



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES

William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

December 30, 2015

Mr. Pat Hickey
General Manager
e-copy: pat.hickey@cityofclarksville.com
Clarksville Gas & Water
2215 Madison Street
P. O. Box 387
Clarksville, TN 37041

Subject: **NPDES Permit No. TN0020656**
Clarksville STP
Clarksville, Montgomery County, Tennessee

Dear Mr. Hickey:

In accordance with the provisions of the Tennessee Water Quality Control Act, Tennessee Code Annotated (T.C.A.), Sections 69-3-101 through 69-3-120, the Division of Water Resources hereby issues the enclosed NPDES Permit. The continuance and/or reissuance of this NPDES Permit is contingent upon your meeting the conditions and requirements as stated therein.

Please be advised that a petition for permit appeal may be filed, pursuant to T.C.A. Section 69-3-105, subsection (i), by the permit applicant or by any aggrieved person who participated in the public comment period or gave testimony at a formal public hearing whose appeal is based upon any of the issues that were provided to the commissioner in writing during the public comment period or in testimony at a formal public hearing on the permit application. Additionally, for those permits for which the department gives public notice of a draft permit, any permit applicant or aggrieved person may base a permit appeal on any material change to conditions in the final permit from those in the draft, unless the material change has been subject to additional opportunity for public comment. Any petition for permit appeal under this subsection (i) shall be filed with the Technical Secretary of the Water Quality, Oil and Gas Board within thirty (30) days after public notice of the commissioner's decision to issue or deny the permit. A copy of the filing should also be sent to TDEC's Office of General Counsel.

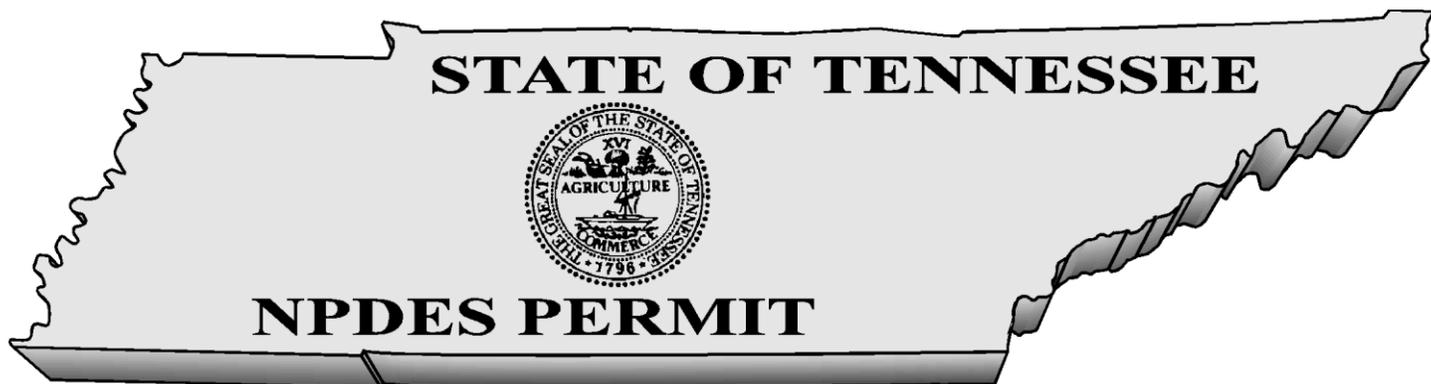
If you have questions, please contact the Nashville Environmental Field Office at 1-888-891-TDEC; or, at this office, please contact Ms. Maybelle T. Sparks at (615) 532-0651 or by E-mail at Maybelle.Sparks@tn.gov.

Sincerely,

Vojin Janjić
Manager, Water-Based Systems

Enclosure

cc: Permit File
Nashville Environmental Field Office
NPDES Permit Section, EPA Region IV, r4npdespermits@epa.gov
Mr. Kevin Buchanan, Public Utilities Director, Clarksville Gas & Water, kevin.buchanan@cityofclarksville.com
Mr. Chris Lambert, Water & Wastewater Manager, Clarksville Gas & Water, chris.lambert@cityofclarksville.com
Mr. Scott Woodard, P.E., Hazen and Sawyer, PC, woodard@hazenandsawyer.com



No. TN0020656

Authorization to discharge under the
National Pollutant Discharge Elimination System (NPDES)

Issued By

**STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102**

Under authority of the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101 et seq.) and the delegation of authority from the United States Environmental Protection Agency under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251, et seq.)

Discharger: **Clarksville STP**

is authorized to discharge: **treated municipal and treated combined wastewater from Outfall 001, treated combined wastewater from Outfalls 002 (Gallows Hollow) and 006 (McClure Street combined sewer vortex separators) and limited untreated combined wastewater from Outfall 004 (Commerce Street)**

from a facility located: **in Clarksville, Montgomery County, Tennessee**

to receiving waters named: **Barkley Reservoir at Cumberland River at miles 125.0, 125.6, 125.9 and 126.2**

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on: **February 1, 2016**

This permit shall expire on: **December 31, 2020**

Issuance date: **January 1, 2016**

A handwritten signature in blue ink, appearing to read "T. Calabrese", is written over a horizontal line.

for Tisha Calabrese Benton
Director

TABLE OF CONTENTS

	<u>Page</u>
1.0. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS	1
1.1. NUMERIC AND NARRATIVE EFFLUENT LIMITATIONS FOR OUTFALL 001	1
1.2. NUMERIC AND NARRATIVE EFFLUENT LIMITATIONS FOR OUTFALLS 002, 004 AND 006.....	3
1.3. MONITORING PROCEDURES.....	5
1.3.1. Representative Sampling	5
1.3.2. Sampling Frequency	5
1.3.3. Test Procedures.....	6
1.3.4. Recording of Results	6
1.3.5. Records Retention.....	7
1.4. REPORTING	7
1.4.1. Monitoring Results.....	7
1.4.2. Additional Monitoring by Permittee	8
1.4.3. Falsifying Results and/or Reports	8
1.4.4. Monthly Report of Operation.....	8
1.4.5. Bypass and Overflow Reporting	8
1.4.5.1. Report Requirements	8
1.4.5.2. Anticipated Bypass Notification	8
1.4.6. Reporting Less Than Detection	9
1.5. COMPLIANCE WITH SECTION 208.....	9
1.6. REOPENER CLAUSE	9
2.0. GENERAL PERMIT REQUIREMENTS.....	10
2.1. GENERAL PROVISIONS.....	10
2.1.1. Duty to Reapply.....	10
2.1.2. Right of Entry	10
2.1.3. Availability of Reports	10
2.1.4. Proper Operation and Maintenance.....	11
2.1.5. Treatment Facility Failure (Industrial Sources).....	11
2.1.6. Property Rights.....	11
2.1.7. Severability.....	11
2.1.8. Other Information	11
2.2. CHANGES AFFECTING THE PERMIT.....	12
2.2.1. Planned Changes.....	12
2.2.2. Permit Modification, Revocation, or Termination.....	12
2.2.3. Change of Ownership.....	12
2.2.4. Change of Mailing Address	13

2.3.	NONCOMPLIANCE	13
2.3.1.	Effect of Noncompliance.....	13
2.3.2.	Reporting of Noncompliance	13
2.3.3.	Overflow	14
2.3.4.	Upset.....	15
2.3.5.	Adverse Impact	15
2.3.6.	Bypass	16
2.3.7.	Washout.....	16
2.4.	LIABILITIES	17
2.4.1.	Civil and Criminal Liability.....	17
2.4.2.	Liability Under State Law	17
3.0.	PERMIT SPECIFIC REQUIREMENTS	18
3.1.	CERTIFIED OPERATOR	18
3.2.	POTW PRETREATMENT PROGRAM GENERAL PROVISIONS	18
3.3.	BIOSOLIDS MANAGEMENT PRACTICES	22
3.4.	BIOMONITORING REQUIREMENTS, CHRONIC (OUTFALL 001)	22
3.5.	PLACEMENT OF SIGNS	25
3.6.	ANTIDegradation	25
3.7.	OTHER COMBINED SEWER CONTROLS.....	26
4.0.	DEFINITIONS AND ACRONYMS	27
4.1.	DEFINITIONS	27
4.2.	ACRONYMNS AND ABBREVIATIONS.....	30
RATIONALE.....		1
1.	FACILITY INFORMATION	1
2.	RECEIVING STREAM INFORMATION.....	1
3.	CURRENT PERMIT STATUS.....	1
4.	NEW PERMIT LIMITATIONS AND COMPLIANCE SCHEDULE SUMMARY	2
5.	PREVIOUS PERMIT DISCHARGE MONITORING REPORT REVIEW	2
6.	PROPOSED EFFLUENT LIMITS & RATIONALE, OUTFALL 001	3
7.	PROPOSED EFFLUENT LIMITS & RATIONALE, OUTFALLS 002, 004 AND 0064	
7.1	CBOD ₅ , NH ₃ -N toxicity, Dissolved Oxygen, and Percent Removals Requirements.....	5
7.2.	Chlorination	5
7.3.	Total Nitrogen and Total Phosphorous Limitations	5
7.4.	<i>E. coli</i> Requirements	6
7.5.	Biomonitoring	6
7.6.	Metals and Toxics	7
7.7.	Volatile Organic, Acid-Extractable, and Base-Neutral Compounds.....	7

