. Haulers who land apply septage must obtain a state permit.
4. Testing of sludge, other than total solids content, is not required if sludge is hauled to a municipal wastewater treatment facility or other permitted wastewater treatment facility, unless it is required by the accepting facility.

## **SECTION E – INCINERATION OF SLUDGE**

1. Sludge incineration facilities shall comply with the requirements of 40 CFR 503 Subpart E; air pollution control regulations under 10 CSR 10; and solid waste management regulations under 10 CSR 80.
2. Permittee may be authorized under the facility description of this permit to store incineration ash in lagoons or ash ponds. This permit does not authorize the disposal of incineration ash. Incineration ash shall be disposed in accordance with 10 CSR 80; or if the ash is determined to be hazardous with 10 CSR 25.
3. In addition to normal sludge monitoring, incineration facilities shall report the following as part of the annual report, quantity of sludge incinerated, quantity of ash generated, quantity of ash stored, and ash used or disposal method, quantity, and location. Permittee shall also provide the name of the disposal facility and the applicable permit number.

## **SECTION F – SURFACE DISPOSAL SITES AND SLUDGE LAGOONS**

1. Surface disposal sites of domestic facilities shall comply with the requirements in 40 CFR 503 Subpart C; air pollution control regulations under 10 CSR 10; and solid waste management regulations under 10 CSR 80.
2. Sludge storage lagoons are temporary facilities and are not required to obtain a permit as a solid waste management facility under 10 CSR 80. In order to maintain sludge storage lagoons as storage facilities, accumulated sludge must be removed routinely, but not less than once every two years unless an alternate schedule is approved in the permit. The amount of sludge removed will be dependent on sludge generation and accumulation in the facility. Enough sludge must be removed to maintain adequate storage capacity in the facility.
  - a. In order to avoid damage to the lagoon seal during cleaning, the permittee may leave a layer of sludge on the bottom of the lagoon, upon prior approval of the Department; or
  - b. Permittee shall close the lagoon in accordance with Section H.

## **SECTION G – LAND APPLICATION**

1. The permittee shall not land apply sludge or biosolids unless land application is authorized in the facility description or the special conditions of the issued NPDES permit.
2. Land application sites within a 20 miles radius of the wastewater treatment facility are authorized under this permit when biosolids are applied for beneficial use in accordance with these standard conditions unless otherwise specified in a site specific permit. If the permittee's land application site is greater than a 20 mile radius of the wastewater treatment facility, approval must be granted from the Department.
3. Land application shall not adversely affect a threatened or endangered species or its designated critical habitat.
4. Biosolids shall not be applied unless authorized in this permit or exempted under 10 CSR 20, Chapter 6.
  - a. This permit does not authorize the land application of domestic sludge except for when sludge meets the definition of biosolids.
  - b. This permit authorizes "Class A or B" biosolids derived from domestic wastewater and/or process water sludge to be land applied onto grass land, crop land, timber or other similar agricultural or silviculture lands at rates suitable for beneficial use as organic fertilizer and soil conditioner.
5. Public Contact Sites:

Permittees who wish to apply Class A biosolids to public contact sites must obtain approval from the Department after two years of proper operation with acceptable testing documentation that shows the biosolids meet Class A criteria. A shorter length of testing will be allowed with prior approval from the Department. Authorization for land applications must be provided in the special conditions section of this permit or in a separate site specific permit.

  - a. After Class B biosolids have been land applied, public access must be restricted for 12 months.
  - b. Class B biosolids are only land applied to root crops, home gardens or vegetable crops whose edible parts will not be for human consumption.
6. Agricultural and Silvicultural Sites:

Septage – Based on Water Quality guide 422 (WQ422) published by the University of Missouri

  - a. Haulers that land apply septage must obtain a state permit
  - b. Do not apply more than 30,000 gallons of septage per acre per year.
  - c. Septage tanks are designed to retain sludge for one to three years which will allow for a larger reduction in pathogens and vectors, as compared to other mechanical type treatment facilities.
  - d. To meet Class B sludge requirements, maintain septage at 12 pH for at least thirty (30) minutes before land application. 50 pounds of hydrated lime shall be added to each 1,000 gallons of septage in order to meet pathogen and vector stabilization for septage biosolids applied to crops, pastures or timberland.
  - e. Lime is to be added to the pump truck and not directly to the septic tanks, as lime would harm the beneficial bacteria of the septic tank.

Biosolids - Based on Water Quality guide 423, 424, and 425 (WQ423, WQ424, WQ425) published by the University of Missouri;

- a. Biosolids shall be monitored to determine the quality for regulated pollutants
- b. The number of samples taken is directly related to the amount of sludge produced by the facility (See Section I of these Standard Conditions). Report as dry weight unless otherwise specified in the site specific permit. Samples should be taken only during land application periods. When necessary, it is permissible to mix biosolids with lower concentrations of biosolids as well as other suitable Department approved material to reach the maximum concentration of pollutants allowed.
- c. Table 1 gives the maximum concentration allowable to protect water quality standards

**TABLE 1**

Biosolids ceiling concentration <sup>1</sup>	
Pollutant	Milligrams per kilogram dry weight
Arsenic	75
Cadmium	85
Copper	4,300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7,500

<sup>1</sup> Land application is not allowed if the sludge concentration exceeds the maximum limits for any of these pollutants

- d. The low metal concentration biosolids has reduced requirements because of its higher quality and can safely be applied for 100 years or longer at typical agronomic loading rates. (See Table 2)

**TABLE 2**

Biosolids Low Metal Concentration <sup>1</sup>	
Pollutant	Milligrams per kilogram dry weight
Arsenic	41
Cadmium	39
Copper	1,500
Lead	300
Mercury	17
Nickel	420
Selenium	36
Zinc	2,800

<sup>1</sup> You may apply low metal biosolids without tracking cumulative metal limits, provided the cumulative application of biosolids does not exceed 500 dry tons per acre.

- e. Each pollutant in Table 3 has an annual and a total cumulative loading limit, based on the allowable pounds per acre for various soil categories.

**TABLE 3**

Pollutant	CEC 15+		CEC 5 to 15		CEC 0 to 5	
	Annual	Total <sup>1</sup>	Annual	Total <sup>1</sup>	Annual	Total <sup>1</sup>
Arsenic	1.8	36.0	1.8	36.0	1.8	36.0
Cadmium	1.7	35.0	0.9	9.0	0.4	4.5
Copper	66.0	1,335.0	25.0	250.0	12.0	125.0
Lead	13.0	267.0	13.0	267.0	13.0	133.0
Mercury	0.7	15.0	0.7	15.0	0.7	15.0
Nickel	19.0	347.0	19.0	250.0	12.0	125.0
Selenium	4.5	89.0	4.5	44.0	1.6	16.0
Zinc	124.0	2,492.0	50.0	500.0	25.0	250.0

<sup>1</sup> Total cumulative loading limits for soils with equal or greater than 6.0 pH (salt based test) or 6.5 pH (water based test)

**TABLE 4** - Guidelines for land application of other trace substances <sup>1</sup>

Cumulative Loading	
Pollutant	Pounds per acre
Aluminum	4,000 <sup>2</sup>
Beryllium	100
Cobalt	50
Fluoride	800
Manganese	500
Silver	200
Tin	1,000
Dioxin	(10 ppt in soil) <sup>3</sup>
Other	<sup>4</sup>

<sup>1</sup> Design of land treatment systems for Industrial Waste, 1979. Michael Ray Overcash, North Carolina State University and Land Treatment of Municipal Wastewater, EPA 1981.)

<sup>2</sup> This applies for a soil with a pH between 6.0 and 7.0 (salt based test) or a pH between 6.5 to 7.5 (water based test). Case-by-case review is required for higher pH soils.

<sup>3</sup> Total Dioxin Toxicity Equivalents (TEQ) in soils, based on a risk assessment under 40 CFR 744, May 1998.

<sup>4</sup> Case by case review. Concentrations in sludge should not exceed the 95<sup>th</sup> percentile of the National Sewage Sludge Survey, EPA, January 2009.

Best Management Practices – Based on Water Quality guide 426 (WQ426) published by the University of Missouri

- a. Use best management practices when applying biosolids.
- b. Biosolids cannot discharge from the land application site
- c. Biosolid application is subject to the Missouri Department of Agriculture State Milk Board concerning grazing restrictions of lactating dairy cattle.
- d. Biosolid application must be in accordance with section 4 of the Endangered Species Act.
- e. Do not apply more than the agronomic rate of nitrogen needed.
- f. The applicator must document the Plant Available Nitrogen (PAN) loadings, available nitrogen in the soil, and crop removal when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) When biosolids are land applied at an application rate greater than two dry tons per acre per year.
  - i. PAN can be determined as follows and is in accordance with WQ426  
(Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor<sup>1</sup>).  
<sup>1</sup>Volatilization factor is 0.7 for surface application and 1 for subsurface application.
- g. Buffer zones are as follows:
  - i. 300 feet of a water supply well, sinkhole, lake, pond, water supply reservoir or water supply intake in a stream;
  - ii. 300 feet of a losing stream, no discharge stream, stream stretches designated for whole body contact recreation, wild and scenic rivers, Ozark National Scenic Riverways or outstanding state resource waters as listed in the Water Quality Standards, 10 CSR 20-7.031;
  - iii. 150 feet if dwellings;
  - iv. 100 feet of wetlands or permanent flowing streams;
  - v. 50 feet of a property line or other waters of the state, including intermittent flowing streams.
- h. Slope limitation for application sites are as follows;
  - i. A slope 0 to 6 percent has no rate limitation
  - ii. Applied to a slope 7 to 12 percent, the applicator may apply biosolids when soil conservation practices are used to meet the minimum erosion levels
  - iii. Slopes > 12 percent, apply biosolids only when grass is vegetated and maintained with at least 80 percent ground cover at a rate of two dry tons per acre per year or less.
- i. No biosolids may be land applied in an area that it is reasonably certain that pollutants will be transported into waters of the state.
- j. Do not apply biosolids to sites with soil that is snow covered, frozen or saturated with liquid without prior approval by the Department.
- k. Biosolids / sludge applicators must keep detailed records up to five years.

## SECTION H – CLOSURE REQUIREMENTS

1. This section applies to all wastewater facilities (mechanical, industrial, and lagoons) and sludge or biosolids storage and treatment facilities and incineration ash ponds. It does not apply to land application sites.
2. Permittees of a domestic wastewater facility who plan to cease operation must obtain Department approval of a closure plan which addresses proper removal and disposal of all residues, including sludge, biosolids. Mechanical plants, sludge lagoons, ash ponds and other storage structures must obtain approval of a closure plan from the Department. Permittee must maintain this permit until the facility is closed in accordance with the approved closure plan per 10 CSR 20 – 6. 010 and 10 CSR 20 – 6.015.
3. Residuals that are left in place during closure of a lagoon or earthen structure or ash pond shall not exceed the agricultural loading rates as follows:
  - a. Residuals shall meet the monitoring and land application limits for agricultural rates as referenced in Section H of these standard conditions.
  - b. If a wastewater treatment lagoon has been in operation for 15 years or more without sludge removal, the sludge in the lagoon qualifies as a Class B biosolids with respect to pathogens due to anaerobic digestion, and testing for fecal coliform is not required. For other lagoons, testing for fecal coliform is required to show compliance with Class B biosolids limitations. In order to reach Class B biosolids requirements, fecal coliform must be less than 2,000,000 colony forming units or 2,000,000 most probable number. All fecal samples must be presented as geometric mean per gram.
  - c. The allowable nitrogen loading that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. For a grass cover crop, the allowable PAN is 300 pounds/acre.
    - i. PAN can be determined as follows:
$$(\text{Nitrate} + \text{nitrite nitrogen}) + (\text{organic nitrogen} \times 0.2) + (\text{ammonia nitrogen} \times \text{volatilization factor}^1).$$

<sup>1</sup> Volatilization factor is 0.7 for surface application and 1 for subsurface application.
4. When closing a domestic wastewater treatment lagoon with a design treatment capacity equal or less than 150 persons, the residuals are considered “septage” under the similar treatment works definition. See Section B of these standard conditions. Under the septage category, residuals may be left in place as follows:
  - a. Testing for metals or fecal coliform is not required
  - b. If the wastewater treatment lagoon has been in use for less than 15 years, mix lime with the sludge at a rate of 50 pounds of hydrated lime per 1000 gallons (134 cubic feet) of sludge.
  - c. The amount of sludge that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. 100 dry tons/acre of sludge may be left in the basin without testing for nitrogen. If 100 dry tons/acre or more will be left in the lagoon, test for nitrogen and determine the PAN using the calculation above. Allowable PAN loading is 300 pounds/acre.
5. Residuals left within the domestic lagoon shall be mixed with soil on at least a 1 to 1 ratio, the lagoon berm shall be demolished, and the site shall be graded and contain  $\geq 70\%$  vegetative density over 100% of the site so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion.
6. Lagoons and/or earthen structure and/or ash pond closure activities shall obtain a storm water permit for land disturbance activities that equal or exceed one acre in accordance with 10 CSR 20-6.200
7. When closing a mechanical wastewater and/or industrial process wastewater plant; all sludge must be cleaned out and disposed of in accordance with the Department approved closure plan before the permit for the facility can be terminated.
  - a. Land must be stabilized which includes any grading, alternate use or fate upon approval by the Department, remediation, or other work that exposes sediment to stormwater per 10 CSR 20-6.200. The site shall be graded and contain  $\geq 70\%$  vegetative density over 100% of the site, so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion.
  - b. Per 10 CSR 20-6.015(4)(B)6, Hazardous Waste shall not be land applied or disposed during industrial and mechanical plant closures unless in accordance with Missouri Hazardous Waste Management Law and Regulations under 10 CSR 25.
  - c. After demolition of the mechanical plant / industrial plant, the site must only contain clean fill defined in RSMo 260.200 (5) as uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinderblocks, brick, minimal amounts of wood and metal, and inert solids as approved by rule or policy of the Department for fill or other beneficial use. Other solid wastes must be removed.
8. If sludge from the domestic lagoon or mechanical treatment plant exceeds agricultural rates under Section G and/or H, a landfill permit or solid waste disposal permit must be obtained if the permittee chooses to seek authorization for on-site sludge disposal under the Missouri Solid Waste Management Law and regulations per 10 CSR 80, and the permittee must comply with the surface disposal requirements under 40 CFR 503, Subpart C.

## SECTION I – MONITORING FREQUENCY

- At a minimum, sludge or biosolids shall be tested for volume and percent total solids on a frequency that will accurately represent sludge quantities produced and disposed. Please see the table below.

**TABLE 5**

Design Sludge Production (dry tons per year)	Monitoring Frequency (See Notes 1, 2 and 3)			
	Metals, Pathogens and Vectors	Nitrogen TKN <sup>1</sup>	Nitrogen PAN <sup>2</sup>	Priority Pollutants and TCLP <sup>3</sup>
0 to 100	1 per year	1 per year	1 per month	1 per year
101 to 200	biannual	biannual	1 per month	1 per year
201 to 1,000	quarterly	quarterly	1 per month	1 per year
1,001 to 10,000	1 per month	1 per month	1 per week	-- <sup>4</sup>
10,001 +	1 per week	1 per week	1 per day	-- <sup>4</sup>

<sup>1</sup> Test total Kjeldahl nitrogen, if biosolids application is 2 dry tons per acre per year or less.

<sup>2</sup> Calculate plant available nitrogen (PAN) when either of the following occurs: 1) when biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.

<sup>3</sup> Priority pollutants (40 CFR 122.21, Appendix D, Tables II and III) and toxicity characteristic leaching procedure (40 CFR 261.24) is required only for permit holders that must have a pre-treatment program.

<sup>4</sup> One sample for each 1,000 dry tons of sludge.

Note 1: Total solids: A grab sample of sludge shall be tested one per day during land application periods for percent total solids.

This data shall be used to calculate the dry tons of sludge applied per acre.

Note 2: Total Phosphorus: Total phosphorus and total potassium shall be tested at the same monitoring frequency as metals.

Note 3: Table 5 is not applicable for incineration

- If you own a wastewater treatment lagoon or sludge lagoon that is cleaned out once a year or less, you may choose to sample only when the sludge is removed or the lagoon is closed. Test one composite sample for each 100 dry tons of sludge or biosolids removed from the lagoon during the year within the lagoon at closing. Composite sample must represent various areas at one-foot depth.
- Additional testing may be required in the special conditions or other sections of the permit. Permittees receiving industrial wastewater may be required to conduct additional testing upon request from the Department.
- At this time, the Department recommends monitoring requirements shall be performed in accordance with, "POTW Sludge Sampling and Analysis Guidance Document," United States Environmental Protection Agency, August 1989, and the subsequent revisions.

## SECTION J – RECORD KEEPING AND REPORTING REQUIREMENTS

- The permittee shall maintain records on file at the facility for at least five years for the items listed in these standard conditions and any additional items in the Special Conditions section of this permit. This shall include dates when the sludge facility is checked for proper operation, records of maintenance and repairs and other relevant information.
- Reporting period
  - By January 28<sup>th</sup> of each year, an annual report shall be submitted for the previous calendar year period for all mechanical wastewater treatment facilities, sludge lagoons, and sludge or biosolids disposal facilities.
  - Permittees with wastewater treatment lagoons shall submit the above annual report only when sludge or biosolids are removed from the lagoon during the report period or when the lagoon is closed.
- Report Forms. The annual report shall be submitted on report forms provided by the Department or equivalent forms approved by the Department.
- Reports shall be submitted as follows:

Major facilities (those serving 10,000 persons or 1 million gallons per day) shall report to both the Department and EPA. Other facilities need to report only to the Department. Reports shall be submitted to the addresses listed as follows:

DNR regional office listed in your permit  
(see cover letter of permit)  
ATTN: Sludge Coordinator

EPA Region VII  
Water Compliance Branch (WACM)  
Sludge Coordinator  
11201 Renner Blvd.  
Lenexa, KS 66219

5. Annual report contents. The annual report shall include the following:
- a. Sludge and biosolids testing performed. Include a copy or summary of all test results, even if not required by the permit.
  - b. Sludge or biosolids quantity shall be reported as dry tons for quantity generated by the wastewater treatment facility, the quantity stored on site at the end of the year, and the quantity used or disposed.
  - c. Gallons and % solids data used to calculate the dry ton amounts.
  - d. Description of any unusual operating conditions.
  - e. Final disposal method, dates, and location, and person responsible for hauling and disposal.
    - i. This must include the name, address for the hauler and sludge facility. If hauled to a municipal wastewater treatment facility, sanitary landfill, or other approved treatment facility, give the name of that facility.
    - ii. Include a description of the type of hauling equipment used and the capacity in tons, gallons, or cubic feet.
  - f. Contract Hauler Activities:

If contract hauler, provide a copy of a signed contract from the contractor. Permittee shall require the contractor to supply information required under this permit for which the contractor is responsible. The permittee shall submit a signed statement from the contractor that he has complied with the standards contained in this permit, unless the contract hauler has a separate sludge or biosolids use permit.
  - g. Land Application Sites:
    - i. Report the location of each application site, the annual and cumulative dry tons/acre for each site, and the landowners name and address. The location for each spreading site shall be given as a legal description for nearest ¼, ¼, Section, Township, Range, and county, or UTM coordinates. The facility shall report PAN when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.
    - ii. If the “Low Metals” criteria are exceeded, report the annual and cumulative pollutant loading rates in pounds per acre for each applicable pollutant, and report the percent of cumulative pollutant loading which has been reached at each site.
    - iii. Report the method used for compliance with pathogen and vector attraction requirements.
    - iv. Report soil test results for pH, CEC, and phosphorus. If none was tested during the year, report the last date when tested and results.



MISSOURI DEPARTMENT OF NATURAL RESOURCES  
 WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH  
**FORM B2 – APPLICATION FOR CONSTRUCTION OR OPERATING  
 PERMIT FOR FACILITIES WHICH RECEIVE PRIMARILY DOMESTIC  
 WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS  
 PER DAY**

C11177  
AP 14871

FOR AGENCY USE ONLY	
CHECK NUMBER	
DATE RECEIVED	FEE SUBMITTED
8/21/13	OSB

**PART A – BASIC APPLICATION INFORMATION**

1. This application is for:

An operating permit and antidegradation review public notice.

A construction permit following an appropriate operating permit and antidegradation review public notice.

A construction permit, a concurrent operating permit and antidegradation review public notice.

A construction permit (submitted before Aug. 30, 2008 or antidegradation review is not required).

An operating permit for a new or unpermitted facility. Construction Permit # \_\_\_\_\_

An operating permit renewal: Permit #MO- 0108227 Expiration Date 09-18-13

An operating permit modification: Permit #MO- \_\_\_\_\_ Reason: \_\_\_\_\_

1.1 Is this a Federal/State Funded Project?  Yes  No Funding Agency/Project #: \_\_\_\_\_

1.2 Is the appropriate fee included with the application (See instructions for appropriate fee)?  Yes  No

**2. FACILITY**

NAME Chillicothe Wastewater Treatment Plant		TELEPHONE NUMBER WITH AREA CODE (660) 646-6373	
ADDRESS (PHYSICAL) 15320 Hwy 65	CITY Chillicothe	STATE Missouri	ZIP 64601-0140

2.1 LEGAL DESCRIPTION (Plant Site): SW ¼, NW ¼, ¼, Sec. , T , R 23W County Livingston

2.2 UTM Coordinates Easting (X): 452378 Northing (Y): 4400740  
 For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

**3. OWNER City of Chillicothe**

NAME Jim Gillilan	TITLE General Manager	TELEPHONE NUMBER WITH AREA CODE (660) 646-1683	
ADDRESS 920 Washington Street	CITY Chillicothe	STATE Missouri	ZIP 64601-0140

3.1 Request review of draft permit prior to Public Notice?  Yes  No

**4. CONTINUING AUTHORITY: Permanent organization which will serve as the continuing authority for the operation, maintenance and modernization of the facility.**

NAME Chillicothe Municipal Utilities		CITY Chillicothe	
ADDRESS 920 Washington St.	CERTIFICATE NUMBER (IF APPLICABLE) A-2192	STATE Missouri	ZIP 64601-0140

**5. OPERATOR**

NAME Kent A. Spainhour	TITLE Chief Plant Operator	TELEPHONE NUMBER WITH AREA CODE (660) 646-6373
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**6. FACILITY CONTACT**

NAME William V. Breeden	TITLE Wastewater System Supt.
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MO 780-1805 (09-08)

FACILITY NAME Chillicothe Wastewater Treatment Plant		PERMIT NO. MO- 0108227	OUTFALL NO. 001, 002
<b>PART A – BASIC APPLICATION INFORMATION</b>			
<b>7. ADDITIONAL FACILITY INFORMATION</b>			
7.1 BRIEF DESCRIPTION OF FACILITIES Influent Pump station (3) pumps, grit removal, fine screening, oxidation ditch/activated sludge, secondary clarifiers (3), chlorination, dechlorination, sludge holding tanks (2) sand filter drying beds (4) land application of biosolids			
7.2 TOPOGRAPHIC MAP. ATTACH TO THIS APPLICATION A TOPOGRAPHIC MAP OF THE AREA EXTENDING AT LEAST ONE MILE BEYOND FACILITY PROPERTY BOUNDARIES. THIS MAP MUST SHOW THE OUTLINE OF THE FACILITY AND THE FOLLOWING INFORMATION. (YOU MAY SUBMIT MORE THAN ONE MAP IF ONE MAP DOES NOT SHOW THE ENTIRE AREA.) a. The area surrounding the treatment plant, including all unit processes. b. The location of the downstream landowner(s). (See Item 10.) c. The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable. d. The actual point of discharge. e. Wells, springs, other surface water bodies and drinking water wells that are: 1) within ¼ mile of the property boundaries of the treatment works, and 2) listed in public record or otherwise known to the applicant. f. Any areas where the sewage sludge produced by the treatment works is stored, treated or disposed. g. If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act, or RCRA, by truck, rail or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored or disposed.			
7.3 PROCESS FLOW DIAGRAM OR SCHEMATIC. PROVIDE A DIAGRAM SHOWING THE PROCESSES OF THE TREATMENT PLANT. ALSO, PROVIDE A WATER BALANCE SHOWING ALL TREATMENT UNITS, INCLUDING DISINFECTION (E.G. CHLORINATION AND DECHLORINATION). THE WATER BALANCE MUST SHOW DAILY AVERAGE FLOW RATES AT INFLUENT AND DISCHARGE POINTS AND APPROXIMATE DAILY FLOW RATES BETWEEN TREATMENT UNITS. INCLUDE A BRIEF NARRATIVE DESCRIPTION OF THE DIAGRAM.			
7.4 FACILITY SIC CODE 4952	DISCHARGE SIC CODE:	FACILITY NAICS CODE:	DISCHARGE NAICS CODE:
7.5 NUMBER OF SEPARATE DISCHARGE POINTS 2 total 1- regular daily continuous discharge point, 1- emergency discharge from storage basin			
7.6 NUMBER OF PEOPLE PRESENTLY CONNECTED OR POPULATION EQUIVALENT 9500		DESIGN POPULATION EQUIVALENT 29400	
NUMBER OF UNITS PRESENTLY CONNECTED HOMES 3280 APARTMENTS TRAILERS OTHER 3867 total w commercial			
TOTAL DESIGN FLOW (ALL OUTFALLS) 3.0 MGD		ACTUAL FLOW 1.5 MGD	
7.7 DOES ANY BYPASSING OCCUR ANYWHERE IN THE COLLECTION SYSTEM OR AT THE TREATMENT FACILITY? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> (If Yes, attach an explanation.)			
7.8 LENGTH OF THE SANITARY SEWER COLLECTION SYSTEM IN MILES 78.1 miles			
7.9 IS INDUSTRIAL WASTE DISCHARGED TO THE FACILITY IDENTIFIED IN ITEM 2? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>			
7.10 WILL THE DISCHARGE BE CONTINUOUS THROUGH THE YEAR? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>			
A. DISCHARGE WILL OCCUR DURING THE FOLLOWING MONTHS all months of year		B. HOW MANY DAYS OF THE WEEK WILL THE DISCHARGE OCCUR? 5 to 7 days per week	
7.11 IS WASTEWATER LAND APPLIED? (If Yes, Attach Form I) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		7.12 DOES THIS FACILITY DISCHARGE TO A LOSING STREAM OR SINKHOLE? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
7.13 HAS A WASTE LOAD ALLOCATION STUDY BEEN COMPLETED FOR THIS FACILITY? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>			
7.14 LIST ALL PERMIT VIOLATIONS, INCLUDING EFFLUENT LIMIT EXCEEDANCES IN THE LAST FIVE YEARS. - No violation ATTACH A SEPARATE SHEET IF NECESSARY. IF NONE, WRITE NONE. SEE ATTACHMENT ISSUED -			
<b>8. LABORATORY CONTROL INFORMATION</b>			
8.1 LABORATORY WORK CONDUCTED BY PLANT PERSONNEL			
Lab work conducted outside of plant.		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Push-button or visual methods for simple test such as pH, settleable solids.		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Additional procedures such as Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand, titrations, solids, volatile content.		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
More advanced determinations such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph.		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

FACILITY NAME Chillicothe Wastewater Treatment Plant		PERMIT NO. MO- 0108227	OUTFALL NO. 001	
<b>PART A – BASIC APPLICATION INFORMATION</b>				
<b>9. SLUDGE HANDLING, USE AND DISPOSAL</b>				
9.1 IS THE SLUDGE A HAZARDOUS WASTE AS DEFINED BY 10 CSR 25? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>				
9.2 SLUDGE PRODUCTION, INCLUDING SLUDGE RECEIVED FROM OTHERS Design Dry Tons/Year 617		Actual Dry Tons/Year 265		
9.3 CAPACITY OF SLUDGE HOLDING STRUCTURES				
9.4 SLUDGE STORAGE PROVIDED Cubic Feet 120533 Days of Storage 180 Average Percent Solids of Sludge 2.5 <input type="checkbox"/> No Sludge Storage is Provided				
9.5 TYPE OF STORAGE <input checked="" type="checkbox"/> Holding Tank <input type="checkbox"/> Basin <input type="checkbox"/> Building <input type="checkbox"/> Concrete Pad <input type="checkbox"/> Other (Describe) _____				
9.6 SLUDGE TREATMENT <input type="checkbox"/> Anaerobic Digester <input checked="" type="checkbox"/> Storage Tank <input type="checkbox"/> Lime Stabilization <input type="checkbox"/> Lagoon <input type="checkbox"/> Aerobic Digester <input type="checkbox"/> Air or Heat Drying <input type="checkbox"/> Composting <input type="checkbox"/> Other (Attach Description)				
9.7 SLUDGE USE OR DISPOSAL <input checked="" type="checkbox"/> Land Application <input type="checkbox"/> Contract Hauler <input type="checkbox"/> Hauled to Another Treatment Facility <input type="checkbox"/> Solid Waste Landfill <input type="checkbox"/> Surface Disposal (Sludge Disposal Lagoon, Sludge Held For More Than Two Years) <input type="checkbox"/> Incineration <input type="checkbox"/> Other (Attach Explanation Sheet) _____				
9.8 PERSON RESPONSIBLE FOR HAULING SLUDGE TO DISPOSAL FACILITY				
NAME Chillicothe Municipal Utilities				
ADDRESS 920 Washington Street		CITY Chillicothe	STATE Missouri	ZIP 64601-0140
CONTACT PERSON Kent A. Spainhour		TELEPHONE NUMBER WITH AREA CODE (660) 646-6373	PERMIT NO. MO- 0108227	
9.9 SLUDGE USE OR DISPOSAL FACILITY <input checked="" type="checkbox"/> By Applicant <input type="checkbox"/> By Others (Complete Below)				
NAME				
ADDRESS		CITY	STATE	ZIP
CONTACT PERSON		TELEPHONE NUMBER WITH AREA CODE	PERMIT NO. MO-	
9.10 DO THE SLUDGE OR BIOSOLIDS DISPOSAL COMPLY WITH FEDERAL SLUDGE REGULATIONS UNDER 40 CFR 503? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Attach Explanation)				
<b>10. DOWNSTREAM LANDOWNER(S). (ATTACH ADDITIONAL SHEETS AS NECESSARY.)</b>				
NAME Mr. David Copeland				
ADDRESS 301 West Harvest Drive		CITY Chillicothe	STATE Missouri	ZIP 64601
<b>11. DRINKING WATER SUPPLY INFORMATION</b>				
11.1 SOURCE OF YOUR DRINKING WATER SUPPLY				
A. PUBLIC SUPPLY (MUNICIPAL OR WATER DISTRICT WATER) (IF PUBLIC, PLEASE GIVE NAME OF PUBLIC SUPPLY) Chillicothe Municipal Utilities, Water Treatment Plant Public Water ID # 2010162				
B. PRIVATE WELL				
C. SURFACE WATER (LAKE, POND OR STREAM)				
11.2 DOES YOUR DRINKING WATER SOURCE SERVE AT LEAST 25 PEOPLE AT LEAST 60 DAYS PER YEAR (NOT NECESSARILY CONSECUTIVE DAYS)? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
11.3 DOES YOUR SUPPLY SERVE HOUSING THAT IS OCCUPIED YEAR ROUND BY THE SAME PEOPLE? THIS DOES NOT INCLUDE HOUSING THAT IS OCCUPIED SEASONALLY? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
<b>END OF PART A</b>				

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**MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL**

FACILITY NAME Chillicothe Wastewater Treatment Plant	PERMIT NO. MO- 0108227	OUTFALL NO. 001
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**PART B – ADDITIONAL APPLICATION INFORMATION**

**20. INFLOW AND INFILTRATION**

ESTIMATE THE AVERAGE NUMBER OF GALLONS PER DAY THAT FLOW INTO THE TREATMENT WORKS FROM INFLOW AND INFILTRATION.

Gallons Per Day (unknown)

BRIEFLY EXPLAIN ANY STEPS UNDERWAY OR PLANNED TO MINIMIZE INFLOW AND INFILTRATION.

see attachment

**20.1 OPERATION AND MAINTENANCE PERFORMED BY CONTRACTOR(S)**

ARE ANY OPERATIONAL OR MAINTENANCE ASPECTS (RELATED TO WASTEWATER TREATMENT AND EFFLUENT QUALITY) OF THE TREATMENT WORKS THE RESPONSIBILITY OF A CONTRACTOR?

Yes  No  If Yes, list the name, address, telephone number and status of each contractor and describe the contractor's responsibilities. (Attach additional pages if necessary.)

NAME

NA

MAILING ADDRESS

TELEPHONE NUMBER WITH AREA CODE

RESPONSIBILITIES OF CONTRACTOR

**20.2 SCHEDULED IMPROVEMENTS AND SCHEDULES OF IMPLEMENTATION. PROVIDE INFORMATION ABOUT ANY UNCOMPLETED IMPLEMENTATION SCHEDULE OR UNCOMPLETED PLANS FOR IMPROVEMENTS THAT WILL AFFECT THE WASTEWATER TREATMENT, EFFLUENT QUALITY OR DESIGN CAPACITY OF THE TREATMENT WORKS. IF THE TREATMENT WORKS HAS SEVERAL DIFFERENT IMPLEMENTATION SCHEDULES OR IS PLANNING SEVERAL IMPROVEMENTS, SUBMIT SEPARATE RESPONSES FOR EACH. (IF NONE, GO TO QUESTION B-20.3.)**

A. List the outfall number that is covered by this implementation schedule

Outfall No. NA

B. Indicate whether the planned improvements or implementation schedule are required by local, state or federal agencies.

Yes  No

**20.3 WASTEWATER DISCHARGES:**

COMPLETE QUESTIONS 20.4 THROUGH 20.7 ONCE FOR EACH OUTFALL (INCLUDING BYPASS POINTS) THROUGH WHICH EFFLUENT IS DISCHARGED. DO NOT INCLUDE INFORMATION ON COMBINED SEWER OVERFLOWS IN THIS SECTION.

**20.4 DESCRIPTION OF OUTFALL**

OUTFALL NUMBER 001

**A. LOCATION**

1/4 SW 1/4 NW Section 13 Township 57 Range 23  E  W

UTM Coordinates Easting (X): \_\_\_\_\_ Northing (Y): \_\_\_\_\_

For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

B. Distance from Shore (If Applicable)

0 ft.

C. Depth Below Surface (If Applicable)

0 ft.

D. Average Daily Flow Rate

1.7 mgd

E. Does this outfall have either an intermittent or periodic discharge?

Yes  No If Yes, Provide the following information:

Number of Days Per Year Discharge Occurs: 365

Average Duration of Each Discharge: 24 hr/ day

Average Flow Per Discharge: 1.7 mgd

Months in Which Discharge Occurs: all

Is Outfall Equipped with a Diffuser?  Yes  No

**20.5 DESCRIPTION OF RECEIVING WATER**

B. Name of Receiving Water

Tributary to Coon Creek (u) Grand River (p)

B. Name of Watershed (If Known)

U.S. Soil Conservation Service 14-Digit Watershed Code (If Known)  
10280103-110003

B. Name of State Management/River Basin (If Known)

U.S. Geological Survey 8-Digit Hydrologic Cataloging Unit Code (If Known)

B. Critical Flow of Receiving Stream (If Applicable)  
Acute \_\_\_\_\_ cfs Chronic \_\_\_\_\_ cfs

B. Total Hardness of Receiving Stream at Critical Low Flow (If Applicable)  
mg/L of CaCO<sub>3</sub>

FACILITY NAME Chillicothe Wastewater Treatment Plant	PERMIT NO. MO- 0108227	OUTFALL NO. 001
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**PART B – ADDITIONAL APPLICATION INFORMATION (CONTINUED)**

20.6 DESCRIPTION OF TREATMENT

A. WHAT LEVELS OF TREATMENT ARE PROVIDED? Check All That Apply  
 Primary     Secondary     Advanced     Other (Describe) Chlorination/Dechlorination

B. INDICATE THE FOLLOWING REMOVAL RATES (AS APPLICABLE)  
 Design BOD<sub>5</sub> Removal Or Design CBOD<sub>5</sub> Removal    85 %    Design SS Removal    85 %  
 Design P Removal    %    Design N Removal    %    Other    %

C. What type of disinfection is used for the effluent from this outfall? If disinfection varies by season, please describe:  
 Chlorine gas form

If disinfection is by chlorination, is dechlorination used for this outfall?     Yes     No

Does the treatment plant have post aeration?     Yes     No

20.7 EFFLUENT TESTING DATA. ALL APPLICANTS THAT DISCHARGE TO WATERS OF THE U.S. MUST PROVIDE EFFLUENT TESTING DATA FOR THE FOLLOWING PARAMETERS. PROVIDE THE INDICATED EFFLUENT DATA FOR EACH OUTFALL THROUGH WHICH EFFLUENT IS DISCHARGED. DO NOT INCLUDE INFORMATION OF COMBINED SEWER OVERFLOWS IN THIS SECTION. ALL INFORMATION REPORTED MUST BE BASED ON DATA COLLECTED THROUGH ANALYSIS CONDUCTED USING 40 CFR PART 136 METHODS. IN ADDITION, THIS DATA MUST COMPLY WITH QA/QC REQUIREMENTS OF 40 CFR PART 136 AND OTHER APPROPRIATE QA/QC REQUIREMENTS FOR STANDARD METHODS FOR ANALYTES NOT ADDRESSED BY 40 CFR PART 136.

PARAMETER	MAXIMUM DAILY VALUE		AVERAGE DAILY VALUE		
	VALUE	UNITS	VALUE	UNITS	NO. OF SAMPLES
pH (Minimum)	6.2	S.U.		S.U.	1096
pH (Maximum)	7.8	S.U.		S.U.	1096
FLOW RATE	11.7	MGD	1.72	MGD	1096
TEMPERATURE (Winter)	22.2	°C	12.4	°C	547
TEMPERATURE (Summer)	25.0	°C	19.4	°C	549

\*For pH report a minimum and a maximum daily value.

POLLUTANT	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML/MDL
	CONC.	UNITS	CONC.	UNITS	NO. OF SAMPLES		

Conventional and Nonconventional Compounds

BIOCHEMICAL OXYGEN DEMAND (Report One)	BOD <sub>5</sub>	15	mg/L	7	mg/L	180	SM5210B	3 mg/l
	CBOD <sub>5</sub>		mg/L		mg/L			
FECAL COLIFORM	382	#/100 mL	33	#/100 mL	105	SM9222D	25/100 ml	
TOTAL SUSPENDED SOLIDS (TSS)	16	mg/L	6	mg/L	179	SM2540D	1 mg/l	
AMMONIA (AS N)	3.5	mg/L	0.7	mg/L	180	SM4500NH3	0.015 mg/l	
CHLORINE (TOTAL RESIDUAL, TRC)	0.12	mg/L	0.026	mg/L	642	SM4500CL	0.01 mg/l	
DISSOLVED OXYGEN	8.8	mg/L	7.3	mg/L	1096	SM4500OG	0 mg/l	
TOTAL KJELDAHL NITROGEN (TKN)	4.1	mg/L	4.1	mg/L	1	EPA 351.2	0.20 mg/l	
NITRATE PLUS NITRITE NITROGEN	7.7	mg/L	7.7	mg/L	1	EPA 353.2	0.50 mg/l	
OIL AND GREASE	ND	mg/L	ND	mg/L	36	EPA 1664A	5 mg/l	
PHOSPHORUS (TOTAL)	1.1	mg/L	1.1	mg/L	1	EPA 365.4		
TOTAL DISSOLVE SOLIDS (TDS)	462	mg/L	462	mg/L	1	SM2540C	5 mg/l	
OTHER		mg/L		mg/L		see attachment	page 12	

**END OF PART B**

**PART C - CERTIFICATION**

**30. CERTIFICATION**

All applicants must complete the Certification Section. This certification must be signed by an officer of the company or city official. All applicants must complete all applicable sections as explained in the Application Overview. By signing this certification statement, applicants confirm that they have reviewed the entire form and have completed all sections that apply to the facility for which this application is submitted.

ALL APPLICANTS MUST COMPLETE THE FOLLOWING CERTIFICATION.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PRINTED NAME AND OFFICIAL TITLE (MUST BE AN OFFICER OF THE COMPANY OR CITY OFFICIAL)

Mr. Jim Gillilan, General Manager Chillicothe Municipal Utilities

SIGNATURE



TELEPHONE NUMBER WITH AREA CODE

(660) 646-1683

DATE SIGNED

3/18/13

Upon request of the permitting authority, you must submit any other information necessary to assess wastewater treatment practices at the treatment works or identify appropriate permitting requirements.

For Design Flows Less than 1 Million Gallons Per Day,  
Send Completed Form to:

**Appropriate Regional Office**

Map of regional offices with addresses and phone numbers is available on the Web at [www.dnr.mo.gov/regions/ro-map.pdf](http://www.dnr.mo.gov/regions/ro-map.pdf).

For Design Flows of 1 Million Gallons Per Day or Greater,  
Send Completed Form to:

Department of Natural Resources  
Water Protection Program  
ATTN: NPDES Permits and Engineering Section  
P.O. Box 176  
Jefferson City, MO 65102

**END OF PART C.**

**REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.**

Do not complete the remainder of this application, unless:

1. Your facility design flow is equal to or greater than 1,000,000 gallons per day.
2. Your facility is a pretreatment treatment works.
3. Your facility is a combined sewer system.

Submittal of an incomplete application may result in the application being returned. Permit fees for returned applications shall be forfeited. Permit fees for applications being processed by the department that are withdrawn by the applicant shall be forfeited.

**MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.**

FACILITY NAME Chillicothe Wastewater Treatment	PERMIT NO. MO- 0108227	OUTFALL NO. 001
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**PART D – EXPANDED EFFLUENT TESTING DATA**

**40. EXPANDED EFFLUENT TESTING DATA**

Refer to the supplemental application information to determine whether Part D applies to the treatment works.