7.8.	Overflow and Bypass Reporting	9
8.	OTHER REQUIREMENTS AND CONDITIONS	9
8.1.	Certified Wastewater Treatment Operator	9
8.2.	Collection System Certified Operator.....	9
8.3.	Pretreatment Program	9
8.4.	Combined Sewer Overflows	10
8.5.	Permit Term	11
9.	ANTIDegradation Statement/Water Quality Status	11
APPENDIX 1	13
APPENDIX 2	15
APPENDIX 3	16
APPENDIX 4	24
APPENDIX 5	25

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1.0. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1.1. NUMERIC AND NARRATIVE EFFLUENT LIMITATIONS FOR OUTFALL 001

The City of Clarksville is authorized to discharge treated municipal wastewater and only during wet weather treated combined sewer wastewater from Outfall 001 to the Barkley Reservoir at the Cumberland River mile 125.0. Discharge 001 consists of fully treated municipal wastewater from a treatment facility with a monthly average design capacity of 25 MGD and maximized treatment of combined sewer wastewater. Discharge 001 shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Effluent Limitations						Monitoring Requirements		
	Monthly Average Conc. (mg/l)	Monthly Average Amount (lb/day)	Weekly Average Conc. (mg/l)	Weekly Average Amount (lb/day)	Daily Maximum Conc. (mg/l)	Daily Maximum Amount (lb/day)	Measurement Frequency	Sample Type	Sampling Point
CBOD ₅	25	5213	35	7298	40	8340	7/week	composite	effluent
	Report	—	—	—	Report	—	7/week	composite	influent
Ammonia as N	Report	—	Report	—	Report	—	7/week	composite	effluent
Suspended Solids	30	6255	40	8340	45	9383	7/week	composite	effluent
	Report	—	—	—	Report	—	7/week	composite	influent
Total Nitrogen	Report	—	—	—	Report	—	quarterly	composite	effluent
	Report	—	—	—	Report	—	quarterly	composite	influent
Total Phosphorous	Report	—	—	—	Report	—	quarterly	composite	effluent
	Report	—	—	—	Report	—	quarterly	composite	influent
Sanitary Sewer Overflows, Total Occurrences	Report						continuous	visual	NA
Dry Weather Overflows, Total Occurrences *	Report						continuous	visual	NA
CSO-Related Bypass of Treatment, Total Occurrences	Report						continuous	visual	NA

Note: The permittee shall achieve 85% removal of CBOD₅ and TSS on a monthly average basis. The permittee shall report all instances of overflow and/or bypasses. See Part 2.3.3.a for the definition of overflow and Part 1.4.5.1 for reporting requirements.

Note: See Part 1.3.3 for test procedures.

* Includes dry weather overflows from Outfalls 002, 004 and 006

Effluent Characteristics	Effluent Limitations			Monitoring Requirements		
	Monthly Average	Daily Minimum	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Total Chlorine Residual (mg/l)	—	—	1.2 (daily maximum)	7/week	grab	effluent
<i>E. coli</i>	126/100 ml (see the following paragraphs)	—	487/100 ml	7/week	grab	effluent
Settleable solids	—	—	1.0 ml/l	7/week	grab	effluent
Dissolved oxygen	—	1.0 mg/l instantaneous	—	7/week	grab	effluent
pH (Standard Units)	—	6.0	9.0	7/week	grab	effluent
Flow, Outfall 001 (MGD)	Report	—	Report	7/week	continuous	influent
	Report	—	Report	7/week	continuous	effluent
IC ₂₅	Survival, reproduction and growth in 3% effluent			1/ 6 months	composite	effluent

Note: See Part 3.4 for biomonitoring test and reporting requirements. See next page for percent removal calculations.

Note: See Part 1.3.3 for test procedures.

Note: Total residual chlorine (TRC) monitoring shall be applicable when chlorine, bromine, or any other oxidants are added. The acceptable methods for analysis of TRC are any methods specified in Title 40 CFR, Part 136 as amended. The method detection level (MDL) for TRC shall not exceed 0.05 mg/l unless the permittee demonstrates that its MDL is higher. The permittee shall retain the documentation that justifies the higher MDL and have it available for review upon request. In cases where the permit limit is less than the MDL, the reporting of TRC at less than the MDL shall be interpreted to constitute compliance with the permit.

1.2. NUMERIC AND NARRATIVE EFFLUENT LIMITATIONS FOR OUTFALLS 002, 004 AND 006

The Clarksville Gallows Hollow Combined Sewer (Outfall 002) and McClure Street Combined Sewer (Outfall 006) are authorized to discharge treated combined sewer flow only during wet weather to Barkley Reservoir at the Cumberland River mile 126.2 and 125.6, respectively. The Commerce Street Combined Sewer Overflow (Outfall 004) serves as a relief point for the combined sewer system and is authorized to discharge limited combined sewer flow to Barkley Reservoir at the Cumberland River mile 125.9 during wet weather only. All discharges from 002, 004 and 006 shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Effluent Limitations						Monitoring Requirements		
	Monthly Average Conc. (mg/l)	Monthly Average Amount (lb/day)	Weekly Average Conc. (mg/l)	Weekly Average Amount (lb/day)	Daily Maximum Conc. (mg/l)	Daily Minimum Percent Removal	Measurement Frequency	Sample Type	Sampling Point
BOD ₅	Report	Report			Report		1 event/year (002 & 006)	composite	effluent
Suspended Solids	Report	Report			Report		1 event/year (002 & 006)	composite	effluent

Effluent Characteristics	Effluent Limitations			Monitoring Requirements		
	Monthly Average	Daily Minimum	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
<i>E. coli</i>			Report	1 event/quarter (002 & 006)	grab	effluent
Settleable solids			Report	1 event/quarter (002 & 006)	grab	effluent
Dissolved oxygen		Report		1 event/year (002 & 006)	grab	effluent
pH (Standard Units)		6.0	9.0	1 event/year (002 & 006)	grab	effluent
Flow (MGD)	Report		Report	Monthly (all)	continuous	effluent
CSO releases, treated	Report occurrences			Monthly (002 & 006)	visual	effluent
CSO releases, untreated*	6 occurrences (annual maximum)			Annually (004)	visual	effluent
CSO releases, untreated*	4 (average occurrences per year)-see note below			once/permit cycle (004)	calculated	effluent

Note: The average number of untreated, discharge events per year shall be calculated by dividing the cumulative total of untreated events during the permit term by the months in the permit term and multiplying the result by 12. Report result on final DMR for permit term.

1 event/year is measured as a calendar year.

*As an alternative, the permittee shall eliminate or capture for treatment, storage and treatment, at least 85 percent of the system-wide combined sewage volume collected during precipitation events under design conditions. The permittee shall annually report either % captured or "CSO releases, untreated" on their DMR. This is calculated on an annual basis as follows:

$$\% \text{ Captured} = \frac{(\text{Annual volume collected} - \text{untreated volume discharged}) \times 100}{\text{Annual volume collected}}$$

The wastewater discharge must be disinfected to the extent that viable coliform organisms are effectively eliminated. The concentration of the *E. coli* group after disinfection shall not exceed 126 cfu per 100 ml as the geometric mean calculated on the actual number of samples collected and tested for *E. coli* within the required reporting period. The permittee may collect more samples than specified as the monitoring frequency. Samples may not be collected at intervals of less than 12 hours. For the purpose of determining the geometric mean, individual samples having an *E. coli* group concentration of less than one (1) per 100 ml shall be considered as having a concentration of one (1) per 100 ml. In addition, the concentration of the *E. coli* group in any individual sample shall not exceed a specified maximum amount. A maximum daily limit of 487 colonies per 100 ml applies to lakes and exceptional Tennessee waters. A maximum daily limit of 941 colonies per 100 ml applies to all other recreational waters.

There shall be no distinctly visible floating scum, oil or other matter contained in the wastewater discharge. The wastewater discharge must not cause an objectionable color contrast in the receiving stream.

The wastewater discharge shall not contain pollutants in quantities that will be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream.

Sludge or any other material removed by any treatment works must be disposed of in a manner that prevents its entrance into or pollution of any surface or subsurface waters. Additionally, the disposal of such sludge or other material must be in compliance with the Tennessee Solid Waste Disposal Act, TCA 68-31-101 et seq. and the Tennessee Hazardous Waste Management Act, TCA 68-46-101 et seq.

For the purpose of evaluating compliance with the permit limits established herein, where certain limits are below the State of Tennessee published required detection levels (RDLs) for any given effluent characteristics, the results of analyses below the RDL shall be reported as Below Detection Level (BDL), unless in specific cases other detection limits are demonstrated to be the best achievable because of the particular nature of the wastewater being analyzed.

For CBOD₅ and TSS, the treatment facility shall demonstrate a minimum of 85% removal efficiency on a monthly average basis. This is calculated by determining an average of all daily influent concentrations and comparing this to an average of all daily effluent concentrations. The formula for this calculation is as follows:

$$\left[1 - \frac{\text{average of daily effluent concentration}}{\text{average of daily influent concentration}} \right] \times 100\% = \% \text{ removal}$$

1.3. MONITORING PROCEDURES

1.3.1. Representative Sampling

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than plus or minus 10% from the true discharge rates throughout the range of expected discharge volumes.

Samples and measurements taken in compliance with the monitoring requirements specified above shall be representative of the volume and nature of the monitored discharge, and shall be taken at the following location(s):

Influent samples must be collected prior to mixing with any other wastewater being returned to the head of the plant, such as sludge return. Those systems with more than one influent line must collect samples from each and proportion the results by the flow from each line.

Effluent samples must be representative of the wastewater being discharged and collected prior to mixing with any other discharge or the receiving stream. This can be a different point for different parameters, but must be after all treatment for that parameter or all expected change:

- a. Samples for *E. coli* can be collected at any point between disinfection and the actual discharge.
- b. The dissolved oxygen can drop in the outfall line; therefore, D.O. measurements are required at the discharge end of outfall lines greater than one mile long. Systems with outfall lines less than one mile may measure dissolved oxygen as the wastewater leaves the treatment facility. For the purpose of this part only, Clarksville's outfall approximating 6000 linear feet is less than one mile in length.
- c. Total suspended solids and settleable solids can be collected at any point after the final clarifier.
- d. Biomonitoring tests (if required) shall be conducted on final effluent.

1.3.2. Sampling Frequency

Where the permit requires sampling and monitoring of a particular effluent characteristic(s) at a frequency of less than once per day or daily, the permittee is precluded from marking the "No Discharge" block on the Discharge Monitoring Report if there has been any discharge from that particular outfall during the period which coincides with the required monitoring frequency; i.e. if the required monitoring frequency is once per month or 1/month, the monitoring period is one month, and if

the discharge occurs during only one day in that period then the permittee must sample on that day and report the results of analyses accordingly.

1.3.3. Test Procedures

- a. Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304 (h) of the Clean Water Act (the "Act"), as amended, under which such procedures may be required.
- b. Unless otherwise noted in the permit, all pollutant parameters shall be determined according to methods prescribed in Title 40, CFR, Part 136, as amended, promulgated pursuant to Section 304 (h) of the Act.
- c. Composite samples must be proportioned by flow at time of sampling. Aliquots may be collected manually or automatically. The sample aliquots must be maintained at ≤ 6 degrees Celsius during the compositing period.
- d. Composite samples of Outfalls 002 and 006 (combined sewer discharges) may be proportioned either by flow or time interval over a period of approximately four hours. Reasonable effort should be made to collect the composite sample during the first four hours of the discharge event. If the discharge event lasts less than four hours, the permittee may discard the sample; or the permittee may submit the sample analysis. Samples collected from discharge events of less than four hours must be accompanied by a written statement explaining the circumstances and noting the duration of the discharge.
- e. Reasonable effort must be made to collect grab samples from Outfalls 002 and 006 during the first thirty minutes of a combined sewer discharge event.
- f. Should circumstances prevent the procedures of d and e above from being implemented, the permittee must submit the following information along with the sample results;
 - a. Documentation of the circumstances that prevented the sample collection procedures of d and e above, and
 - b. The time that the discharge began and the time at which sample collection began.

1.3.4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The exact place, date and time of sampling;
- b. The exact person(s) collecting samples;
- c. The dates and times the analyses were performed;

- d. The person(s) or laboratory who performed the analyses;
- e. The analytical techniques or methods used, and;
- f. The results of all required analyses.

1.3.5. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation shall be retained for a minimum of three (3) years, or longer, if requested by the Division of Water Resources.

1.4. REPORTING

1.4.1. Monitoring Results

Monitoring results shall be recorded monthly and submitted monthly using Discharge Monitoring Report (DMR) forms or an electronic program supplied by the Division of Water Resources. Submittals shall be postmarked or sent electronically no later than 15 days after the completion of the reporting period. The top two copies of each report are to be submitted. A copy should be retained for the permittee's files. DMRs and any communication regarding compliance with the conditions of this permit must be sent to:

**STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
COMPLIANCE & ENFORCEMENT SECTION
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102**

The first DMR is due on the 15th of the month following permit effectiveness.

DMRs and any other report or information submitted to the division must be signed and certified by a responsible corporate officer as defined in 40 CFR 122.22, a general partner or proprietor, or a principal municipal executive officer or ranking elected official, or his duly authorized representative. Such authorization must be submitted in writing and must explain the duties and responsibilities of the authorized representative.

The electronic submission of DMRs will be accepted only if approved in writing by the division. For purposes of determining compliance with this permit, data submitted in electronic format is legally equivalent to data submitted on signed and certified DMR forms.

1.4.2. Additional Monitoring by Permittee

If the permittee monitors any pollutant specifically limited by this permit more frequently than required at the location(s) designated, using approved analytical methods as specified herein, the results of such monitoring shall be included in the calculation and reporting of the values required in the DMR form. Such increased frequency shall also be indicated on the form.

1.4.3. Falsifying Results and/or Reports

Knowingly making any false statement on any report required by this permit or falsifying any result may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Water Pollution Control Act, as amended, and in Section 69-3-115 of the Tennessee Water Quality Control Act.

1.4.4. Monthly Report of Operation

Monthly operational reports shall be submitted on standard forms to the appropriate Division of Water Resources Environmental Field Office in Jackson, Nashville, Chattanooga, Columbia, Cookeville, Memphis, Johnson City, or Knoxville. Reports shall be submitted by the 15th day of the month following data collection.

1.4.5. Bypass and Overflow Reporting

1.4.5.1. Report Requirements

A summary report of known or suspected instances of overflows in the collection system or bypass of wastewater treatment facilities shall accompany the Discharge Monitoring Report. The report must contain the location (property address), latitude and longitude and/or manhole number and pump station name, known or suspected cause, receiving water(s) if applicable and the date and duration of the instances of overflow and/or bypassing and the estimated quantity of wastewater released and/or bypassed. Discharges from manholes in the combined sewer areas shall be included in the count of untreated CSO releases on the monthly discharge monitoring reports for Outfall 004 rather than as wet weather overflows for Outfall 001. Multiple combined sewer discharge events occurring within a single rainfall event are a single, untreated, discharge event for the outfall basin in which they occur.