40.1 EFFLUENT TESTING: IF THE TREATMENT WORKS HAS A DESIGN FLOW GREATER THAN OR EQUAL TO 1 MILLION GALLONS PER DAY OR IT HAS (OR IS REQUIRED TO HAVE) A PRETREATMENT PROGRAM, OR IS OTHERWISE REQUIRED BY THE PERMITTING AUTHORITY TO PROVIDE THE DATA, THEN PROVIDE EFFLUENT TESTING DATA FOR THE FOLLOWING POLLUTANTS. PROVIDE THE INDICATED EFFLUENT TESTING INFORMATION FOR EACH OUTFALL THROUGH WHICH EFFLUENT IS DISCHARGED. DO NOT INCLUDE INFORMATION ON COMBINED SEWER OVERFLOWS IN THIS SECTION. ALL INFORMATION REPORTED MUST BE BASED ON DATA COLLECTED THROUGH ANALYSIS CONDUCTED USING 40 CFR PART 136 METHODS. IN ADDITION, THIS DATA MUST COMPLY WITH QA/QC REQUIREMENTS OF 40 CFR PART 136 AND OTHER APPROPRIATE QA/QC REQUIREMENTS FOR STANDARD METHODS FOR ANALYTES NOT ADDRESSED BY 40 CFR PART 136. INDICATE IN THE BLANK ROWS PROVIDED BELOW ANY DATA YOU MAY HAVE ON POLLUTANTS NOT SPECIFICALLY LISTED IN THIS FORM. EFFLUENT TESTING MUST NOT BE MORE THAN FOUR AND ONE-HALF YEARS OLD.

OUTFALL NUMBER (Complete Once for Each Outfall Discharging Effluent to Waters of the State.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL	
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES			
METALS (TOTAL RECOVERABLE), CYANIDE, PHENOLS AND HARDNESS												
ANTIMONY					ND	ug/l				1	EPA 200.7	10.0
ARSENIC					ND	ug/l				1	EPA 200.7	10.0
BERYLLIUM					ND	ug/l				1	EPA 200.7	1.0
CADMIUM					ND	ug/l				1	EPA 200.7	5.0
CHROMIUM					ND	ug/l				1	EPA 200.7	5.0
COPPER					ND	ug/l				1	EPA 200.7	10.0
LEAD					ND	ug/l				1	EPA 200.7	5.0
MERCURY					ND	ug/l				1	EPA 200.7	0.20
NICKEL					ND	ug/l				1	EPA 200.7	5.0
SELENIUM					ND	ug/l				1	EPA 200.7	15.0
SILVER					ND	ug/l				1	EPA 200.7	7.0
THALLIUM					ND	ug/l				1	EPA 200.7	20.0
ZINC					ND	ug/l				1	EPA 200.7	50.0
CYANIDE					ND	mg/l				1	SM4500-CN	0.0050
TOTAL PHENOLIC COMPOUNDS					ND	mg/l				1	EPA 420.1	0.050
HARDNESS (as CaCO <sub>3</sub> )					228	mg/l				1	SM 2340 C	

USE THIS SPACE (OR A SEPARATE SHEET) TO PROVIDE INFORMATION ON OTHER METALS REQUESTED BY THE PERMIT WRITER.


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**PART D – EXPANDED EFFLUENT TESTING DATA (CONTINUED)**

**40.1 EXPANDED EFFLUENT TESTING DATA (CONTINUED)**

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL	
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES			
<b>VOLATILE ORGANIC COMPOUNDS</b>												
ACROLEIN					ND	ug/l				1	EPA 624 Low	100
ACRYLONITRILE					ND	ug/l				1	EPA 624 Low	20.0
BENZENE					ND	ug/l				1	EPA 624 Low	1.0
BROMOFORM					ND	ug/l				1	EPA 624 Low	1.0
CARBON TETRACHLORIDE					ND	ug/l				1	EPA 624 Low	1.0
CHLOROBENZENE					ND	ug/l				1	EPA 624 Low	1.0
CHLORODIBROMO-METHANE					ND	ug/l				1	EPA 624 Low	1.0
CHLOROETHANE					ND	ug/l				1	EPA 624 Low	1.0
2-CHLORO-ETHYLVINYL ETHER					ND	ug/l				1	EPA 624 Low	10.0
CHLOROFORM					ND	ug/l				1	EPA 624 Low	1.0
DICHLOROBROMO-METHANE					ND	ug/l				1	EPA 624 Low	1.0
1,1-DICHLORO-ETHANE					ND	ug/l				1	EPA 624 Low	1.0
1,2-DICHLORO-ETHANE					ND	ug/l				1	EPA 624 Low	1.0
TRANS-1,2-DICHLOROETHYLENE					ND	ug/l				1	EPA 624 Low	1.0
1,1-DICHLORO-ETHYLENE					ND	ug/l				1	EPA 624 Low	1.0
1,2-DICHLORO-PROPANE					ND	ug/l				1	EPA 624 Low	1.0
1,3-DICHLORO-PROPYLENE					ND	ug/l				1	EPA 624 Low	1.0
ETHYLBENZENE					ND	ug/l				1	EPA 624 Low	1.0
METHYL BROMIDE					ND	ug/l				1	EPA 624 Low	5.0
METHYL CHLORIDE					ND	ug/l				1	EPA 624 Low	1.0
METHYLENE CHLORIDE					ND	ug/l				1	EPA 624 Low	1.0
1,1,2,2-TETRA-CHLOROETHANE					ND	ug/l				1	EPA 624 Low	1.0
TETRACHLORO-ETHANE					ND	ug/l				1	EPA 624 Low	1.0
TOLUENE					ND	ug/l				1	EPA 624 Low	1.0
3,4-BENZO-FLUORANTHENE					ND	ug/l				1	EPA 625	5.0
BENZO(GH) PHERYLENE					ND	ug/l				1	EPA 625	5.0
BENZO(K) FLUORANTHENE					ND	ug/l				1	EPA 625	5.0

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**PART D – EXPANDED EFFLUENT TESTING DATA (CONTINUED)**

**40.1 EXPANDED EFFLUENT TESTING DATA (CONTINUED)**

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES		
BIS (2-CHLOROTHOXY) METHANE					ND	ug/l			1	EPA 625	5.0
BIS (2-CHLOROETHYL) – ETHER					ND	ug/l			1	EPA 625	6.0
BIS (2-ETHYLHEXYL) PHTHALATE					ND	ug/l			1	EPA 625	6.0
4-BROMOPHENYL PHENYL ETHER					ND	ug/l			1	EPA 625	5.0
BUTYL BENZYL PHTHALATE					ND	ug/l			1	EPA 625	5.0
2-CHLORONAPH-THALENE					ND	ug/l			1	EPA 625	5.0
4-CHLORPHENYL PHENYL ETHER					ND	ug/l			1	EPA 625	5.0
CHRYSENE					ND	ug/l			1	EPA 625	5.0
DI-N-BUTYL PHTHALATE					ND	ug/l			1	EPA 625	5.0
DEBENZO (A,H) ANTHRACENE					ND	ug/l			1	EPA 625	5.0
1,2-DICHLORO-BENZENE					ND	ug/l			1	EPA 624 Low	1.0
1,3-DICHLORO-BENZENE					ND	ug/l			1	EPA 624 Low	1.0
1,4-DICHLORO-BENZENE					ND	ug/l			1	EPA 624 Low	1.0
3,3-DICHLORO-BENZIDINE					ND	ug/l			1	EPA 625	20.0
DIETHYL PHTHALATE					ND	ug/l			1	EPA 625	5.0
DIMETHYL PHTHALATE					ND	ug/l			1	EPA 625	5.0
2,4-DINITRO-TOLUENE					ND	ug/l			1	EPA 625	6.0
2,6-DINITRO-TOLUENE					ND	ug/l			1	EPA 625	5.0
1,2-DIPHENYL-HYDRAZINE					ND	ug/l			1	EPA 625	8.0
1,1,1-TRICHLORO-ETHANE					ND	ug/l			1	EPA 624 Low	1.0
1,1,2-TRICHLORO-ETHANE					ND	ug/l			1	EPA 624 Low	1.0
TRICHLORETHYLENE					ND	ug/l			1	EPA 624 Low	1.0
VINYL CHLORIDE					ND	ug/l			1	EPA 624 Low	1.0

USE THIS SPACE (OR A SEPARATE SHEET) TO PROVIDE INFORMATION ON OTHER VOLATILE ORGANIC COMPOUNDS REQUESTED BY THE PERMIT WRITER




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**PART D – EXPANDED EFFLUENT TESTING DATA (CONTINUED)**

**40.1 EXPANDED EFFLUENT TESTING DATA (CONTINUED)**

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL	
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES			
<b>BASE-NEUTRAL COMPOUNDS</b>												
ACENAPHTHENE					ND	ug/l				1	EPA 625	5.0
ACENAPHTHYLENE					ND	ug/l				1	EPA 625	5.0
ANTHRACENE					ND	ug/l				1	EPA 625	5.0
BENZIDINE					ND	ug/l				1	EPA 625	50.0
BENZO(A)ANTHRACENE					ND	ug/l				1	EPA 625	5.0
BENZO(A)PYRENE					ND	ug/l				1	EPA 625	5.0
FLUORANTHENE					ND	ug/l				1	EPA 625	5.0
FLUORENE					ND	ug/l				1	EPA 625	5.0
HEXACHLOROBENZENE					ND	ug/l				1	EPA 625	5.0
HEXACHLOROCYCLO-PENTADIENE					ND	ug/l				1	EPA 625	5.0
HEXACHLOROETHANE					ND	ug/l				1	EPA 625	5.0
INDENO (1,2,3-CD) PYRENE					ND	ug/l				1	EPA 625	5.0
ISOPHORONE					ND	ug/l				1	EPA 625	5.0
NAPHTHALENE					ND	ug/l				1	EPA 625	5.0
NITROBENZENE					ND	ug/l				1	EPA 625	5.0
N-NITROSODI-PROPYLAMINE					ND	ug/l				1	EPA 625	5.0
N-NITROSODI-METHYLAMINE					ND	ug/l				1	EPA 625	5.0
N-NITROSODI-PHENYLAMINE					ND	ug/l				1	EPA 625	5.0
PHENANTHRENE					ND	ug/l				1	EPA 625	5.0
PYRENE					ND	ug/l				1	EPA 625	5.0
1,2,4-TRICHLOROBENZENE					ND	ug/l				1	EPA 625	5.0

USE THIS SPACE (OR SEPARATE SHEET) TO PROVIDE INFORMATION ON OTHER BASE-NEUTRAL COMPOUNDS REQUESTED BY THE PERMIT WRITER.

CYANIDE (T)	0.055	mg/l			0.016	mg/l				12	SM 4500CNE	0.0050
PHENOLICS (T)	ND	mg/l			ND	mg/l				12	EPA 420.1	0.050
Recoverable												

**END OF PART D**

**REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.**

**MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.**

FACILITY NAME Chillicothe Wastewater Treatment Plant	PERMIT NO. MO- 0108227	OUTFALL NO. 001
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**PART E – TOXICITY TESTING DATA**

**50. TOXICITY TESTING DATA**

Refer to the Supplemental Application Information to determine whether Part E applies to the treatment works.

Publicly owned treatment works, or POTWS, meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points.

- A. POTWs with a design flow rate greater than or equal to 1 million gallons per day.
- B. POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403).
- C. POTWs required by the permitting authority to submit data for these parameters
  - ◆ At a minimum, these results must include quarterly testing for a 12-month period within the past one year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute or chronic toxicity, depending on the range of receiving water dilution. Do not include information about combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
  - ◆ If EPA methods were not used, report the reason for using alternative methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E. If no biomonitoring data is required, do not complete Part E. Refer to the application overview for directions on which other sections of the form to complete.

50.1 REQUIRED TESTS. INDICATE THE NUMBER OF WHOLE EFFLUENT TOXICITY TESTS CONDUCTED IN THE PAST FOUR AND ONE-HALF YEARS.

CHRONIC	ACUTE	4
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INDIVIDUAL TEST DATA. Complete the following chart for the last three whole effluent toxicity tests. Allow one column per test (where each species constitutes a test). Copy this page if more than three tests are being reported.

	MOST RECENT	2 <sup>ND</sup> MOST RECENT	3 <sup>RD</sup> MOST RECENT
<b>A. TEST INFORMATION</b>			
TEST NUMBER	60129202	60106001	6085830
TEST SPECIES AND TEST METHOD NUMBER			
AGE AT INITIATION OF TEST	Dubia<24hrs Fathead13day	Dubia<24hr Fathead 8days	Dubia<24hrsFathead1-14da
OUTFALL NUMBER	001	001	001
DATES SAMPLE COLLECTED	9/17/12 0800 9/18/12 0800	9/12/11 0800 9/13/11 0800	9/20/10 0830 9/21/10 0830
DATE TEST STARTED	9/19/12 1300	9/14/11 1300	9/22/10 0945
DURATION	48 hr	48 hr	48 hr
<b>B. GIVE TOXICITY TEST METHODS FOLLOWED</b>			
MANUAL TITLE			
EDITION NUMBER AND YEAR OF PUBLICATION			
PAGE NUMBER(S)			
<b>C. GIVE THE SAMPLE COLLECTION METHOD(S) USED. FOR MULTIPLE GRAB SAMPLES, INDICATE THE NUMBER OF GRAB SAMPLES USED.</b>			
24-HOUR COMPOSITE	one sample / hr / 24 hrs	one sample / hr / 24 hrs	one sample / hr / 24 hrs
GRAB			
<b>D. INDICATE WHERE THE SAMPLE WAS TAKEN IN RELATION TO DISINFECTION. (CHECK ALL THAT APPLY FOR EACH)</b>			
BEFORE DISINFECTION	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AFTER DISINFECTION	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AFTER DECHLORINATION	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>E. DESCRIBE THE POINT IN THE TREATMENT PROCESS AT WHICH THE SAMPLE WAS COLLECTED</b>			
SAMPLE WAS COLLECTED	post dechlorination	post dechlorination	post dechlorination
<b>F. FOR EACH TEST, INCLUDE WHETHER THE TEST WAS INTENDED TO ASSESS CHRONIC TOXICITY, ACUTE TOXICITY OR BOTH.</b>			
CHRONIC TOXICITY	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ACUTE TOXICITY	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>G. PROVIDE THE TYPE OF TEST PERFORMED</b>			
STATIC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
STATIC STATIC-RENEWAL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FLOW-THROUGH	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>H. SOURCE OF DILUTION WATER. IF LABORATORY WATER, SPECIFY TYPE; IF RECEIVING WATER, SPECIFY SOURCE</b>			
LABORATORY WATER	results enclosed	results enclosed	results enclosed
RECEIVING WATER			

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**PART E – TOXICITY TESTING DATA (CONTINUED)**

**50.1 WHOLE EFFLUENT TOXICITY TESTS DATA (CONTINUED)**

	MOST RECENT	2 <sup>ND</sup> MOST RECENT	3 <sup>RD</sup> MOST RECENT
I. TYPE OF DILUTION WATER, IF SALT WATER, SPECIFY "NATURAL" OR TYPE OF ARTIFICIAL SEA SALTS OR BRINE USED.			
FRESH WATER	results enclosed	results enclosed	results enclosed
SALT WATER	for following items	for following items	for following items

J. GIVE THE PERCENTAGE EFFLUENT USED FOR ALL CONCENTRATIONS IN THE TEST SERIES.	100	100	100

K. PARAMETERS MEASURED DURING THE TEST. (STATE WHETHER PARAMETER MEETS TEST METHOD SPECIFICATIONS)			
pH			
SALINITY			
TEMPERATURE			
AMMONIA			
DISSOLVED OXYGEN			

L. TEST RESULTS			
ACUTE:			
PERCENT IN SURVIVAL IN 100% EFFLUENT	100	100	100
LC <sub>50</sub>			
95% C.I.			
CONTROL PERCENT SURVIVAL			
OTHER (DESCRIBE)			

CHRONIC:			
NOEC			
IC <sub>25</sub>			
CONTROL PERCENT SURVIVAL			
OTHER (DESCRIBE)			

M. QUALITY CONTROL ASSURANCE			
IS REFERENCE TOXICANT DATA AVAILABLE?			
WAS REFERENCE TOXICANT TEST WITHIN ACCEPTABLE BOUNDS?			
WHAT DATE WAS REFERENCED TOXICANT TEST RUN (MM/DD/YYYY)?			
OTHER (DESCRIBE)			

**50.2 TOXICITY REDUCTION EVALUATION**  
 Is the treatment works involved in a toxicity reduction evaluation?  Yes  No  
 If yes, describe: NA

**50.3 SUMMARY OF SUBMITTED BIOMONITORING TEST INFORMATION**  
 If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.  
 Date Submitted (MM/DD/YYYY)  
 Summary of Results (See Instructions)  
 NA

**END OF PART E**  
**REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.**

**MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.**

FACILITY NAME Chillicothe Wastewater Treatment Plant	PERMIT NO. MO- 0108227	OUTFALL NO. 001
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**PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES**

**60. INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES**

Refer to the Supplemental Application Information to determine whether Part F applies to the treatment works.

All treatment works receiving discharges from significant industrial users or which receive RCRA, CERCLA, or other remedial wastes must complete this form.

**GENERAL INFORMATION**

**60.1 PRETREATMENT PROGRAM**

Does the treatment works have, or is it subject to, an approved pretreatment program?

Yes       No

**60.2 NUMBER OF NON-CATEGORICAL SIGNIFICANT INDUSTRIAL USERS, or SIUs AND CATEGORICAL INDUSTRIAL USERS, or CIUs. PROVIDE THE NUMBER OF EACH OF THE FOLLOWING TYPES OF INDUSTRIAL USERS THAT DISCHARGE TO THE TREATMENT WORKS.**

A. Number of Non-Categorical SIUs -1-	B. Number of CIUs -1-
--	--------------------------

**60.3 SIGNIFICANT INDUSTRIAL USER INFORMATION**

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, provide the information requested for each. Submit additional pages as necessary.

NAME see attachment			
MAILING ADDRESS	CITY	STATE	ZIP

**60.4 INDUSTRIAL PROCESSES**

DESCRIBE ALL OF THE INDUSTRIAL PROCESSES THAT AFFECT OR CONTRIBUTE TO THE SIU's DISCHARGE.

**60.5 PRINCIPAL PRODUCT(S) AND RAW MATERIAL (S)**

Describe all of the principle processes and raw materials that affect or contribute to the SIU's discharge.

PRINCIPAL PRODUCT(S)
RAW MATERIAL(S)

**60.6 FLOW RATE**

A. PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

gpd       Continuous       Intermittent

B. NON-PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of non-process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

C. gpd       Continuous       Intermittent

**60.7 PRETREATMENT STANDARDS**

Indicate whether the SIU is subject to the following

A. Local Limits       Yes       No  
 B. Categorical Pretreatment Standards       Yes       No

If subject to categorical pretreatment standards, which category and subcategory?

**60.8 PROBLEMS AT THE TREATMENT WORKS ATTRIBUTED TO WASTE DISCHARGED BY THE SIU**

Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?

Yes       No      If Yes, describe each episode

**MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.**

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**PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES (CONTINUED)**

**60.9 RCRA HAZARDOUS WASTE RECEIVED BY TRUCK, RAIL, OR DEDICATED PIPELINE**

RCRA WASTE. Does the treatment works receive or has it in the past three years received RCRA hazardous waste by truck, rail or dedicated pipe?  
 Yes       No

WASTE TRANSPORT. Method by which RCRA waste is received. (Check all that apply)  
 Truck       Rail       Dedicated Pipe

WASTE DESCRIPTION. Give EPA hazardous waste number and amount (volume or mass, specify units).

EPA HAZARDOUS WASTE NUMBER	AMOUNT	UNITS
NA	NA	NA

**60.10 CERCLA, OR SUPERFUND, WASTEWATER, RCRA REMEDIATION/CORRECTIVE ACTION WASTEWATER AND OTHER REMEDIAL ACTIVITY WASTEWATER**

REMEDIAL WASTE. Does the treatment works currently (or has it been notified that it will) receive waste from remedial activities?  
 Yes       No      Provide a list of sites and the requested information for each current and future site.

**60.11 WASTE ORIGIN**

Describe the site and type of facility at which the CERCLA/RCRA/or other remedial waste originates (or is expected to originate in the next five years).  
 NA

**60.12 POLLUTANTS**

List the hazardous constituents that are received (or are expected to be received). Included data on volume and concentration, if known. (Attach additional sheets if necessary)  
 NA

**60.13 WASTE TREATMENT**

A. Is this waste treated (or will it be treated) prior to entering the treatment works?  
 Yes       No

If Yes, describe the treatment (provide information about the removal efficiency):  
 NA

B. Is the discharge (or will the discharge be) continuous or intermittent?  
 Continuous       Intermittent

If intermittent, describe the discharge schedule:  
 NA

**END OF PART F**

**REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.**

MO 780-1805 (09-08)



**FORM I – PERMIT APPLICATION FOR CONSTRUCTION AND  
 OPERATION OF WASTEWATER IRRIGATION SYSTEMS**

**FOR AGENCY USE ONLY**

PERMIT NUMBER

MO -

DATE RECEIVED

**INSTRUCTIONS:** The following forms must be submitted with Form I: FORM B for domestic wastewater. Submit FORMS E and G for land disturbance permit if construction areas total one acre or more.

**1.00 FACILITY INFORMATION**

1.10 Facility Name

Chillicothe Wastewater Treatment Plant

1.20 Application for:  Construction Permit (attach Engineering report, Plans and Specifications per 10 CSR 20-8)

Operating Permit (if no construction permit, attach engineering documents)

Date Irrigation System Began Operation: \_\_\_\_\_

Operating Permit Renewal

1.30 Type of wastewater to be irrigated:  Domestic  Municipal  State/National Park  Seasonal business

Municipal with Pretreatment Program or Significant Industrial Users  Other (explain) \_\_\_\_\_

SIC Codes (list all that apply, in order of importance) \_\_\_\_\_

1.40 Months when the business or enterprise will operate or generate wastewater:

12 months per year  Part of year (list Months): \_\_\_\_\_

1.50 This system is designed for:

No-discharge  Partial irrigation when feasible and discharge rest of time.

Irrigation during recreation season (April – October) and discharge during November – March.

Other (explain) \_\_\_\_\_

1.60 List the Facility outfalls which will be applicable to the irrigation system from outfalls listed on Form B.

Outfall Nos. 001 \_\_\_\_\_

**2.00 STORAGE BASINS**

2.10 Number of storage basins: 1 Type of basin:  Steel  Concrete  Fiberglass  Earthen

Earthen with membrane liner

2.20 Storage basin dimensions at inside top of berm (feet): Report freeboard as feet from top of berm to emergency spillway or overflow pipe.

(Complete Attachment A: Profile Sketch)

Basin #1: Length \_\_\_\_\_ Width \_\_\_\_\_ Depth 6' Freeboard > 1' Berm Width 35' % Slope 3:1

Basin #2: Length \_\_\_\_\_ Width \_\_\_\_\_ Depth \_\_\_\_\_ Freeboard \_\_\_\_\_ Berm Width \_\_\_\_\_ % Slope \_\_\_\_\_

2.30 Storage Basin operating levels (report as feet below emergency overflow level)

Basin #1: Maximum water level 6 ft. Minimum operating water level 1 ft.

Basin #2: Maximum water level na ft. Minimum operating water level na ft.

2.40 Depth of sludge in lagoons and storage basins na ft.

Total sludge stored 0 dry tons 0 cu. ft.

**3.00 LAND APPLICATION SYSTEM**

3.10 Number of irrigation sites 1 Total Acres 155 Maximum % field slopes < 3 %

Location: 1/4, 1/4, 1/4, 12 Sec. 57 T 24W R Liv County 230 Acres

Location: 1/4, 1/4, 1/4, 13 Sec. 57 T 24W R Liv County 230 Acres

3.11	Type of vegetation: <input type="checkbox"/> Grass hay <input type="checkbox"/> Pasture <input type="checkbox"/> Timber <input checked="" type="checkbox"/> Row crops <input type="checkbox"/> Other (describe) _____
3.20	Wastewater flow (dry weather) gallons/day: Average annual: <u>1.7</u> Seasonal _____ Off-season _____ Months of seasonal flow: _____ Human Population Equivalent: _____
3.21	Land Application rate per acre (design flow including 1 in 10 year storm water flows): Design: _____ inches/year _____ inches/hour _____ inches/day <u>2</u> inches/week Actual: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week Total Irrigation per year (gallons): _____ Design _____ Actual Actual months used for Irrigation (check): <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input checked="" type="checkbox"/> Apr <input checked="" type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec
3.22	Land Application Rate is based on: <input type="checkbox"/> Nutrient Management Plan (N&P) <input checked="" type="checkbox"/> Hydraulic Loading <input type="checkbox"/> Other (describe) _____
3.30	Equipment type: <input type="checkbox"/> Sprinklers <input type="checkbox"/> Gated pipe <input checked="" type="checkbox"/> Center pivot <input type="checkbox"/> Traveling gun <input type="checkbox"/> Other (describe) _____ Equipment Flow Capacity: _____ Gallons per hour _____ Total hours of operation per year
3.40	Public Access Restrictions for irrigation sites: <input type="checkbox"/> Site is Fenced <input checked="" type="checkbox"/> Wastewater disinfection prior to irrigation <input type="checkbox"/> Other (describe): _____
3.50	Separation distance (in feet) from the outside edge of the wetted irrigation area to down gradient features: _____ Permanent flowing stream _____ Losing Stream _____ Intermittent (wet weather) stream _____ Lake or pond _____ Property boundary _____ Dwellings _____ Water supply well <input checked="" type="checkbox"/> Other (describe) _____
3.60	SOILS INFORMATION: Use information from the County Soil Survey, NRCS, or professional soil scientist. Soil Series Name _____ Depth of bedrock _____ Feet Depth of water table _____ Feet Soil Infiltration rate in inches/hour (in/hr) for most restrictive layer within the following soil depth ranges: _____ In/hr for 0-12 in soil depth _____ In/hr for 12-24 inch soil depth _____ In/hr for 24-60 inch soil depth
3.70	Include a recent Geologic Report by the Department's Geological Survey and Resource Assessment Division with your construction permit.
3.80	Attach a current copy of the Operation and Maintenance (O&M) Plan for the irrigation system. Date of O&M Plan: <u>2006</u>
3.81	Attach a site map showing topography, storage basins, irrigation sites, property boundary, streams, wells, roads, dwellings and other pertinent features.
3.82	Attach a facility sketch showing treatment units, storage basins, pipelines, irrigation equipment, application sites and other features.
<b>4.00 CERTIFICATION</b>	
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine or imprisonment.	
CONSULTING ENGINEER – Name, Official Title and Engineering Firm (TYPE OR PRINT)	
TELEPHONE NUMBER (area code and number)	
SIGNATURE	
DATE SIGNED	
OWNER OR AUTHORIZED REPRESENTATIVE – Name and Official Title (TYPE OR PRINT)	
TELEPHONE NUMBER (area code and number)	
SIGNATURE	
DATE SIGNED	

**CHILLCOTHE MUNICIPAL UTILITIES**

ELECTRIC, WATER, SEWER AND SANITARY SERVICES

920 WASHINGTON ST., P.O. BOX 140

**CHILLCOTHE, MISSOURI 64601**

TELEPHONE 660-646-1664 - Customer info.

660-646-1683 - Administrative

FAX 660-646-4181

3/13/2013

Department of Natural Resources:

Please let this letter stand as our explanation to the Letter of Warning issued by the Northeast Regional Office on December 15, 2010. You will find enclosed a copy of the Facsimile to Mr. Scott Adams of the DNR ~~NEAR~~

*NERO*

Please note that the 304 mg/l was not used in calculating the averages for this permit renewal application. I did not feel it would be representative of our effluent.

If you have any questions please feel free to contact me at (660) 646-6373.

Sincerely,

CHILLCOTHE MUNICIPAL UTILITIES



Kent A. Spainhour  
Chief Plant Operator

KAS

enclosure

# Facsimile

To: Scott Adams, MDNR NERO  
@Fax: 660 385- 8090  
From: Kent A. Spainhour  
Date: Tuesday, June 15, 2010 @ 10:10AM  
Re: Effluent TSS  
Pages: 1, including this

Dear Mr. Adams,

Please let this letter stand as written notification of our conversation on the morning of 06-10-10 in reference to the exceeded total suspended solids in the effluent for our wastewater treatment plant on 06-09-10. As I stated the effluent tss was 304 mg/l. Due to the fact we were receiving flood water from the Grand River in the influent of our facility. It was later discovered a cone section from manhole #0020 was the source of entry. The cone section was off the barrel section allowing flood water to enter the influent. On 06-12-10 after the flood waters receded we were able to place the cone section and reseal the manhole to prevent the water from outside sources from entering. It was not determined the exact cause for this manhole being disturbed.

At this writing it would appear our effluent should be back within our limits set forth in MO-0108227. I will advise after our next testing of total suspended solids if it fails to do so.

If you have any further questions or comments please do not hesitate to contact me at (660) 646-6373.

Sincerely,

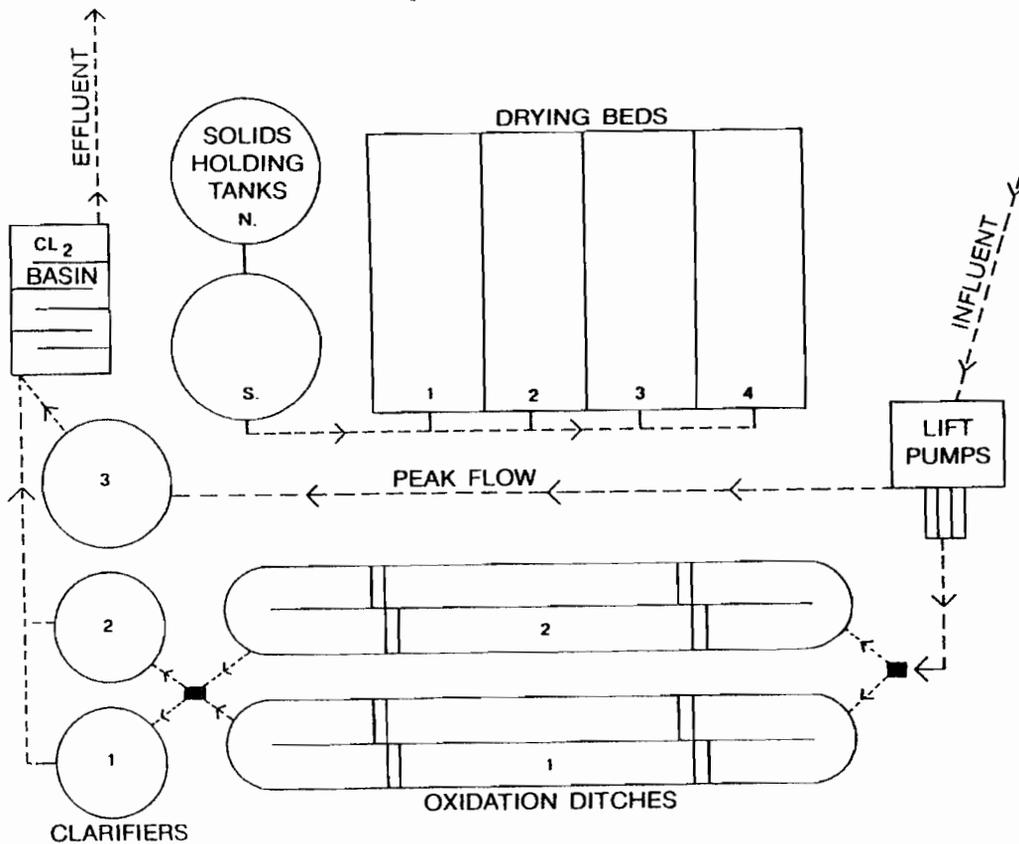
CHILLICOTHE MUNICIPAL UTILITIES



Kent A. Spainhour  
Chief Operator WWTP



# PART A 7.3



**WASTEWATER  
TREATMENT  
PLANT FLOW  
DIAGRAM**

## 7.3 Flow Diagram

Influent flow from the City of Chillicothe enters the Lift Pump Building, flow is pumped to above ground level so flow is gravity feed into the grit chamber and flow monitors record the daily flow. Mechanical barscreen removes material before entering the oxidation ditch, each ditch (1.15 MG) is equipped with four (4) surface aerators. Flow then enters secondary clarifiers (0.264 MG). Clarifier effluent flows to the disinfection basin. Solids are pumped back to the oxidation ditch or wasted to solids holding tanks. Effluent is chlorinated by chlorine gas and dechlorinated by sulfur dioxide gas. Effluent is discharged continuously to Coon Creek. Solids holding tanks (.45 MG) ea gravity thicken biosolids for land application.

Attachment  
Part B line 20

2009 Municipal Utilities contracted Insituform Technologies of Chesterfield Missouri to line 18,700 lineal feet of 6" to 18" clay tile pipe.

2009 & 2010 Municipal Utilities contracted Trekk Design Group of Kansas City Missouri to smoke test 287,850 lineal feet of sanitary sewer was smoke tested and 492 potential I/I source in the public and 535 potential defects in the private. C.M.U. Maintenance crew has been working on the public defects list.

2010 & 2011 Municipal Utilities contracted SAK Construction of Ofallon Missouri to line 70,700 lineal feet of 8" to 24" clay tile pipe. Also C.M.U. In house construction crew replaced 500' of 10" clay tile main and to manholes.

2012 Municipal Utilities contracted Bates Utility Company of Weldon Spring Missouri to line 345 VF of manholes with cementitious mortar. Also replace 170' of 12" clay tile main pipe and to manholes.

C.M.U. is working with a Engineering Company to line around 400 V F of manholes in 2013 this project will be put out for bids in late March.

C.M.U. Future plan to minimize I/I is to continue doing liner and manhole projects, when money is available with in our budget and continue to work on the smoke testing defects.

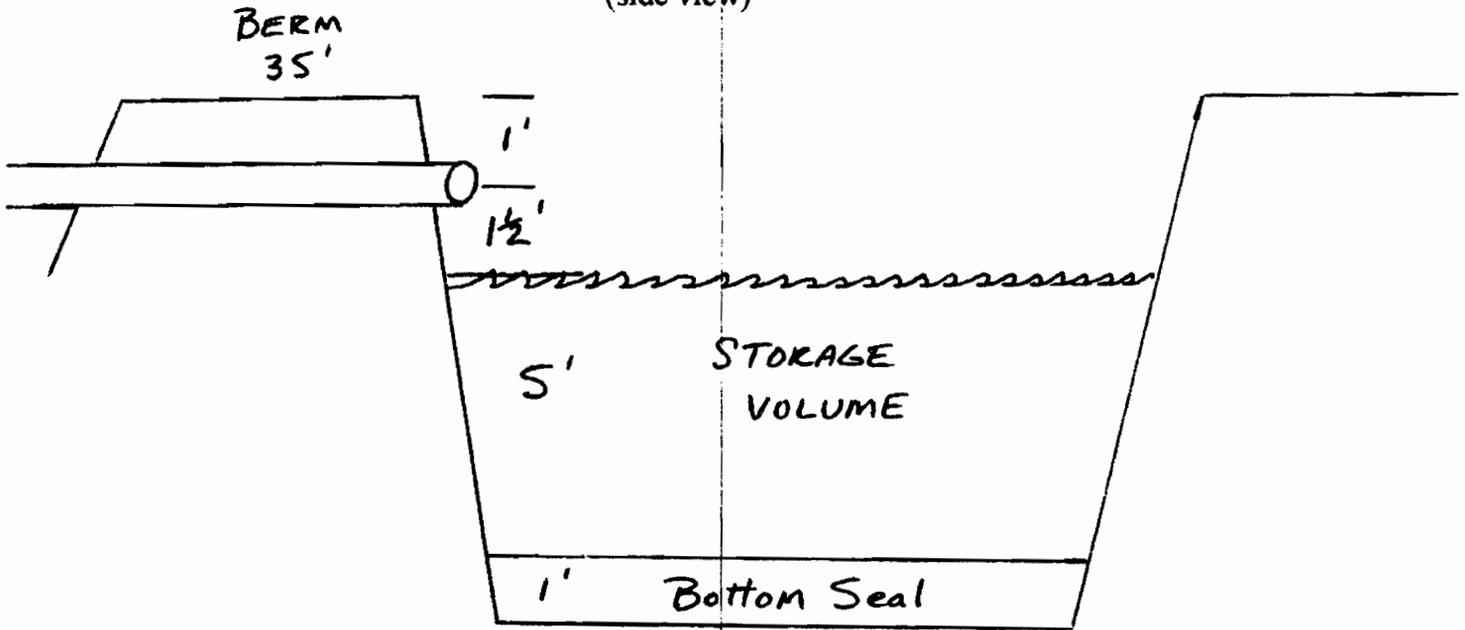
Part F. Industrial User Discharges and RCRA/CERCLA Wastes

- 60.3 Donaldson Company Inc.  
400 Donaldson Drive  
Chillicothe, MO 64601
- 60.4 Water cooled welding of sheet metal to construct air cleaner assemblies
- 60.5 Principal Products, manufacturing of air cleaner assemblies for heavy equipment  
Raw Materials, sheet steel
- 60.6 A. Process Flow rate 75,000 GPD, continuous during hours of operation  
B. Non process flow 25,000 GPD, intermittent
- 60.7 A. Local Limits : yes B. Categorical Pretreatment Standards : yes 433 Standards
- 60.3 Wire Co World Group  
601 Corporate Drive  
Chillicothe, MO 64601
- 60.4 Clean, pickle and galvanizing wire for production line
- 60.5 Cleaning of wire for plant use and other customers to be drawn to various diameters
- 60.6 A. Process Flow rate 55,000 GPD, intermittent  
B. Non process flow 10,000 GPD, intermittent
- 60.7 A. Local limits : yes B. Categorical Pretreatment Standards : Production Based 420 NS

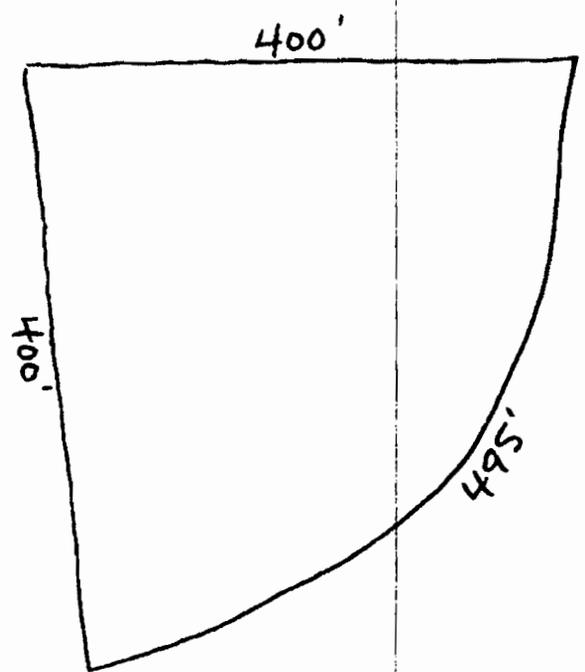
# Form I

Attachment "A"

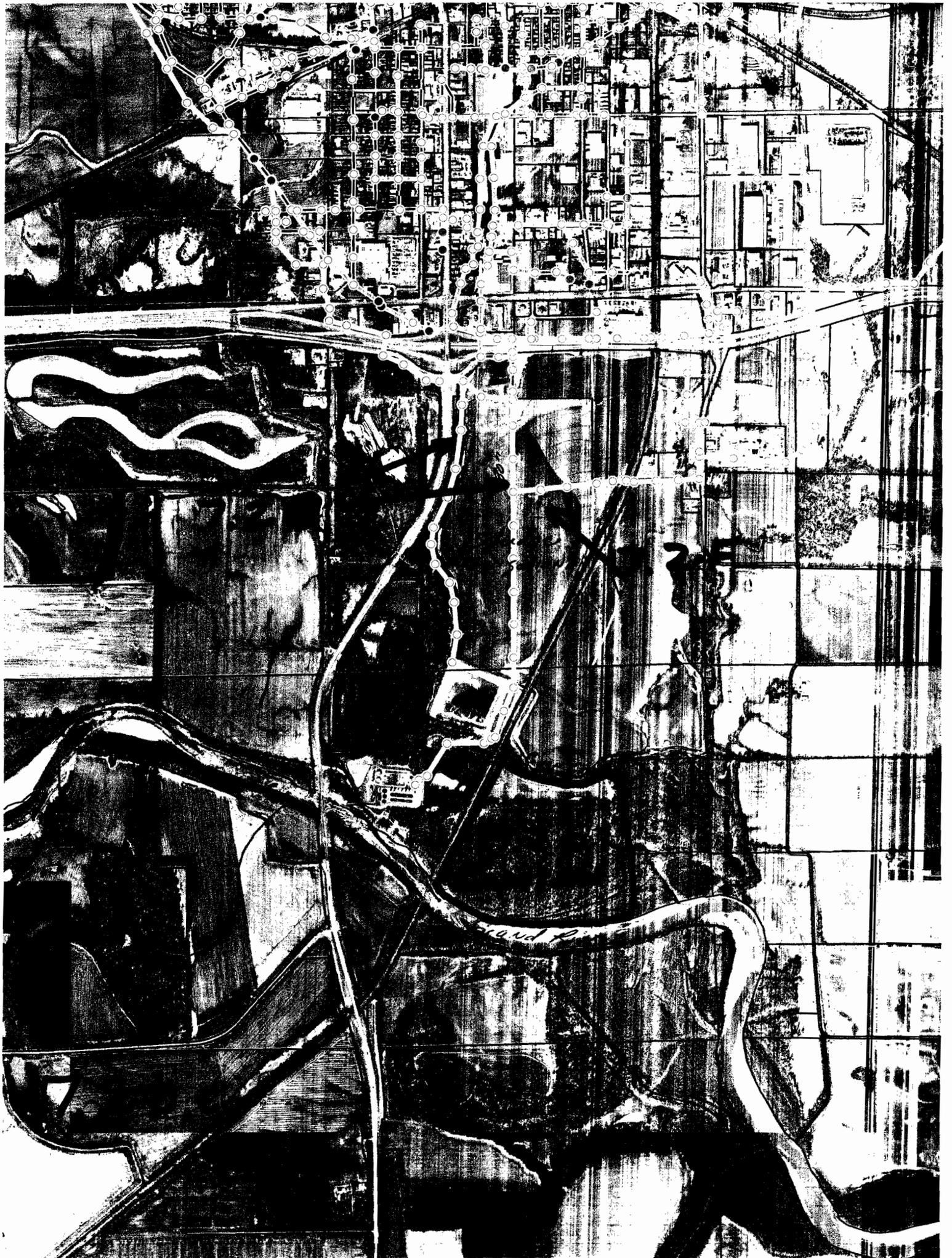
Storage Basin Profile Sketch  
(side view)