The report must also detail activities undertaken during the reporting period to (1) determine if overflow is occurring in the collection system, (2) correct those known or suspected overflow points and (3) prevent future or possible overflows and any resulting bypassing at the treatment facility.

On the DMR, the permittee must report the number of sanitary sewer overflows, dry-weather overflows and in-plant bypasses separately. Three lines must be used on the DMR form, one for sanitary sewer overflows, one for dry-weather overflows and one for in-plant bypasses.

1.4.5.2. Anticipated Bypass Notification

If, because of unavoidable maintenance or construction, the permittee has need to create an in-plant bypass which would cause an effluent violation, the permittee must notify the division as soon as possible, but in any case, no later than 10 days prior to the date of the bypass.

1.4.6. Reporting Less Than Detection

A permit limit may be less than the accepted detection level. If the samples are below the detection level, then report "BDL" or "NODI =B" on the DMRs. The permittee must use the correct detection levels in all analytical testing required in the permit. The required detection levels are listed in the Rules of the Department of Environment and Conservation, Division of Water Resources, Chapter 0400-40-3-.05(8).

For example, if the limit is 0.02 mg/l with a detection level of 0.05 mg/l and detection is shown; 0.05 mg/l must be reported. In contrast, if nothing is detected reporting "BDL" or "NODI =B" is acceptable.

1.5. COMPLIANCE WITH SECTION 208

The limits and conditions in this permit shall require compliance with an area-wide waste treatment plan (208 Water Quality Management Plan) where such approved plan is applicable.

1.6. REOPENER CLAUSE

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 307(a)(2) and 405(d)(2)(D) of the Clean Water Act, as amended, if the effluent standard, limitation or sludge disposal requirement so issued or approved:

- a. Contains different conditions or is otherwise more stringent than any condition in the permit; or
- b. Controls any pollutant or disposal method not addressed in the permit.

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

The NPDES authority may reopen and modify the permit upon determination that the CSO controls fail to meet WQS or protect designated uses.

2.0. GENERAL PERMIT REQUIREMENTS

2.1. GENERAL PROVISIONS

2.1.1. Duty to Reapply

Permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Director of Water Resources (the "director") no later than 180 days prior to the expiration date. Such forms shall be properly signed and certified.

2.1.2. Right of Entry

The permittee shall allow the director, the Regional Administrator of the U.S. Environmental Protection Agency, or their authorized representatives, upon the presentation of credentials:

- a. To enter upon the permittee's premises where an effluent source is located or where records are required to be kept under the terms and conditions of this permit, and at reasonable times to copy these records;
- b. To inspect at reasonable times any monitoring equipment or method or any collection, treatment, pollution management, or discharge facilities required under this permit; and
- c. To sample at reasonable times any discharge of pollutants.

2.1.3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Water Pollution Control Act, as amended, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Water Resources. As required by the Federal Act, effluent data shall not be considered confidential.

2.1.4. Proper Operation and Maintenance

- a. The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup 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. Backup continuous pH and flow monitoring equipment are not required.
- b. Dilution water shall not be added to comply with effluent requirements to achieve BCT, BPT, BAT and or other technology based effluent limitations such as those in State of Tennessee Rule 0400-40-5-.09.

2.1.5. Treatment Facility Failure (Industrial Sources)

The permittee, in order to maintain compliance with this permit, shall control production, all discharges, or both, upon reduction, loss, or failure of the treatment facility, until the facility is restored or an alternative method of treatment is provided. This requirement applies in such situations as the reduction, loss, or failure of the primary source of power.

2.1.6. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations.

2.1.7. Severability

The provisions of this permit are severable. If any provision of this permit due to any circumstance, is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

2.1.8. Other Information

If the permittee becomes aware of failure to submit any relevant facts in a permit application, or of submission of incorrect information in a permit application or in any report to the director, then the permittee shall promptly submit such facts or information.

2.2. CHANGES AFFECTING THE PERMIT

2.2.1. Planned Changes

The permittee shall give notice to the director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

- a. 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
- b. 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).

2.2.2. Permit Modification, Revocation, or Termination

- a. This permit may be modified, revoked and reissued, or terminated for cause as described in 40 CFR 122.62 and 122.64, Federal Register, Volume 49, No. 188 (Wednesday, September 26, 1984), as amended.
- b. The permittee shall furnish to the director, within a reasonable time, any information which the director 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 director, upon request, copies of records required to be kept by this permit.
- c. If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established for any toxic pollutant under Section 307(a) of the Federal Water Pollution Control Act, as amended, the director shall modify or revoke and reissue the permit to conform to the prohibition or to the effluent standard, providing that the effluent standard is more stringent than the limitation in the permit on the toxic pollutant. The permittee shall comply with these effluent standards or prohibitions within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified or revoked and reissued to incorporate the requirement.
- d. The filing of a request by the permittee for a modification, revocation, reissuance, termination, or notification of planned changes or anticipated noncompliance does not halt any permit condition.

2.2.3. Change of Ownership

This permit may be transferred to another party (provided there are neither modifications to the facility or its operations, nor any other changes which might affect the permit limits and conditions contained in the permit) by the permittee if:

- a. The permittee notifies the director of the proposed transfer at least 30 days in advance of the proposed transfer date;
- b. The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them; and
- c. The director, within 30 days, does not notify the current permittee and the new permittee of his intent to modify, revoke or reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

Pursuant to the requirements of 40 CFR 122.61, concerning transfer of ownership, the permittee must provide the following information to the division in their formal notice of intent to transfer ownership: 1) the NPDES permit number of the subject permit; 2) the effective date of the proposed transfer; 3) the name and address of the transferor; 4) the name and address of the transferee; 5) the names of the responsible parties for both the transferor and transferee; 6) a statement that the transferee assumes responsibility for the subject NPDES permit; 7) a statement that the transferor relinquishes responsibility for the subject NPDES permit; 8) the signatures of the responsible parties for both the transferor and transferee pursuant to the requirements of 40 CFR 122.22(a), "Signatories to permit applications"; and, 9) a statement regarding any proposed modifications to the facility, its operations, or any other changes which might affect the permit limits and conditions contained in the permit.

2.2.4. Change of Mailing Address

The permittee shall promptly provide to the director written notice of any change of mailing address. In the absence of such notice the original address of the permittee will be assumed to be correct.

2.3. NONCOMPLIANCE

2.3.1. Effect of Noncompliance

All discharges shall be consistent with the terms and conditions of this permit. Any permit noncompliance constitutes a violation of applicable state and federal laws and is grounds for enforcement action, permit termination, permit modification, or denial of permit reissuance.

2.3.2. Reporting of Noncompliance

- a. 24-Hour Reporting

In the case of any noncompliance which could cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to

the Division of Water Resources in the appropriate Environmental Field Office within 24-hours from the time the permittee becomes aware of the circumstances. (The Environmental Field Office should be contacted for names and phone numbers of environmental response team).

A written submission must be provided within five days of the time the permittee becomes aware of the circumstances unless the director on a case-by-case basis waives this requirement. The permittee shall provide the director with the following information:

- i. A description of the discharge and cause of noncompliance;
 - ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and
 - iii. The steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.
- b. Scheduled Reporting

For instances of noncompliance which are not reported under subparagraph 2.3.2.a above, the permittee shall report the noncompliance on the Discharge Monitoring Report. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

2.3.3. Overflow

- a. "**Overflow**" means any release of sewage from any portion of the collection, transmission, or treatment system other than through permitted outfalls.
- b. Overflows are prohibited.
- c. The permittee shall operate the collection system so as to avoid overflows. No new or additional flows shall be added upstream of any point in the collection system, which experiences chronic overflows (greater than 5 events per year) or would otherwise overload any portion of the system.
- d. Unless there is specific enforcement action to the contrary, the permittee is relieved of this requirement after: 1) an authorized representative of the Commissioner of the Department of Environment and Conservation has approved an engineering report and construction plans and specifications prepared in accordance with accepted engineering practices for correction of the problem; 2) the correction work is underway; and 3) the cumulative, peak-design, flows potentially added from new connections and line extensions upstream of any chronic overflow point are less than or proportional to the amount of inflow and infiltration removal documented upstream of that point. The inflow and infiltration reduction must be measured by the permittee using practices that are customary in the environmental engineering field and reported in an attachment

to a Monthly Operating Report submitted to the local TDEC Environmental Field Office. The data measurement period shall be sufficient to account for seasonal rainfall patterns and seasonal groundwater table elevations.