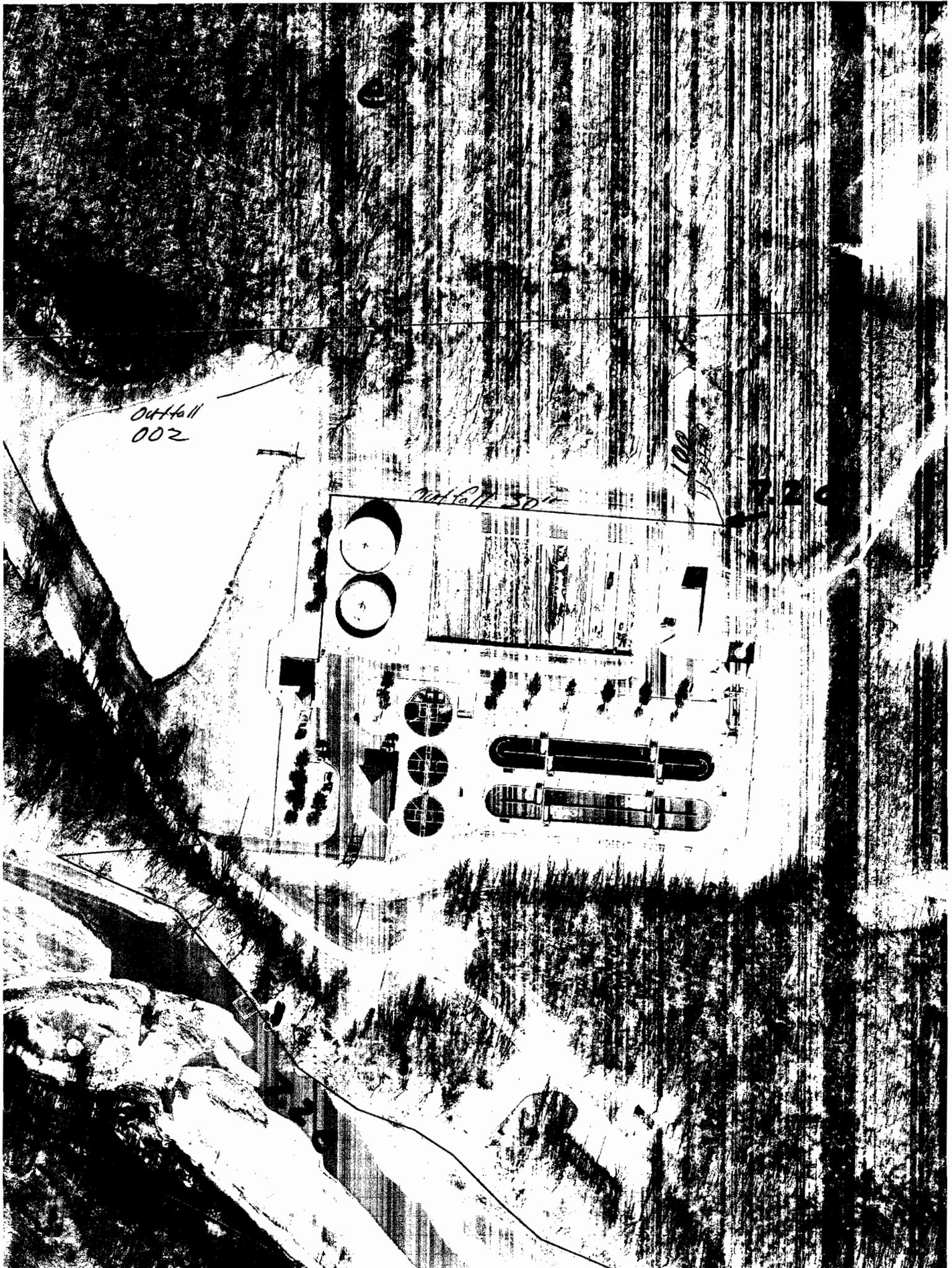


Storage Basin Profile Sketch  
(overhead view)



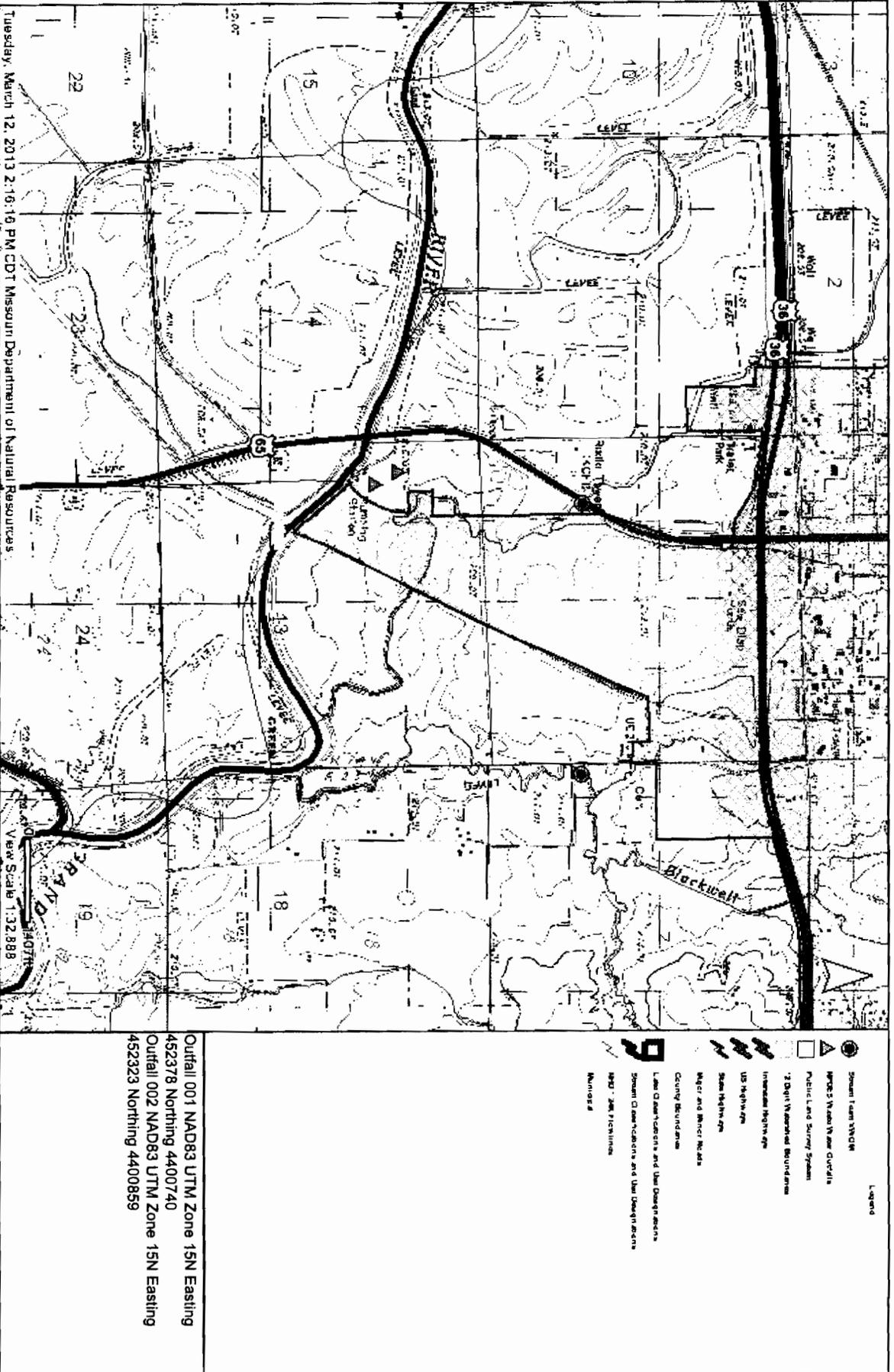
NOT TO SCALE





# PART A 2.2

## Chillicothe Municipal Utilities WWTP Outfalls



Missouri  
 Department of  
 Natural Resources

Disclaimer: Although this map has been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.



PACE # 60129202

**Pace Analytical Services, Inc.**  
9608 Loiret Blvd.  
Lenexa, KS 66219  
Phone: 913.599.5665  
Fax: 913.599.1759

September 24, 2012

Mr. Kent Spainhour  
Chillicothe Municipal Utilities  
920 Washington St.  
Chillicothe, MO 64601

Re: Lab Project Number: 60129202  
Client Project ID: Wet Test

Dear:

Enclosed are the analytical results for sample(s) received by the laboratory. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAP standards, where applicable, unless otherwise narrated in the body of the report.

If you have any question concerning this report, please feel free to contact me.

Sincerely,

Tim Harrell  
[Tim.Harrell@pacelabs.com](mailto:Tim.Harrell@pacelabs.com)  
Technical Director

Kansas/ NELAP Certification Number E-10116  
Utah Certification Number 9135995665  
Texas Certification Number T104704407-08-TX  
Oklahoma Certification Number 9205/9935  
Louisiana Certification Number 03055  
Arkansas Certification Number 05-008-0

Enclosures

## REPORT OF LABORATORY ANALYSIS

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**Pace Analytical Services, Inc.**  
**808 West McKay, Frontenac, KS 66763**

**LABORATORY REPORT:**

<b>CLIENT:</b> Chillicothe Municipal Utilities Attn: Kent Spainhour 920 Washington St. Chillicothe, MO 64601 1-660-646-6373	<b>Date Reported:</b> 9-24-12 <b>Date Initiated:</b> 9-19-12 <b>Time Arrived:</b> 9:00 <b>Date Terminated:</b> 9-21-12
---	---

**BIOMONITORING STUDY**

**ACUTE TOXICITY**

**Permit # MO-0108227**

**FINDING AND CONCLUSIONS:**

Acute toxicity testing was performed on duplicate samples of effluent collected from the City of Chillicothe effluent discharge. **Acute toxicity**, as defined by significant mortality for at least one of two aquatic test species during a 48 hour period of exposure, was not detected in Ceriodaphnia exposed to the 100% effluent (AEC), and was not detected in fathead minnows exposed to the 100% effluent. The LC50 for the Ceriodaphnia was >100% and >100% for the Pimephales. The test species utilized in this test were the water flea, Ceriodaphnia dubia and the fathead minnow, Pimephales promelas. Detailed results of the toxicity testing are provided in the Acute Toxicity Reports. In addition to the acute toxicity testing, water temperature, pH, dissolved oxygen, total hardness, total alkalinity, conductivity, and chlorine determinations were performed on the effluent and control samples.

**SAMPLING PROCEDURES:**

City of Chillicothe personnel collected a sample at the City of Chillicothe effluent discharge. The sample was preserved with ice and transported to Pace Analytical by commercial carrier.

**REPORT OF LABORATORY ANALYSIS**

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## INTRODUCTION:

The purpose of this test was to determine the acute toxicity of the City of Chillicothe effluent on the freshwater invertebrate, Ceriodaphnia dubia and the fathead minnow, Pimephalas promelas. These tests were conducted at Pace Analytical Services, Inc., Frontenac, KS.

## TEST ORGANISMS:

Ceriodaphnia dubia - The genetic stock of Ceriodaphnia dubia used in this acute toxicity Test were originally obtained from a private breeder. Ceriodaphnia are cultured in house at Pace Analytical Services, Inc. Culture methods of Ceriodaphnia were obtained from EPA821-C-02-006 November 2002.

Pimephales promelas - The fathead minnows used in this acute toxicity test were cultured in-house at Pace Analytical Services, Inc., Frontenac, KS and were originally obtained from a private breeder. Fathead minnows are maintained at Pace Analytical Services until use for acute toxicity between the ages of 1 and 14 days. Information for culturing fathead minnows was taken from EPA821-C-02-006 November 2002.

## MATERIALS AND METHODS:

Procedures used in the acute toxicity tests are described in Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (USEPA, 2002).

City of Chillicothe personnel collected the effluent tested from the City of Chillicothe discharge. Testing was performed using a 100% effluent, an Upstream, and a synthetic control. The toxicity test was initiated within 36 hours of sample collection.

Effluent and synthetic control test solutions were not aerated during the testing period.

## Ceriodaphnia ACUTE METHODS:

This static test was ran using 40 ml glass vials containing 25 ml of test solution. Food was administered before the test. Five Ceriodaphnia neonates (<24 hr old) were randomly selected and placed in each of 4 replicates of test solution. A total of 20 organisms per concentration were tested. Observations of mortality were made at 24 and 48 hours of exposure.

## REPORT OF LABORATORY ANALYSIS

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**Pimephales ACUTE METHODS:**

This static toxicity test was conducted using 1000 ml mason jars as test chambers containing 250 ml of test solution. Food was administered prior to test initiation, but not during the testing period. Ten Pimephales, 1 - 14 days old, from a single spawn, were randomly selected and placed in each of 4 test chambers. A total of 40 organisms were exposed to each test concentration. Observations of mortality were made at 24 and 48 hours of exposure.

**WATER QUALITY METHODS:**

Prior to test initiation, temperature, dissolved oxygen, pH, total alkalinity, total hardness, and total residual chlorine were measured in the effluent and in the controls. At 24 and 48 hours of exposure, temperature, dissolved oxygen, pH, and conductance were measured in the effluent sample and the controls.

**DATA ANALYSIS:**

Statistically significant ( $p < 0.05$ ) mortality is determined by Dunnet's procedure using average percent survival of each test concentration versus the average survival of the controls. If significant mortality occurs, median lethal concentrations (LC50) are calculated using effluent concentrations and their corresponding percent mortality data. The LC50's and the 95% confidence intervals are calculated where appropriate by the Spearman-Kärber method. Statistical analysis is accomplished by following steps in EPA/600/4-90/027F, August 1993 and by use of Toxstat version 3.4.

**RESULTS:**

THE Ceriodaphnia MORTALITY RESULTS - There was no significant mortality observed of the freshwater invertebrate, Ceriodaphnia dubia, during the 48 hour exposure period to the 100% effluent concentrations. There was no significant mortality in the synthetic control. The LC50 value of the sample to Ceriodaphnia is approximately >100%.

**Ceriodaphnia MORTALITY DATA**

**# ALIVE**

CONC.	REP #	0 HOURS	24 HOURS	48 HOURS	% MORT.
SYNTHETIC	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
Upstream	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
100%	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0

**AVG. MORTALITY @ AEC (100% EFFLUENT) =0.0%**

**REPORT OF LABORATORY ANALYSIS**

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**THE Pimephales RESULTS** - Minnows exposed to effluent collected at the City of Chillicothe effluent discharge exhibited no significant mortality in the 100% effluent concentration during the 48 hr exposure period. The synthetic control showed no significant mortality during the testing period. The LC50 value of the effluent to fathead minnows is estimated to be >100%.

CONC.	REP #	0 HOURS	24 HOURS	48 HOURS	% MORTALITY
SYNTHETIC	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
Upstream	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
100%	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0

**AVG. MORTALITY @ AEC (100% EFFLUENT) =0.0%**

**REPORT OF LABORATORY ANALYSIS**

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**WATER CHEMISTRY RESULTS:**

Total residual chlorine (Cl<sub>2</sub>) - The effluent sample from the City of Chillicothe discharge had <0.1 mg/l detectable level of total residual chlorine upon receipt in the laboratory.

Dissolved Oxygen (D.O.) - Dissolved oxygen reading of the 100% effluent sample was 7.70 mg/l after being raised to the test temperature of 25° C. At termination D.O. was 7.50 mg/l in the 100% effluent, which falls into acceptable limits. Aeration was not required in this test.

pH - The pH of the 100% effluent was 7.37 upon receipt in the laboratory and the synthetic control had a 7.57. At termination the pH measurement in the 100% effluent sample was 8.16.

Conductance - The conductance of the effluent sample was 1142 umhos and the synthetic control was 323 umhos.

**REPORT OF LABORATORY ANALYSIS**

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**INITIAL WATER QUALITY:**

Initial Measurements Synthetic Water

pH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.57	8.00	323	<0.2	<0.1	25	98	62

Initial Measurements of Upstream

PH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.79	7.60	770	N/A	<0.1	25	252	196

Initial Measurements of 100% Effluent

PH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.37	7.70	1142	N/A	<0.1	25	246	100

**TEST WATER QUALITY:**

24-hour Water Quality Measurements

EFFLUENT CONC (%)	PH	D.O. (mg/l)	TEMP (C)	COND. (umhos)
Synthetic	7.84	7.50	25	390
Upstream	8.41	7.50	25	782
100%	8.02	7.60	25	1196

48-hour Water Quality Measurements

EFFLUENT CONC (%)	PH	D.O. (mg/l)	TEMP (C)	COND. (umhos)
Synthetic	7.89	7.40	25	393
Upstream	8.45	7.40	25	947
100%	8.16	7.50	25	1448

**REPORT OF LABORATORY ANALYSIS**

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**QUALITY ASSURANCE:**

The absence of control mortality during this test indicated the health of the organisms and indicated that any significant mortality in the test concentrations is not due to contaminants or variations in test conditions. Reference toxicity tests are routinely performed by staff members of our Toxicology Department.

**REFERENCE TOXICANT (NaCl)**  
Ceriodaphnia  
**# OF LIVE ORGANISMS**

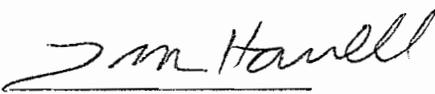
CONC OF TOXICANT	TEST INITIATION	24 HOUR EXPOSURE	48 HOUR EXPOSURE
3.0 g/l	20	1	0
2.5 g/l	20	14	9
2.0 g/l	20	19	19
1.5 g/l	20	20	20
1.0 g/l	20	20	20

LC50 = 2.45 g/l NaCl

**REFERENCE TOXICANT (NaCl)**  
Pimephales  
**# OF LIVE ORGANISMS**

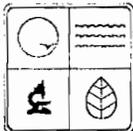
CONC OF TOXICANT	TEST INITIATION	24 HOUR EXPOSURE	48 HOUR EXPOSURE
10.0 g/l	40	9	0
8.0 g/l	40	31	26
6.0 g/l	40	39	38
4.0 g/l	40	40	40
2.0 g/l	40	40	40

LC50 = 8.32 g/l NaCl

Submitted By:   
**Timothy Harrell**  
Technical Director

**REPORT OF LABORATORY ANALYSIS**

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MISSOURI DEPARTMENT OF NATURAL RESOURCES  
WATER PROTECTION PROGRAM

**WHOLE EFFLUENT TOXICITY (WET) TEST REPORT**

(TO BE ATTACHED TO WET TESTS FOR SUBMISSION TO THE REGULATORY AUTHORITY)

**PART A – TO BE COMPLETED IN FULL BY PERMITTEE**

FACILITY NAME		DATE AND TIME COLLECTED	
PERMIT NUMBER		PERMIT OUTFALL NUMBER	
COLLECTOR'S NAME			
RECEIVING STREAM COLLECTION SITE AND DESCRIPTION			
PERMITTED EFFLUENT DAILY MAXIMUM LIMITATION FOR CHLORINE _____ mg/L		EFFLUENT SAMPLE TYPE (CHECK ONE) <input type="checkbox"/> 24 HR COMPOSITE <input type="checkbox"/> GRAB <input type="checkbox"/> OTHER _____	
PERMITTED EFFLUENT DAILY MAXIMUM LIMITATION FOR AMMONIA _____ mg/L		UPSTREAM SAMPLE TYPE (CHECK ONE) <input type="checkbox"/> 24 HR COMPOSITE <input type="checkbox"/> GRAB <input type="checkbox"/> OTHER _____	

**PART B – TO BE COMPLETED IN FULL BY PERFORMING LABORATORY**

PERFORMING LABORATORY PACE ANALYTICAL SERVICES	TEST TYPE Acute	
FINAL REPORT NUMBER 60129202	TEST DURATION 48 HOURS	
DATE OF LAST REFERENCE TOXICANT TESTING 9/5/12	TEST METHOD EPA 2000 AND 2002	
DATE AND TIME SAMPLES RECEIVED AT LABORATORY 9/19/12 13:00	TEST START DATE AND TIME 9/19/12 13:00	TEST END DATE AND TIME 9/21/12 13:15
SAMPLE DECHLORINATED PRIOR TO ANALYSIS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT _____ UPSTREAM _____	TEST ORGANISM #1 AND AGE DUBIA <24 HOURS	TEST ORGANISM #2 AND AGE FATHEAD 13 DAYS
SAMPLE FILTERED* PRIOR TO ANALYSIS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT _____ UPSTREAM _____	90 PERCENT OR GREATER SURVIVAL IN SYNTHETIC CONTROL? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	DILUTION WATER USED TO ACHIEVE AEC
FILTER MESH SIEVE SIZE 2	EFFLUENT ORGANISM #1 PERCENT MORTALITY AT AEC 0	EFFLUENT ORGANISM #2 PERCENT MORTALITY AT AEC 0
SAMPLE AERATED DURING TESTING? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	UPSTREAM ORGANISM #1 PERCENT MORTALITY 0	UPSTREAM ORGANISM #2 PERCENT MORTALITY 0
pH ADJUSTED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT _____ UPSTREAM _____	TEST RESULT AT AEC FOR ORGANISM #1 <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	TEST RESULT AT AEC FOR ORGANISM #2 <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**PART A – TO BE COMPLETED IN FULL BY PERMITTEE**

PARAMETER	RESULT	METHOD	WHEN ANALYZED
Temperature °C	25	SM 2550B	9/19/12
pH Standard Units	7.37	SM 4500-H+ B	9/19/12
Conductance µMhos	1142	EPA 120.1	9/19/12
Dissolved Oxygen mg/L	7.70	SM 4500-O G	9/19/12
Total Residual Chlorine mg/L	<1	SM 4500-CL G	9/19/12
Unionized Ammonia mg/L			
* Total Alkalinity mg/L	100	SM 2320 B	9/19/12
* Total Hardness mg/L	246	SM2340 B	9/19/12

\* Recommended by EPA guidance, not a required analysis.

<sup>1</sup> Samples shall only be filtered if indigenous organisms are present that may be confused with, or attack the test organisms.

<sup>2</sup> Filters shall have a sieve size of 60 microns or greater.

**WHOLE EFFLUENT TOXICITY (WET) TEST REPORT (Continued)**  
 (TO BE ATTACHED TO WET TESTS FOR SUBMISSION TO THE REGULATORY AUTHORITY)

<b>MINIMUM REQUIRED ANALYTICAL RESULTS FOR THE 100 PERCENT UPSTREAM SAMPLE<sup>3</sup></b>			
PARAMETER	RESULT	METHOD	WHEN ANALYZED
Temperature °C	25	SM 2550B	9/19/12
pH Standard Units	7.79	SM 4500-H+ B	9/19/12
Conductance µMhos	770	EPA 120.1	9/19/12
Dissolved Oxygen mg/L	7.60	SM 4500-O G	9/19/12
Total Residual Chlorine mg/L	<.1	SM 4500-CL G	9/19/12
Unionized Ammonia mg/L			
* Total Alkalinity mg/L	196	SM 2320 B	9/19/12
* Total Hardness mg/L	252	SM2340 B	9/19/12
* Recommended by EPA guidance, not a required analysis			

<b>PRELIMINARY TEST ACCEPTABILITY MATRIX (FOR USE BY PERMITTEE IN DETERMINING TEST VALIDITY)</b>
<b>MINIMUM REQUIRED ANALYTICAL RESULTS FOR THE 100 PERCENT UPSTREAM SAMPLE<sup>3</sup></b>
<b>PERMIT ALLOWABLE EFFLUENT CONCENTRATION, or AEC:</b> As indicated on permit. Test is invalid otherwise.
<b>EFFLUENT SAMPLE TYPE:</b> As indicated on permit. Test is invalid otherwise.
<b>TEST TYPE:</b> Acute Static Non-Renewal Test or other as indicated on permit. Test is invalid otherwise.
<b>TEST DURATION:</b> Forty-eight hours or as indicated on permit. Test is invalid otherwise.
<b>TEST ORGANISMS:</b> As indicated on permit. Test is invalid otherwise.
<b>DILUTION WATER USED TO ACHIEVE AEC:</b> Upstream receiving water required if available.
<b>TEST METHOD:</b> The only acceptable method is the <b>most current</b> edition of <i>Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms</i> , or other as specifically assigned by EPA for determining National Pollutant Discharge Elimination System, or NPDES, compliance. Test is invalid otherwise.
<b>TEST START DATE AND TIME:</b> Unless otherwise specified in writing by EPA, if >36 hours lapse between collection and initiation, test is invalid.
<b>FILTER MESH SIEVE SIZE:</b> Unless otherwise specified in writing by EPA, if sieve size is smaller than 60 microns, test is invalid.
<b>90 PERCENT OR GREATER SURVIVAL IN LABORATORY CONTROL(S) (Y/N):</b> If no, test is invalid.

PARAMETER	RESULT	NOTES	WHEN ANALYZED
Temperature °C	0 – 6	Unless received by the laboratory on the same day as collected, values outside this range invalidate the test.	Upon receipt.

<sup>3</sup> Where no upstream control is available, enter results from laboratory or synthetic control.

Section A Required Client Information: Section B Required Project Information: Section C Invoice Information:

Company: Pace Analytical Report To: Project Manager Attention: Project Manager Page: 1 of 1  
 Address: 11111 Main St Copy To: Project Manager Company Name: Pace Analytical Invoice Number: 15450317  
 Email To: Project Manager Purchase Order No.: 11111 Address: 11111 Main St Regulatory Agency: GROUND WATER  
 Phone: 11111 1111 Fax: 11111 1111 Project Name: 11111 Pace Quote Reference: 11111  NPDES  GROUND WATER  DRINKING WATER  
 Requested Due Date/TAT: 11/11/11 Project Number: 11111 Pace Project Manager: 11111 Site Location STATE: MD  UST  RCRA  OTHER

ITEM #	Section D Required Client Information <b>SAMPLE ID</b> (A-Z, 0-9 / -) Sample IDs MUST BE UNIQUE	Matrix Codes MATRIX / CODE Drinking Water DW Water WT Waste Water WW Product P Soil/Solid SL Oil OL Wipe WP Air AR Tissue TS Other OT	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analysis Test	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.													
					COMPOSITE START	COMPOSITE END/GRAB																				
			DATE	TIME	DATE	TIME		Unpreserved	H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol	Other											
1	11111		11/11/11	0800	11/11/11	0805	1	X																		
2	11111		11/11/11	0800	11/11/11	0805	1	X																		
3	11111		11/11/11	0800	11/11/11	0805	1	X																		
4	11111		11/11/11	0800	11/11/11	0805	1	X																		
5	11111		11/11/11	0800	11/11/11	0805	1	X																		
6	11111		11/11/11	0800	11/11/11	0805	1	X																		
7	11111		11/11/11	0800	11/11/11	0805	1	X																		
8	11111		11/11/11	0800	11/11/11	0805	1	X																		
9	11111		11/11/11	0800	11/11/11	0805	1	X																		
10	11111		11/11/11	0800	11/11/11	0805	1	X																		
11	11111		11/11/11	0800	11/11/11	0805	1	X																		
12	11111		11/11/11	0800	11/11/11	0805	1	X																		

ADDITIONAL COMMENTS: 11111

RELINQUISHED BY / AFFILIATION: 11111 DATE: 11/11/11 TIME: 0800

ACCEPTED BY / AFFILIATION: 11111 DATE: 11/11/11 TIME: 0800

SAMPLER NAME AND SIGNATURE: 11111

PRINT Name of SAMPLER: 11111

SIGNATURE of SAMPLER: 11111

DATE Signed (MM/DD/YY): 11/11/11

Temp in °C: 10

Received on Ice (Y/N): Y

Custody Sealed Cooler (Y/N): Y

Samples Intact (Y/N): X

\*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.



PACE # 60106001

**Pace Analytical Services, Inc.**  
9608 Loiret Blvd.  
Lenexa, KS 66219  
Phone: 913.599.5665  
Fax: 913.599.1759

September 20, 2011

Mr. Kent Spainhour  
Chillicothe Municipal Utilities  
920 Washington St.  
Chillicothe, MO 64601

Re: Lab Project Number: 60106001  
Client Project ID: Wet Test

Dear:

Enclosed are the analytical results for sample(s) received by the laboratory. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any question concerning this report, please feel free to contact me.

Sincerely,

Tim Harrell  
[Tim.Harrell@pacelabs.com](mailto:Tim.Harrell@pacelabs.com)  
Technical Director

Kansas/ NELAP Certification Number E-10116  
Utah Certification Number 9135995665  
Texas Certification Number T104704407-08-TX  
Oklahoma Certification Number 9205/9935  
Louisiana Certification Number 03055  
Arkansas Certification Number 05-008-0

Enclosures

## REPORT OF LABORATORY ANALYSIS

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Phone: 913.599.5665  
Fax: 913.599.1759

**Pace Analytical Services, Inc.**  
**808 West McKay, Frontenac, KS 66763**

**LABORATORY REPORT:**

<b>CLIENT:</b> Chillicothe Municipal Utilities Attn: Kent Spainhour 920 Washington St. Chillicothe, MO 64601 1-660-646-6373	<b>Date Reported:</b> 9-20-11 <b>Date Initiated:</b> 9-14-11 <b>Time Arrived:</b> 9:45 <b>Date Terminated:</b> 9-16-11
---	---

**BIOMONITORING STUDY**

**ACUTE TOXICITY**

**Permit # MO-0108227**

**FINDING AND CONCLUSIONS:**

Acute toxicity testing was performed on duplicate samples of effluent collected from the Chillicothe Municipal Utilities effluent discharge. Acute toxicity, as defined by significant mortality for at least one of two aquatic test species during a 48 hour period of exposure, was not detected in Ceriodaphnia exposed to the 100% effluent (AEC), and was not detected in fathead minnows exposed to the 100% effluent. The LC50 for the Ceriodaphnia was >100% and >100% for the Pimephales. The test species utilized in this test were the water flea, Ceriodaphnia dubia and the fathead minnow, Pimephales promelas. Detailed results of the toxicity testing are provided in the Acute Toxicity Reports. In addition to the acute toxicity testing, water temperature, pH, dissolved oxygen, total hardness, total alkalinity, conductivity, and chlorine determinations were performed on the effluent and control samples.

**SAMPLING PROCEDURES:**

Chillicothe Municipal Utilities personnel collected a sample at the Chillicothe Municipal Utilities effluent discharge. The sample was preserved with ice and transported to Pace Analytical by commercial carrier.

**REPORT OF LABORATORY ANALYSIS**

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## INTRODUCTION:

The purpose of this test was to determine the acute toxicity of the Chillicothe Municipal Utilities effluent on the freshwater invertebrate, Ceriodaphnia dubia and the fathead minnow, Pimephalas promelas. These tests were conducted at Pace Analytical Services, Inc., Frontenac, KS.

## TEST ORGANISMS:

Ceriodaphnia dubia - The genetic stock of Ceriodaphnia dubia used in this acute toxicity Test were originally obtained from a private breeder. Ceriodaphnia are cultured in house at Pace Analytical Services, Inc. Culture methods of Ceriodaphnia were obtained from EPA821-C-02-006 November 2002.

Pimephales promelas - The fathead minnows used in this acute toxicity test were cultured in-house at Pace Analytical Services, Inc., Frontenac, KS and were originally obtained from a private breeder. Fathead minnows are maintained at Pace Analytical Services until use for acute toxicity between the ages of 1 and 14 days. Information for culturing fathead minnows was taken from EPA821-C-02-006 November 2002.

## MATERIALS AND METHODS:

Procedures used in the acute toxicity tests are described in Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (USEPA, 2002).

Chillicothe Municipal Utilities personnel collected the effluent tested from the Chillicothe Municipal Utilities discharge. Testing was performed using a 100% effluent, an Upstream, and a synthetic control. **The toxicity test was initiated within 36 hours of sample collection.**

Effluent and synthetic control test solutions were not aerated during the testing period.

## Ceriodaphnia ACUTE METHODS:

This static test was ran using 40 ml glass vials containing 25 ml of test solution. Food was administered before the test. Five Ceriodaphnia neonates (<24 hr old) were randomly selected and placed in each of 4 replicates of test solution. A total of 20 organisms per concentration were tested. Observations of mortality were made at 24 and 48 hours of exposure.

**Pimephales ACUTE METHODS:**

This static toxicity test was conducted using 1000 ml mason jars as test chambers containing 250 ml of test solution. Food was administered prior to test initiation, but not during the testing period. Ten Pimephales, 1 – 14 days old, from a single spawn, were randomly selected and placed in each of 4 test chambers. A total of 40 organisms were exposed to each test concentration. Observations of mortality were made at 24 and 48 hours of exposure.

**WATER QUALITY METHODS:**

Prior to test initiation, temperature, dissolved oxygen, pH, total alkalinity, total hardness, and total residual chlorine were measured in the effluent and in the controls. At 24 and 48 hours of exposure, temperature, dissolved oxygen, pH, and conductance were measured in the effluent sample and the controls.

**DATA ANALYSIS:**

Statistically significant ( $p < 0.05$ ) mortality is determined by Dunnet's procedure using average percent survival of each test concentration versus the average survival of the controls. If significant mortality occurs, median lethal concentrations (LC50) are calculated using effluent concentrations and their corresponding percent mortality data. The LC50's and the 95% confidence intervals are calculated where appropriate by the Spearman-Kärber method. Statistical analysis is accomplished by following steps in EPA/600/4-90/027F, August 1993 and by use of Toxstat version 3.4.

**RESULTS:**

THE Ceriodaphnia MORTALITY RESULTS - There was no significant mortality observed of the freshwater invertebrate, Ceriodaphnia dubia, during the 48 hour exposure period to the 100% effluent concentrations. There was no significant mortality in the synthetic control. The LC50 value of the sample to Ceriodaphnia is approximately >100%.

**Ceriodaphnia MORTALITY DATA**

**# ALIVE**

CONC.	REP #	0 HOURS	24 HOURS	48 HOURS	% MORT.
SYNTHETIC	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
Upstream	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
100%	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0

**AVG. MORTALITY @ AEC (100% EFFLUENT) =0.0%**



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**THE Pimephales RESULTS** - Minnows exposed to effluent collected at the Chillicothe Municipal Utilities effluent discharge exhibited no significant mortality in the 100% effluent concentration during the 48 hr exposure period. The synthetic control showed no significant mortality during the testing period. The LC50 value of the effluent to fathead minnows is estimated to be >100%.

CONC.	REP #	0 HOURS	24 HOURS	48 HOURS	% MORTALITY
SYNTHETIC	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
Upstream	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
100%	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0

**AVG. MORTALITY @ AEC (100% EFFLUENT) = 0.0%**

**REPORT OF LABORATORY ANALYSIS**

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**WATER CHEMISTRY RESULTS:**

Total residual chlorine (Cl<sub>2</sub>) - The effluent sample from the Chillicothe Municipal Utilities discharge had <0.1 mg/l detectable level of total residual chlorine upon receipt in the laboratory.

Dissolved Oxygen (D.O.) - Dissolved oxygen reading of the 100% effluent sample was 7.50 mg/l after being raised to the test temperature of 25° C. At termination D.O. was 7.40 mg/l in the 100% effluent, which falls into acceptable limits. Aeration was not required in this test.

pH - The pH of the 100% effluent was 7.41 upon receipt in the laboratory and the synthetic control had a 8.04. At termination the pH measurement in the 100% effluent sample was 8.37.

Conductance - The conductance of the effluent sample was 690 umhos and the synthetic control was 335 umhos.

**REPORT OF LABORATORY ANALYSIS**

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**INITIAL WATER QUALITY:**

## Initial Measurements Synthetic Water

pH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
8.04	8.10	335	<0.2	<0.1	25	98	50

## Initial Measurements of Upstream

PH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.68	6.70	545	N/A	<0.1	25	256	176

## Initial Measurements of 100% Effluent

PH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.41	7.50	690	N/A	<0.1	25	264	104

**TEST WATER QUALITY:**

## 24-hour Water Quality Measurements

EFFLUENT CONC (%)	PH	D.O. (mg/l)	TEMP (C)	COND. (umhos)
Synthetic	7.84	7.90	25	348
Upstream	8.14	7.10	25	650
100%	8.23	7.40	25	740

## 48-hour Water Quality Measurements

EFFLUENT CONC (%)	PH	D.O. (mg/l)	TEMP (C)	COND. (umhos)
Synthetic	8.12	7.70	25	380
Upstream	8.50	7.00	25	795
100%	8.37	7.40	25	960

**REPORT OF LABORATORY ANALYSIS**

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**QUALITY ASSURANCE:**

The absence of control mortality during this test indicated the health of the organisms and indicated that any significant mortality in the test concentrations is not due to contaminants or variations in test conditions. Reference toxicity tests are routinely performed by staff members of our Toxicology Department.

**REFERENCE TOXICANT (NaCl)**

**Ceriodaphnia**

**# OF LIVE ORGANISMS**

CONC OF TOXICANT	TEST INITIATION	24 HOUR EXPOSURE	48 HOUR EXPOSURE
3.0 g/l	20	0	0
2.5 g/l	20	14	7
2.0 g/l	20	20	19
1.5 g/l	20	20	20
1.0 g/l	20	20	20

LC50 = 2.38 g/l NaCl

**REFERENCE TOXICANT (NaCl)**

**Pimephales**

**# OF LIVE ORGANISMS**

CONC OF TOXICANT	TEST INITIATION	24 HOUR EXPOSURE	48 HOUR EXPOSURE
10.0 g/l	40	10	0
8.0 g/l	40	36	27
6.0 g/l	40	40	40
4.0 g/l	40	40	40
2.0 g/l	40	39	39

LC50 = 8.36 g/l NaCl

Submitted By: 

**Timothy Harrell**  
**Technical Director**

**REPORT OF LABORATORY ANALYSIS**

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FACILITY NAME	DATE AND TIME COLLECTED EFFLUENT _____ UPSTREAM _____
PERMIT NUMBER	PERMIT OUTFALL NUMBER
COLLECTOR'S NAME	
RECEIVING STREAM COLLECTION SITE AND DESCRIPTION	
PERMIT ALLOWABLE EFFLUENT CONCENTRATION (AEC)	EFFLUENT SAMPLE TYPE (CHECK ONE) <input type="checkbox"/> 24 HR COMPOSITE <input type="checkbox"/> GRAB <input type="checkbox"/> OTHER _____
SAMPLE NUMBER EFFLUENT _____ UPSTREAM _____	UPSTREAM SAMPLE TYPE (CHECK ONE) <input type="checkbox"/> 24 HR COMPOSITE <input type="checkbox"/> GRAB <input type="checkbox"/> OTHER _____
PERMITTED EFFLUENT DAILY MAXIMUM LIMITATION FOR CHLORINE _____ mg/L	PERMITTED EFFLUENT DAILY MAXIMUM LIMITATION FOR AMMONIA _____ mg/L

**PART B – TO BE COMPLETED IN FULL BY PERFORMING LABORATORY**

PERFORMING LABORATORY PACE ANALYTICAL SERVICES	TEST TYPE Acute	
FINAL REPORT NUMBER 60106001	TEST DURATION 48 HOURS	
DATE OF LAST REFERENCE TOXICANT TESTING 9/14/11	TEST METHOD EPA 2000 AND 2002	
DATE AND TIME SAMPLES RECEIVED AT LABORATORY 9/14/11 9:45	TEST START DATE AND TIME 9/14/11 13:00	TEST END DATE AND TIME 9/16/11 13:45
SAMPLE DECHLORINATED PRIOR TO ANALYSIS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT _____ UPSTREAM _____	TEST ORGANISM #1 AND AGE DUBIA <24 HOURS	TEST ORGANISM #2 AND AGE FATHEAD 8 DAYS
SAMPLE FILTERED <sup>1</sup> PRIOR TO ANALYSIS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT _____ UPSTREAM _____	90 PERCENT OR GREATER SURVIVAL IN SYNTHETIC CONTROL? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	DILUTION WATER USED TO ACHIEVE AEC
_____ FILTER MESH SIEVE SIZE 2	EFFLUENT ORGANISM #1 PERCENT MORTALITY AT AEC 0	EFFLUENT ORGANISM #2 PERCENT MORTALITY AT AEC 0
SAMPLE AERATED DURING TESTING? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	UPSTREAM ORGANISM #1 PERCENT MORTALITY 0	UPSTREAM ORGANISM #2 PERCENT MORTALITY 0
pH ADJUSTED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT _____ UPSTREAM _____	TEST RESULT AT AEC FOR ORGANISM #1 <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	TEST RESULT AT AEC FOR ORGANISM #2 <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**PART A – TO BE COMPLETED IN FULL BY PERMITTEE**

PARAMETER	RESULT	METHOD	WHEN ANALYZED
Temperature °C	25	SM 2550B	9/14/11
pH Standard Units	7.41	SM 4500-H+ B	9/14/11
Conductance µMohs	690	EPA 120.1	9/14/11
Dissolved Oxygen mg/L	7.50	SM 4500-O G	9/14/11
Total Residual Chlorine mg/L	<1	SM 4500-CL G	9/14/11
Unionized Ammonia mg/L			
* Total Alkalinity mg/L	104	SM 2320 B	9/14/11
* Total Hardness mg/L	264	SM2340 B	9/14/11

\* Recommended by EPA guidance, not a required analysis.

<sup>1</sup> Samples shall only be filtered if indigenous organisms are present that may be confused with, or attack the test organisms.  
<sup>2</sup> Filters shall have a sieve size of 60 microns or greater.

**WHOLE EFFLUENT TOXICITY (WET) TEST REPORT (Continued)**

(TO BE ATTACHED TO WET TESTS FOR SUBMISSION TO THE REGULATORY AUTHORITY)

MINIMUM REQUIRED ANALYTICAL RESULTS FOR THE 100 PERCENT UPSTREAM SAMPLE <sup>3</sup>			
PARAMETER	RESULT	METHOD	WHEN ANALYZED
Temperature °C	25	SM 2550B	9/14/11
pH Standard Units	7.68	SM 4500-H+ B	9/14/11
Conductance µMohs	545	EPA 120.1	9/14/11
Dissolved Oxygen mg/L	6.70	SM 4500-O G	9/14/11
Total Residual Chlorine mg/L	<.1	SM 4500-CL G	9/14/11
Unionized Ammonia mg/L			
* Total Alkalinity mg/L	176	SM 2320 B	9/14/11
* Total Hardness mg/L	256	SM2340 B	9/14/11

\* Recommended by EPA guidance, not a required analysis.

PRELIMINARY TEST ACCEPTABILITY MATRIX (FOR USE BY PERMITTEE IN DETERMINING TEST VALIDITY) MINIMUM REQUIRED ANALYTICAL RESULTS FOR THE 100 PERCENT UPSTREAM SAMPLE <sup>3</sup>
<b>PERMIT ALLOWABLE EFFLUENT CONCENTRATION, or AEC:</b> As indicated on permit. Test is invalid otherwise.
<b>EFFLUENT SAMPLE TYPE:</b> As indicated on permit. Test is invalid otherwise.
<b>TEST TYPE:</b> Acute Static Non-Renewal Test or other as indicated on permit. Test is invalid otherwise.
<b>TEST DURATION:</b> Forty-eight hours or as indicated on permit. Test is invalid otherwise.
<b>TEST ORGANISMS:</b> As indicated on permit. Test is invalid otherwise.
<b>DILUTION WATER USED TO ACHIEVE AEC:</b> Upstream receiving water required if available.
<b>TEST METHOD:</b> The only acceptable method is the <b>most current edition</b> of <i>Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms</i> , or other as specifically assigned by EPA for determining National Pollutant Discharge Elimination System, or NPDES, compliance. Test is invalid otherwise.
<b>TEST START DATE AND TIME:</b> Unless otherwise specified in writing by EPA, if >36 hours lapse between collection and initiation, test is invalid.
<b>FILTER MESH SIEVE SIZE:</b> Unless otherwise specified in writing by EPA, if sieve size is smaller than 60 microns, test is invalid.
<b>90 PERCENT OR GREATER SURVIVAL IN LABORATORY CONTROL(S) (Y/N):</b> If no, test is invalid.

PARAMETER	RESULT	NOTES	WHEN ANALYZED
Temperature °C	0 – 6	Unless received by the laboratory on the same day as collected, values outside this range invalidate the test.	Upon receipt.

<sup>3</sup> Where no upstream control is available, enter results from laboratory or synthetic control.

**CHAIN-OF-CUSTODY / Analytical Request Document**  
The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information: Company: \_\_\_\_\_ Report To: \_\_\_\_\_ Invoice Information: Attention: \_\_\_\_\_  
 Section B Required Project Information: Copy To: \_\_\_\_\_ Purchase Order No.: \_\_\_\_\_  
 Section C Information: Address: \_\_\_\_\_ Company Name: \_\_\_\_\_  
 Reference: \_\_\_\_\_ Pace Project Manager: \_\_\_\_\_ Pace Profile #: \_\_\_\_\_

Address: \_\_\_\_\_  
 Email To: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 Requested Due Date/TAT: \_\_\_\_\_  
 Project Name: \_\_\_\_\_  
 Project Number: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Company Name: \_\_\_\_\_  
 Reference: \_\_\_\_\_  
 Pace Project Manager: \_\_\_\_\_  
 Pace Profile #: \_\_\_\_\_

Page: 1 of 1  
 1074710

REGULATORY AGENCY  
 NPDES  GROUND WATER  DRINKING WATER  
 UST  RCRA  OTHER \_\_\_\_\_  
 Site Location STATE: WA

ITEM #	Section D Required Client Information	Matrix Codes MATRIX / CODE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives							Analysis Test	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
					COMPOSITE START	COMPOSITE END/GRAB			H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol	Other				
1					DATE	TIME	DATE	TIME											
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			

ADDITIONAL COMMENTS: \_\_\_\_\_

RELINQUISHED BY / AFFILIATION: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

ACCEPTED BY / AFFILIATION: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

Temp in °C: 1.8  
 Received on Ice (Y/N): Y  
 Custody Sealed Cooler (Y/N): Y  
 Samples Intact (Y/N): Y

SAMPLER NAME AND SIGNATURE: \_\_\_\_\_  
 PRINT Name of SAMPLER: \_\_\_\_\_  
 SIGNATURE of SAMPLER: \_\_\_\_\_  
 DATE Signed (MM/DD/YY): \_\_\_\_\_

\*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.



PACE # 6085830

**Pace Analytical Services, Inc.**  
9608 Loiret Blvd.  
Lenexa, KS 66219  
Phone: 913.599.5665  
Fax: 913.599.1759

September 27, 2010

Mr. Kent Spainhour  
Chillicothe Municipal Utilities  
920 Washington St.  
Chillicothe, MO 64601

Re: Lab Project Number: 6085830  
Client Project ID: Wet Test

Dear:

Enclosed are the analytical results for sample(s) received by the laboratory. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any question concerning this report, please feel free to contact me.

Sincerely,

Tim Harrell  
[Tim.Harrell@pacelabs.com](mailto:Tim.Harrell@pacelabs.com)  
Technical Director

Kansas/ NELAP Certification Number E-10116  
Utah Certification Number 9135995665  
Texas Certification Number T104704407-08-TX  
Oklahoma Certification Number 9205/9935  
Louisiana Certification Number 03055  
Arkansas Certification Number 05-008-0

Enclosures

## REPORT OF LABORATORY ANALYSIS

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**Pace Analytical Services, Inc.**  
**808 West McKay, Frontenac, KS 66763**

**LABORATORY REPORT:**

<b>CLIENT: Chillicothe Municipal Utilities</b> Attn: Kent Spainhour 920 Washington St. Chillicothe, MO 64601 1-660-646-6373	<b>Date Reported: 9-27-10</b> <b>Date Initiated: 9-22-10</b> <b>Time Arrived: 9:45</b> <b>Date Terminated: 9-24-10</b>
---	---

**BIOMONITORING STUDY**

**ACUTE TOXICITY**

**Permit # MO-0108227**

**FINDING AND CONCLUSIONS:**

Acute toxicity testing was performed on duplicate samples of effluent collected from the Chillicothe Municipal Utilities effluent discharge. Acute toxicity, as defined by significant mortality for at least one of two aquatic test species during a 48 hour period of exposure, was not detected in Ceriodaphnia exposed to the 100% effluent (AEC), and was not detected in fathead minnows exposed to the 100% effluent. The LC50 for the Ceriodaphnia was >100% and >100% for the Pimephales. The test species utilized in this test were the water flea, Ceriodaphnia dubia and the fathead minnow, Pimephales promelas. Detailed results of the toxicity testing are provided in the Acute Toxicity Reports. In addition to the acute toxicity testing, water temperature, pH, dissolved oxygen, total hardness, total alkalinity, conductivity, and chlorine determinations were performed on the effluent and control samples.

**SAMPLING PROCEDURES:**

CHILLICOTHE MUNICIPAL UTILITIES personnel collected a sample at the Chillicothe Municipal Utilities effluent discharge. The sample was preserved with ice and transported to Pace Analytical by commercial carrier.

**REPORT OF LABORATORY ANALYSIS**

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## INTRODUCTION:

The purpose of this test was to determine the acute toxicity of the Chillicothe Municipal Utilities effluent on the freshwater invertebrate, Ceriodaphnia dubia and the fathead minnow, Pimephalas promelas. These tests were conducted at Pace Analytical Services, Inc., Frontenac, KS.

## TEST ORGANISMS:

Ceriodaphnia dubia - The genetic stock of Ceriodaphnia dubia used in this acute toxicity Test were originally obtained from a private breeder. Ceriodaphnia are cultured in house at Pace Analytical Services, Inc. Culture methods of Ceriodaphnia were obtained from EPA821-C-02-006 November 2002.

Pimephales promelas - The fathead minnows used in this acute toxicity test were cultured in-house at Pace Analytical Services, Inc., Frontenac, KS and were originally obtained from a private breeder. Fathead minnows are maintained at Pace Analytical Services until use for acute toxicity between the ages of 1 and 14 days. Information for culturing fathead minnows was taken from EPA821-C-02-006 November 2002.

## MATERIALS AND METHODS:

Procedures used in the acute toxicity tests are described in Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (USEPA, 2002).

CHILLICOTHE MUNICIPAL UTILITIES personnel collected the effluent tested from the Chillicothe Municipal Utilities discharge. Testing was performed using a 100% effluent, an upstream, and a synthetic control. **The toxicity test was initiated within 36 hours of sample collection.**

Effluent and synthetic control test solutions were not aerated before testing.

## Ceriodaphnia ACUTE METHODS:

This static test was ran using 40 ml glass vials containing 25 ml of test solution. Food was administered before the test. Five Ceriodaphnia neonates (<24 hr old) were randomly selected and placed in each of 4 replicates of test solution. A total of 20 organisms per concentration were tested. Observations of mortality were made at 24 and 48 hours of exposure.

## REPORT OF LABORATORY ANALYSIS

**Pimephales ACUTE METHODS:**

This static toxicity test was conducted using 1000 ml mason jars as test chambers containing 250 ml of test solution. Food was administered prior to test initiation, but not during the testing period. Ten Pimephales, 1 – 14 days old, from a single spawn, were randomly selected and placed in each of 4 test chambers. A total of 40 organisms were exposed to each test concentration. Observations of mortality were made at 24 and 48 hours of exposure.

**WATER QUALITY METHODS:**

Prior to test initiation, temperature, dissolved oxygen, pH, total alkalinity, total hardness, and total residual chlorine were measured in the effluent and in the controls. At 24 and 48 hours of exposure, temperature, dissolved oxygen, pH, and conductance were measured in the effluent sample and the controls.

**DATA ANALYSIS:**

Statistically significant ( $p < 0.05$ ) mortality is determined by Dunnet's procedure using average percent survival of each test concentration versus the average survival of the controls. If significant mortality occurs, median lethal concentrations (LC50) are calculated using effluent concentrations and their corresponding percent mortality data. The LC50's and the 95% confidence intervals are calculated where appropriate by the Spearman-Kärber method. Statistical analysis is accomplished by following steps in EPA/600/4-90/027F, August 1993 and by use of Toxstat version 3.4.

**REPORT OF LABORATORY ANALYSIS**

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**RESULTS:**

THE Ceriodaphnia MORTALITY RESULTS - There was no significant mortality observed of the freshwater invertebrate, Ceriodaphnia dubia, during the 48 hour exposure period to the 100% effluent concentrations. There was no significant mortality in the synthetic control. The LC50 value of the sample to Ceriodaphnia is approximately >100%.

**Ceriodaphnia MORTALITY DATA**

# ALIVE

CONC.	REP #	0 HOURS	24 HOURS	48 HOURS	% MORT.
SYNTHETIC	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
Upstream	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
100%	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0

**AVG. MORTALITY @ AEC (100% EFFLUENT) =0.0%**

**THE Pimephales RESULTS** - Minnows exposed to effluent collected at the Chillicothe Municipal Utilities effluent discharge sampled by CHILLICOTHE MUNICIPAL UTILITIES personnel exhibited no significant mortality in the 100% effluent concentration during the 48 hr exposure period. The synthetic control showed no significant mortality during the testing period. The LC50 value of the effluent to fathead minnows is estimated to be >100%.

CONC.	REP #	0 HOURS	24 HOURS	48 HOURS	% MORTALITY
SYNTHETIC	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
Upstream	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
100%	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0

**AVG. MORTALITY @ AEC (100% EFFLUENT) =0.0%**

## REPORT OF LABORATORY ANALYSIS

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**WATER CHEMISTRY RESULTS:**

Total residual chlorine (Cl<sub>2</sub>) - The effluent sample from the Chillicothe Municipal Utilities effluent discharge had < 0.1 mg/l detectable level of total residual chlorine upon receipt in the laboratory.

Dissolved Oxygen (D.O.) - Dissolved oxygen reading of the 100% effluent sample was 7.90 mg/l after being raised to the test temperature of 25° C. At termination D.O. was 7.30 mg/l in the 100% effluent, which falls into acceptable limits. Aeration was not used prior to test set up.

pH - The pH of the 100% effluent was 7.65 upon receipt in the laboratory and the synthetic control had a 7.69. At termination the pH measurement in the 100% effluent sample was 8.17.

Conductance - The conductance of the effluent sample was 710 umhos and the synthetic control was 390 umhos.

**REPORT OF LABORATORY ANALYSIS**

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**INITIAL WATER QUALITY:**

Initial Measurements Synthetic Water

pH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.69	8.70	390	<0.2	<0.1	25	92	58

Initial Measurements of Upstream

PH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.55	7.60	295	N/A	<0.1	25	104	100

Initial Measurements of 100% Effluent

PH	D.O. (mg/l)	Cond. (umhos)	NH3-N (mg/l)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.65	7.90	710	N/A	<0.1	25	272	164

**TEST WATER QUALITY:**

24-hour Water Quality Measurements

EFFLUENT CONC (%)	PH	D.O. (mg/l)	TEMP (C)	COND. (umhos)
Synthetic	7.82	7.60	25	440
Upstream	7.91	7.40	25	372
100%	8.09	7.70	25	712

48-hour Water Quality Measurements

EFFLUENT CONC (%)	PH	D.O. (mg/l)	TEMP (C)	COND. (umhos)
Synthetic	7.85	7.30	25	486
Upstream	7.99	7.20	25	415
100%	8.17	7.50	25	734

**REPORT OF LABORATORY ANALYSIS**

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**QUALITY ASSURANCE:**

The absence of control mortality during this test indicated the health of the organisms and indicated that any significant mortality in the test concentrations is not due to contaminants or variations in test conditions. Reference toxicity tests are routinely performed by staff members of our Toxicology Department.

**REFERENCE TOXICANT (NaCl)**  
**Ceriodaphnia**  
**# OF LIVE ORGANISMS**

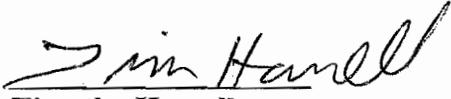
CONC OF TOXICANT	TEST INITIATION	24 HOUR EXPOSURE	48 HOUR EXPOSURE
3.0 g/l	20	0	0
2.5 g/l	20	14	8
2.0 g/l	20	20	20
1.5 g/l	20	20	20
1.0 g/l	20	20	20

LC50 = 2.43 g/l NaCl

**REFERENCE TOXICANT (NaCl)**  
**Pimephales**  
**# OF LIVE ORGANISMS**

CONC OF TOXICANT	TEST INITIATION	24 HOUR EXPOSURE	48 HOUR EXPOSURE
10.0 g/l	40	7	0
8.0 g/l	40	35	23
6.0 g/l	40	40	38
4.0 g/l	40	40	40
2.0 g/l	40	40	40

LC50 = 8.16 g/l NaCl

Submitted By:   
**Timothy Harrell**  
**Technical Director**

**REPORT OF LABORATORY ANALYSIS**

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Section A Required Client Information: Section B Required Project Information: Section C Invoice Information:

Company: Chlorine Alkalinity St Report To: East Spaworth Attention: Ms. Jackie Manning  
 Address: Chlorine Alkalinity St Copy To: East Spaworth Company Name:  
 Email To: 660 Purchase Order No.: 109 Address:  
 Project Name: WET TESTS Project Number:  
 Requested Due Date/TAT: 9/22/10 Pace Quote Reference:  
 Pace Project Manager:  
 Pace Profile #:

REGULATORY AGENCY  
 NPDES  GROUND WATER  DRINKING WATER  
 UST  RCRA  
 Site Location STATE: MA

Page: 1 of 1  
1117775

ITEM #	Section D Required Client Information	Matrix Codes MATRIX / CODE	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives						Analysis Test	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
			COMPOSITE START	COMPOSITE END/GRAB			H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol				
1	EFFLUENT	WWG	8/20 0830	8/21 0830	5	1	X							X		6085835
2	EFFLUENT	WWG	8/21 0840	8/21 0840	1	X								X		1 (64B) 251
3	UPSTREAM CONCRETE	WTG	8/21 0845	8/21 0845	1	X								X		1 (64B) 251
4	UPSTREAM CONCRETE	WTG	8/21 0845	8/21 0845	1	X								X		1 (64B) 251
5	UPSTREAM CONCRETE	WTG	8/21 0845	8/21 0845	1	X								X		1 (64B) 251
6																
7																
8																
9																
10																
11																
12																

ADDITIONAL COMMENTS: Relinquished by Affiliation

RELEASING BY / AFFILIATION: East Spaworth DATE: 9/21/10 TIME: 1337

ACCEPTED BY / AFFILIATION: Jackie Manning DATE: 9/21/10 TIME: 1445

SAMPLER NAME AND SIGNATURE: East Spaworth

PRINT Name of SAMPLER: East Spaworth DATE Signed (MM/DD/YY): 9/21/10

SIGNATURE of SAMPLER: Jackie Manning

Temp in °C: 16 Received on Ice (Y/N): Y Custody Sealed Cooler (Y/N): Y Samples Intact (Y/N): Y

\*Important Note: Signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any as not paid within 30 days.



MISSOURI DEPARTMENT OF NATURAL RESOURCES  
 WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH  
**FORM B2 – APPLICATION FOR CONSTRUCTION OR OPERATING PERMIT FOR FACILITIES WHICH RECEIVE PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY**

FACILITY NAME Chillicothe Wastewater Treatment Plant	
PERMIT NO. MO-0108227	COUNTY Livingston

**APPLICATION OVERVIEW**

Form B2 has been developed in a modular format and consists of Parts A, B and C and a Supplemental Application Information (Parts D, E, F and G) packet. All applicants must complete Parts A, B and C. Some applicants must also complete parts of the Supplemental Application Information packet. The following items explain which parts of Form B2 you must complete. Submittal of an incomplete application may result in the application being returned.

**BASIC APPLICATION INFORMATION**

- A. Basic Application Information for all Applicants. All applicants must complete Part A.
- B. Additional Application Information for all Applicants. All applicants must complete Part B.
- C. Certification. All applicants must complete Part C.

**SUPPLEMENTAL APPLICATION INFORMATION**

- D. Expanded Effluent Testing Data. A treatment works that discharges effluent to surface water of the United States and meets one or more of the following criteria must complete *Part D - Expanded Effluent Testing Data*:
  - 1. Has a design flow rate greater than or equal to 1 million gallons per day.
  - 2. Is required to have or currently has a pretreatment program.
  - 3. Is otherwise required by the permitting authority to provide the information.
- E. Toxicity Testing Data. A treatment works that meets one or more of the following criteria must complete *Part E - Toxicity Testing Data*:
  - 1. Has a design flow rate greater than or equal to 1 million gallons per day.
  - 2. Is required to have or currently has a pretreatment program.
  - 3. Is otherwise required by the permitting authority to provide the information.
- F. Industrial User Discharges and Resource Conservation and Recovery Act / Comprehensive Environmental Response, Compensation and Liability Act Wastes. A treatment works that accepts process wastewater from any significant industrial users, also known as SIUs, or receives a Resource Conservation and Recovery Act or CERCLA wastes must complete *Part F - Industrial User Discharges and Resource Conservation and Recovery Act / CERCLA Wastes*.  
 SIUs are defined as:
  - 1. All Categorical Industrial Users, or CIUs, subject to Categorical Pretreatment Standards under 40 Code of Federal Regulations 403.6 and 40 Code of Federal Regulations 403.6 and 40 CFR Chapter 1, Subchapter N.
  - 2. Any other industrial user that meets one or more of the following:
    - i. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions).
    - ii. Contributes a process waste stream that makes up five percent or more of the average dry weather hydraulic or organic capacity of the treatment plant.
    - iii. Is designated as an SIU by the control authority.
- G. Combined Sewer Systems. A treatment works that has a combined sewer system must complete *Part G - Combined Sewer Systems*.

**RECEIVED**

**ALL APPLICANTS MUST COMPLETE PARTS A, B and C**

MAR 21 2013





**VALLEY**<sup>®</sup>  
**6000**

**OPERATOR'S MANUAL**

RECEIVED  
1975  
OPERATION PROGRAM

Manufactured for Quality and Reliability

# WARNING

As with any electrical machinery, if the power supplied to the Irrigation System is not grounded properly, or if the equipment is tampered with, severe injury or death can result should an electrical malfunction occur. It is your responsibility to insure that your power supplier and/or electrical contractor has grounded the irrigation system as required by the National Electrical Code and by applicable local electrical codes.

Before attempting to adjust or trouble-shoot the electrical components of the Valley system, the following safety procedures should be observed.

1. Do not attempt to check any of the components until all power is disconnected. All components can be checked with power off.
2. The integrity of the equipment grounding conductors for the entire irrigation system should be seasonally checked by a qualified electrician.
3. Do not depend on another person to disconnect the power -- do it yourself.
4. When starting the machine, do not take for granted that system is going to run in the proper direction.
5. Do not oversize fuses -- they were sized for the protection of your machine.

When work is performed on system electrical components, a padlock should be used to lock the main disconnect of the machine. This should be used while conducting all checks other than those on the pivot box. Make certain disconnect is open before using the OHM meter. Remember that there may be 480 volts in all boxes.

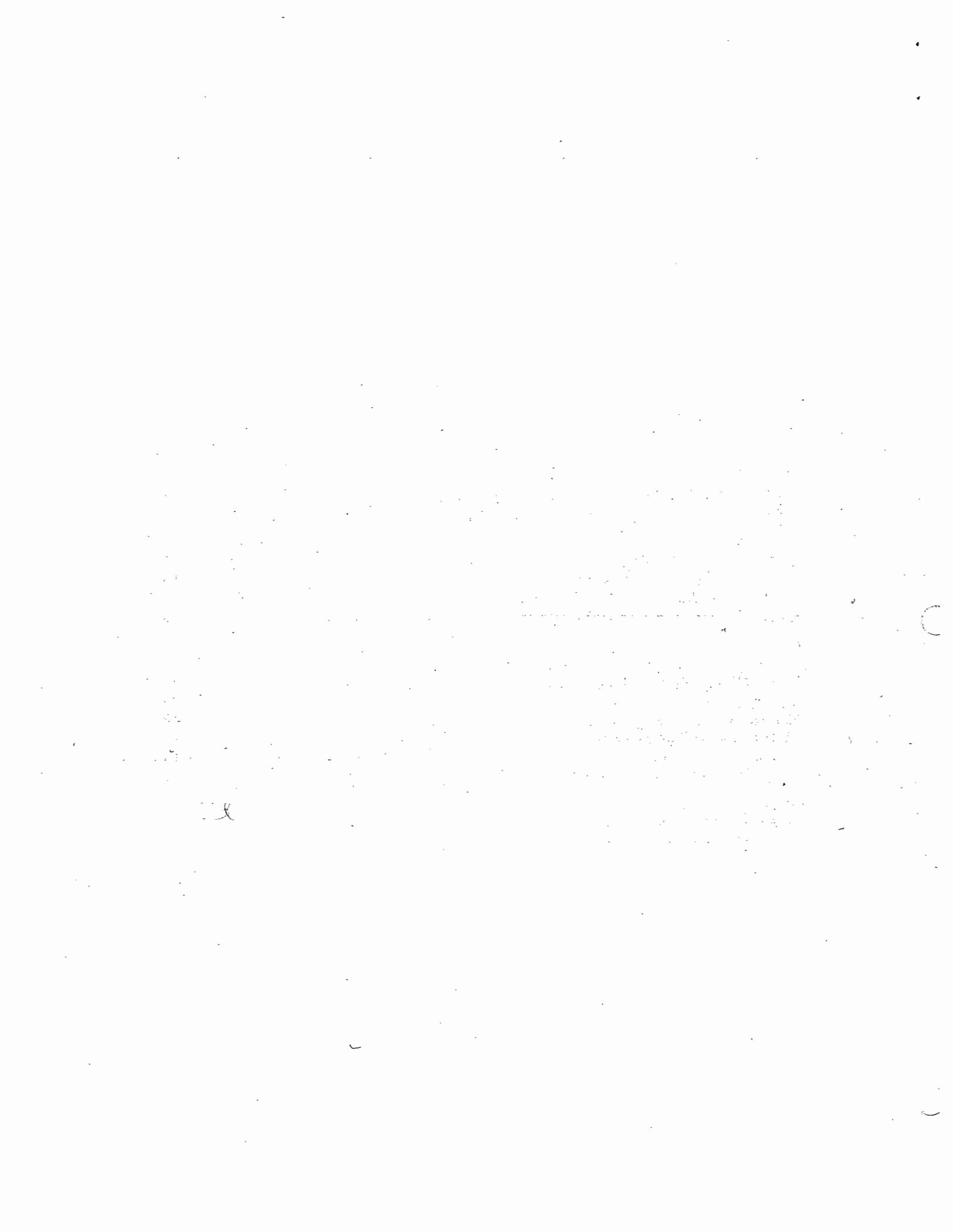
Normally, if a system is properly grounded, and fuse sizing is correct, there is very little probability of an individual being injured by electrical shock. However, if an electrical "short-circuit" exists on a system, it could be extremely hazardous.

If you have any reason to suspect that the system may have hazardous voltage on the hardware, such as physical damage to the electrical cable, recent electrical storms (lightning), or unusual operational characteristics, it is recommended that you contact a qualified electrician to check the system. If you must operate or touch the system under the above conditions, do not grasp the hardware as you would a ladder rung. Instead, quickly and lightly brush the back of your hand past a pivot or tower leg. Physical contact in this manner, with a hot system, will be felt as a "rippling tingle" or "jolt," but should not cause serious injury. However, if you do experience such a sensation, contact a qualified electrician or Valley serviceman immediately.

**Specifications, descriptions and illustrative material contained herein were as accurate as known at the time this publication was approved for printing. Valmont Industries, Inc., reserves the right to change specification or design without incurring obligation. Specifications are applicable to systems sold in the United States and may vary outside the U.S.**

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# 6000 Pivot Introduction

**Center pivot irrigation systems** -- so named because of their radial rotation around a center point in a field, leaving wheel tracks that resemble an archery target -- a very efficient method of distributing water, fertilizer, and herbicides.

**Let's break such a system down** into some smaller, easier to comprehend segments. First of all, we have the pivot itself. It is a quadripod, braced and bolted or chained to a concrete foundation. There is a large pipe, usually about 8 inches in diameter rising from ground level to the top where the four legs are joined to a swivel arrangement that is connected to a rotating elbow shaped fitting. The pipe, we will call a riser and the elbow, a pivot swivel.

Next we have a pipeline which is suspended above the ground by what we call drive units or towers. Through this pipeline the water is transferred from the pivot to the edge of the field. Finally, we need a sprinkling system. This consists of a number of sprinklers at equidistant points along the top of the pipeline, designed to provide an equal amount of water at all points in the irrigated field.

**First the pipeline itself** . . . each span has from three to six sections of pipe, depending on desired length and these pipes are an integral part or the third side of a triangular undertruss system that forms a rigid, self-supporting span. At the outer end of each span, we attach some drive unit legs and a base beam on which we mount our drive motor and wheels. Also at each end of every span, except the first and last span, is a ball hitch and cup assembly which will give us forward and reverse, bending flexibility between spans. To close the gap between span pipelines, we install a short length of special hose which we call a flex boot that is clamped in place just like an automobile radiator hose.

At each tower we need an electrical tower control box and a color coded control cable strapped to the pipeline running along the entire system. This cable carries two types of electrical voltage. The 120 volt system is called a control system and the 480 volt portion is used to operate our drive unit motors for system movement when called upon to do so by the control system.

**Power to operate an electric drive system** must come from one of two sources -- public utility power lines or gasoline engine generators. From either of these sources, power must be routed to both a pump engine and to a master control panel mounted at the pivot or in special cases, to a remotely located control panel. Within the master control panel or "pivot box" are various components that permit us to transform some of the 480 V-3Ø power to 120 VAC control power, turn the system power on or off, select forward or reverse, set the speed of the system, and finally a push button to start the system in motion.

The control power cable is routed up through a tube in the riser pipe to a "collector ring assembly" which consists of brass rings in a stack that remain stationary and are separated by insulators. Contact brushes that revolve around the brass rings provide continuous flow of current without twisting our cable as the system makes its revolutions around the field. The 480-V VAC power is a parallel system with drop offs from each tower box to the drive motors making power available whenever a control signal operates or closes a drive motor contactor (switch).

Since the speed of each drive motor is pre-established, each tower would run at the same speed if we simply turned the system on and said "Go!" but each tower inward from the last tower must travel a proportionately shorter distance to complete a 360° revolution. Therefore, each successive inner tower must run for a progressively shorter duration in order to maintain system alignment.

Earlier, it was mentioned that the pivot control box had a component that would set the speed of the system. This component is the percentage timer. If we set its dial at 100%, the last tower drive motor contactor will close sending 480V to the drive motor full time and the tower will run continuously. But this full speed operation may not apply as much water per revolution as we want, so we have the option of operating the system at a slower speed -- let's assume that a calculation showed us that 66% would give us the proper amount of water. We set the timer at 66%, which will send a 120V signal to the last tower for only 40 seconds out of each minute or approximately  $\frac{2}{3}$  of its potential running time.



## 6000 Pivot Introduction (continued)

---

You may notice that we have been talking about the last tower only. The last tower is the controlling tower. At each inner tower we have a control bar that is fastened to the bottom of the tower control box, across the flex boot to a small tab on the next span. As the last tower and its span moves forward, the control arm is rotated slightly forward also. Where the control arm is fastened to the bottom of the tower control box, there is also a cam plate and a pair of microswitches, one of which is a run switch. As the control arm rotates forward, it causes the cam plate to push against the run microswitch that will now cause the contactor to close and send 480V power to the next to last tower drive motor and it will run for a period of time slightly less than the 40 seconds of the last tower or until the next to last tower has moved forward into alignment with the last tower and as it does so it will begin to rotate the control arm of the next inner tower and the cycle repeats itself throughout the length of the system but remember, the last tower was only going to be "at rest" for 20 seconds so it has already started moving again. The result of this is that any tower can be moving at any given time, depending only on whether or not its control arm senses a call to move by an angular difference in its position in relation to the adjacent span.

**The safety circuit is a series circuit.** One side of the circuit carries 120 volts to the end of the system, which connects to the return side that passes thru a safety switch at each tower. If for any reason the tower does not run, or if it runs too much and the angular difference is greater than our tolerances can

withstand, the cam connected to the control arm will "open" the safety microswitch and cause a system shutdown. The system **can** be restarted by pressing an override switch, but it **should not** be until the source or cause of the malfunction has been determined and corrected.

**The remaining three most common options** found on electric systems are the "stop-in-slot," the end gun shut-off, and reversing function. Located at the pivot end attached to the pivot swivel assembly is a pivot ring. Going back momentarily, you'll recall our drive motor power is 480V, 3-phase power. If we can change the positions of two of the three wires (one wire carrying each phase), we can reverse the direction that our electric motors turn. Our pivot panel has such a device and arrangement. We can manually select the reverse direction, which swaps two phases, push the button and the system will begin to operate in the reverse direction. To do the same thing automatically, we mount two switches on the pivot ring which, when they are engaged by the motion of the system to a given point, are depressed momentarily to activate a reversing-latch relay that automatically selects the other direction of travel.

Located above the pivot swivel is an actuator plate and switch box that contains a pair of switches and rollers. The box rotates with the system and when the rollers contact preset ramps, one switch will open the safety circuit to stop the system at a predetermined point. The other switch will energize or deenergize a wire to turn the end gun on or off.

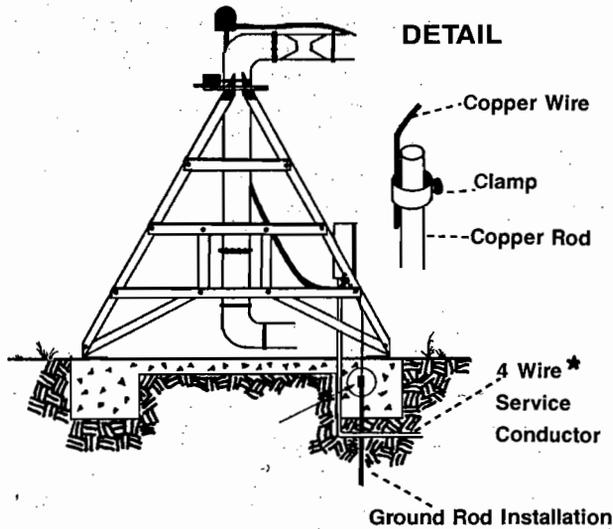
The VALLEY ELECTRIC SYSTEM is powered by 480 volts and can be extremely dangerous if used improperly. For your maximum safety and optimum performance of the VALLEY ELECTRIC SYSTEM, it is essential that you, your maintenance personnel, or any other operator of the system read and understand this manual before operating this product.

**SAFETY FIRST. GOOD ELECTRICAL AND OPERATIONAL PRACTICES SAVE TIME, MONEY AND LIVES.**

## OPERATE SAFELY

**DO NOT** operate system without first reading Operator's Manual.

**DO NOT** attempt to start system until system and electrical service is properly installed and grounded by a qualified electrician as per the electrical standards section of this manual.



**\*NOTE:** All 480 VAC power supply services must be a 4 conductor service. Three 480VAC power lines and one ground conductor which is as large as any power conductor for that service.

**DO NOT** oversize fuses -- they were sized for the protection of your machine. Refer to the Pivot Panel Fuse Chart of this manual prior to initial start up to be certain that you have the proper size fuses.

**WARNING** Repeated start attempts can cause serious structural damage. Inspect entire system after each start attempt failure. **DO NOT** depress the start and safety override buttons simultaneously for more than 3 seconds. Repeated override attempts can cause serious structural damage.

**AVOID** exposure to system spray while chemicals are being injected into the water.

**ALWAYS disconnect** electric power before servicing the machine. Shut off and lock the main disconnect yourself. **Don't trust someone else to do it for you.**

**MAKE SURE** that all persons are clear before turning the machine on.

**DO NOT** operate if the system moves in the direction opposite to that which was chosen.

Forward - Clockwise  
Reverse - Counterclockwise

**MAKE SURE** no equipment is parked over or near a wheel track.

**DO NOT** attempt to service an end gun while the system is running.

**When the system operates on public power,** the incoming power disconnect must be in the "off" position before connecting or disconnecting any plug-in connectors.

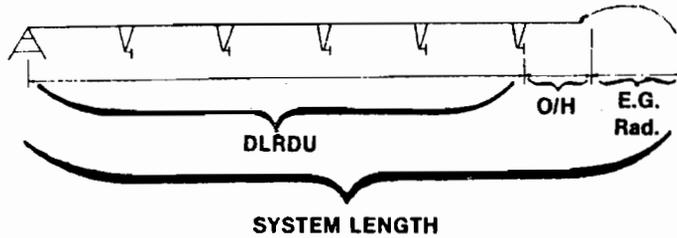
**Each time a towable system is moved,** the ground wire must be attached to the ground rod and checked for electrical integrity.

**Have qualified personnel perform any hazardous repair or maintenance.**



# 6000 Water Application Data

Water application depths are determined by system length, gpm, and revolution speed. Information from the following tables, and actual system data, can be used in the formulas shown to determine hours per revolution and inches per revolution.



APPROXIMATE END GUN COVERAGES		
Rainbird 85	=	60'
Rainbird 95	=	65'
Nelson 100	=	100'
Rainbird 103	=	100'

The percentage timer regulates system speed. This controls the end drive unit to operate the stated percent of one minute.

PERCENTAGE TIMER SETTING	SECONDS OF MOVEMENT PER ONE MINUTE OF LAST TOWER
100%	60 sec. (continuous movement)
75%	45 sec.
50%	30 sec.
25%	15 sec.
0%	no movement

**NOTE:** Upon assembly of the system, the first revolution should be made at 100% to determine actual revolution time. Use this rotation time with the formulas and charts provided to determine water application rate.

## END TOWER WHEEL ROTATION SPEEDS (Feet per minute at 100%)

CENTER DRIVE OUTPUT RPM	STANDARD TIRES 11.2 x 24	HIGH FLOAT 14.9 x 24	MAXI FLOAT 16.9 x 24	RETREAD 11 x 24.5
29	5.90'	6.54'	6.98'	6.07'
35	7.12'	7.90'	8.42'	7.33'
58	11.80'	13.08'	13.96'	12.15'
69	14.03'	15.57'	16.60'	14.45'



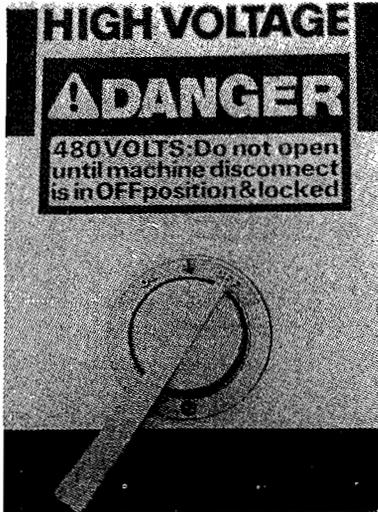
# Percentage Timer Setting Calculation

		EXAMPLE	CALCULATION
FORMULA 1.	$\text{Application Rate (Inches Per Day)} = \frac{\text{GPM} \times 735.3}{(\text{DLRDU} + \text{Overhang} + \text{Endgun Range})}$	$\frac{1800 \text{ GPM} \times 735.3}{(1290' + 85' + 100')^2}$ $= \frac{1323540}{2175625}$ $= .6$	$\frac{( ) \times 735.3}{( )^2}$ $= \frac{( )}{( )}$ <p>App. Rate = ( )</p> <p><b>Use Result in Formula 3</b></p>
DRLDU = Distance Last Regular Drive Unit			
FORMULA 2.	$\text{Hours Per Revolution at 100\%} = \frac{(.105) \times (\text{DLRDU})}{\text{Speed (Feet Per Minute)}}$	$\frac{(.105) \times 1290}{6.77}$ $= 20$	$\frac{(.105) \times ( )}{( )}$ <p>Hrs./Rev. = ( )</p> <p><b>Use Result in Formula 3 And Also Enter in Col. A</b></p>
FORMULA 3.	$\text{Inches Per Revolution at 100\%} = \frac{(\text{Hrs./Rev.}) (\text{App. Rate})}{24}$	$\frac{\text{From Formula \#1 } .6 \times \text{From Formula \#2 } 20}{24}$ $= .5$	$\frac{( ) \times ( )}{24}$ $= ( )$ <p><b>Enter in Col. B</b></p>
% Timer Setting	Col. A (From Step 2)	% Timer Setting	Col. B (From Step 3)

100% = ( ) Hrs./Revolution
90% = ( ) ÷ (.9) = _____ Hrs./Rev.
80% = ( ) ÷ (.8) = _____ Hrs./Rev.
70% = ( ) ÷ (.7) = _____ Hrs./Rev.
60% = ( ) ÷ (.6) = _____ Hrs./Rev.
50% = ( ) ÷ (.5) = _____ Hrs./Rev.
40% = ( ) ÷ (.4) = _____ Hrs./Rev.
30% = ( ) ÷ (.3) = _____ Hrs./Rev.
25% = ( ) ÷ (.25) = _____ Hrs./Rev.
20% = ( ) ÷ (.2) = _____ Hrs./Rev.
15% = ( ) ÷ (.15) = _____ Hrs./Rev.
10% = ( ) ÷ (.1) = _____ Hrs./Rev.
5% = ( ) ÷ (.05) = _____ Hrs./Rev.

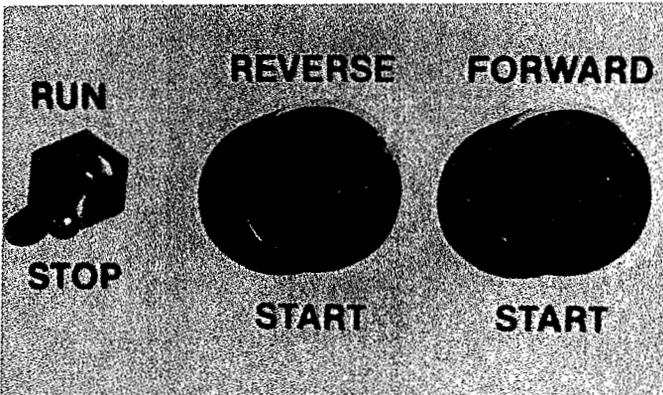
100% = ( ) Inches Per Revolution
90% = ( ) ÷ (.9) = _____ In./Rev.
80% = ( ) ÷ (.8) = _____ In./Rev.
70% = ( ) ÷ (.7) = _____ In./Rev.
60% = ( ) ÷ (.6) = _____ In./Rev.
50% = ( ) ÷ (.5) = _____ In./Rev.
40% = ( ) ÷ (.4) = _____ In./Rev.
30% = ( ) ÷ (.3) = _____ In./Rev.
25% = ( ) ÷ (.25) = _____ In./Rev.
20% = ( ) ÷ (.2) = _____ In./Rev.
15% = ( ) ÷ (.15) = _____ In./Rev.
10% = ( ) ÷ (.1) = _____ In./Rev.
5% = ( ) ÷ (.05) = _____ In./Rev.





**MAIN DISCONNECT.** This switch disconnects all power to the system except at the incoming (upper) terminals on the Main Disconnect Switch inside the control panel. The function of the disconnect is to turn the power "ON" or "OFF"

**NOTE:** A three-second auto restart is standard equipment built into the circuitry of your Valley system. In the event of a momentary power loss or voltage drop, the system will automatically restart, if power is returned within three seconds.