- e. In the event that more than 5 overflows have occurred from a single point in the collection system for reasons that may not warrant the self-imposed moratorium or completion of the actions identified in this paragraph, the permittee may request a meeting with the Division of Water Resources EFO staff to petition for a waiver based on mitigating evidence.

2.3.4. Upset

- a. "**Upset**" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based 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.
- b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, 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 operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
 - iii. The permittee submitted information required under "Reporting of Noncompliance" within 24-hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and
 - iv. The permittee complied with any remedial measures required under "Adverse Impact."

2.3.5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. It shall not be a defense for the 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.

2.3.6. Bypass

- a. "**Bypass**" is the intentional diversion of waste streams from any portion of a treatment facility. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause 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.
- b. Bypasses are prohibited unless all of the following 3 conditions are met:
 - i. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;
 - ii. There are no feasible alternatives to bypass, such as the construction and 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 preventative maintenance;
 - iii. The permittee submits notice of an unanticipated bypass to the Division of Water Resources in the appropriate Environmental Field Office within 24 hours of becoming aware of the bypass (if this information is provided orally, a written submission must be provided within five days). When the need for the bypass is foreseeable, prior notification shall be submitted to the director, if possible, at least 10 days before the date of the bypass.
- c. Bypasses not exceeding permit limitations are allowed **only** if the bypass is necessary for essential maintenance to assure efficient operation. All other bypasses are prohibited. Allowable bypasses not exceeding limitations are not subject to the reporting requirements of 2.3.6.b.iii, above.

2.3.7. Washout

- a. For domestic wastewater plants only, a "washout" shall be defined as loss of Mixed Liquor Suspended Solids (MLSS) of 30.00% or more. This refers to the MLSS in the aeration basin(s) only. This does not include MLSS decrease due to solids wasting to the sludge disposal system. A washout can be caused by improper operation or from peak flows due to infiltration and inflow.
- b. A washout is prohibited. If a washout occurs the permittee must report the incident to the Division of Water Resources in the appropriate Environmental Field Office within 24 hours by telephone. A written submission must be provided within five days. The washout must be noted on the discharge monitoring report. Each day of a washout is a separate violation.

2.4. LIABILITIES

2.4.1. Civil and Criminal Liability

Except as provided in permit conditions for "***Bypassing,***" "***Overflow,***" and "***Upset,***" nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this Permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

2.4.2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or the Federal Water Pollution Control Act, as amended.

3.0. PERMIT SPECIFIC REQUIREMENTS

3.1. CERTIFIED OPERATOR

The waste treatment facilities shall be operated under the supervision of a certified wastewater treatment operator and the collection system shall be operated under the supervision of a certified collection system operator in accordance with the Water Environmental Health Act of 1984.

3.2. POTW PRETREATMENT PROGRAM GENERAL PROVISIONS

As an update of information previously submitted to the division, the permittee will undertake the following activity.

- a. The permittee has been delegated the primary responsibility and therefore becomes the "control authority" for enforcing the 40 CFR 403 General Pretreatment Regulations. Where multiple plants are concerned the permittee is responsible for the Pretreatment Program for all plants within its jurisdiction. The permittee shall implement and enforce the Industrial Pretreatment Program in accordance with Section 403(b)(8) of the Clean Water Act, the Federal Pretreatment Regulations 40 CFR 403, Tennessee Water Quality Control Act Part 63-3-123 through 63-3-128, and the legal authorities, policies, procedures, and financial provisions contained in its approved Pretreatment Program, except to the extent this permit imposed stricter requirements. Such implementation shall require but not limit the permittee to do the following:
 - i. Carry out inspection, surveillance, and monitoring procedures which will determine, independent of information supplied by the industrial user (IU), whether the IU is in compliance with the pretreatment standards;
 - ii. Require development, as necessary, of compliance schedules for each IU for the installation of control technologies to meet applicable pretreatment standards;
 - iii. Require all industrial users to comply with all applicable monitoring and reporting requirements outlined in the approved pretreatment program and IU permit;
 - iv. Maintain and update, as necessary, records identifying the nature and character of industrial user discharges, and retain such records for a minimum of three (3) years;
 - v. Obtain appropriate remedies for noncompliance by an IU with any pretreatment standard and/or requirement;

- vi. Publish annually, pursuant to 40 CFR 403.8 (f)(2)(viii), a list of industrial users that have significantly violated pretreatment requirements and standards during the previous twelve-month period.
 - vii. Maintain an adequate revenue structure for continued operation of the pretreatment program.
 - viii. Update its Industrial Waste Survey at least once every five years. Results of this update shall be submitted to the Division of Water Resources, Pretreatment Section within 120 days of the effective date of this permit.
 - ix. Submit a written technical evaluation of the need to revise local limits within 120 days of the effective date of this permit to the state pretreatment program coordinator. The evaluation shall include the most recent pass-through limits proposed by the division. The technical evaluation shall be based on practical and specialized knowledge of the local program and not be limited by a specified written format.
- b. The permittee shall enforce 40 CFR 403.5, "prohibited discharges". Pollutants introduced into the POTW by a non-domestic source shall not cause pass through or interference as defined in 40 CFR Part 403.3. These general prohibitions and the specific prohibitions in this section apply to all non-domestic sources introducing pollutants into the POTW whether the source is subject to other National Pretreatment Standards or any state or local pretreatment requirements.

Specific prohibitions. Under no circumstances shall the permittee allow introduction of the following wastes in the waste treatment system:

- i. Pollutants which create a fire or explosion hazard in the POTW;
- ii. Pollutants which will cause corrosive structural damage to the treatment works, but in no case discharges with pH less than 5.0 unless the system is specifically designed to accept such discharges.
- iii. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the treatment system resulting in interference.
- iv. Any pollutant, including oxygen-demanding pollutants (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the treatment works.
- v. Heat in amounts which will inhibit biological activity in the treatment works resulting in interference, but in no case heat in such quantities that the temperature at the treatment works exceeds 40°C (104°F) unless the works are designed to accommodate such heat.
- vi. Any priority pollutant in amounts that will contaminate the treatment works sludge.

- vii. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
 - viii. Pollutants which result in the presence of toxic gases, vapors or fumes within the POTW in a quantity that may cause acute worker health and safety problems;
 - ix. Any trucked or hauled pollutants except at discharge points designated by the POTW.
- c. The permittee shall notify the Tennessee Division of Water Resources of any of the following changes in user discharge to the system no later than 30 days prior to change of discharge:
- i. New introductions into such works of pollutants from any source which would be a new source as defined in Section 306 of the Act if such source were discharging pollutants.
 - ii. New introductions of pollutants into such works from a source which would be subject to Section 301 of the "Federal Water Quality Act as Amended" if it were discharging such pollutants.
 - iii. A substantial change in volume or character of pollutants being introduced into such works by a source already discharging pollutants into such works at the time the permit is issued.

This notice will include information on the quantity and quality of the wastewater introduced by the new source into the publicly owned treatment works, and on any anticipated impact on the effluent discharged from such works. If this discharge necessitates a revision of the current NPDES permit or pass-through guidelines, discharge by this source is prohibited until the Tennessee Division of Water Resources gives final authorization.

d. Reporting Requirements

The permittee shall provide a semiannual report briefly describing the permittee's pretreatment program activities over the previous six-month period. Reporting periods shall end on the last day of the months of March and September. The report shall be submitted to the Division of Water Resources, Central Office and a copy to the appropriate Environmental Field Office no later than the 28th day of the month following each reporting period. For control authorities with multiple STPs, one report should be submitted with a separate Form 1 for each STP. Each report shall conform to the format set forth in the State POTW Pretreatment Semiannual Report Package which contains information regarding:

- i. An updated listing of the permittee's industrial users.

- ii. Results of sampling of the influent and effluent of the wastewater treatment plant. At least once each reporting period, the permittee shall analyze the wastewater treatment plant influent and effluent for the following pollutants, using the prescribed sampling procedures:

Pollutant	Sample Type
chromium, trivalent	24-hour composite
chromium, hexavalent	24-hour composite
total chromium	24-hour composite
copper	24-hour composite
lead	24-hour composite
nickel	24-hour composite
zinc	24-hour composite
cadmium	24-hour composite
mercury	24-hour composite
silver	24-hour composite
total phenols	grab
cyanide	grab

If any particular pollutant is analyzed more frequently than is required, the permittee shall report the maximum and average values on the semiannual report. All upsets, interferences, and pass-through violations must also be reported on the semiannual report, the actions that were taken to determine the causes of the incidents and the steps that have been taken to prevent the incidents from recurring.

At least once during the term of this permit, the permittee shall analyze the effluent from the STP (and report the results in the next regularly scheduled report) for the following pollutants:

chromium III	cyanide	phthalates, sum of the following: bis (2-ethylhexyl) phthalate butyl benzylphthalate di-n-butylphthalate diethyl phthalate
chromium VI	silver	
copper	benzene	
lead	carbon tetrachloride	
nickel	chloroform	
zinc	ethylbenzene	1,2 trans-dichloroethylene
cadmium	methylene chloride	tetrachloroethylene
mercury	naphthalene	toluene
phenols, total	1,1,1 trichloroethane	trichloroethylene
chromium, total		

- iii. Compliance with categorical and local standards, and review of industrial compliance, which includes a summary of the compliance status for all permitted industries. Also included is information on the number and type of major violations of pretreatment regulations, and the actions taken by the

POTW to obtain compliance. The effluent from all significant industrial users must be analyzed for the appropriate pollutants at least once per reporting period.

- iv. A list of industries in significant non-compliance as published in local newspapers in accordance with the requirements set forth in 40 CFR 403.8(f)(2)(viii).
- v. A description of all substantive changes made to the permittee's pretreatment program. Any such changes shall receive prior approval. Substantive changes include, but are not limited to, any change in any ordinance, major modification in the program's administrative structure, local limits, or a change in the method of funding the program.
- vi. Summary of permittee's industrial user inspections, which includes information on the number and type of industry inspected. All significant industrial users must be inspected at least once per year.

3.3. BIOSOLIDS MANAGEMENT PRACTICES

Sludge and/or biosolids disposal of in a municipal solid waste landfill must comply with 40 CFR 258 et seq.

- a. Reopener: If an applicable "acceptable management practice" or numerical limitation for pollutants in sewage sludge promulgated under Section 405(d)(2) of the Clean Water Act, as amended by the Water Quality Act of 1987, is more stringent than the sludge pollutant limit or acceptable management practice in this permit, or controls a pollutant not limited in this permit, this permit shall be promptly modified or revoked and reissued to conform to the requirements promulgated under Section 405(d)(2). The permittee shall comply with the limitations by no later than the compliance deadline specified in the applicable regulations as required by Section 405(d)(2) of the Clean Water Act.
- b. Notice of change in sludge disposal practice: The permittee shall give prior notice to the director of any change planned in the permittee's sludge disposal practice.

3.4. BIOMONITORING REQUIREMENTS, CHRONIC (OUTFALL 001)

The permittee shall conduct a 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test and a 7-Day Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test on samples of final effluent from Outfall 001.

The measured endpoint for toxicity will be the inhibition concentration causing 25% reduction in survival, reproduction and growth (IC_{25}) of the test organisms. The IC_{25} shall be determined based on a 25% reduction as compared to the controls, and as derived from linear interpolation. The average reproduction and growth responses will be determined based on the number of *Ceriodaphnia dubia* or *Pimephales promelas* larvae used to initiate the test.

Test shall be conducted and its results reported based on appropriate replicates of a total of five serial dilutions and a control, using the percent effluent dilutions as presented in the following table:

Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
4 X PL	2 X PL	Permit Limit (PL)	0.50 X PL	0.25 X PL	Control
% effluent					
12	6	3	1.5	0.75	0

The dilution/control water used will be moderately hard water as described in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013 (or the most current edition). A chronic standard reference toxicant quality assurance test shall be conducted with each species used in the toxicity tests and the results submitted with the discharge monitoring report. Additionally, the analysis of this multi-concentration test shall include review of the concentration-response relationship to ensure that calculated test results are interpreted appropriately.

Toxicity will be demonstrated if the IC₂₅ is less than or equal to the permit limit indicated for each outfall in the above table(s). Toxicity demonstrated by the tests specified herein constitutes a violation of this permit.

All tests will be conducted using a minimum of three 24-hour flow-proportionate composite samples of final effluent collected on days 1, 3 and 5. If, in any control more than 20% of the test organisms die in 7 days, the test (control and effluent) is considered invalid and the test shall be repeated within two (2) weeks. Furthermore, if the results do not meet the acceptability criteria in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013 (or the most current edition), or if the required concentration-response review fails to yield a valid relationship per guidance contained in Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing, EPA-821-B-00-004 (or the most current edition), that test shall be repeated. Any test initiated but terminated before completion must also be reported along with a complete explanation for the termination.

The toxicity tests specified herein shall be conducted semi-annually (1/ 6 months) for Outfall 001 and begin no later than 90 days from the effective date of this permit.

In the event of a test failure, the permittee must start a follow-up test within 2 weeks and submit results from a follow-up test within 30 days from obtaining initial WET testing results. The follow-up test must be conducted using the same serial dilutions as presented in the corresponding table(s) above. **The follow-up test will not negate an initial failed test. In addition, the failure of a follow-up test will constitute a separate permit violation.**

In the event of 2 consecutive test failures or 3 test failures within a 12-month period for the same outfall, the permittee must initiate a Toxicity Identification Evaluation/Toxicity Reduction Evaluation (TIE/TRE) study within 30 days and so notify the division by letter. This notification shall include a schedule of activities for the initial investigation of that outfall. **During the term of the TIE/TRE study, the frequency of biomonitoring shall be once every three months.** Additionally, the permittee shall submit progress reports once every three months throughout the term of the TIE/TRE study. The toxicity must be reduced to allowable limits for that outfall within 2 years of initiation of the TIE/TRE study. Subsequent to the results obtained from the TIE/TRE studies, the permittee may request an extension of the TIE/TRE study period if necessary to conduct further analyses. The final determination of any extension period will be made at the discretion of the division.

The TIE/TRE study may be terminated at any time upon the completion and submission of 2 consecutive tests (for the same outfall) demonstrating compliance. Following the completion of TIE/TRE study, the frequency of monitoring will return to a regular schedule, as defined previously in this section as well in Part I of the permit. **During the course of the TIE/TRE study, the permittee will continue to conduct toxicity testing of the outfall being investigated at the frequency of once every three months but will not be required to perform follow-up tests for that outfall during the period of TIE/TRE study.**

Test procedures, quality assurance practices, determinations of effluent survival/reproduction and survival/growth values, and report formats will be made in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Results of all tests, reference toxicant information, copies of raw data sheets, statistical analysis and chemical analyses shall be compiled in a report. The report will be written in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Two copies of biomonitoring reports (including follow-up reports) shall be submitted to the division. One copy of the report shall be submitted along with the discharge monitoring report (DMR). The second copy shall be submitted to the local Division of Water Resources office address (see table below):

Division of Water Resources			
Office	Location	Zip Code	Phone No.
Chattanooga	540 McCallie Avenue, Suite 550	37402-2013	(423) 634-5745
Jackson	1625 Hollywood Drive	38305	(731) 512-1300
Cookeville	1221 South Willow Avenue	38506	(931) 432-4015
Columbia	2484 Park Plus Drive	38401	(931) 380-3371
Johnson City	2305 Silverdale Road	37601	(423) 854-5400
Knoxville	3711 Middlebrook Pike	37921	(865) 594-6035
Memphis	8383 Wolf Lake Drive, Bartlett TN	38133-4119	(901) 371-3000
Nashville	711 R.S. Gass Boulevard	37243-1550	(615) 687-7000

3.5. PLACEMENT OF SIGNS

Within sixty (60) days of the effective date of this permit, the permittee shall place and maintain a sign(s) at each outfall and any bypass/overflow point in the collection system. For the purposes of this requirement, any bypass/overflow point that has discharged five (5) or more times in the last year must be so posted. The sign(s) should be clearly visible to the public from the bank and the receiving stream. The minimum sign size should be two feet by two feet (2' x 2') with one-inch (1") letters. The sign should be made of durable material and have a white background with black letters.