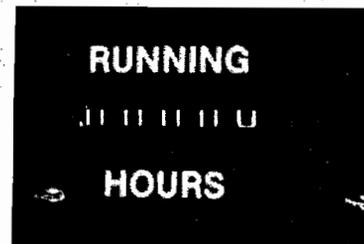


**THE RUN/STOP TOGGLE SWITCH** must be in the "run" position to start or operate the system. Selecting the "stop" position will stop or shut-down the system.

the **forward or reverse push button switches.** Forward travel will cause the system to move to the right as you face the control panel. Reverse travel will be to the left. The direction of travel can be changed while running by simply pressing the opposite button.



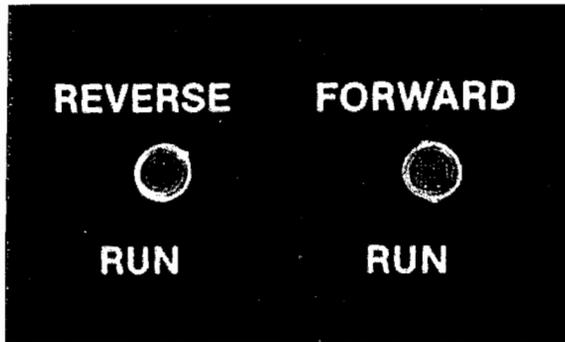
**THE SIS/BYPASS TOGGLE SWITCH** works in conjunction with the optional Stop In Slot (SIS) feature. When the SIS position is selected, the system will stop at the position pre-set provided the SIS ramp has been set. If the bypassed position is selected, the system will continue its travel past the SIS ramp. **THE WET/DRY toggle** is an integral part of the optional low pressure shut down. When the system is equipped with this option, the switch must be placed in the dry position to run the system without water. When the system is irrigating, this switch should be placed in the wet position. This will allow the pressure switch to stop the system if, for some reason, the water pressure drops 10-15# below the systems designed pivot pressure.



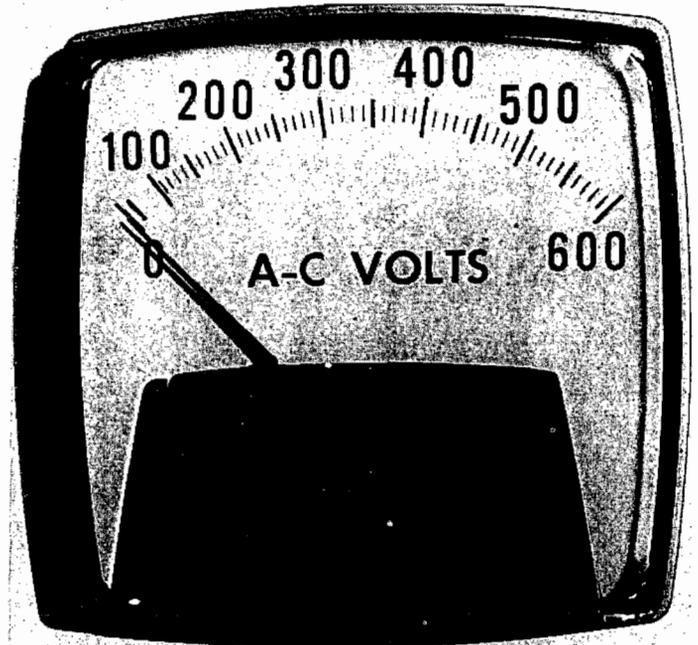
**RUNNING HOURS.** The running hour meter records the number of hours the system has operated. This being both dry time and irrigating time.



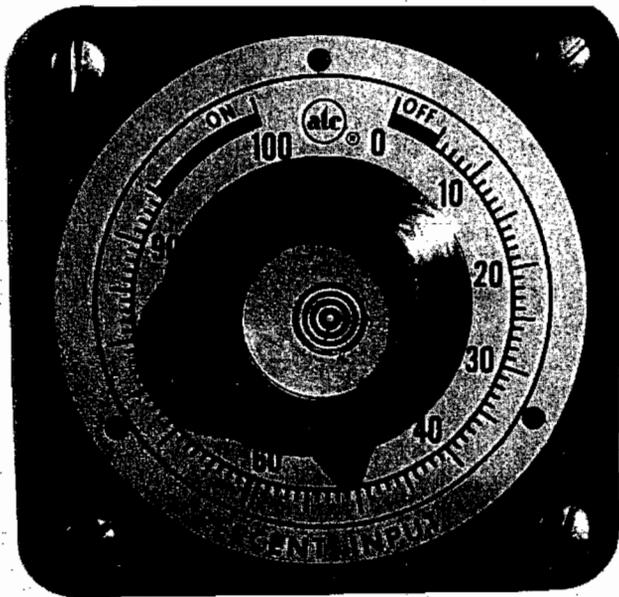
# 6000 Pivot Panel Components



**FORWARD/REVERSE RUN LAMPS.** One of these lamps will be "on" when the system is running indicating the direction of travel forward or reverse. These lamps will illuminate only when the systems safety circuit is complete.



**VOLTMETER.** The voltmeter displays the voltage being delivered to the system and should read 460 to 505 volts during normal operation. Do not operate the system if the meter reads below 460 or above 505 volts. Operating the system outside these limits could cause damage to the electrical components. (480VAC preferred)



**PERCENTAGE TIMER.** The percentage timer regulates system speed by causing the end drive units to operate at the selected percentage of one minute. Regulation of the speed determines the amount of water applied during irrigation.

**WARNING**  
**STRUCTURAL DAMAGE**  
**CAN OCCUR WHEN**  
**THIS SWITCH IS**  
**DEPRESSED**



**SAFETY**  
**OVERRIDE**  
**SWITCH**

**SAFETY OVERRIDE SWITCH.** The systems safety circuit can be overridden by depressing this switch in conjunction with the Reverse or Forward Start switches. **WARNING:** under no circumstances should this switch be depressed longer than three seconds at any time. Safety override can cause serious structural damage. Call your local Valley dealer should your system fail to start.



# Pivot Panel Fuses

## SYSTEM FUSES RECOMMENDED FUSE SIZES FOR MAIN DISCONNECT IN PIVOT PANEL\*

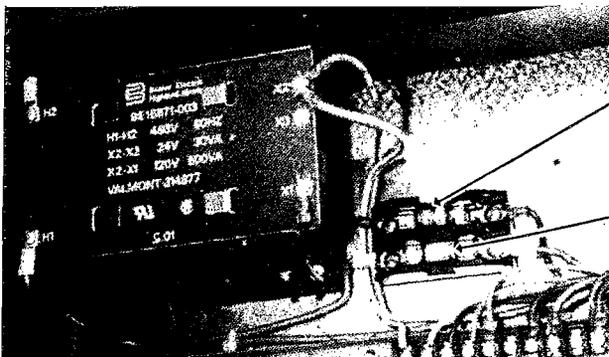
NO. OF TOWERS	Standard System	Std. System with 2 HP Booster	Std. System with 5 HP Booster	Std. System with 7.5 HP Booster	High Speed System	Hi Speed System with 2 HP Booster	Hi Speed System with 5 HP Booster	Hi Speed System with 7.5 HP Booster
1	6	12	12	15	6	12	12	15
2	6	12	12	15	6	12	15	17.5
3	6	12	15	17.5	6	12	15	17.5
4	6	12	17.5	17.5	12	12	17.5	20
5	12	12	17.5	20	12	15	17.5	20
6	12	15	17.5	20	12	15	20	25
7	12	15	17.5	20	15	17.5	20	25
8	12	15	20	25	15	20	20	25
9	12	15	20	25	15	20	25	25
10	12	17.5	25	25	17.5	20	25	30
11	15	20	25	25	20	25	25	30
12	15	20	25	25	20	25	30	30
13	15	20	25	30	20	25	30	30
14	15	20	25	30	20	30	30	45
15	17.5	25	30	30	25	30	45	45
16	20	25	30	30	25	30	45	45
17	20	25	30	45	25	45	45	45
18	20	30	30	45	30	45	45	45
19	25	30	45	45	30	45	45	
20	25	30	45	45	45	45		

\*Based on System Length and Motor Speed

NOTE: The above chart shows the recommended fuse sizes for the three main fuses in the Pivot Panel. The fuse size is determined by the system length and motors used to propel the system.

FUSE SIZE	VAL. P/N
6 Amp	— 314591
12 Amp	— 314343
15 Amp	— 314344
17.5 Amp	— 314345
20 Amp	— 314167
25 Amp	— 314346
30 Amp	— 315411
45 Amp	— 315459

**DO NOT OVERSIZE FUSES — THEY WERE SIZED FOR THE PROTECTION OF YOUR MACHINE.**



5 Amp Fuse  
P/N 314243

3 Amp Fuse  
P/N 314755

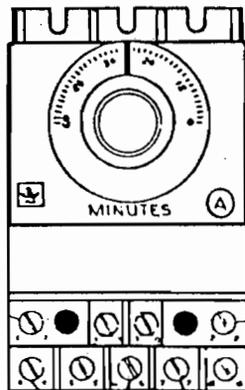
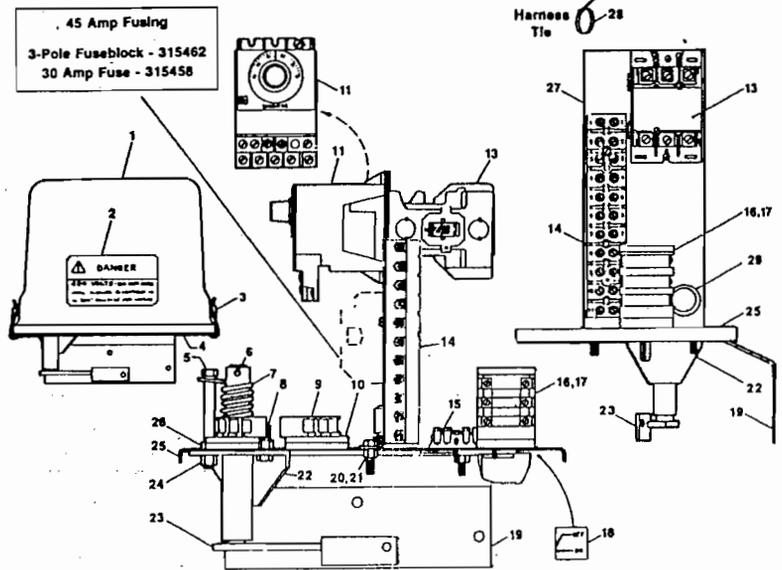
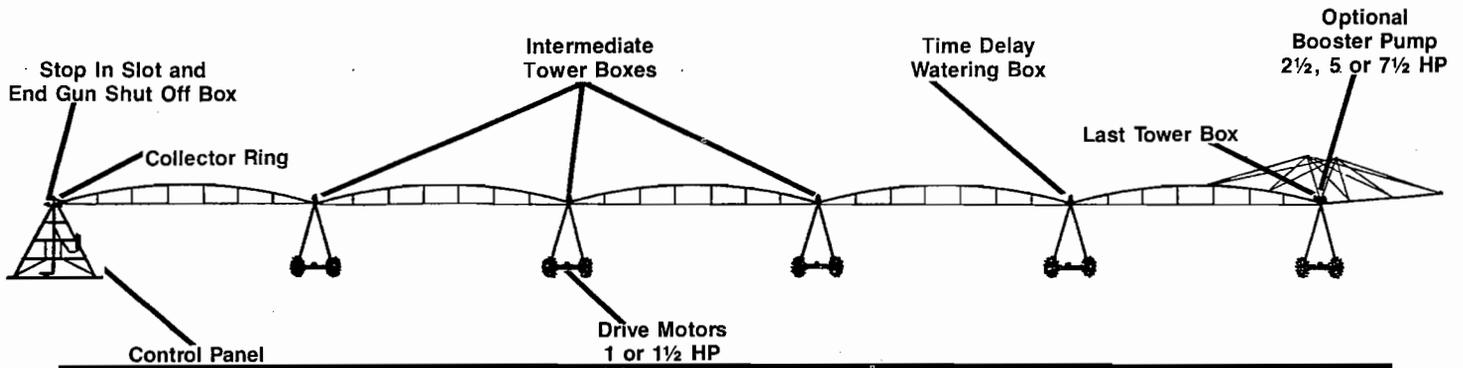


**WARNING:** Never attempt to check or change any fuse without first disconnecting all power to the pivot panel.

Anywhere an optional running light is wired it is fused with an inline 1.5 amp (P/N 314858) fuse. Shown in the illustration is the location of the running light fuse when wired into the Stop-In-Slot and End Gun Control Switch Box.



# 6000 System Components



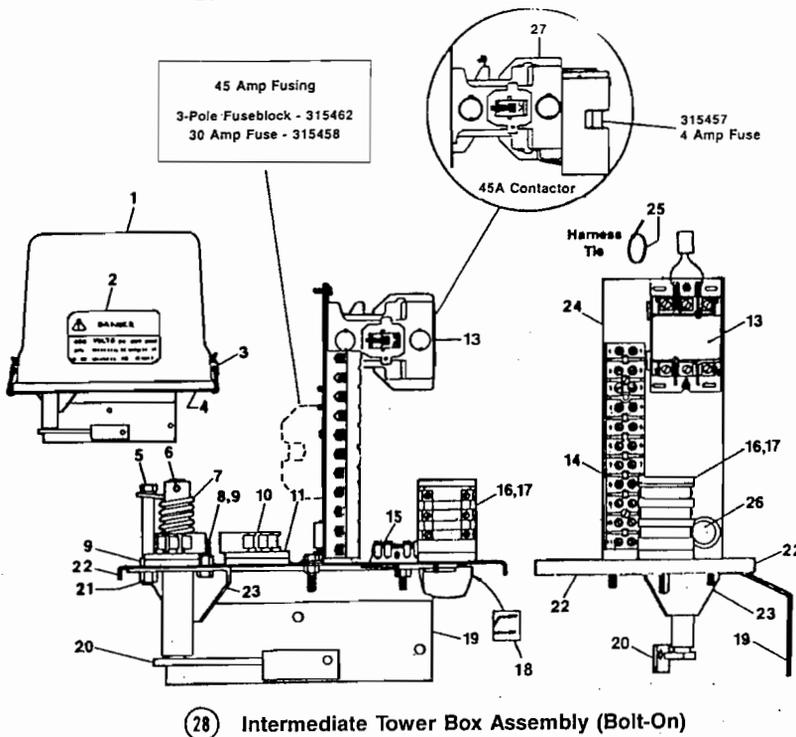
30 Time Delay Watering Box (Bolt-On)

## OVERWATERING TIMER

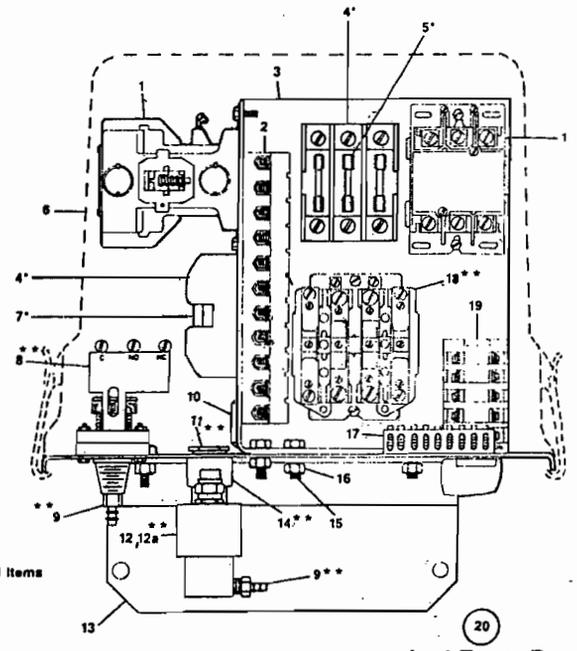
The overwatering timer is located in the time delay watering box. Its function is to act as a safety device to shut the entire system off should the end tower fail to move due to mechanical/electrical failure or wheel slippage. The time delay watering box should be located at the next to last tower as illustrated above and the timer set at approximately 12 min.

At a setting of 12 minutes the next to last tower must cycle "on" and "off" prior to the 12 minute setting. Each time the next to last tower runs the timer is reset.

ITEM	DESCRIPTION	PART #
1	Electric Tower Box Cover	1702056
2	Decal (Danger)	991261
3	Tower Box Cover Latch	992073
4	Gasket (On Bottom Plate)	992071
5	3/8" x 3 1/2" Long Cap Screw	161150
6	1/8" x 1" Roll Pin	111024
7	Spring	181046
8	Spring - L.C.P.A.	181082
9	Adjustable Micro-Switch	314905
10	Insulator	1701632
11	Time Delay Relay	314708
13	Contactor	314667
14	Terminal Block	315485
15	Grounding Lug	315120
16	Disconnect	315746
17	Disconnect Sleeve (Cover)	1702190
18	Disconnect Decal	992090
19	Mounting Plate	1702054
20	1/4" x 1" Cap Screw	161056
21	1/4" Lock Nut	133008
22	Sensor Bearing Assembly w/Bushings	1703336
23	Switch Pivot Arm Assembly	1701262
24	3/8" Lock Nut	133006
25	Bottom Plate	1702055
26	3/8" Nut	131018
27	Vertical Plate	1702053
28	Harness Tie (5 Req'd.)	314225
29	Snap Bushing	992070
30	Time Delay Watering Box (Comp.)	1811265
	Time Delay Watering Box - L.C.P.A.	1811697



**(28) Intermediate Tower Box Assembly (Bolt-On)**



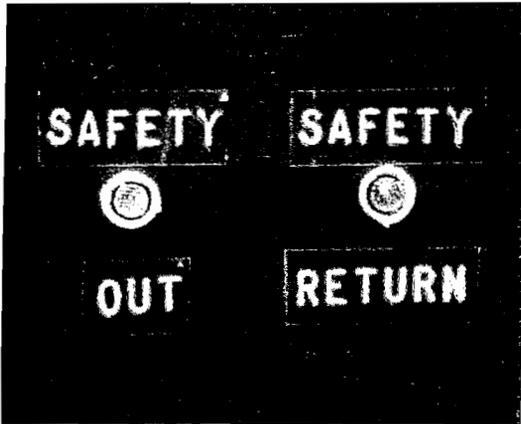
\*Optional Items

**(20) Last Tower Box**

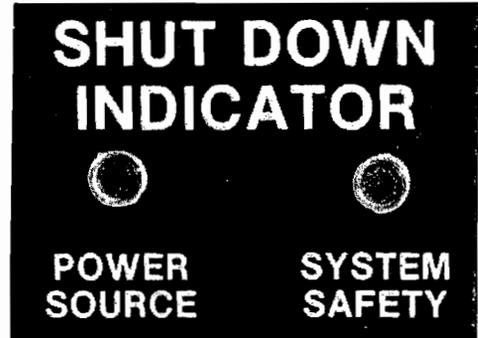
**\*\*Used only if the system is equipped with optional booster pump**

ITEM	DESCRIPTION	PART #
1	Electric Tower Box Cover	1702056
2	Decal (Danger)	991261
3	Tower Box Cover Latch	992073
4	Gasket (On Bottom Plate)	992071
5	3/8" x 3 1/2" Long Cap Screw	161150
6	1/8" x 1" Roll Pin	111024
7	Spring	181046
	Spring - Long Center Pivot-Box	181082
8	3/8" x 1" Cap Screw	161045
9	3/8" Nut	131018
10	Adjustable Micro-Switch	314905
11	Insulator	1701632
13	Contactors	314667
14	Terminal Block	315485
15	Grounding Lug	315120
16	Disconnect	315746
17	Disconnect Sleeve (Cover)	1702190
18	Disconnect Decal	992090
19	Mounting Plate	1702054
20	Switch Pivot Arm Assembly	1701262
21	3/8" Lock Nut	133006
22	Bottom Plate	1702055
23	Sensor Bearing Assembly w/Bushings	1703336
24	Vertical Plate	N/A
25	Harness Tie (8 Req'd.)	314225
26	Snap Bushing	992070
27	3 H.P. Contactor w/Fuseblock	315464
28	Intermediate Tower Box Complete	1811219
	In. Tower Box - L.C.P.A.	1811698

ITEM	DESCRIPTION	PART #
1	Contactors	314667
2	Terminal Block	315485
3	Mounting Plate	1702392
4	3-Pole Fuseblock	315462
5	4 Amp Fuse (for 1 H.P. Motors)	315457
	5.6 Amp Fuse (for 1.5 H.P. Motors)	315711
6	Tower Box Cover	1702056
7	8 Amp Fuse (for 2 H.P. Booster)	315712
	15 Amp Fuse (for 5 H.P. Booster)	315983
	20 Amp Fuse (for 7.5 H.P. Booster)	315621
8	Pressure Switch	315994
9	1/4" Connector	232362
10	Snap Bushing	992070
11	1/2" Conduit Nipple	244037
12	Solenoid Valve	232170
12a	120 Volt Coil	232151
13	Mounting Plate	1702054
14	1/2" Bushed Elbow	241057
15	1/4" x 3/4" C.S.	161057
16	1/4" Locknut	133008
17	Ground Lug	315120
18	Contactors	314751
19	Disconnect Switch	315897
20	Std. Booster Pump Box Complete	1811602



**SAFETY OUT/SAFETY RETURN LIGHTS.** These lights are an optional feature designed to aid in field troubleshooting. When the system is in operation both these lights will be "ON." Should the system fail to operate or shuts down, one or both of these lights will not illuminate when the start button is depressed. If the safety out light is on when the forward or reverse start button is depressed, the problem is in the system. Should both lights fail to come on when one of the directional buttons is depressed, the problem is in the pivot control panel.

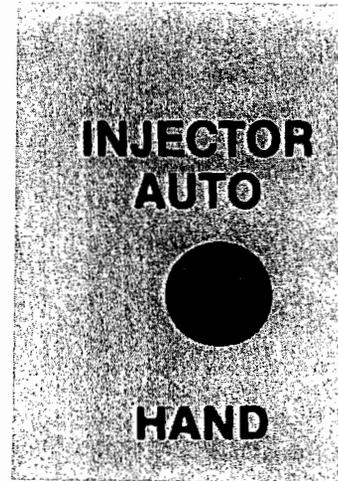


**SHUT DOWN INDICATOR (Optional).** Should the system "shut down" during normal operation either the power source or the system safety lamp will be "on" indicating the cause of failure. NOTE: 480 V power must be supplied to the control panel to illuminate these lamps (standard on all 6000 corner systems).

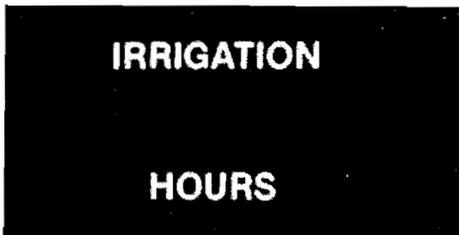
**END TOWER**



**END TOWER LIGHT.** This option allows you to time the on-off cycle of the end tower from the pivot. When the end tower is running, the light will be on; when the end tower stops, the light will be off.



**THE INJECTOR HAND/AUTO OPTION** is used in conjunction with an additional pump used typically for injection of chemicals into the system. This switch allows the pump to run independently or with the irrigation system.



**IRRIGATION HOURS (Optional).** This hour meter records only those hours the system has operated with water or actual irrigating time.



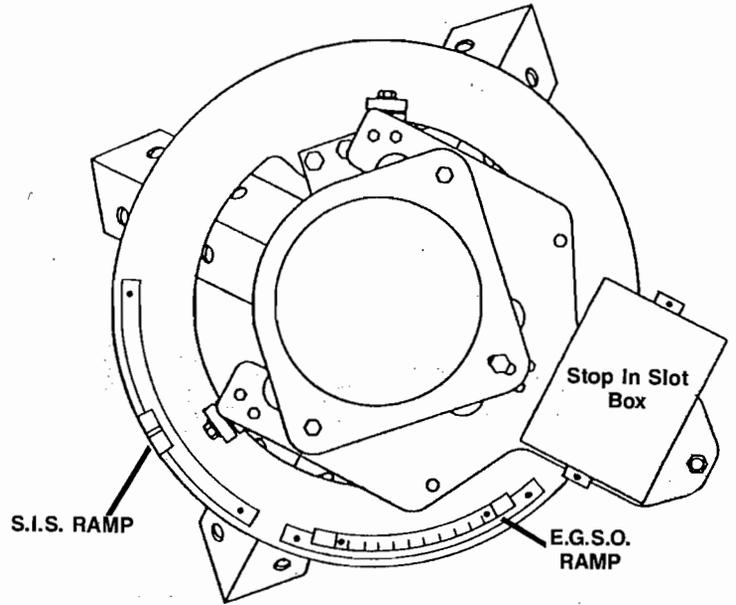
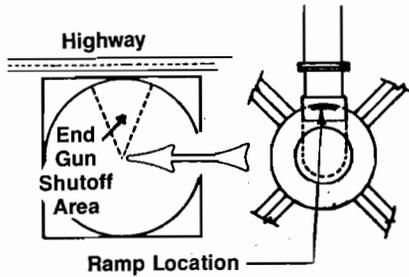
**SURGE PROTECTION,** this option is designed to protect your systems electrical components from voltage surges.

## END GUN SHUT-OFF OPTION

The End Gun Shut-Off Option directs the end gun to turn off and on at desired locations. The actuator plate supports the ramps that turn the end gun off and on. Whenever the control box micro switch rides up on the ramps, power is removed from the solenoid and the end gun is shut-off. The end gun comes back on as the micro switch rides off the ramp. (End gun arc settings vary with different sprinkler packages. Refer to your Sprinkler Chart for arc degree information.)

Adjust end gun shut-off by positioning ramps on actuator ring opposite action point. Duration of time the end gun is shut-off is adjusted by length of ramp.

Cut and splice ramp as necessary.

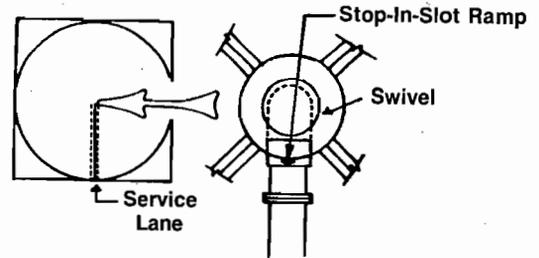


**NOTE:** Assure proper contact of ramp and switch roller.

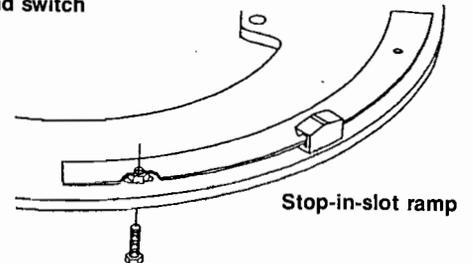
## STOP-IN-SLOT OPTION

The Stop-In-Slot Option directs the system to stop at any predetermined location(s). This can be used to stop the system in its service lane or other convenient position.

When the Stop-In-Slot micro switch, mounted in the Stop-In-Slot box, contacts the Stop-In-Slot ramp, the system and pump are shut down.

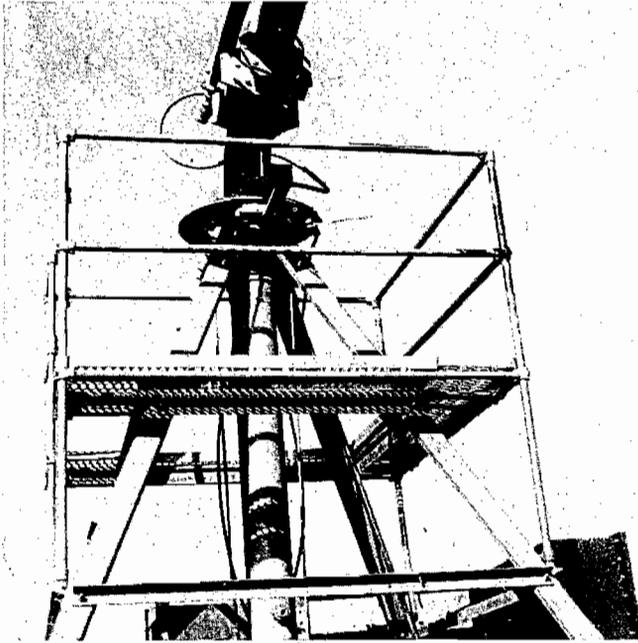


**NOTE:** Assure proper contact of ramp and switch

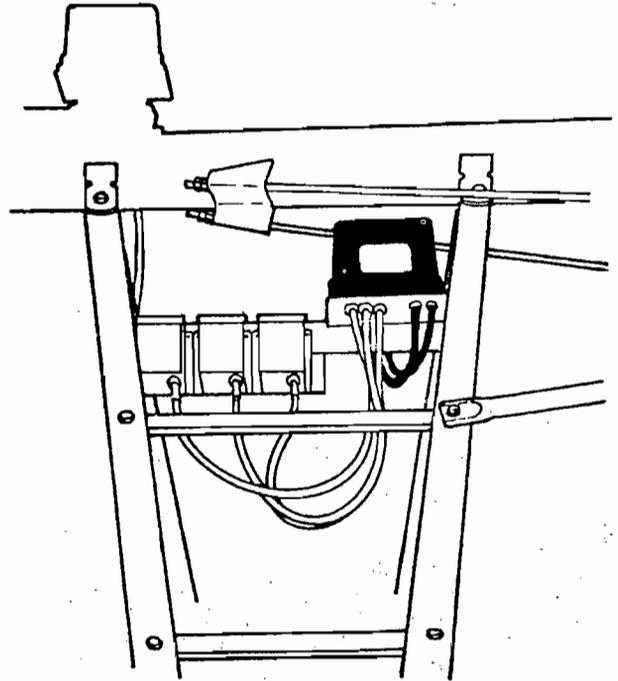


**CAUTION:** A very small change in location of the Stop-In-Slot ramp causes a MUCH larger change at the outer end of the system.

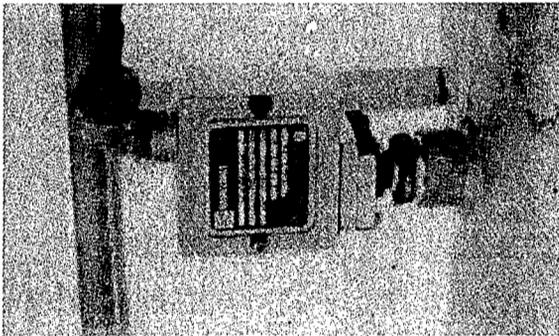
**NOTE:** The functions should occur when the switch rollers are halfway up or down the respective sloped portion of the ramp.



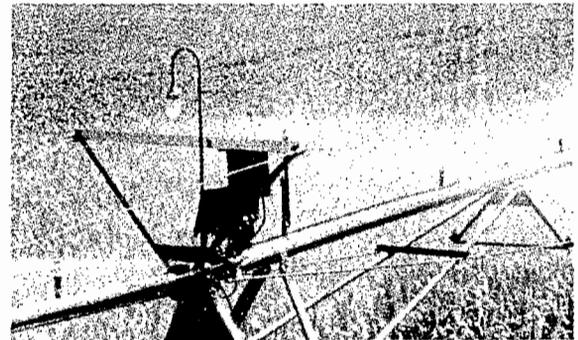
**PIVOT PLATFORM.** Provides easy access to the pivot swivel area and pivot mounted controls.



**BOOSTER TRANSFORMER.** Increases voltage by 5%, should your system require a voltage increase due to system length or low incoming power voltage. The location of these transformers will vary depending on voltage inputs.

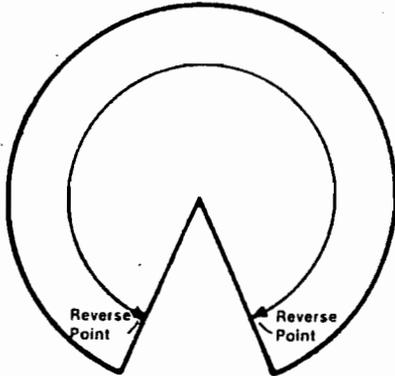


**LOW PRESSURE SHUT-OFF.** This option will shut the system "off" should the water pressure drop 10-15 PSI below the required system pivot pressure.



**RUNNING LIGHT.** Allows you a visual contact during the systems operation with either a flashing or standard illuminated light.

The auto-reverse option provides a method of reversing the direction of the system at pre-determined locations, causing the system to move back and forth, rather than making a complete circle.



The pivot mounted auto-reverse switches are two step heavy duty limit switches and are mounted as shown in the illustration. Each switch has a back-up safety contact designed to stop the system if the reversing contact or associated circuitry fails to achieve the planned direction change.

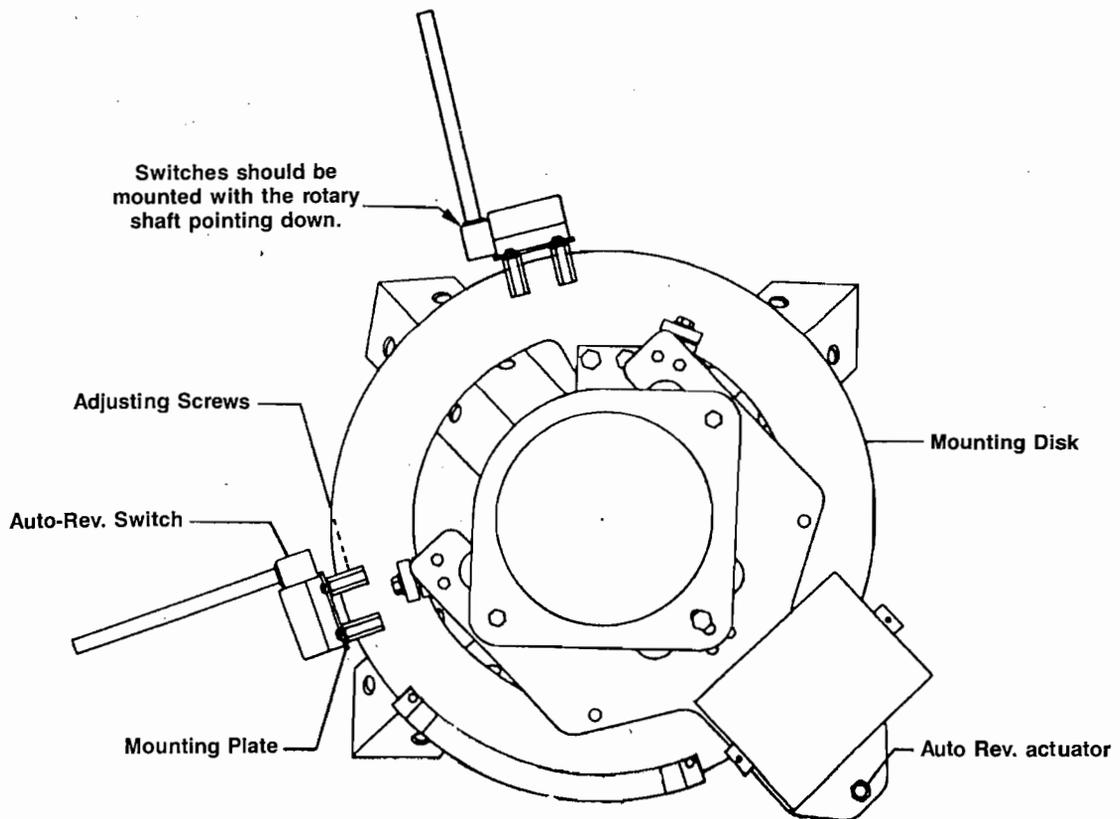
## ADJUSTMENT

Adjust the auto-reverse switches by loosening the adjustable screws and repositioning them on the mounting disk.

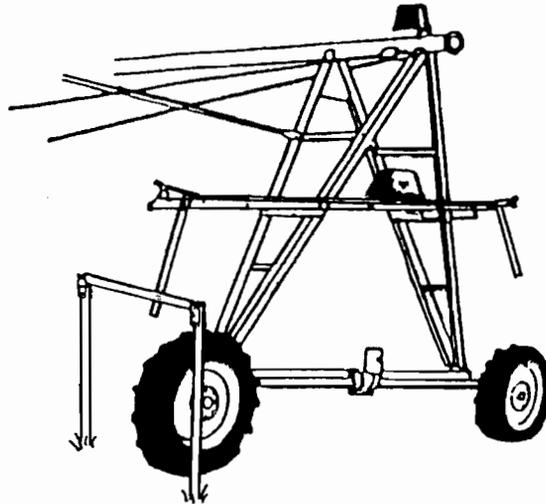
**CAUTION:** A very small change in the location of either switch causes a much larger change at the outer end of the system. For example, 1/16 of an inch at the pivot equates to about 7 feet at the outer end of a quarter section system.

After the auto-reverse switches have been installed and adjusted, observe the system as it reverses direction to ensure that it does not travel beyond the desired reversing point. If necessary, readjust the switch until the system reverses at the desired point.

**NOTE:** When the need for a precise reversing point is critical, such as in the case of avoiding a building, it is recommended that the drive unit mounted auto-reverse option be used. (See next page.)



## DRIVE UNIT MOUNTED



This assembly is used for both end of field stop and end of field auto reverse options.

This option will stop the system when the actuator arm contacts the barricade. If the Auto Reverse/Auto Stop option is installed you may choose to either stop the system when it reaches the barricade or have the system automatically reverse its direction of travel and continue to run. **NOTE:** Care must be taken when this option is used. You must insure the actuator arm contacts the barricade. Under certain conditions soil may build-up in the wheel track resulting in a ramp effect allowing the actuator arm to go over the barricades.



**AUTO/REV, AUTO/STOP SWITCH.** This switch will be installed at the control panel of systems equipped with the Auto/Rev, Auto/Stop Option. In the "Auto/Rev" position the system will run continuously, automatically reversing at the prescribed points. In the "Auto/Stop" position the system will stop at the end of its current pass.

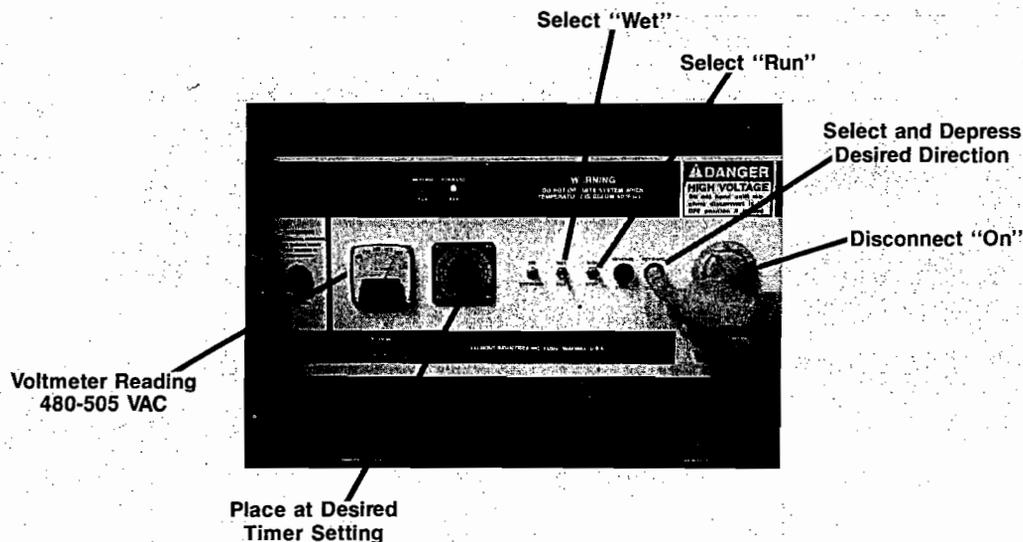
## STARTING THE SYSTEM WET

1. Inspect wheel tracks to insure no vehicle or other equipment will be contacted upon start-up or operation.
2. Place the WET/DRY switch in the "WET" position.
3. Partially close the mainline valve to the system.
4. Start the pump.
5. Slowly introduce more water into the system until full.
6. Turn the disconnect switch to the "on" position. If power is supplied by an engine driven generator, adjust the RPM until the voltmeter reads 480 volts to 505 volts. **Do not exceed 505 volts.**
7. Place the stop/run toggle switch to the run position.
8. Set the percentage timer.
9. Select and push the "FORWARD" or "REVERSE" start button. Forward clockwise, reverse counter-clockwise.
10. If equipped with optional Stop-In-Slot, place the SIS/Bypassed switch in the position desired.

## TO STOP THE SYSTEM

1. Move the run/stop toggle switch to the stop position.
2. Turn the main disconnect switch to off.
3. Turn off the pumping unit (if not automatic).

### Start-Up Switch Positions (Wet)



## STARTING THE SYSTEM DRY

To operate the system dry or without water, follow the start-up procedures eliminating Steps 3, 4 and 5 and placing the WET/DRY switch in the "DRY" position.



# 6000 Pivot Safety Override

The Model 6000 is equipped with a safety override push button switch. Should the system misalign for some reason, and it is necessary to override the safety circuit momentarily to realign the system, this switch may be used.

**CAUTION MUST BE TAKEN** when this button is depressed as it will by-pass or disable all of the system's safety circuits. Never depress this button for more than 3 to 5 seconds if you are able to see the entire system.

To use the by-pass function, depress one of the direction of travel push button switches and the override button simultaneously.

**NEVER** depress the override button longer than 3 to 5 seconds and you must inspect the entire system between each start attempt. Repeated override start attempts can cause severe structural damage. Call your local Valley dealer should the system fail to start.