The sign(s) are to provide notice to the public as to the nature of the discharge and, in the case of the permitted outfalls, that the discharge is regulated by the Tennessee Department of Environment and Conservation, Division of Water Resources. The following is given as an example of the minimal amount of information that must be included on the sign:

Permitted CSO or unpermitted bypass/overflow point:

UNTREATED WASTEWATER DISCHARGE POINT
Clarksville STP
(931) 645-1857
NPDES Permit NO. TN0020656
TENNESSEE DIVISION OF WATER RESOURCES
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Nashville

NPDES Permitted Municipal/Sanitary Outfall:

TREATED MUNICIPAL/SANITARY WASTEWATER
Clarksville STP
(931) 645-1857
NPDES Permit NO. TN0020656
TENNESSEE DIVISION OF WATER RESOURCES
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Nashville

No later than sixty (60) days from the effective date of this permit, the permittee shall have the above sign(s) on display in the location specified.

3.6. ANTIDegradation

Pursuant to the Rules of the Tennessee Department of Environment and Conservation, Chapter 0400-40-3-.06, titled "Tennessee Antidegradation Statement," and in consideration of the department's directive in attaining the greatest degree of effluent reduction achievable in municipal, industrial, and other wastes, the permittee shall further be required, pursuant to the terms and conditions of this permit, to comply with the effluent limitations and schedules of compliance required to

implement applicable water quality standards, to comply with a State Water Quality Plan or other state or federal laws or regulations, or where practicable, to comply with a standard permitting no discharge of pollutants.

3.7. OTHER COMBINED SEWER CONTROLS

The diversion of combined sewer flow to the excess flow treatment train after the facility maximizes treatment its secondary peak capability during a wet weather event is allowable if all conditions in part 2.3.6 are met. Only in the case of maximized treatment of combined sewer wastewater, severe property damage may include washout as defined in this permit.

The permittee shall continue to comply with the following technology-based requirements (nine minimum controls).

1. Proper operation and regular maintenance programs for the sewer system and the combined sewer discharge points.
2. Maximum use of the collection system for storage.
3. Review and modification of pretreatment programs to assure combined sewer discharge impacts are minimized.
4. Maximization of flow to the Publicly Owned Treatment Works (POTW or sewage treatment plant (STP)) for treatment.
5. Prohibition of combined sewer discharges during dry weather.
6. Control of solid and floatable materials in combined sewer discharges.
7. Pollution prevention programs that focus on contaminant reduction activities.
8. Public notification to ensure that the public receives adequate notification of combined sewer discharge occurrences and combined sewer discharge impacts.
9. Monitoring to effectively characterize combined sewer discharge impacts and the efficacy of combined sewer discharge controls.

4.0. DEFINITIONS AND ACRONYMS

4.1. DEFINITIONS

A "**bypass**" is defined as the intentional diversion of waste streams from any portion of a treatment facility.

A "**calendar day**" is defined as the 24-hour period from midnight to midnight or any other 24-hour period that reasonably approximates the midnight to midnight time period.

A "**composite sample**" is a combination of not less than 8 influent or effluent portions, of at least 100 ml, collected over a 24-hour period. Under certain circumstances a lesser time period may be allowed, but in no case, less than 8 hours.

The "**daily maximum concentration**" is a limitation on the average concentration in units of mass per volume (e.g. milligrams per liter), of the discharge during any calendar day. When a proportional-to-flow composite sampling device is used, the daily concentration is the concentration of that 24-hour composite; when other sampling means are used, the daily concentration is the arithmetic mean of the concentrations of equal volume samples collected during any calendar day or sampling period.

"**Degradation**" means the alteration of the properties of waters by the addition of pollutants or removal of habitat. Alterations not resulting in the condition of pollution that are of a temporary nature or those alterations having de minimus impact (not measurable or less than 5 percent loss of assimilative capacity) will not be considered degradation. Degradation will not be considered de minimus if a substantial loss (more than 50 percent) of assimilative capacity has already occurred.

"**Discharge**" or "discharge of a pollutant" refers to the addition of pollutants to waters from a source.

A "**dry weather overflow**" is a type of sanitary sewer overflow and is defined as one day or any portion of a day in which unpermitted discharge of wastewater from the collection or treatment system other than through the permitted outfall occurs and is not directly related to a rainfall event. Discharges from more than one point within a 24-hour period shall be counted as separate overflows.

An "**ecoregion**" is a relatively homogeneous area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.

The "**geometric mean**" of any set of values is the n^{th} root of the product of the individual values where "n" is equal to the number of individual values. The

geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For the purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

A "**grab sample**" is a single influent or effluent sample collected at a particular time.

The "**instantaneous maximum concentration**" is a limitation on the concentration, in milligrams per liter, of any pollutant contained in the wastewater discharge determined from a grab sample taken from the discharge at any point in time.

The "**instantaneous minimum concentration**" is the minimum allowable concentration, in milligrams per liter, of a pollutant parameter contained in the wastewater discharge determined from a grab sample taken from the discharge at any point in time.

The "**monthly average amount**", shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made.

The "**monthly average concentration**", other than for *E. coli* bacteria, is the arithmetic mean of all the composite or grab samples collected in a one-calendar month period.

A "**one week period**" (or "**calendar-week**") is defined as the period from Sunday through Saturday. For reporting purposes, a calendar week that contains a change of month shall be considered part of the latter month.

"**Pollutant**" means sewage, industrial wastes, or other wastes.

A "**quarter**" is defined as any one of the following three-month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, and/or October 1 through December 31.

A "**rainfall event**" is defined as any occurrence of rain, preceded by 10 hours without precipitation that results in an accumulation of 0.01 inches or more. Instances of rainfall occurring within 10 hours of each other will be considered a single rainfall event.

A "**rationale**" (or "fact sheet") is a document that is prepared when drafting an NPDES permit or permit action. It provides the technical, regulatory and administrative basis for an agency's permit decision.

A "**reference site**" means least impacted waters within an ecoregion that have been monitored to establish a baseline to which alterations of other waters can be compared.

A "**reference condition**" is a parameter-specific set of data from regional reference sites that establish the statistical range of values for that particular substance at least-impacted streams.

A “**sanitary sewer overflow (SSO)**” is defined as an unpermitted discharge of wastewater from the collection or treatment system other than through the permitted outfall.

“**Sewage**” means water-carried waste or discharges from human beings or animals, from residences, public or private buildings, or industrial establishments, or boats, together with such other wastes and ground, surface, storm, or other water as may be present.

“**Severe property damage**” when used to consider the allowance of a bypass or SSO means 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 or SSO. Severe property damage does not mean economic loss caused by delays in production.

“**Sewerage system**” means the conduits, sewers, and all devices and appurtenances by means of which sewage and other waste is collected, pumped, treated, or disposed.

A “**subecoregion**” is a smaller, more homogenous area that has been delineated within an ecoregion.

“**Upset**” means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based 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.

The term, “**washout**” is applicable to activated sludge plants and is defined as loss of mixed liquor suspended solids (MLSS) of 30.00% or more from the aeration basin(s).

“**Waters**” means any and all water, public or private, on or beneath the surface of the ground, which are contained within, flow through, or border upon Tennessee or any portion thereof except those bodies of water confined to and retained within the limits of private property in single ownership which do not combine or effect a junction with natural surface or underground waters.

The “**weekly average amount**”, shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar week when the measurements were made.

The “**weekly average concentration**”, is the arithmetic mean of all the composite samples collected in a one-week period. The permittee must report the highest weekly average in the one-month period.