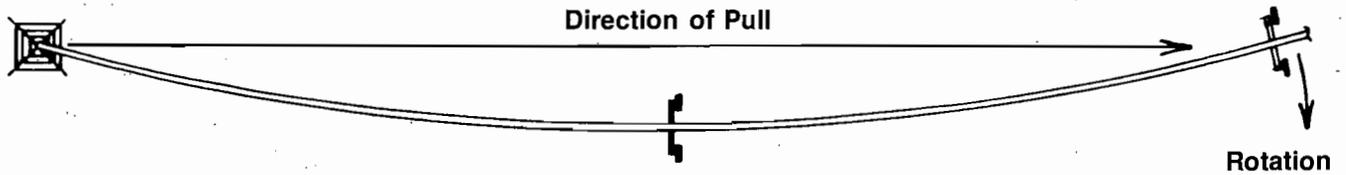


## EFFECT OF COMPRESSION ON SPAN

Alignment is an extremely important factor in the operation of the system, as a misaligned machine develops very high stresses which could cause structural damage and equally as important reduces expected motor and gear-box life. Below are examples of how these stresses develop:

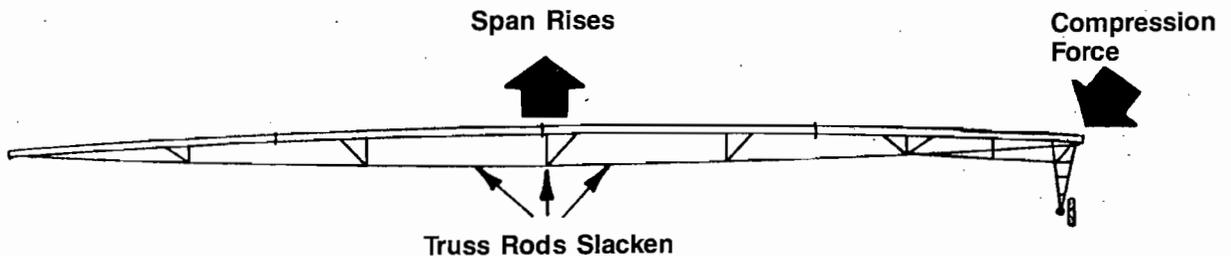
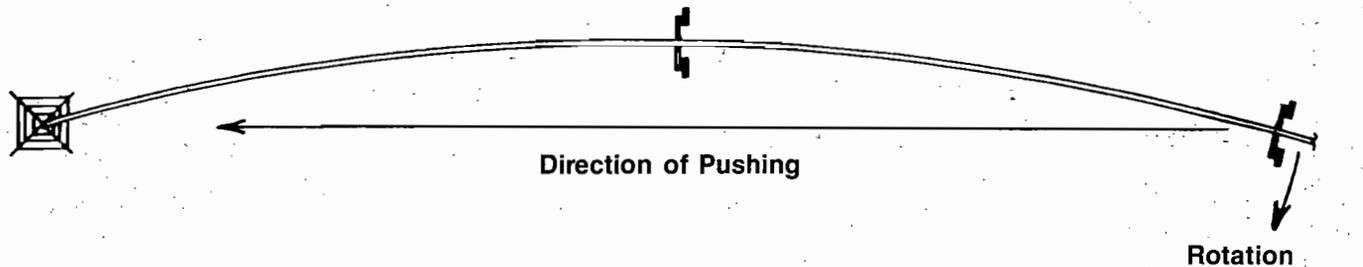
### LEADING BOW

A. Leading Bow -- A leading bow can cause problems by creating extreme tension or pull that could cause structural damage.



### TRAILING BOW

B. Trailing Bow -- This situation is most critical as it causes a compression of the entire machine. When the spans are compressed, they tend to lose their inherent strength.

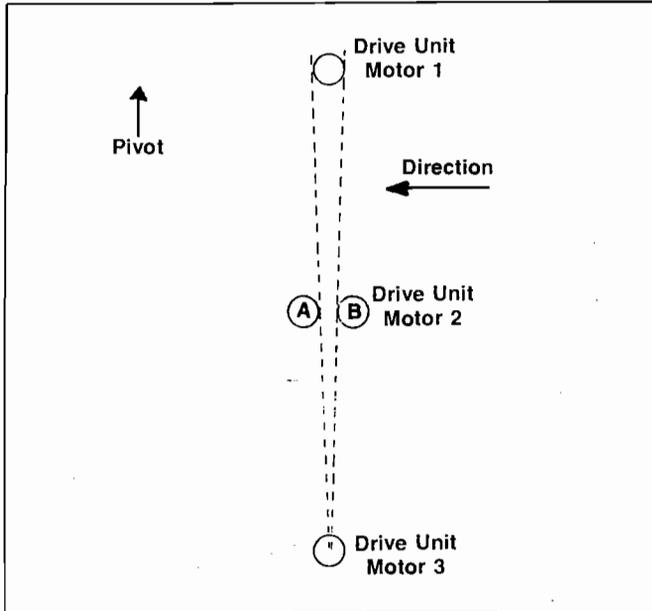


**NOTE:** A trailing bow is not acceptable, but a slight leading bow is tolerable. However, if the system is operated in forward and reverse, the leading bow in one direction is the trailing in the other direction. Therefore, such a system should be aligned to operate in as straight a line as possible.

## ALIGNMENT PROCEDURE

Set the percentage timer between 50% and 70%, depending on your pace and start the system in either direction (forward or reverse).

Beginning three drive units from the pivot, one person sights an imaginary line from the center of motor 3 to the edges of motor 1 (looking toward the pivot).

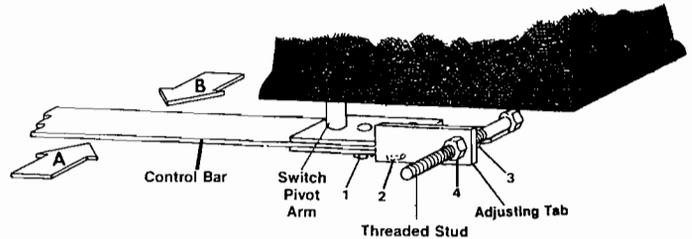
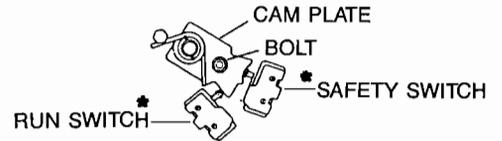


Motor 2 is to stop at position A and start at position B. The adjustment is correct when the motor 2 starts and stops equal distances relative to the motor 1. The first drive unit can be aligned by sighting between motor 2 and the vertical riser pipe.

## TOWER BOX PRE-ADJUSTMENT

Before starting any adjustments, manually depress the run switch and rotate the switch arm in both directions to ensure that the safety switch will actuate BEFORE the cam plate makes contact with the bolt in the center of the cam plate. If you cannot hear the safety switch click in and out in both directions, do not proceed with that tower box adjustment until a qualified service technician has properly adjusted the safety switch. If the safety switch is functioning properly, begin as follows.

1. With system in straight alignment loosen the carriage bolts on the control bar (nuts 1 & 2 below). The threaded stud of the control bar should have one nut turned well down and the threaded portion placed through the adjusting tab.



2. Rotate the switch pivot arm until the roller of the safety switch rests in the "V" of the cam plate, and tighten bolt #1. Bolt #2 should be snug but not tight.
3. Adjust nut #3 until the run switch actuates. Tighten nut #4.
4. Readjust #3 and #4 nuts as needed so when the control bar is moved in direction "A" the run switch is actuated but not released when the control bar is released. Also, when the control bar is moved in direction "B" the run switch should release but not be actuated again once the control bar is released.
5. Tighten nut #2.

## SYSTEM REALIGNMENT

Following the alignment procedure each tower can be realigned by:

- A. Loosen carriage bolt #2  
NOTE: Do not loosen bolt #1
- B. Adjust nuts #3 and #4 (clockwise if the tower is ahead and counterclockwise if the tower is behind).
- C. Retighten carriage bolt #2.

**CAUTION:** Never adjust nuts #3 and #4 more than 1/4 turn at one time, always adjust, retighten carriage bolt #2 and allow the tower to cycle twice (start and stop) prior to making additional adjustments.

\* The safety switch is always located in this manner. Some Model 6000 systems may have the run switch located on the opposite side of the cam plate.



# Flushing Procedure

---

After thoroughly checking the system and correcting any problems, the system must be flushed. The purpose for flushing the system is to remove sand and debris from the pipeline. Sand is extremely abrasive and can cause undue wear to the sprinkler heads.

**IMPORTANT:** Excessive accumulation of sand in the system also adds weight and can cause system damage.

The Flushing Process Should Be Performed:

1. After system installation.
2. After pump repair.
3. After structural repair.
4. Seasonally -- prior to operating system and after the operating season.
5. As often as necessary according to debris or sand content in water. Excessive sprinkler problems (clogging) could be an indication of high debris or sand content.



**DANGER! DO NOT START FLUSHING PROCEDURE WHILE THE SYSTEM IS UNDER WATER PRESSURE. REMOVING SAND TRAP PLUGS WHILE THE SYSTEM IS UNDER PRESSURE MAY CAUSE PERSONAL INJURY OR DEATH.**

Flushing Procedure:

1. Be sure the main disconnect switch is off. Electrical power is not needed for this procedure.
2. Remove sand trap, drain caps and end caps from end of overhang.
3. Start engine/pump.
4. Allow system to flush out thoroughly.
5. Turn off pump and re-install drains, sand trap and end caps on overhang.
6. After flushing for winterization, insure that all drains have allowed water out of the pipeline to prevent freezing and splitting of the pipeline.



# Cold Weather/Winterizing

**DO NOT OPERATE AT FREEZING TEMPERATURES.** Spraying of water has a cooling effect and the water will freeze even though the air temperature is slightly above freezing. Shut the system down at 40 degrees Fahrenheit (4.5 degrees Celsius).

**WARNING**

**YOUR VALLEY SYSTEM IS NOT FACTORY EQUIPPED WITH A COLD WEATHER SHUTOFF!**

Cold weather shut-off controls are available from other vendor sources which will cause system and power

unit shutdown to occur when the air temperature reaches (40 degrees F.). Installation of these cold weather shut-down controls should not take the place of regular checks by the operator when the system must perform during marginally cold weather (40-50 degrees F.).

**WARNING!**

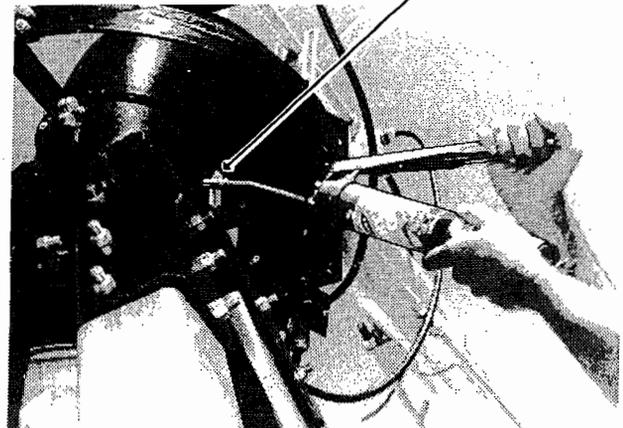
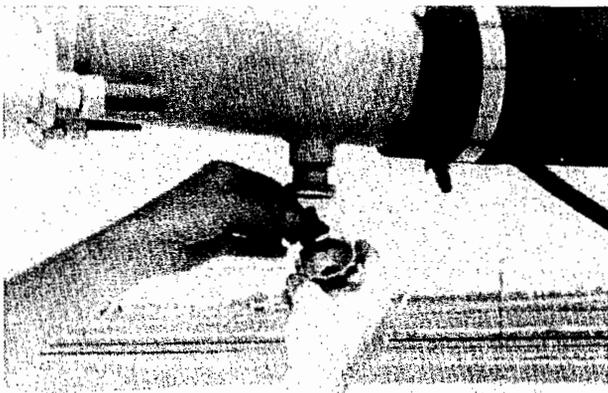
Make certain all pipe drains function properly to prevent pipe line freeze-up and equipment damage in extremely cold weather. **DAMAGE TO EQUIPMENT RESULTING FROM FREEZE-UP IS NOT COVERED UNDER WARRANTY!**

## Winterizing

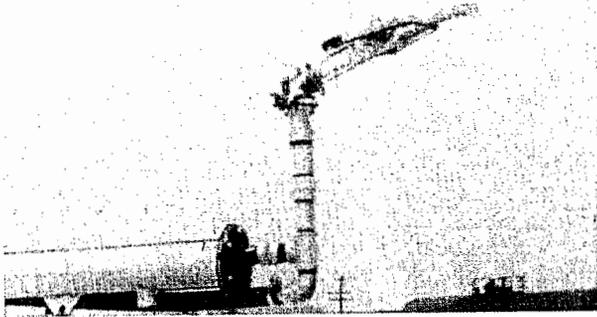
1. If the system uses underground pipe leading to the pivot, make sure the water is drained below the frost level, or pumped from the line. The 2" pipe plug should be removed to drain the riser pipe. When drainage is complete, reinstall plugs to prevent rodent infestation.
2. Remove bottom pipe drain caps. Clean sand and foreign particles from these drains, then flush.

**NOTE:** Drain seals should be turned over when being re-installed. This will greatly increase the seal life.

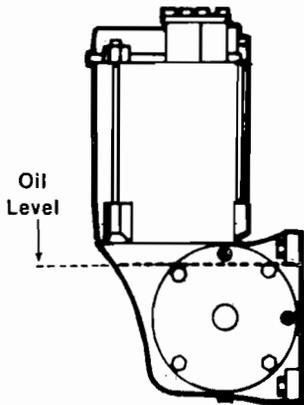
3. Protect moving parts and bearing surfaces against rust and corrosion by greasing all fittings with Water-proof Grease.



- Remove overhang drain nozzles, flush and reinstall.



- Electrically operated end gun shut-off valves should have the top removed to check for drainage.
- Remove the drain plug on the bottom of the booster pump volute case and the bearing frame and drain any water accumulation. Also disconnect and drain the booster pump hose. You must drain the volute case prior to the onset of freezing temperatures. It is recommended the booster pump hose be disconnected and the ends covered. In severe cold the hose may shrink and fracture the pump case.
- Visually check motor junction box to make sure drain hole in bottom is open. Check gaskets installed between the stator, junction box and cap. Replace if cracked or mis-shaped.



- The oil in the electric gear motors should be changed according to the maintenance section of this manual. However, motors should be checked for condensation of water and refilled with Valley gear lube.

- The water caused by condensation should be drained from worm gear boxes and refill with Valmont gear lubricant.
- Repack bearings and hub cavity on towable systems.
- Check nut tightness on all wheels.
- Steel will expand and contract with variances in temperature. When your system is being operated this poses no threat. However, should the system be parked in the wheel tracks and the tires are frozen to the ground, shrinking due to the contraction of the steel could pose a structural hazard. This shrinkage increases as system length increases on systems 1500' or longer, where extreme temperature variances occur, (+90° to -0°F), you should consider one of the following methods when parking the system in the off season.

- Park the system in an area in which the wheel tracks have been eliminated.
- Place planks, (1" x 12"), over the wheel tracks parking the system with the tires on the center of the planks.
- Towable Only - Place every third drive units wheels in the tow position.
- Skid Pivot - Loosen the anchor chains. (Also recommendation #1.)
- Remove all wheel tracks and run the system 100 to 200 yards monthly.

You may wish to contact your Valley dealer for other winter storage/parking information.

Follow manufacturer's WINTERIZATION recommendations on all auxiliary equipment such as pumps, power units, mainline pipes and hoses. Generally, this includes lubrication, clearing drains, covering openings to prevent rodent infestation and overall protection from the elements. A thorough flushing of the system with all drains removed should clean out any build-up of sand or other foreign matter. Replace all drains and don't forget to insure that the mainline is pumped clear. Any low spot in the mainline between the pump and the pivot should have a riser installed at the low point to provide access for pumping water from the line.

Additional winterizing facts which are common to your area may be suggested by your serviceman. If you have any questions or comments concerning winterizing procedures contact your VALLEY dealer.



# Maintenance Safety

## ALWAYS PRACTICE SAFE MAINTENANCE

**DO NOT** Attempt to service any component until all electric power is disconnected. Always turn the control panel disconnect to "off." Lock it in that position.

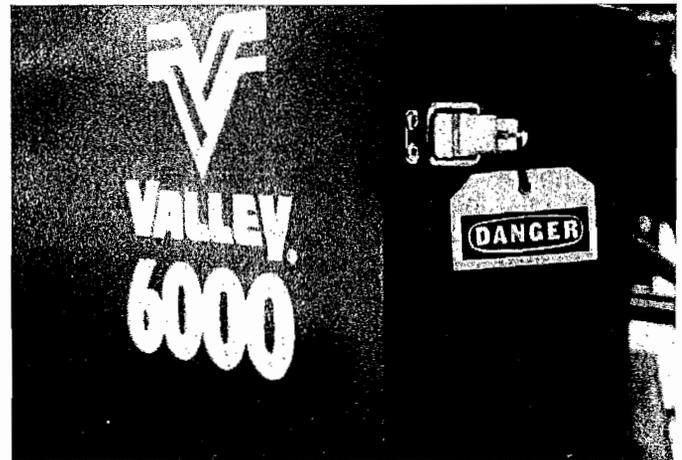
**DO NOT** depend on another person to disconnect the power -- **DO IT YOURSELF!**

**NEVER** perform any maintenance or trouble-shooting until power is off, the outer door shut, and the "Do Not Operate" sign placed in the panel latch.

**REPLACE** any guards and shields removed for servicing.

**DO NOT** attempt to adjust end gun as it operates.

**DO NOT** deep rip or chisel near the buried power service wires.



<b>HIGH VOLTAGE</b>	
	<b>DANGER</b>
<b>480 VOLTS</b>	DO NOT OPEN
	UNTIL MACHINE DISCONNECT IS
	IN "OFF" POSITION AND LOCKED



# Maintenance Check List

Time, humidity, vibration, temperature, sand and system operation all contribute to wear on your VALLEY irrigation system. To keep the system operating properly with a minimum amount of down time, we urge you to establish a regular preventative maintenance program. If replacement parts are needed, use only VALLEY REALPARTS.

**DO NOT** attempt to service any component until all electrical power is disconnected and the panel locked.

**DO NOT** attempt to adjust the end gun while it is operating.

**DO NOT** depend on another person to disconnect the power — **DO IT YOURSELF!**

**DO REPLACE** any guards and shields removed for servicing.

## PIVOT ✓

	1st PASS	4th PASS	Pre- season	REMARKS
Check all nuts and bolts Tighten as required			X	
Check anchor bolts or chains			X	If your system is towable, check the anchor chains and grounding conductor hook-ups prior to start-up each time the system is towed
Check equipment grounding conductors Tighten or clean as required			X	
Grease pivot swivel		X	X	
Check condition of power and pump shutdown wires			X	For your safety immediately replace or repair any broken conduit or wire with cracked insulation, call your Valley dealer
Check collector ring base drain for open flow			X	Also check at end of season shutdown
Visually check pivot contactors for arcing*			X	Burned or pitted contact points indicate low voltage, check gen. belts
Drain riser assembly			X	Also check at end of season shutdown
Check placement of screens on generator, pump panel and electric motors (used to prevent rodent damage)			X	Also check at end of season shutdown

\* NOTE: Insure disconnect in "OFF" position



# Maintenance Check List (continued)

## SPAN ✓

	1st PASS	4th PASS	Pre- season	REMARKS
Check and insure all truss rod keepers are installed			X	
Check flanges for leaks, tighten as necessary			X	
Check pipe drains for open flow and invert seal when applicable (see winterization)			X	These must be checked at end of season shutdown
Check structural components for tightness			X	
Check power cable for breaks and proper banding			X	

## SPRINKLER ✓

Check match up of pivot pressure to sprinkler package pressure		X	X	Notify your Valley dealer of any change
Check sprinklers & nozzles for tightness			X	
Check sprinkler for free movement		X	X	
Check sprinkler nozzles for wear			X	Increasing engine RPM or pipeline pressure loss indicates wear
Check pressure gauge for proper operation and calibration			X	
Check for plugged or partially plugged nozzles	X	X	X	
Flush entire system			X	See Flushing Procedure
Check end gun bearing and brake setting			X	
Drain booster pump hose				This should be done at end of season

## DRIVE UNIT ✓

Check flex joint boot for leaks Tighten as required			X	See flex hose page
Check conditions of motor lead cable			X	Call your Valley dealer if the outer insulating sheath is cracked
Check for proper ground connection on motor and motor lead.			X	
Check motor lead connections and connector position			X	
Check motor drain hole for open flow			X	
*Drain & replace gearmotor lubrication				*See note
*Check/change gearbox lubricant				*See note
Check gearmotor seals and gaskets			X	
Check drive shaft U-joints and U-joint covers			X	
Check gearbox seals & gaskets			X	
Check and tighten wheel lug bolts			X	
Check tire pressure			X	See tire pressures
Clean gearbox ventilation hole in expansion chamber		X	X	Ventilation holes must be kept open to extend the gearbox seal life
Repack towable hub bearing and cavity			X	See towable hub page

\*NOTE: Recommended change totally the first year and every third year thereafter. When oil is not changed condensation should be checked and gearbox oil level replenished.



# Maintenance Check List (continued)

## ALIGNMENT ✓

	1st PASS	4th PASS	Pre- season	REMARKS
Check all nuts and bolts Tighten as required				
Check connection of grounding bond jumpers			X	
Visually check for contactor wear and/or pitting			X	Pitted or burned contact points indicate low voltage
Visually check suppressor connection			X	
Align system and check all safety switches				As needed, see alignment section
Check for proper safety micro switch position				See alignment

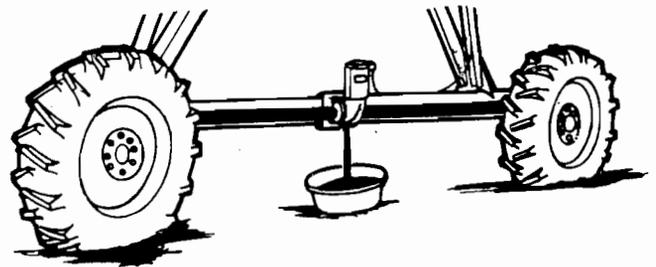
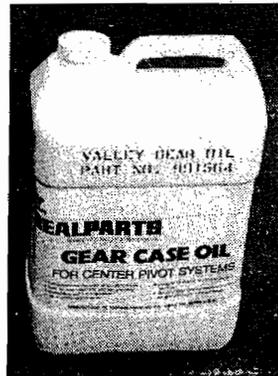
## OVERHANG/BOOSTER PUMP ✓

Check overhang cables for broken cable strands			X	Replace if cables are damaged
Clean and insure operation of end gun drain			X	Always check at end of season shut-down
Check and clean sand trap			X	As needed, see flushing procedure
Check end gun arc setting			X	Refer to your sprinkler chart
Check end gun bearing and brake			X	
Check end gun nozzle for wear			X	
Drain booster pump and end gun supply hose				See winterization



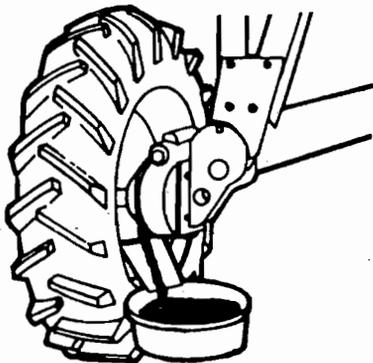
# Gearbox Lubrication

**IMPORTANT:** The composition of various brands of lubricants contain additives which are corrosive to bronze worm gears. Therefore, we recommend only the use of VALLEY Gear Lube, which is a compounded worm lubricant containing non-corrosive extreme pressure additives. The oil bath in worm gear cases may reach a temperature of 200°F. (90°C.) without alarm.



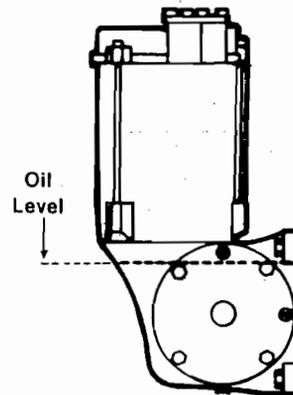
## ELECTRICAL GEARMOTORS

After each season of operation, drain all oil from gear motors. Replace plug and refill as indicated below.

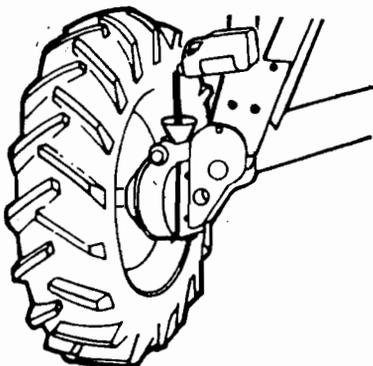


## VALLEY GEARBOXES (First Season)

After first season of operation, drain and replace oil from gearboxes. Refill the gearboxes thru expansion chamber until level of oil is even with the bottom of the expansion chamber (Approx. 5 qt. capacity).



Refill the gear case to approximately 1/2" from the fill plug with Valley Gear Lube. (Approx. 1 qt. capacity).



## VALLEY GEARBOXES (Continued Maintenance)

Total gearbox oil change is not required on a yearly basis. It is recommended that under typical operating conditions (500-1000 hrs. per year) the gear oil be completely changed every third year. **However, it is essential** that at the end of each operating season the gearboxes be drained of any condensation or contaminated oil that may have accumulated and the gearbox be refilled to the indicated level.

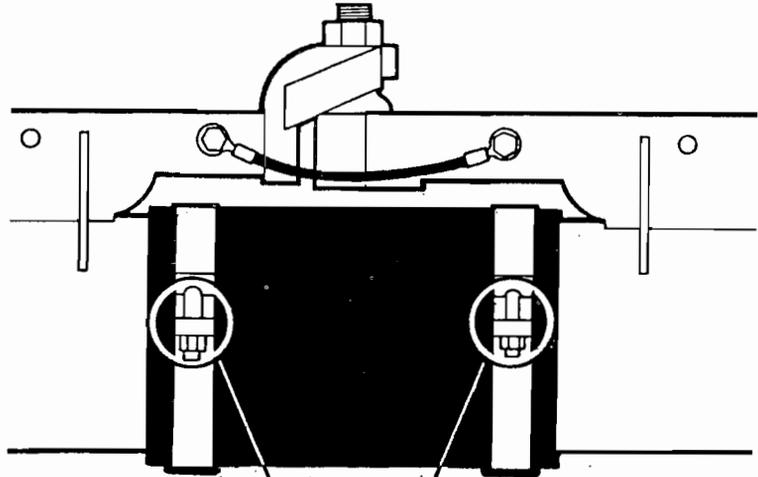


# Flex Hoses & Tire Pressures

Flex hoses on Valley systems are constructed of fiber reinforced neoprene which resists cracking and checking, heat and water.

If a boot must be replaced, loosen the two clamps to remove the old boot and insert the new one. No extra support is needed while making the changes.

		HOSE P/N	CLAMP P/N
8"	Pipeline	1710029	991147
6 5/8"	Pipeline	1800318	991087
6"	Pipeline	991187	991186
10"	Pipeline	1702326	(1) 992386 & (1) 992441



When installing or tightening the boot clamps always place the bolts and fasteners on the opposite side of the control rod. Under certain terrain conditions the bolts could interfere with the systems alignment if positioned on the same side as the control rod.

## TIRE PRESSURE

Proper tire pressure is important to the operation of the system. Operating with low tire pressure will damage the tires and the drive train. Check tire pressure at least three times a year, at spring start-up, during the irrigation season, and when performing fall winterization.

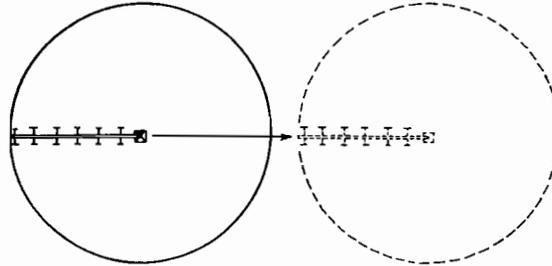
TIRE SIZE (Inches)	RECOMMENDED TIRE PRESSURES		
	Pounds/Square/Inch	Kilograms/Square/Centimeter	Atmospheres
11. x 24.5 recap	30	2.11	2.04
11.2 x 24	22	1.55	1.50
14.9 x 24	18	1.26	1.22
16.9 x 24	18	1.26	1.22



# Towing The 6000

## STEP 1:

Position the system in the tow lane. The tow lane should be flat and void of any crop rows. If you are towing on a side slope the system may tend to shift down the hill due to gravitational pull.

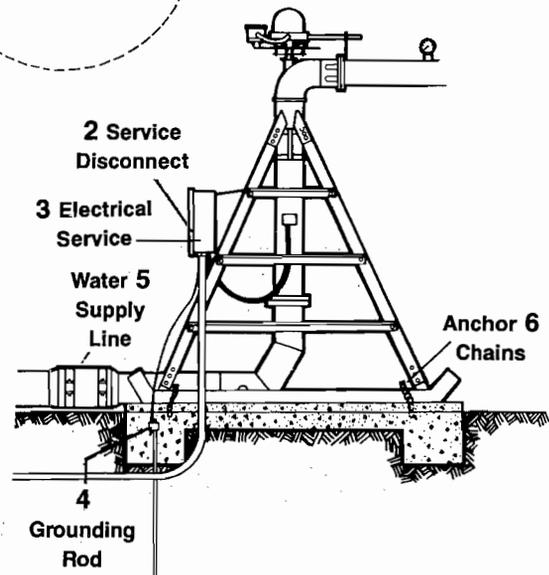
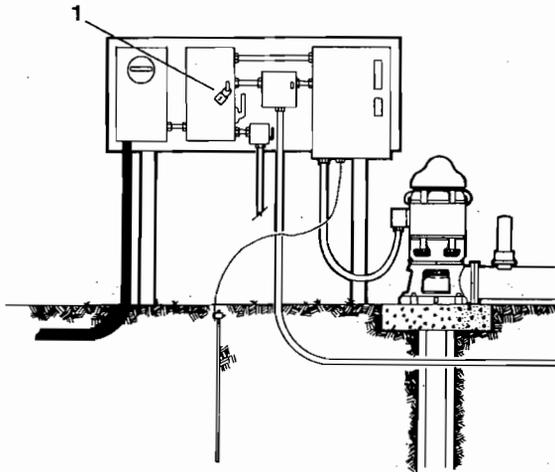


## STEP 2:

### DISCONNECT EXTERNAL POWER SOURCE

Electrical service to system must be equipped with a disconnect at the pump which cuts power off to pivot panel.

- a. Turn off and lock electrical service to system from pump or power source. (Ref. No. 1)



Installation must be done in accordance to national, state or local electrical codes.

- b. Remove wires from pivot panel disconnect, cover bare ends with water tight caps and tape. (Ref. No. 3) If your system is not equipped with the optional public power package make sure you mark each wire as leg 1, 2, and 3 replacing them in the exact terminals from which they were removed. **CAUTION:** The incoming power disconnect must be "OFF" and locked prior to the wires removal.
- c. Turn off and lock the service disconnect at the pivot. (Ref. No. 2)
- d. Remove ground wire from grounding rod. (Ref. No. 4)

## STEP 3.

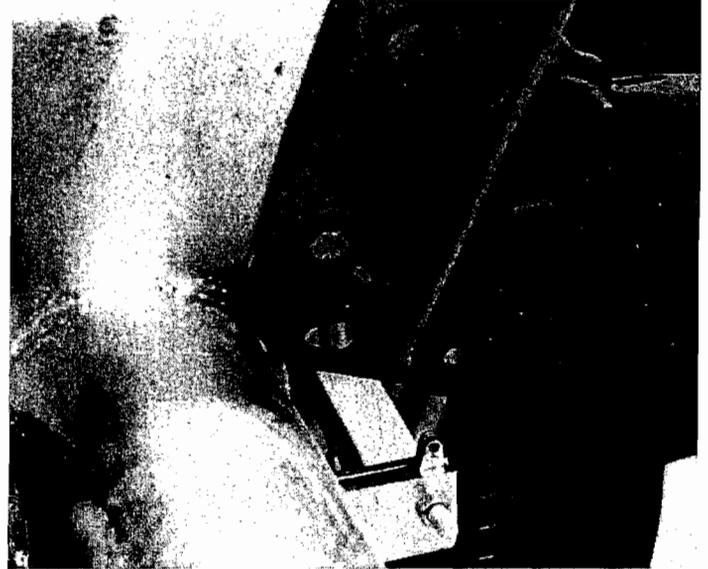
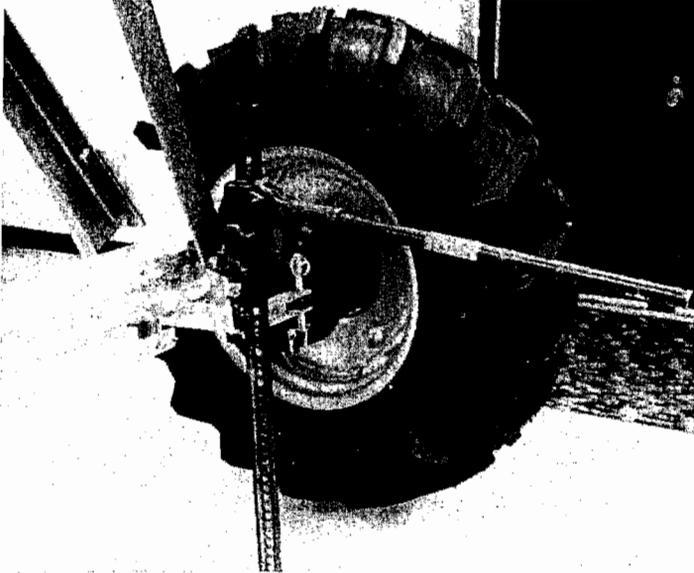
### REMOVE PIVOT HARDWARE

- a. Remove or disconnect water supply line. (Ref. No. 5)
- b. Remove pivot anchor chains. (Ref. No. 6)

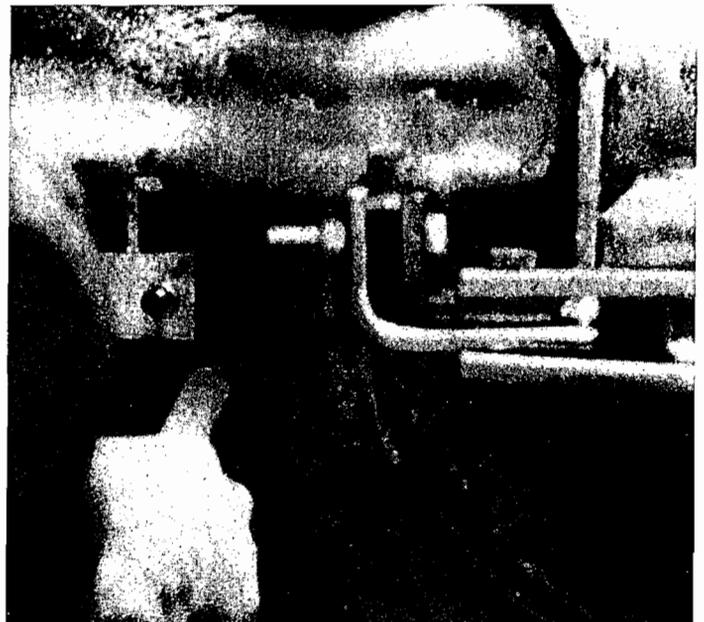
## STEP 4:

### ROTATE DRIVE UNIT WHEELS TO THE TOW POSITION

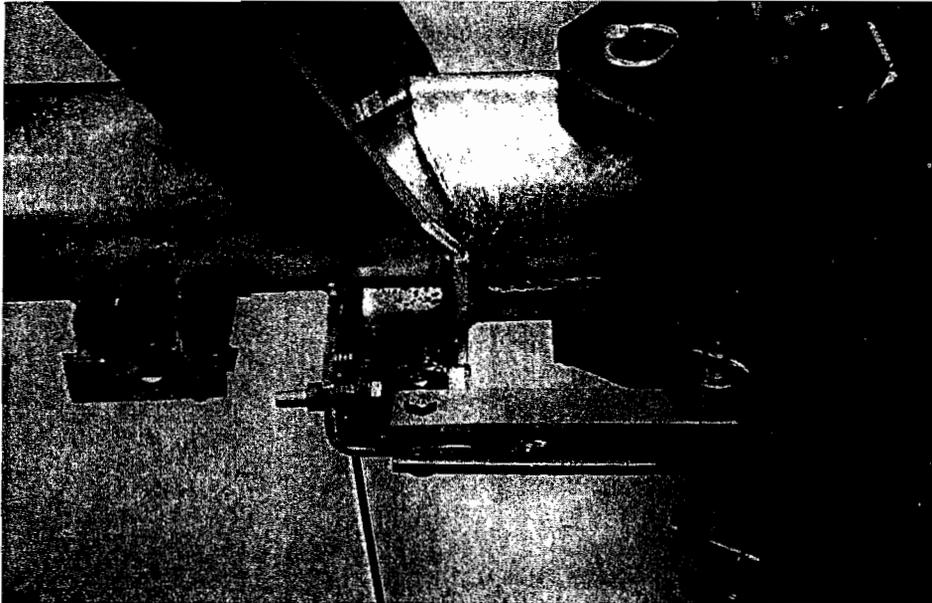
- A. Using a handyman or similar lifting device, raise each wheel by placing the jack as shown below. CAUTION: Exercise care when raising each wheel; jack slippage can be hazardous.



- B. Remove the spring and torque pins from the hub/rim assembly. Now go to the opposite or back side of the wheel and push down on the tow latch. You can now pivot the gearbox and wheel into the tow position. CAUTION: When rotating the wheel the drive shaft will be pulled off of the gearbox. Hold the shaft when pivoting the wheel and hang it from the drive shaft hanger provided. (Mounted approx. 5½' high on the drive unit leg.



- C. Insert the torque and spring pin as shown below then remove the lifting device. NOTE: Under no circumstances should the torque or spring pin be removed while towing the system.

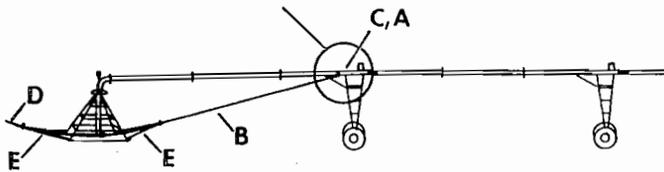


The alignment of the wheels can be adjusted should the system experience a tower which does not tow straight. This is done by either removing or adding shims as shown.

**STEP 5:  
ATTACH ALL REQUIRED TOW HARDWARE**

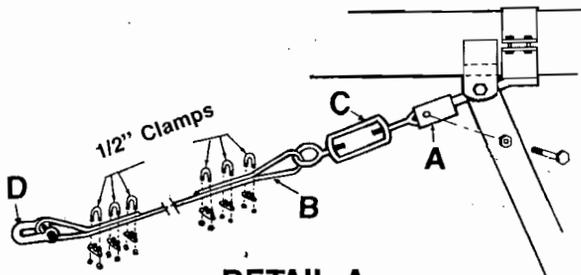
- A - Cable Attachment Bracket
- B - 1/2" Tow Cable
- C - Turnbuckle
- D - Clevis
- E - Pivot Trail Cables
- F - Pivot Attachment Chain
- G - Pivot Tow Brace
- H - Pivot Tow Brace

SEE DETAIL A



**FORWARD TOW CABLE ATTACHMENT**

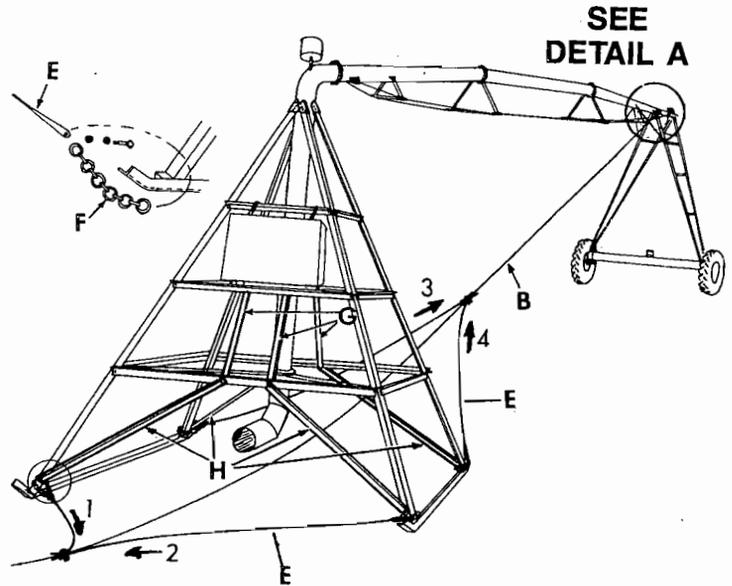
1. Install tow cable attachment bracket (A).
2. Extend 2' of 1/2" tow cable (B) through eye of turnbuckle (C). Clamp with three 1/2" cable clamps.
3. Bolt turnbuckle (C) to tow cable attachment bracket (A).



DETAIL A

4. Extend 2' of two cable (B) through clevis (D). Clamp with three 1/2" cable clamps.
5. Bolt pivot trail cables (E) and pivot attachment chains (F) to corners of pivot legs.
6. Attach trail cables (E) to tow cable (B) as shown using 1/2" cable clamps.
7. The pulling tension indicated by the dark arrows (1 & 2) should be adjusted so that the leading ends of the pivot skids are raised 4"–5" to prevent "digging in" during the towing operation.

Arrows 3 & 4 also need to be taut to prevent a "wallowing" action of the pivot.



SEE  
DETAIL A

**IMPORTANT:** Pivot Tow Braces (G & H) are critical to pivot towing strength. Tow system only when pivot is equipped with extra braces (G & H).

**STEP 6.  
TOWING**

- a. Insure all drive unit wheels have been placed into the tow position, the system may now be hitched to a tractor and moved to next field location.
- b. Start system into motion in a slow gradual manner. Continue towing to next field location. **DO NOT JERK. DO NOT TOW THE SYSTEM IN EXCESS OF 2 TO 2 1/2 MILES PER HOUR.**
- c. Jack up each drive unit wheel and pivot wheel back to operating position, and **WHILE TURNING, INSTALL THE DRIVE SHAFT.** Reinstall drive shaft shields.
- d. While wheel is still raised, insert torque pin into tow hub. If towers are out of line, leave out torque pins, move tower or towers into line with tractor. Then replace torque pins.
- e. Check that service disconnect for this pivot pad is OFF and locked before reconnecting wires.
- f. Reconnect water and electrical service **INCLUDING GROUND WIRES.** Place towing equipment in storage positions. If this is first connection to pivot point . . . be certain that phasing, or motor rotation is correct.) Should any of the drive units fail to operate or travel in the direction selected turn the control panel "OFF" and call your nearest Valley dealer.

**SAFETY LINE SHIELD — REPLACE AFTER WIRING**

**WARNING**

IMPROPER INSTALLATION WIRING OF THIS IRRIGATION MACHINE MAY CAUSE INJURY TO PERSONNEL OR EQUIPMENT FAILURE. THIS IRRIGATION MACHINE MUST BE CONNECTED TO A FOUR WIRE GROUNDED ELECTRICAL SERVICE. THIS IRRIGATION MACHINE MUST BE GROUNDED AS REQUIRED BY THE "NATIONAL ELECTRICAL CODE" AND APPLICABLE LOCAL CODES. THE VALLEY OWNERS MANUAL CONTAINS THE STANDARD FOR ELECTRICAL SERVICE AND EQUIPMENT FOR IRRIGATION.

During the life of the system, minor problems may arise that can be solved by the system operator. The following troubleshooting guide is designed to assist the operator in finding the possible cause of a problem and a recommendation of repair.

Problems may arise that can be corrected only by a qualified service person. If this should happen, try to describe the problem fully when talking to the service person. This may give him enough information to repair the system with greater expediency.

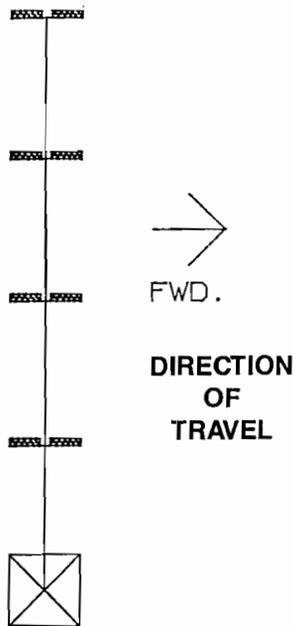
**DANGER! 480 VOLTS -- TURN THE MACHINE DISCONNECT SWITCH OFF BEFORE MAKING ANY MECHANICAL REPAIRS OR BEFORE CHECKING FUSES. All other electrical repairs should be made by a qualified service person.**

**DANGER! HIGH WATER PRESSURE. TURN OFF THE PUMP AND ALLOW THE SYSTEM TO DRAIN COMPLETELY BEFORE REPAIRING THE SYSTEM.**

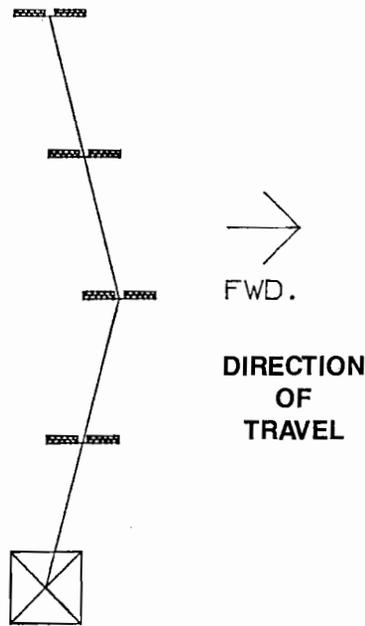
Prior to troubleshooting the 6000 you should familiarize yourself with the three basic types of system shut-downs.

1. In line shut-down.
2. Tower ahead shut-down.
3. Tower behind shut-down.

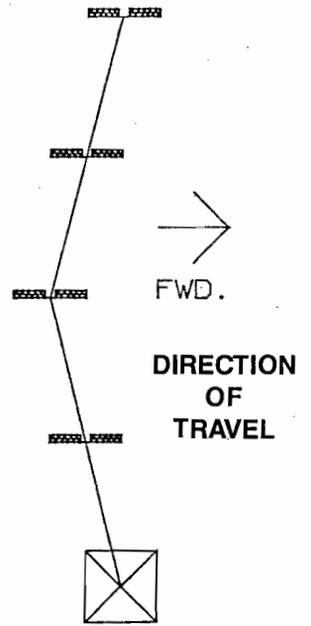
IN LINE SHUT DOWN



TOWER AHEAD



TOWER BEHIND





# Troubleshooting (continued)

## In line shut downs

In line shut downs are typically caused by either the power source, pivot controls or the systems end tower. Possible causes and recommendations for in line shut downs are:

- A. Incoming power failure ..... Check power company  
Check engine set for loose or missing drive belts.
- B. Fuse failed ..... Call your Valley Dealer.
- C. Pivot tranformer failed ..... Call your Valley Dealer.
- D. Time delay relay failed ..... Call your Valley Dealer.
- E. Stop-in-slot switch depressed ..... Bypass the SIS and operate the systems.
- F. Percent timer failed ..... Call your Valley Dealer.
- G. Eagle timer timed out ..... Reset by reversing system direction. Typically the timer has timed out due to the end towers failure to move. You must determine and repair the cause of end tower stop.
- H. End tower stuck ..... Fill in wheel track with dry soil to allow the end tower movement.
- I. Flat tire at end tower ..... Repair tire.
- J. End tower u-joint failed ..... Repair.
- K. End tower contactor failed ..... Call your Valley Dealer.
- L. End tower motor failure ..... Call your Valley Dealer. Should a motor fail one or more of the 480 volt control panel fuses will be failed also.

## Tower Ahead Shut Downs

In a tower ahead shut down situation, the tower which is out of line the farthest or leading has failed to shut off and has broken the systems safety circuit. **NEVER REVERSE THE SYSTEMS MODE OF TRAVEL** in a tower ahead shut down as this can cause serious structural damage. Always, upon repair of the system, begin system operation in the same direction of travel prior to the shutdown.

Possible causes and recommendations for tower ahead shut downs are:

- A. Tower contactor stuck closed ..... Call your Valley Dealer.
- B. Tower contactor suppressor failed ..... Call your Valley Dealer.
- C. System alignment ..... Realign system following this manuals guidelines.
- D. Run micro switch failed ..... Call your Valley Dealer.
- E. Tower box alignment has ..... Clean all components of tower box alignment. It may be necessary bound up due to chemical or water deposits. to ream the 1/2" fiber bushing in the tower box. Should this be required, call your Valley Dealer.

## Tower Behind Shut Downs

Tower behind shut downs are caused by the trailing tower failing to run and breaking the systems safety circuit. **NEVER START OR ATTEMPT TO START** the system in the same direction of travel as the system was operating when the system shut down. Once the necessary repairs are made, you must reverse the direction of travel and operate until the system is straight prior to assuming the original direction of travel.

Possible causes and recommendations for tower behind shut downs are:

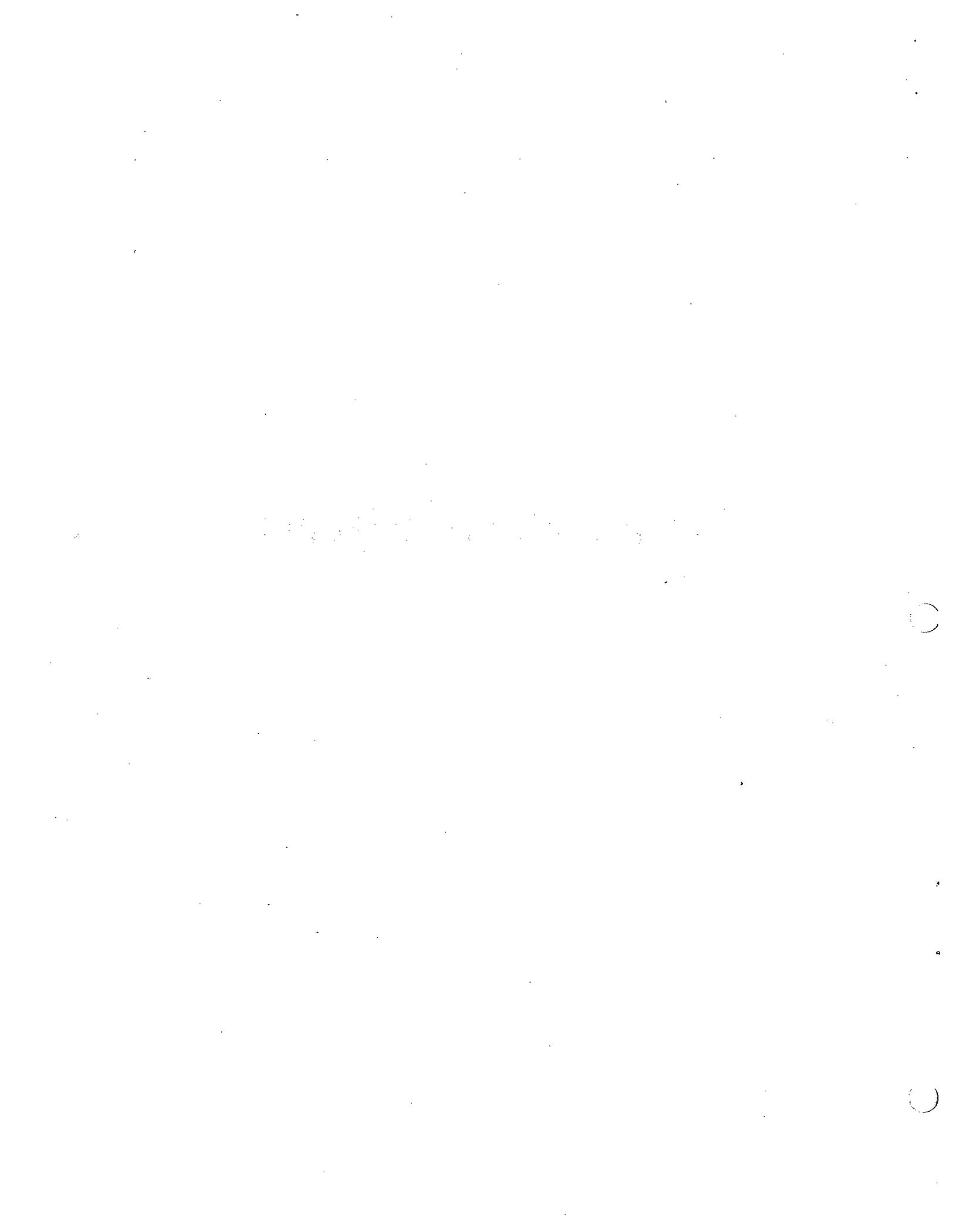
- A. Tower stuck ..... Fill in wheel track with dry soil to allow the tower movement.
- B. Flat tire at tower ..... Repair tire.
- C. Tower u-joint failed ..... Repair.
- D. Tower contactor failed ..... Call your Valley Dealer.
- E. Tower motor failure ..... Call your Valley Dealer. Should a motor fail one or more of the 480 volt control panel fuses will be failed also.
- F. System alignment ..... Realign system following this manuals guidelines.
- G. Run micro switch failed ..... Call your Valley Dealer.
- H. Tower box alignment has ..... Clean all components of tower box alignment. It may be necessary bound up due to chemical deposits to ream the 1/2" fiber bushing in the tower box. Should this be required, call your Valley Dealer.



**Standards  
For  
Electrical Service  
And  
Equipment For Irrigation**

Approved by:

Nebraska Inter-Industry Electrical Council,  
Sprinkler Irrigation Association, and  
Agricultural Research Service, U.S. Department of Agriculture



# Standards For Electrical Service And Equipment For Irrigation

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## Section 1 - Three-Phase, 240-Volt, and 480-Volt Service<sup>1</sup>

### A. Introduction

These minimum standards apply to three-phase, four-wire service to irrigation pump motors, irrigation machines, and auxiliary equipment. The standards are in accordance with the 1975 National Electric Code (NEC) where applicable, the recommendations of the Nebraska Inter-Industry Electrical Council, and the recommendations of the Sprinkler Irrigation Association. All materials must be listed (NEC Article 100 - Definition).

### B. Equipment Requirements

1. The minimum irrigation electrical installation consists of a circuit disconnect means (safety switch), a motor controller (starter), a raceway or conduit for conductors, and a pump motor.
2. In many installations, irrigation machines, injector pumps, compressors, lights, magnetic oilers, time clocks, time delay restart relays, timers, etc., are used which require additional control and protective equipment.
3. Clearance: Sufficient access and working space shall be provided and maintained around all electrical equipment. Location of enclosures, motors, and irrigation piping is important in maintaining proper access.
4. Caution: Before purchasing and installing electrical equipment determine the type of electrical service which will be supplied. One of the Figures 1-7 will have the proper equipment to go with each specified service.

### C. Circuit Disconnect Means

1. Circuit disconnect means should be a fused safety switch, **not** a circuit breaker<sup>2</sup>.
2. Type: 4 wire, 3 blade, 2 or 3 fuse, solid neutral, horsepower rated<sup>3</sup>.
3. Enclosure: NEMA 3R for outdoor installation.  
NEMA 1 for indoor installation.
4. All service disconnects shall be permanently labeled as to their function (NEC 230-70).

### D. Motor Controllers [Starters]

1. Enclosure: NEMA 3R for outdoor installation.  
NEMA 1 for indoor installation.
2. Type: Magnetic, manual, or solid state.
3. Overload relays: Ambient-compensated with three overload elements (heaters). In submersible pump applications, "fast trip" heater ele-

ments may be required.

4. Heater element selection: From the full-load current rating of the motor select the recommended overload heater from the literature of the manufacturer of the controller being used. Select ambient-compensated overload heaters.
5. Inherent protective devices inside the motor may be used.

### E. Pump Panels

A circuit disconnect means and motor controller may be mounted in a single enclosure which has been approved as a "pump panel."

### F. Pump Motors

1. General specifications: Most pump motors are 3 phase, 60 hertz, squirrel cage induction, normal starting torque, 40°C rise, with 1.15 service factor, or 50° rise with 1.0 service factor, if nonsubmersible. Loading: motors must match the load so that the full load current does not exceed the service factor. If loading is **under 80%** or **over 110%** of the nameplate rating, a low power factor may result which can not be adequately corrected.
2. Deep-well turbine pump vertical-hollow-shaft motors: These motors shall be provided with bearings of adequate thrust capacity to equal or exceed the total thrust imposed by the pump and shall be equipped with a nonreverse ratchet to prevent operation in reverse rotation. These motors must meet NEMA Weather-Protected Type 1 Specifications.
3. Other motors: Motors shall be equipped with ball bearings and be selected from frame sizes, facings, and shaft dimensions recommended by NEMA.
  - a. Horizontal motors must meet NEMA Specifications for Drip-Proof Motors.
  - b. Where motors are used in the vertical position, they must meet NEMA Specifications for Weather-Protected Type 1 Motors and be suitable for such operation.
4. Rodent screens: Motor must be protected from rodents by factory-installed screens. All unused

<sup>1</sup>These are the most commonly used irrigation service voltages.

<sup>2</sup>NEC permits circuit breakers. Standards committee recommends fused switch for more positive fault protection. Because of infrequent operation, breakers may be adversely affected by dust and moisture. Dealers often do not stock adequate selection of breakers.

<sup>3</sup>Two fuses used where service has grounded phase conductor (See Figures 3, 4, and 7). Three fuses used where service has all ungrounded phase conductors.

knock-outs on motor control enclosures must be closed.

- Guarding: Guards must be installed to adequately protect persons from accidental contact with belts, pulleys, or other rotating equipment.

**G. Other Motors**

Other motors, such as those used on injector pumps, hydraulic pumps, compressors, etc., shall be suitable for use in the intended environment.

**H. Equipment Protection and Sizing<sup>4</sup>**

Recommended sizing for fuses, switches, starters, conductors, and conduit are listed in Table 1 for 230-volt motors and in Table 2 for 460-volt motors. Locations of switches and protective devices are shown in all the figures.

<sup>4</sup>Electrical service is nominally 240 or 480 volt at the transformer power supply. This provides the proper voltage range for 230- and 460-volt motors.

**Table 1. Recommended protection and equipment sizing for three-phase 230-volt motors and circuits.**

Size Of Motor (Table 430-150)		Dual-Element Fuse For Motor Running Overload Protection [Section 430-32] These Fuses Also Provide Branch Circuit Protection			Branch Circuit Protection † [Short-Circuit Protection Only] [Section 430-52] These Fuses Do Not Give Motor Running Protection					Minimum Size Of Starter	Minimum Size Of Copper Wire Table 310-16	Minimum Size Of Trade <sup>2</sup> Conduit	
HORSE POWER	AMPERE RATING	FUSETRON Dual Element Fuse or LOW PEAK Dual Element Fuse Size		Switch or Fuseholder Size	Class for Motor Starting Inrush & Code Letter	FUSETRON Dual Element Fuse or LOW-PEAK Dual Element Fuse [Time Delay]	Switch or Fuseholder Size	Non Time Delay Fuse	Switch or Fuseholder Size	NEMA SIZE	AWG or MCM [60 C] a-TW [75 C] b-THW [75 C] c-THWN [90 C] d-IHWN [90 C] e-XHHW [90 C]		
		Motor Rated Not Over 40C or Not less than 1 15 S F Max Fuse 125%	All Other Motors Max Fuse 115%								a	b	c
1/2	2	2 1/2	2 1/4	30	Any	4	30	15	30	00	14	a, b, c, d, e	1/2"
3/4	2.8	3 1/2	3 2/10	30	Any	4	30	15	30	00	14	a, b, c, d, e	1/2"
1	3.6	4 1/2	4	30	Any	6 1/4	30	15	30	00	14	a, b, c, d, e	1/2"
1 1/2	5.2	6 1/4	5 6/10	30	Any	8	30	15	30	00	14	a, b, c, d, e	1/2"
2	6.8	8	7	30	1	10	30	25	30	0	14	a, b, c, d, e	1/2"
					2	10	30	20	30				
					3-4	10	30	15	30				
3	9.6	12	10	30	1	15	30	30	30	0	14	a, b, c, d, e	1/2"
					2	15	30	25	30				
					3	15	30	20	30				
					4	15	30	15	30				
5	15.2	17 1/2	17 1/2	30	1	25	30	50	60	1	12	a, b, c, d, e	1/2"
					2	25	30	40	60				
					3	25	30	35	60				
					4	25	30	25	30				
7 1/2	22	25	25	30	1	35	60	70	100	1	10	a, b, c, d, e	1/2"
					2	35	60	60	60				
					3	35	60	45	60				
					4	35	60	35	60				
10	28	35	30	60	1	40	60	90	100	2	8	a, b, e	3/4"
					2	40	60	70	100				
					3	40	60	60	60				
					4	40	60	45	60				
15	42	50	45	60	1	60	60	125	200	2	6	a, b	1"
					2	60	60	110	200				
					3	60	60	90	100				
					4	60	60	70	100				
20	54	60	60	100	1	80	100	175	200	3	4	a, b, c	1"
					2	80	100	150	200				
					3	80	100	110	200				
					4	80	100	90	100				
25	68	80	70	100	1	100	100	225	400	3	2	a	1 1/4"
					2	100	100	175	200				
					3	100	100	150	200				
					4	100	100	110	200				
30	80	100	90	100	1	125	200	250	400	3	1	a	1 1/4"
					2	125	200	200	200				
					3	125	200	175	200				
					4	125	200	125	200				

<sup>1</sup>Equipment in general use is made primarily for connection to copper wire. Wire size shown does not compensate for voltage drop.

<sup>2</sup>Rigid metal conduit and electrical metallic conduit are not approved for direct burial unless corrosive protection is provided. Galvanized rigid metal conduit or rigid nonmetallic conduit are recommended for direct burial.

**Table 2. Recommended protection and equipment sizing for three-phase 460-volt motors and circuits.**

Size Of Motor (Table 430-150)		Dual Element Fuse For Motor Running Overload Protection [Section 430-32] These Fuses Also Provide Branch Circuit Protection			Branch Circuit Protection † [Short-Circuit Protection Only] [Section 430-52] These Fuses Do Not Give Motor Running Protection					Minimum Size of Starter	Minimum Size of Copper Wire Table 1 310-16	Minimum Size of Trade <sup>2</sup> Conduit		
HORSE POWER	AMPERE RATING	FUSETRON Dual Element Fuse Or LOW PEAK Dual Element Fuse Size		Switch or Fuseholder Size	Class for Motor Starting Inrush & Code Letter	FUSETRON Dual Element Fuse or LOW PEAK Dual Element Fuse [Time Delay]	Switch or Fuseholder Size	Non Time Delay Fuse	Switch or Fuseholder Size	NEMA SIZE	AWG or MCM			
		Motor Rated Not Over 40C or Not less than 1 15 S F Max Fuse 125%	All Other Motors Max Fuse 115%								a-TW [60 C]	b-THW [75 C]	c-THWN [75 C]	d-IHNN [90 C]
1/2	1	1 1/4	1 1/8	30	Any	2	30	15	30	00	14	a, b, c, d, e	1/2"	
3/4	1.4	1 6/10	1 6/10	30	Any	2 1/8	30	15	30	00	14	a, b, c, d, e	1/2"	
1	1.8	2 1/4	2	30	Any	3 2/10	30	15	30	00	14	a, b, c, d, e	1/2"	
1 1/2	2.6	3 2/10	2 2/10	30	Any	4	30	15	30	00	14	a, b, c, d, e	1/2"	
2	3.4	4	3 1/2	30	Any	5	30	15	30	00	14	a, b, c, d, e	1/2"	
3	4.8	5 6/10	5	30	Any	8	30	15	30	0	14	a, b, c, d, e	1/2"	
5	7.6	9	8	30	1 2 3-4	15 15 15	30 30 30	25 20 15	30 30 30	0	14	a, b, c, d, e	1/2"	
7 1/2	11	12	12	30	1 2 3 4	20 20 20 20	30 30 30 30	35 30 25 20	60 30 30 30	1	14	a, b, c, d, e	1/2"	
10	14	17 1/2	15	30	1 2 3 4	20 20 20 20	30 30 30 30	45 35 30 25	60 60 30 30	1	12	a, b, c, d, e	1/2"	
15	21	25	20	30	1 2 3 4	30 30 30 30	30 30 30 30	70 60 45 35	100 60 60 60	2	10	a, b, c, d, e	1/2"	
20	27	30	30	60	1 2 3 4	40 40 40 40	60 60 60 60	90 70 60 45	100 100 60 60	2	8 8	a, b, e c, d	3/4" 1/2"	
25	34	40	35	60	1 2 3 4	50 50 50 50	60 60 60 60	110 90 70 60	200 100 100 60	2	6 8 8	a b, e c, d	1" 3/4" 1/2"	
30	40	50	45	60	1 2 3 4	60 60 60 60	60 60 60 60	125 100 80 60	200 100 100 60	3	6 6 8 8	a, b c d e	1" 3/4" 1/2" 3/4"	
40	52	60	60	60	1 2 3 4	80 80 80 80	100 100 100 100	175 150 110 80	200 200 200 100	3	4 6 6	a b c, d, e	1" 1" 3/4"	
50	65	80	70	100	1 2 3 4	100 100 100 100	100 100 100 100	200 175 150 100	200 200 200 100	3	2 4	a b, c, d, e	1 1/4" 1"	
60	77	90	80	100	1 2 3 4	125 125 125 125	200 200 200 200	250 200 175 125	400 200 200 200	4	1 3 3	a b c, d, e	1 1/4" 1 1/4" 1"	
75	96	110	110	200	1 2 3 4	150 150 150 150	200 200 200 200	300 250 200 150	400 400 200 200	4	1/0 1 2	a b, c d, e	1 1/2" 1 1/4" 1"	
100	124	150	125	200	1 2 3 4	200 200 200 200	200 200 200 200	400 350 250 200	400 400 400 200	4	3/0 2/0 1/0	a b, c d, e	2" 1 1/2" 1 1/4"	
125	156	175	175	200	1 2 3 4	250 250 250 250	400 400 400 400	500 400 350 250	600 400 400 400	5	4/0 3/0 3/0	a b c, d, e	2" 2" 1 1/2"	
150	180	225	200	400	1 2 3 4	300 300 300 300	400 400 400 400	600 450 400 300	600 600 400 400	5	300 4/0	a b, c, d, e	2 1/2" 2"	
200	240	300	250	400	1 2 3 4	400 400 400 400	400 400 400 400	600 500 400	600 600 400	5	500 350 300	a b, c d, e	3" 2 1/2" 2"	

<sup>1</sup> Equipment in general use is made primarily for connection to copper wire. Wire size shown does not compensate for voltage drop.

<sup>2</sup> Rigid metal conduit and electrical metallic conduit are not approved for direct burial unless corrosive protection is provided. Galvanized rigid metal conduit or rigid nonmetallic conduit are recommended for direct burial.

**I. Grounding**

1. A grounding means shall be installed at the meter and shall serve as a service ground. If the service disconnect switch is not adjacent to the meter, a separate service ground rod shall be installed for connecting a grounding conductor. See Figures 1 through 7, for proper grounding connections.
2. A grounding conductor shall be provided to serve as the interconnection between equipment grounds, the service grounds, and the transformer ground.
3. The necessity for maintaining the integrity of the grounding connection in irrigation equipment, dictates that grounding conductors be required when motors, auxiliary enclosures, or equipment are involved (See Figures 1 through 7). (Identical to requirements for marine applications in Article 555-7 of NEC.)
4. Grounding electrode conductors should be routed in the most direct manner and without sharp bends to the ground rod.

**J. Power Factor Correction**

Capacitors for power factor corrections are recommended for motors 10 horsepower and larger. The maximum size of the capacitor that should be installed is shown in Table 3. Capacitors shall be installed on the motor side of the starter (see Figures 8 and 9) or shall be protected by a disconnecting means and overcurrent protection (NEC 460-8).

**K. Lightning Arrestors**

If lightning arrestors are installed, they shall be installed on the supply side of the circuit disconnecting means.

**L. Irrigation Machines**

1. Irrigation machines should comply with Article 675 of NEC and American Society of Agricultural Engineers Standard S362.
2. A service rated disconnect shall be provided ahead of the main control panel of an irrigation machine.
3. Disconnect switches shall be provided at each supply point where a single irrigation machine is moved from one point to another.
4. Figure 10 and 11 indicate the recommended equipment, connections, protection, and grounding for service to phase converters from 240- or 480-volt supply.
5. Figure 12 indicates the recommended equipment, connections, protection, and grounding for a three-phase generator serving an irrigation machine.

**Table 3. Recommended capacitor sizes for power factor correction for 230- and 460-volt motors. For other voltages or motor speeds consult with capacitor manufacturer.**

Hp	T-Frame Motors			U-Frame Motors		
	Motor Speed rpm			Motor Speed rpm		
	1800	1200	900	1800	1200	900
10	4	5	5	2	4	5
15	5	7.5	10	4	4	5
20	5	7.5	10	4	5	7.5
25	7.5	7.5	10	7.5	7.5	10
30	7.5	10	15	7.5	7.5	10
40	10	15	20	10	10	10
50	20	15	25	10	10	15
60	20	30	30	10	15	20
75	25	30	40	15	15	20
100	30	30	50	20	25	30
125	35	40	50	20	30	30
150	35	45	50	35	35	45
200	50	55	70	40	50	70
250	55	70	85	50	50	80

**M. Interlocking**

Where personal hazard or property damage may be caused by the failure of any one device (such as a fertilizer injector or an irrigation machine) to function properly, protective interlocks shall be provided. Where practical, these interlocks shall interrupt all operations, providing such interruption will not create a hazardous condition.

**N. Miscellaneous Requirements, Pumping Plants**

1. Control circuit for magnetic starters: The starter control circuit shall be wired using three-wire control and not two-wire control, unless "on delay" relay protection is provided. If the start-stop station is not located in the cover of the starter or nipped to the starter, the extended control circuit wires must be enclosed in a raceway and overcurrent protection provided (NEC Article 430-72[b]).
2. Magnetic oilers: Magnetic oilers shall be wired from the motor terminals (see Figures 8 and 9). The conductors shall be protected by an approved raceway.
3. Pilot lights: A pilot light to indicate whether the motor is on or off may be used.

A two-pole, fused disconnect switch must be installed in the circuit to permit de-energizing the circuit while the pump motor is running. This circuit shall be fused properly. The lampholder must be of the type approved for outdoor installation. The conductors shall be enclosed in approved raceway.

On 240-volt installations the pilot lamp may be connected as shown in Figure 8.

If 240- or 120-volt power source is not available, a 480/240-volt to 120-volt transformer should be used with a fused primary and secondary to supply a standard 120-volt lamp (NEC Article 450).

4. Lights and other 120-volt equipment: If lighting convenience outlets for fence chargers, etc., are required, a transformer to reduce the supply voltage from either 240 volts or 480 volts to 120 volts shall be installed. An auto-transformer is

not permitted. This transformer should be fed from the line side of the service switch, having a disconnect switch ahead of it, properly fused, and wire size shall not be smaller than No. 14. The switch rating, fuse size, conductor size on the load side of the transformer, and the transformer capacity will be determined by the size of the load to be served. (See Figures 8 or 9.)

5. Time clock, time delay, and other automatic control: Automatic starting is permitted provided it is installed in such a manner to conform with the requirements for interlocking. The setting of "on-delay" relays required in all "two-wire" control circuits may be determined by the **electric utility**. This will provide a "on delay" for staggered starting of groups of motors, and provide protection for the irrigation equipment. For siphon-tube irrigation using "on-delay" restart, an "off-delay" timer is also recommended for ditch protection.<sup>5</sup>
6. Weather protection for motors and controls: Motor and controls may be installed outdoors or in an enclosure. All electrical equipment for outdoor installation shall meet NEMA standards for such use. Types of protective structures: The structures may be closed or have open sides and function only as a shade. Structures should be built to remove for service and repair of motor and well. When electric service wires are attached to the structure, special construction should be incorporated into the structure for strength to hold wires and to maintain clearance of wires.

**Size:** Structure shall be large enough to allow a man to service motor and equipment from all sides.

**Base:** For a closed structure the base should be of the same size as the structure, constructed of concrete, and drained to the outside. For a shade only the base does not need to be the size of the shade.

**Ventilation:** Cross ventilation of closed structures must be provided by doors or louvers. All doors must have positive catches to hold door open.

**Control Mounting:** Controls should be protected from the heat of the sun and from inclement weather. When possible, mount controls on a north wall with at least 1 inch air space between controls and outside covering of structure.

## Appendix

### I. Disconnect Means

- a. Providing a disconnect ahead of the main pump panel is recommended for convenience. Many accessories such as center-pivot machines and fertilizer injectors are often added to today's irrigation systems. These accessories must be connected to the service side of the pump motor disconnect and provided with a disconnecting means and over-current protection. These accessory disconnects can be installed and serviced simply if

a disconnect is provided ahead of the pump disconnect. A wiring trough may be added to accommodate these additional connections.

- b. The pump motor disconnect is sized as a single motor disconnect and controller and not a distribution panel or load center; therefore, equipment such as fertilizer injectors or irrigation machines cannot be served from the load side of the disconnect. Each disconnecting means becomes the service disconnect for the equipment it serves.

### II. Two Fuses in 3-Phase Equipment

The schematic drawings in Figures 3, 4, and 7 do not have a fuse in series with the grounded phase conductor. Articles 240-20 and 240-22 of the NEC specifically state "no overcurrent device shall be connected in series with a conductor intentionally grounded" unless the overcurrent device opens all conductors of the circuit or unless the overcurrent device is used for motor running overcurrent protection (Article 430-36). However, Article 430-36 does not apply to these circuits because the fuses are sized for branch circuit protection (Part D of Article 430) and not motor running overcurrent protection (Part C of Article 430) which contains 430-36. The schematic diagrams indicate motor running overcurrent protection is provided with the motor controller. Part D of Article 430, 430-56, which deals with branch circuit protection, refers back to Article 240-20.

### III. Conductors

Equipment in general use is made primarily for connection to copper wire. It is recommended that copper wire be used from the load side of starter to pump motor.

Aluminum wire, where used elsewhere, requires special care in terminating. Manufacturers recommendations should be followed.

### IV. Three-Wire Service

Where systems are served by a 3-phase, 3-wire service, there are two possible methods of grounding.

- a. A grounding conductor shall be connected at the first disconnect, as shown in Figure 7. Connect the grounding conductor to the grounded (identified) conductor **ahead** of the disconnect switch. This will improve the grounding safety.
- b. The safest solution is to install a grounding conductor back to the service ground as shown in Figures 3 and 4.

- V. The equipment grounding conductor shall not be used as a current carrying conductor on the load side of the first disconnecting means.

- VI. All materials and equipment shall be installed in a neat and workmanlike manner.

<sup>5</sup>For safety where automatic controls are used, a sign shall be posted near motor stating "Caution Automatic Starting".

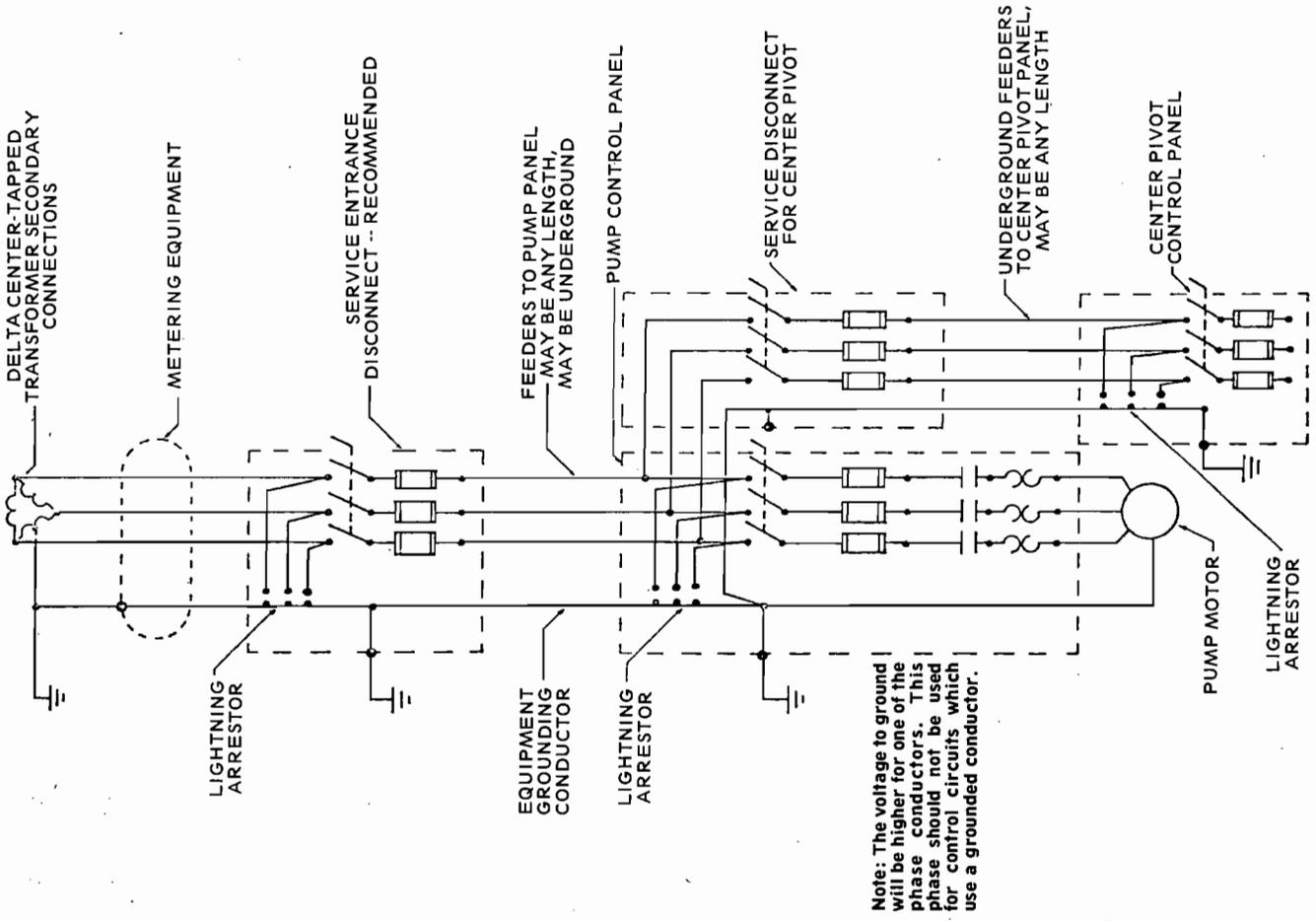


Figure 2. Recommended equipment and grounding for a delta center-tapped secondary.

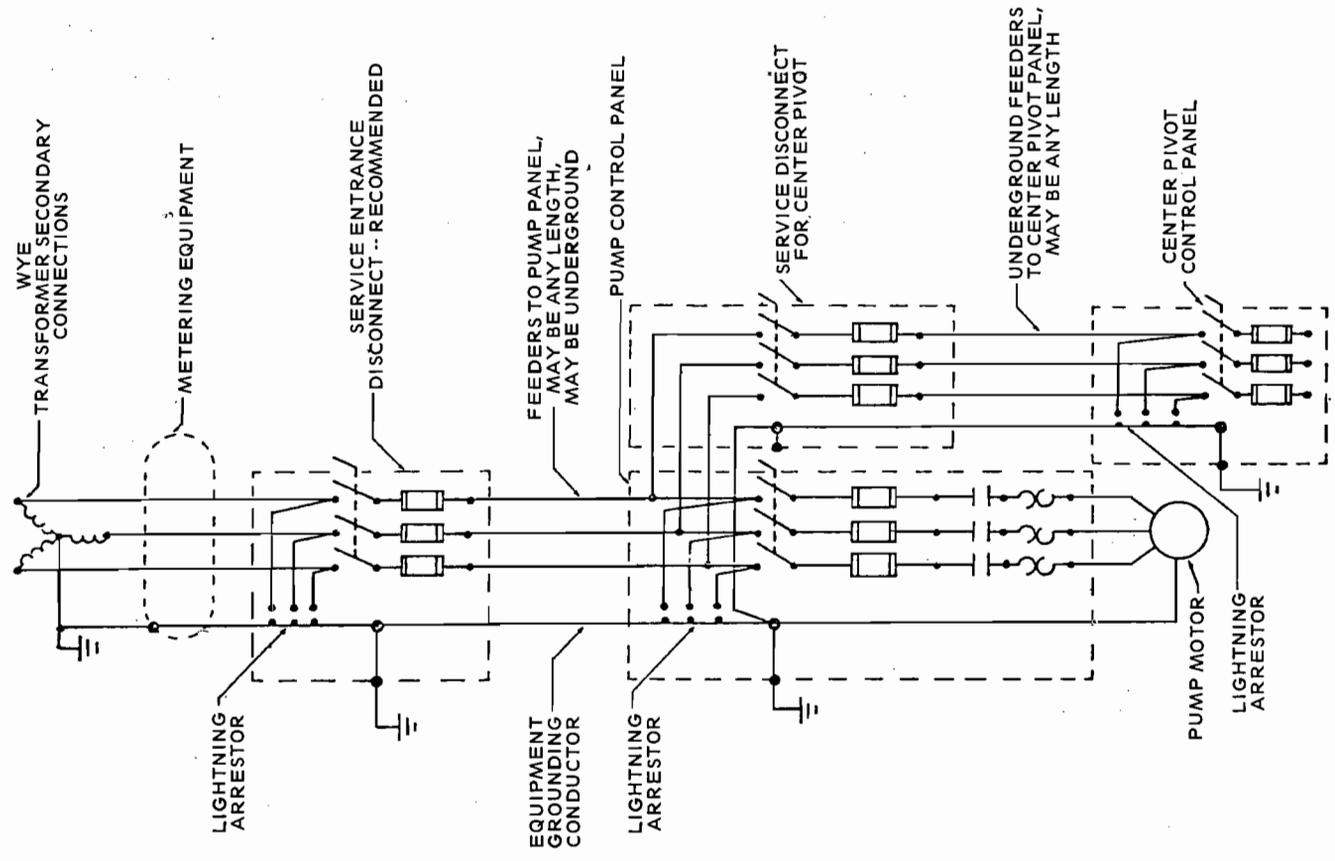


Figure 1. Recommended equipment and grounding for a wye-connected secondary.

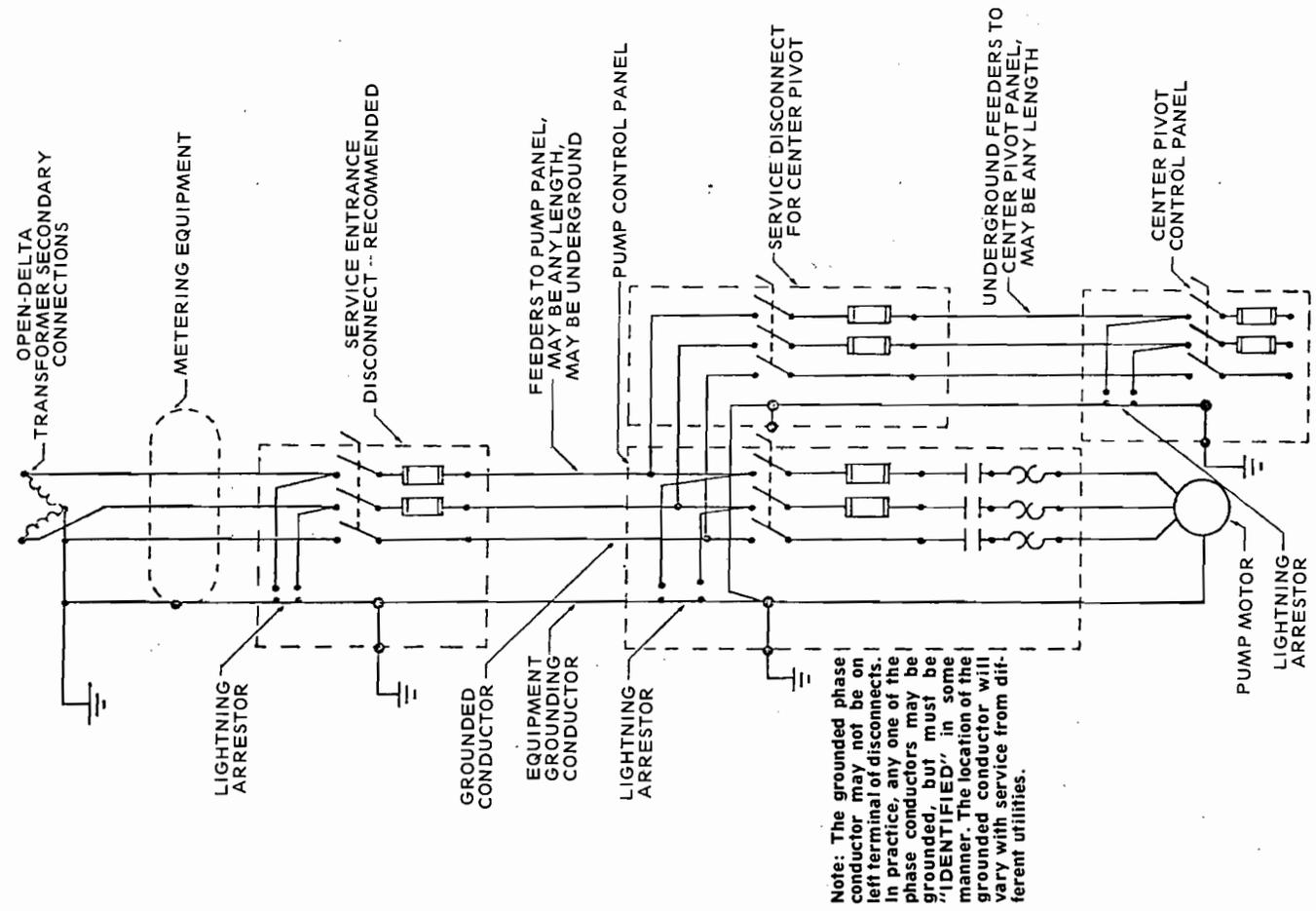


Figure 4. Recommended equipment and grounding for an open delta-connected secondary.

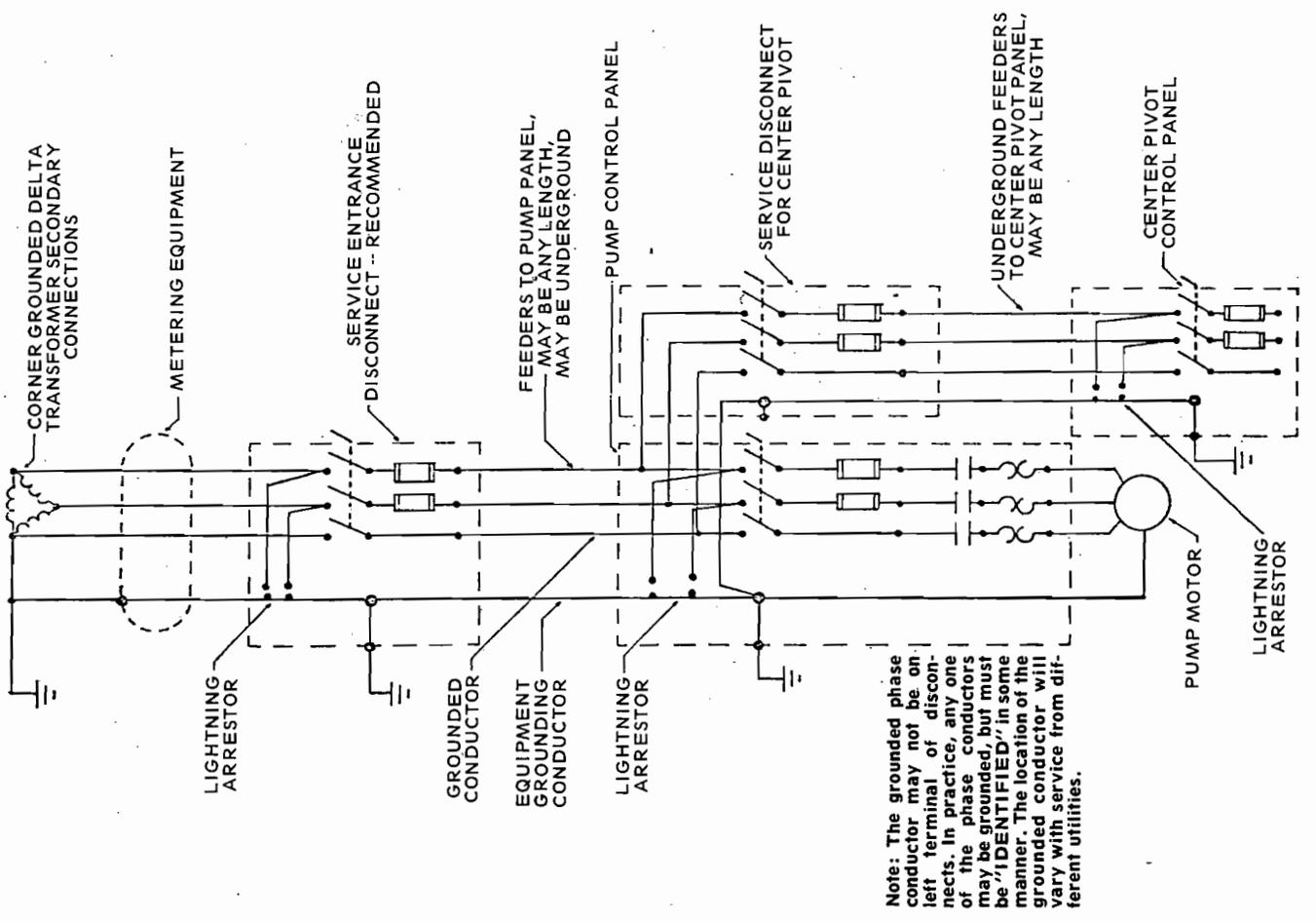


Figure 3. Recommended equipment and grounding for a grounded, delta-connected secondary.

**NOT RECOMMENDED**

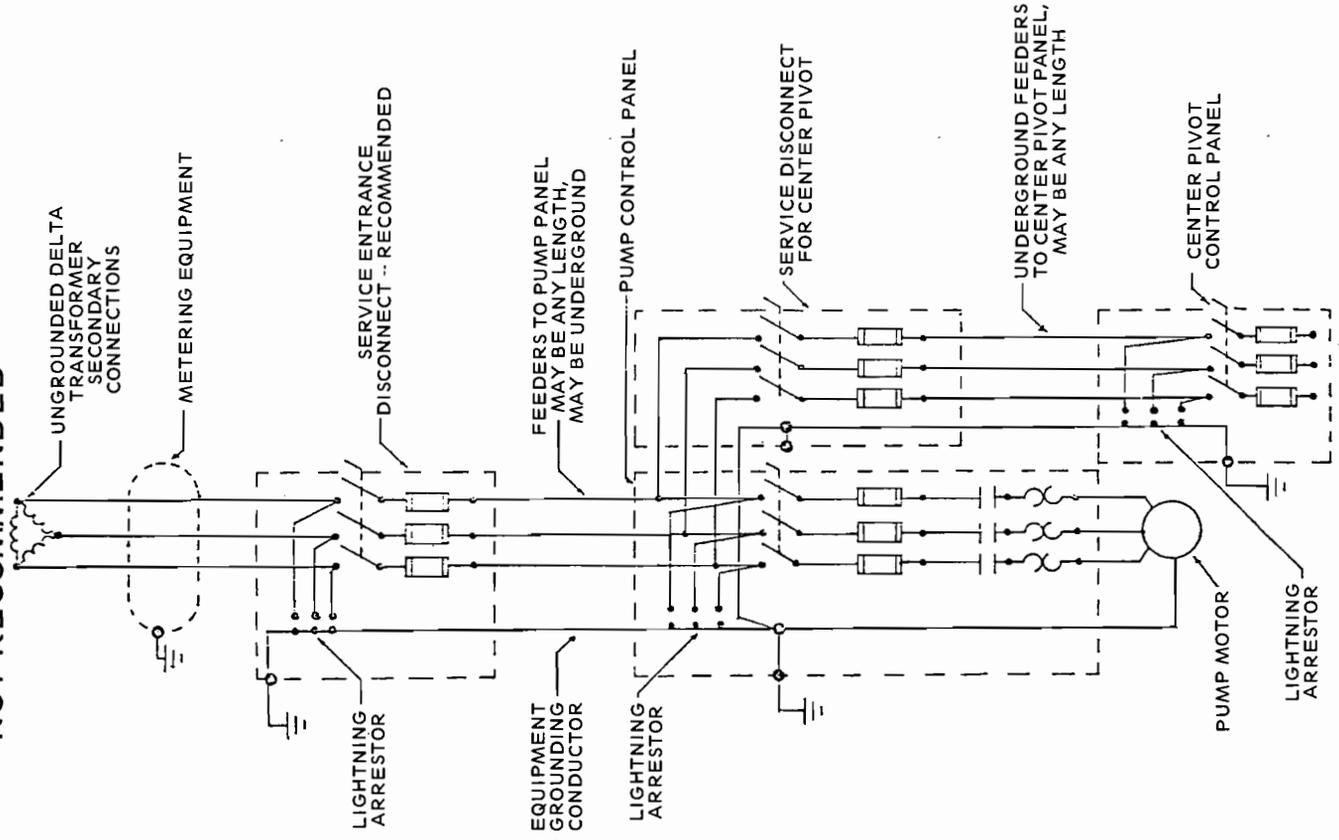


Figure 6. Equipment and grounding of 3-phase, 3-wire service when the transformer system is ungrounded. [Not recommended]

**NOT RECOMMENDED**

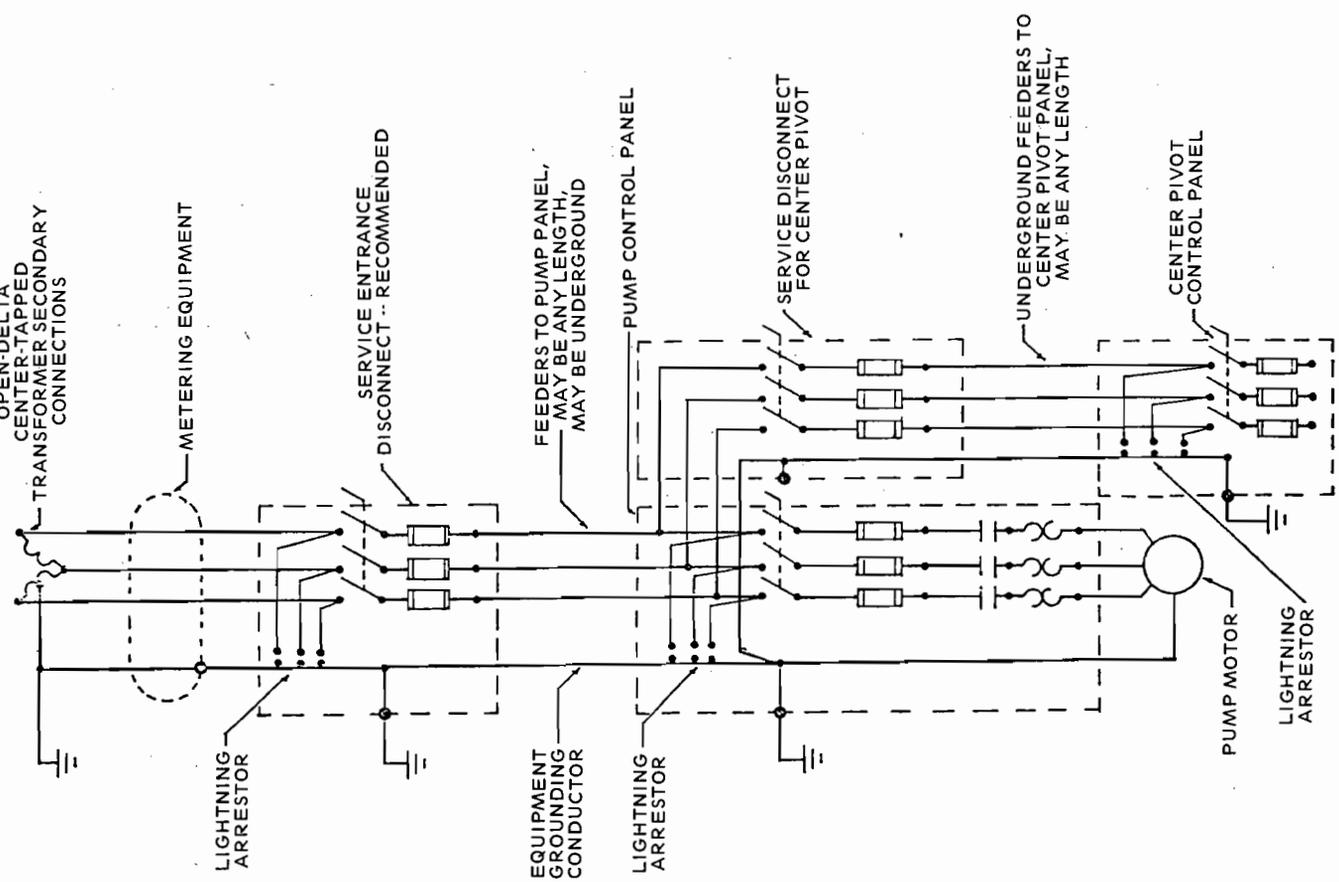


Figure 5. Recommended equipment and grounding for an open-delta center-tapped connected secondary.

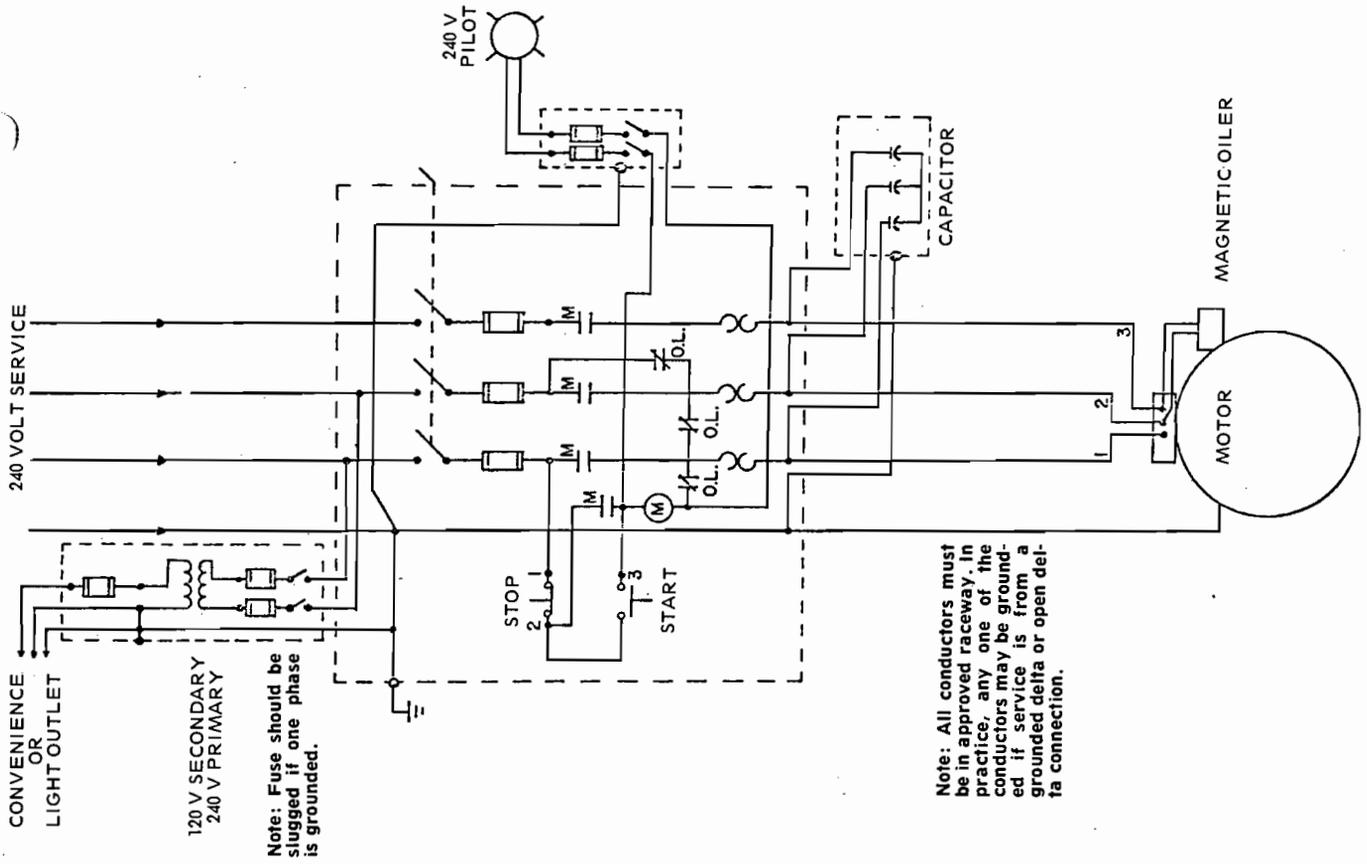


Figure 8. Wiring diagram for capacitor installation and auxiliary equipment for 240-volt service.

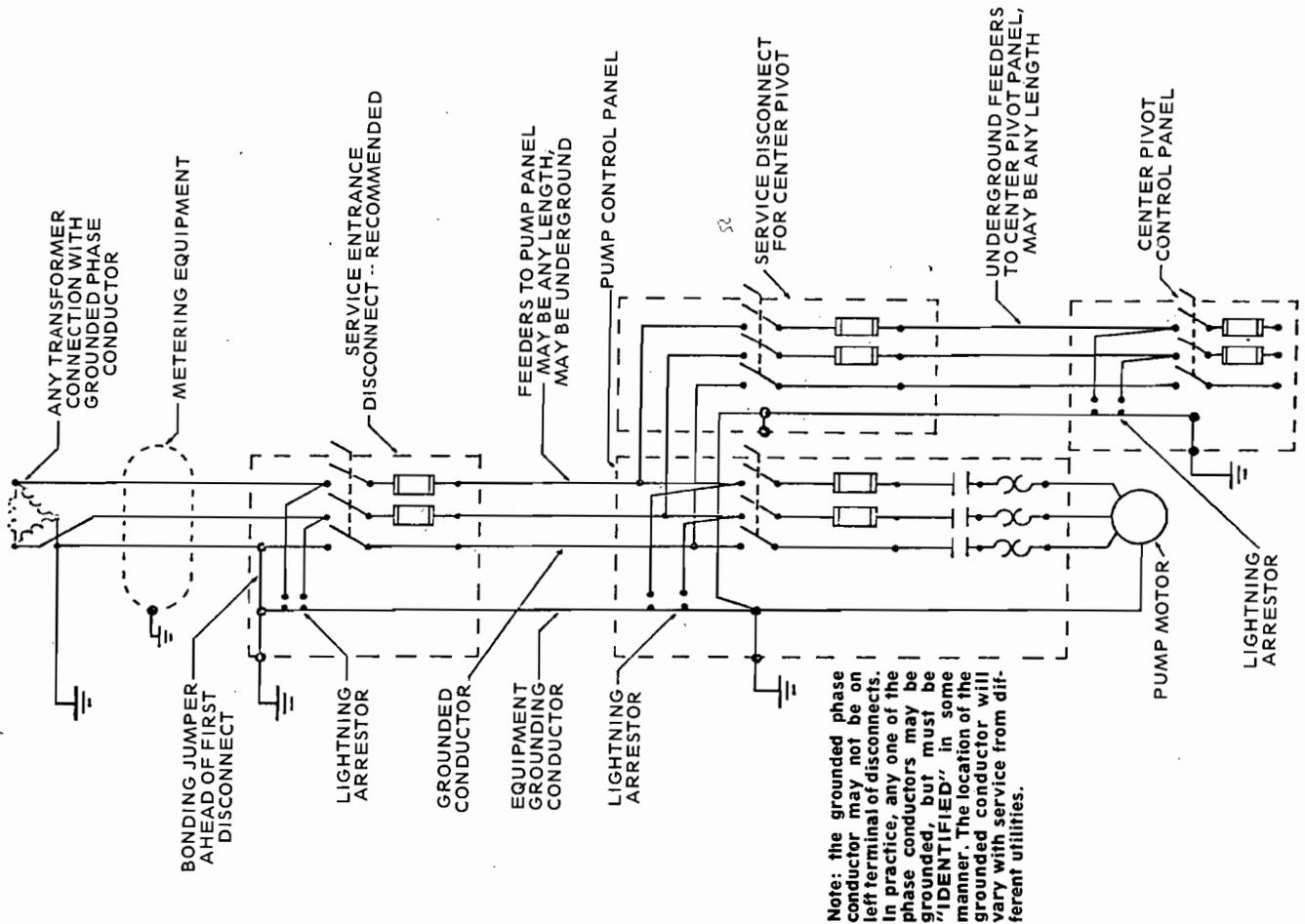


Figure 7. Recommended equipment and grounding of 3-phase, 3-wire service when one of the phase conductors is grounded.

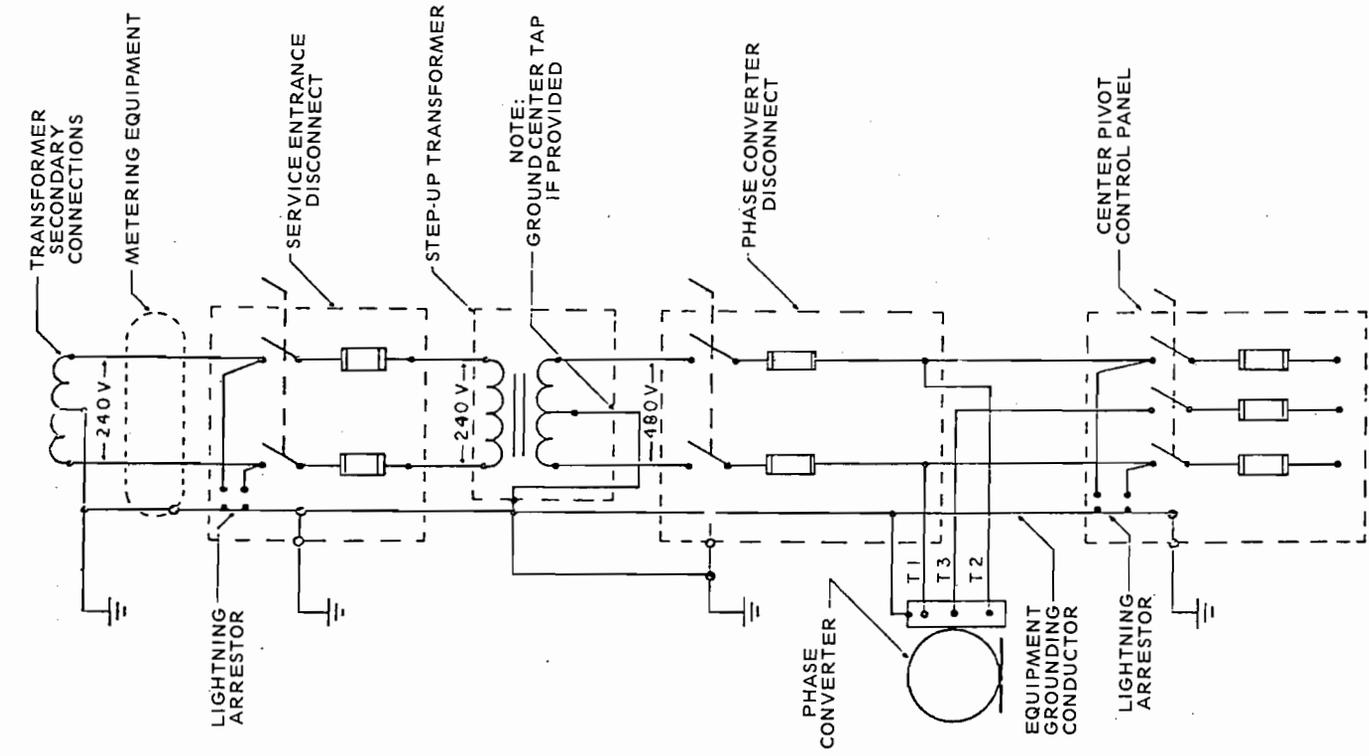
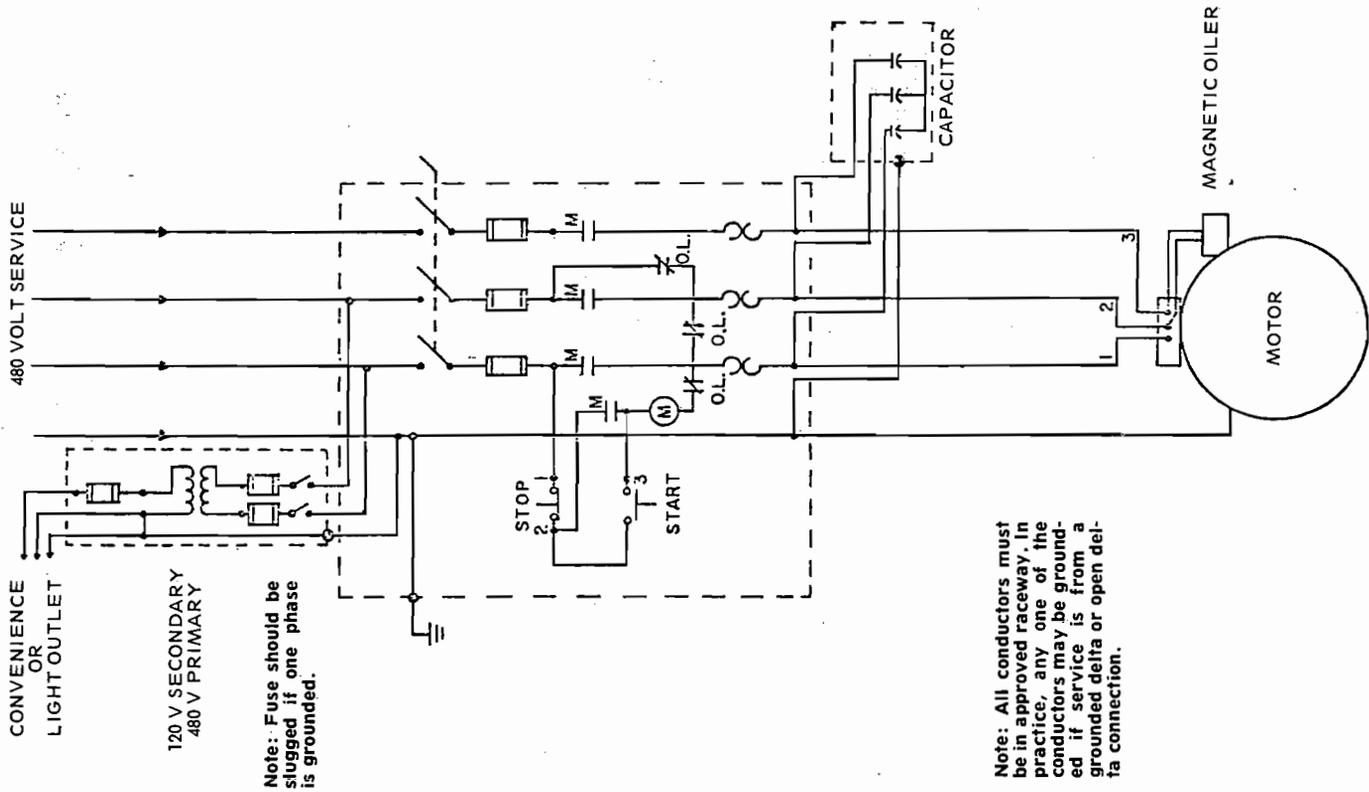


Figure 10. Recommended equipment and grounding for phase converter - center-pivot service from a 240-volt single-phase secondary.



Note: All conductors must be in approved raceway. In practice, any one of the conductors may be grounded if service is from a grounded delta or open delta connection.

Figure 9. Wiring diagram for capacitor installation and auxiliary equipment for 480-volt service.

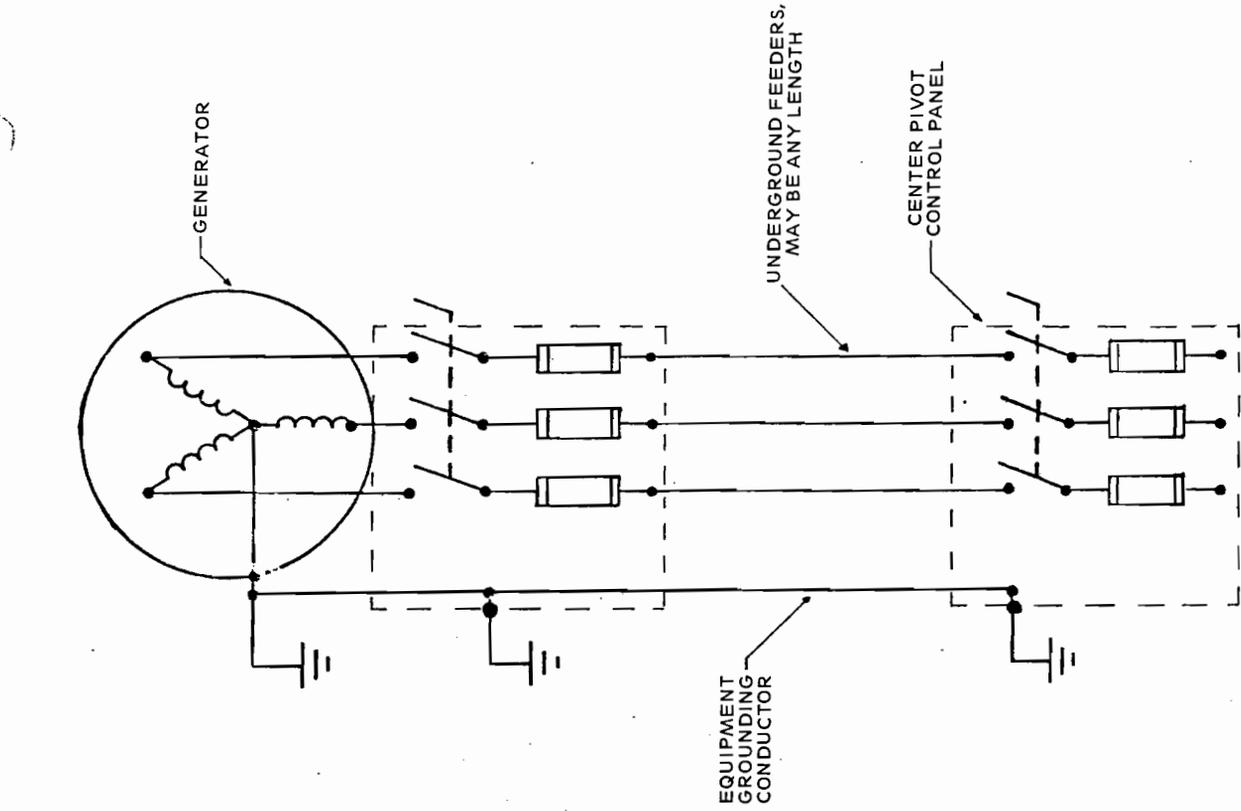


Figure 12. Recommended equipment and grounding for a generator serving a center pivot.

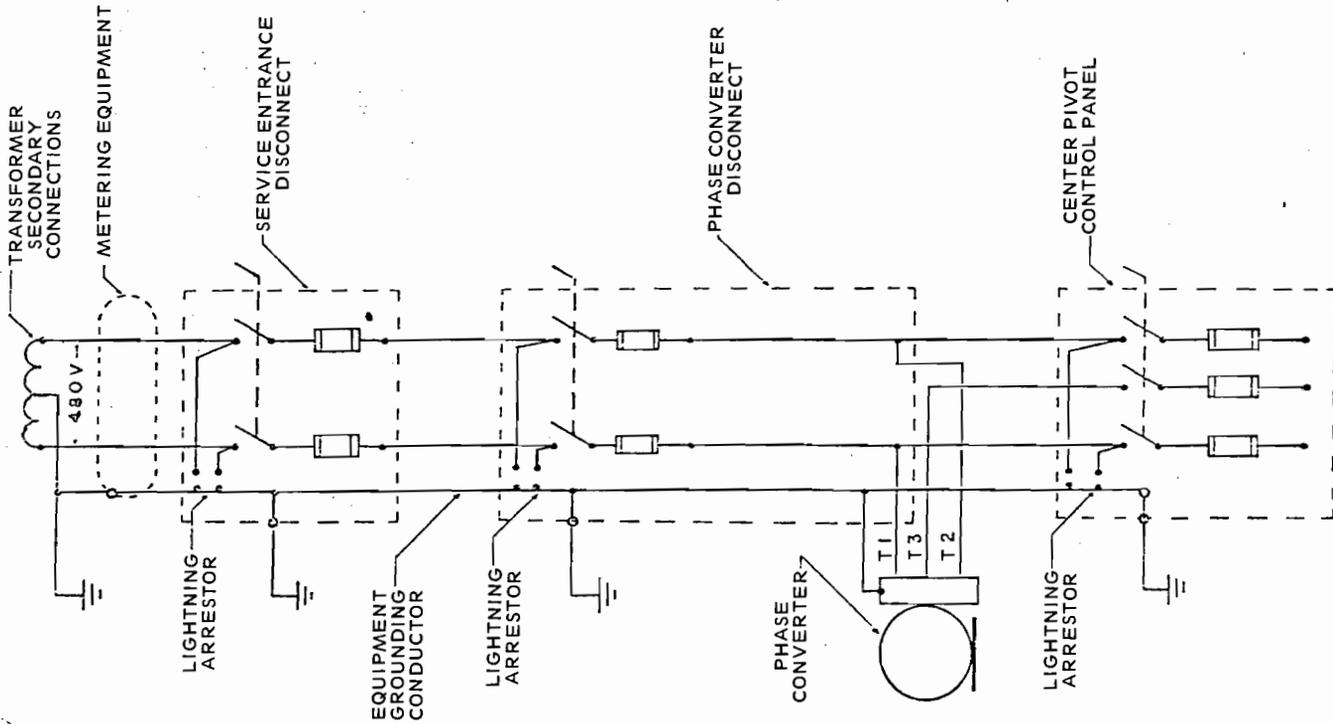
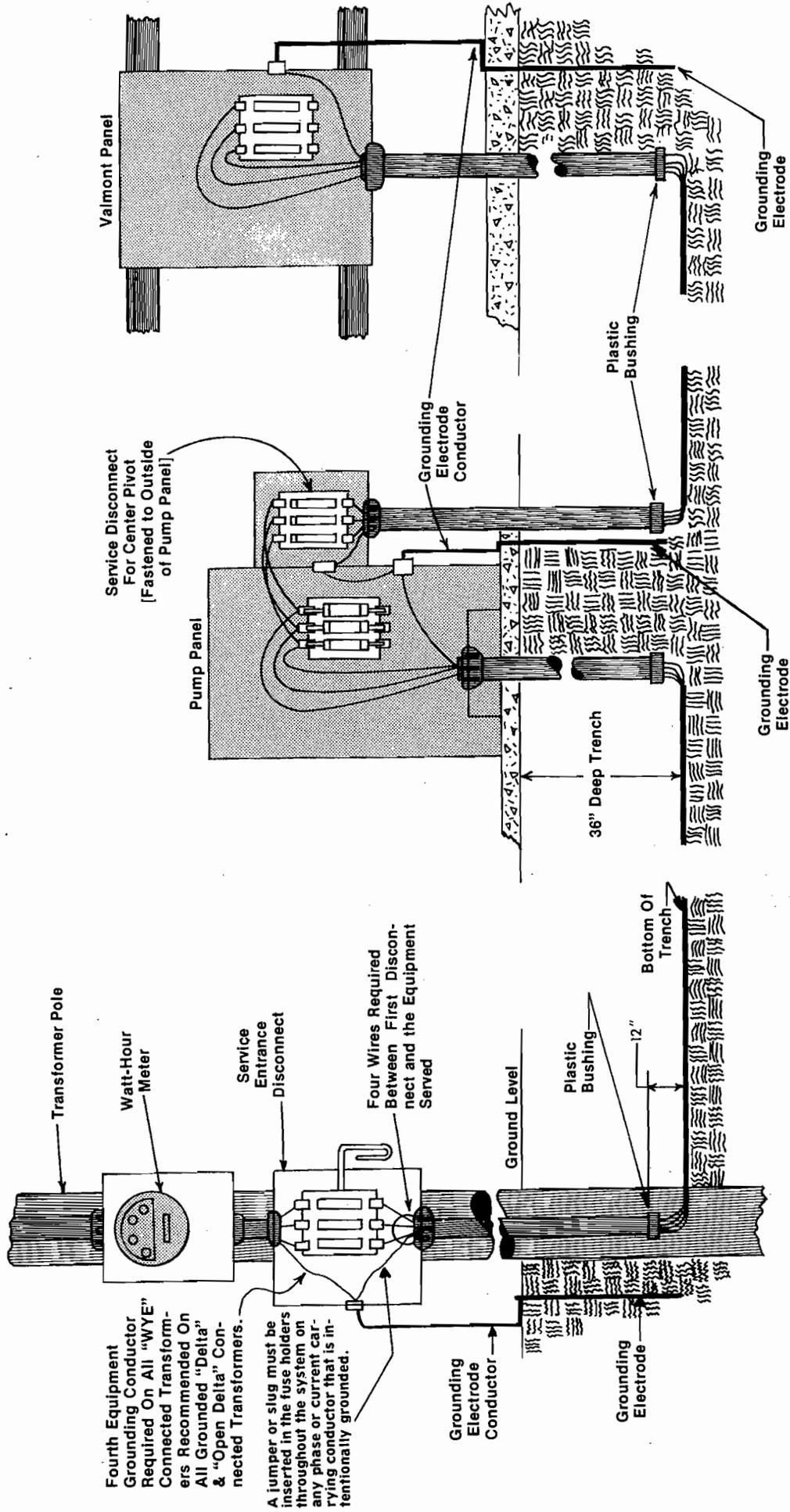
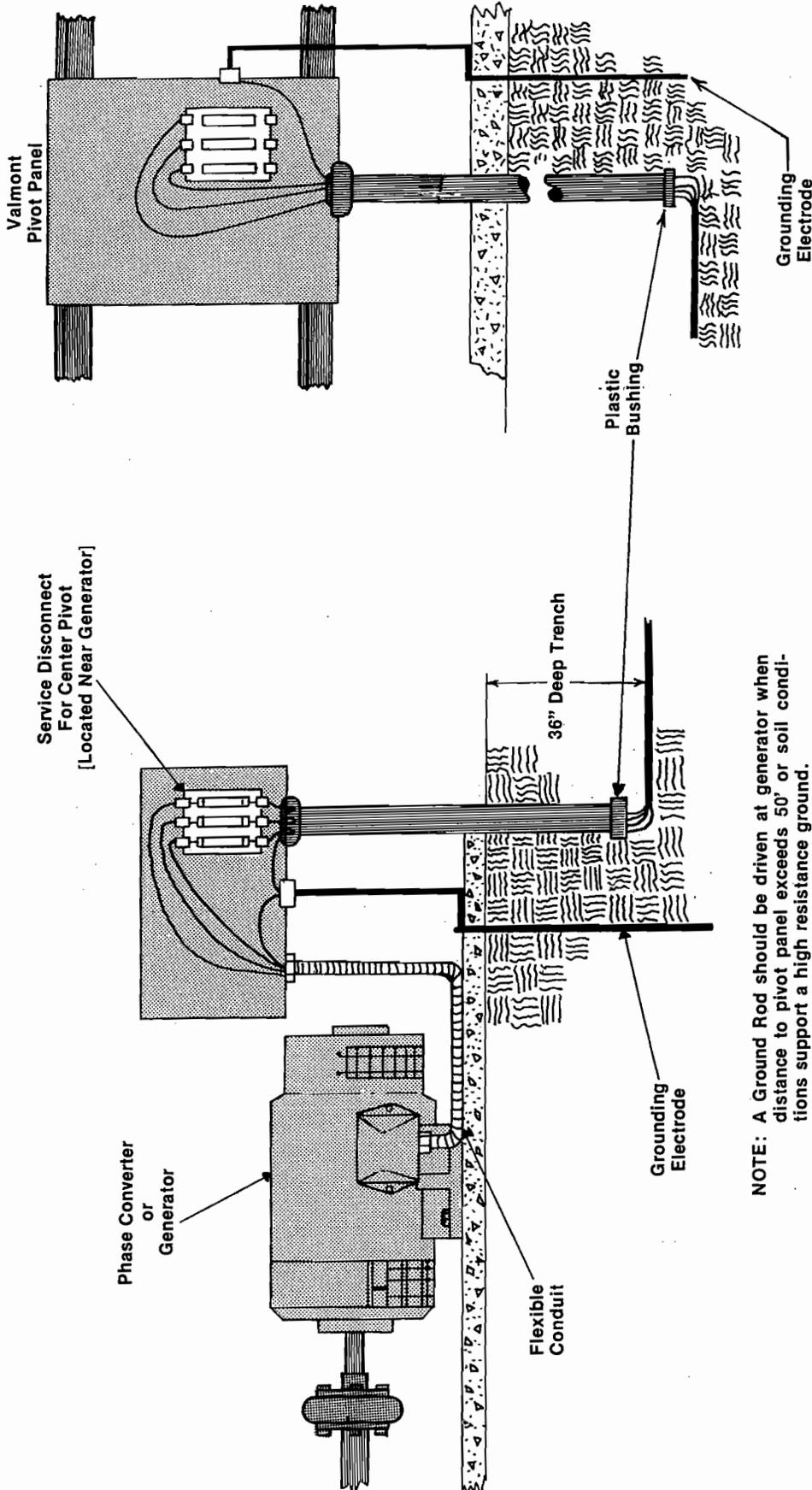


Figure 11. Recommended equipment and grounding for phase converter - center-pivot service from a 480-volt single-phase secondary.



**Example of Recommended Wiring Practices**



NOTE: A Ground Rod should be driven at generator when distance to pivot panel exceeds 50' or soil conditions support a high resistance ground.

### Example of Recommended Wiring Practices