4.2. ACRONYMS AND ABBREVIATIONS

1Q10 – 1-day minimum, 10-year recurrence interval

30Q20 – 30-day minimum, 20-year recurrence interval

7Q10 – 7-day minimum, 10-year recurrence interval

BAT – best available technology economically achievable

BCT – best conventional pollutant control technology

BDL – below detection level

BOD₅ – five day biochemical oxygen demand

BPT – best practicable control technology currently available

CBOD₅ – five day carbonaceous biochemical oxygen demand

CEI – compliance evaluation inspection

CFR – code of federal regulations

CFS – cubic feet per second

CFU – colony forming units

CIU – categorical industrial user

CSO – combined sewer overflow

DMR – discharge monitoring report

D.O. – dissolved oxygen

E. coli – *Escherichia coli*

EFO – environmental field office

LB(lb) - pound

IC₂₅ – inhibition concentration causing 25% reduction in survival, reproduction and growth of the test organisms

IU – industrial user

IWS – industrial waste survey

LC₅₀ – acute test causing 50% lethality

MDL – method detection level

MGD – million gallons per day

MG/L(mg/l) – milligrams per liter

ML – minimum level of quantification

ml – milliliter

MLSS – mixed liquor suspended solids

MOR – monthly operating report

NODI – no discharge
NOEC – no observed effect concentration
NPDES – national pollutant discharge elimination system
PL – permit limit
POTW – publicly owned treatment works
RDL – required detection limit
SAR – semi-annual [pretreatment program] report
SIU – significant industrial user
SSO – sanitary sewer overflow
STP – sewage treatment plant
TCA – Tennessee code annotated
TDEC – Tennessee Department of Environment and Conservation
TIE/TRE – toxicity identification evaluation/toxicity reduction evaluation
TMDL – total maximum daily load
TRC – total residual chlorine
TSS – total suspended solids
WQBEL – water quality based effluent limit

RATIONALE

Clarksville STP
NPDES PERMIT No. TN0020656
DATE: 7/27/15
Permit Writer: Maybelle T. Sparks

1. FACILITY INFORMATION

Clarksville STP
Mr. Pat Hickey
Clarksville, Montgomery County, Tennessee
(615) 783-1515
Treatment Plant Average Design Flow: 25 MGD
Percentage Industrial Flow: Continuous and intermittent flows approximate 2% of STP design flow
Treatment Description: Activated sludge preceded by rotary screening, grit removal and primary clarification and followed by clarification and chlorine disinfection. Currently, flows exceeding maximized peak treatment capability are combined wastewater and routes around biological treatment after primary settling and are blended with treated wastewater for disinfection before discharge. Ongoing WWTP improvements will eliminate the CSO-related bypass of biological treatment. Sludge is dewatered and disposed of in a municipal solid waste landfill.

2. RECEIVING STREAM INFORMATION

Barkley Reservoir at Cumberland River at miles 125.0, 125.6, and 126.2.
Watershed Group: Cumberland-Lower-Barkley Lake
Hydrocode: 5130205
Low Flow: 1Q10 = 722 MGD (1118 CFS)
Low Flow Reference:
USGS Water-Resource Investigation Report 95-4293
Station #03436500 and 03436490 (Red River)
Tier Designation: Available conditions waters for all parameters except for temperature
Stream Classification Categories:

Domestic Wtr Supply	Industrial	Fish & Aquatic	Recreation
X	X	X	X
Livestock Wtr & Wlife	Irrigation	Navigation	
X	X	X	

Water Quality Assessment: Not supporting of fish and aquatic life and recreation designated uses due to thermal impairment

3. CURRENT PERMIT STATUS

Permit Type:	Municipal
Classification:	Major
Issuance Date:	30-APR-15
Expiration Date:	30-JUN-15
Effective Date:	01-MAY-15

4. NEW PERMIT LIMITATIONS AND COMPLIANCE SCHEDULE SUMMARY

- a. The permittee will continue to be required to analyze 001 CSO releases.
- b. Compliance Schedule Summary

Description of Report to be Submitted	Reference Section in Permit
Monthly Discharge Monitoring Reports	1.4.1
Monthly Operational Reports	1.4.4
Monthly Bypass and Overflow Summary Report	1.4.5.1
Industrial Waste Survey Report within 120 days of the effective permit date	3.2.a.viii
Biomonitoring Report beginning within 90 days of the effective permit date	3.4 and 3.5

c. For comparison, this rationale contains a table depicting the previous permit limits and effluent monitoring requirements in Appendix 1.

5. PREVIOUS PERMIT DISCHARGE MONITORING REPORT REVIEW

A review of the DMR summary from August 2010- March 2014 reveals that the City of Clarksville has exceeded permit limits for BOD₅ (monthly avg, daily max and percent removal), TSS (monthly avg, daily max and percent removal), settleable solids, *E. coli* (daily max) and bypassing.

A complete discharge monitoring report summary is located in Appendix 2.

6. PROPOSED EFFLUENT LIMITS & RATIONALE, OUTFALL 001

PARAMETERS	MONTHLY AVERAGE CONCENTRATION (MG/L)	MONTHLY AVERAGE AMOUNT (LB/DAY)	WEEKLY AVERAGE CONCENTRATION (MG/L)	WEEKLY AVERAGE AMOUNT (LB/DAY)	DAILY MAXIMUM CONCENTRATION (MG/L)	DAILY MAXIMUM AMOUNT (LB/DAY)	RATIONALE
CBOD ₅	25	5213	35	7298	40	8340	D.O. protection, Refer to 7.1 below
NH ₃ -N	Report	—	Report	—	Report	—	D.O. protection, Refer to 7.1 below
Total Nitrogen	Report	—	—	—	Report	—	Refer to 7.3 below
Total Phosphorous	Report	—	—	—	Report	—	Refer to 7.3 below
Total Suspended Solids	30	6255	40	8340	45	9383	0400-40-5-.09
Dissolved Oxygen (mg/l)	1.0 (daily minimum) instantaneous	—	—	—	—	—	D.O. protection, Refer to 7.1 below
Total Chlorine Residual (mg/l)	—	—	—	—	1.2 (daily maximum)	—	Refer to 7.2 below
<i>E. coli</i> (colonies/100ml)	126/100 ml	—	—	—	487/100 ml	—	0400-40-3-.03, Refer to 7.4 below
Settleable Solids (ml/l)	—	—	—	—	1.0 (daily maximum)	—	0400-40-5-.09
pH (standard units)	6.0-9.0	—	—	—	—	—	0400-40-3-.03
Flow, Outfall 001 (MGD):							
Influent	Report	—	—	—	—	—	Used to quantify pollutant load
Effluent	Report	—	—	—	—	—	Used to quantify pollutant load
Combined flow receiving partial treatment (MGD):	Report				Report		Used to quantify pollutant load
Whole Effluent Toxicity:							
IC ₂₅	Survival, reproduction and growth in 3% effluent						Refer to 7.5 below
Combined discharge events, treated	Report occurrences						
Metals & Toxics:							Refer to 7.6 below
Sanitary Sewer Overflows, Total Occurrences					Report		Refer to 7.8 below
Dry Weather Overflows, Total Occurrences					Report		Refer to 7.8 below
CSO-Related Bypass of Treatment, Total Occurrences					Report		Refer to 7.8 below

Note: Weekly limitations on CBOD₅ and TSS concentrations are given as required per 40 CFR 133.102(a)(2) or 133.102(a)(4)(2) & 133.102 (b)(2) respectively; daily CBOD₅ and TSS limitations are authorized by T.C.A. 0400-40-5-.09; monthly and weekly mass loads are limited per 40 CFR 122.45(f) and based on the design flow as per 40 CFR 122.45(b); monthly average percent removal rates for CBOD₅ and TSS are required per 40 CFR 133.102(a)(3) or 133.102(a)(4)(iii) and 133.102 (b)(3) respectively. A minimum 40% daily removal rate is required as equivalent to a daily mass load limitation.

7. PROPOSED EFFLUENT LIMITS & RATIONALE, OUTFALLS 002, 004 AND 006

PARAMETERS	MONTHLY AVERAGE CONCENTRATION (MG/L)	MONTHLY AVERAGE AMOUNT (LB/DAY)	WEEKLY AVERAGE CONCENTRATION (MG/L)	WEEKLY AVERAGE AMOUNT (LB/DAY)	DAILY MAXIMUM CONCENTRATION (MG/L)	DAILY MAXIMUM AMOUNT (LB/DAY)	RATIONALE
BOD ₅	Report				Report		002 and 006; equivalent to primary (CSO Control Policy)
Total Suspended Solids	Report				Report		002 and 006; equivalent to primary (CSO Control Policy)
Dissolved Oxygen (mg/l)	Report, (daily minimum)						T.C.A. 0400-40-3-.03
<i>E. coli</i> (colonies/100ml)					Report		T.C.A. 0400-40-3-.03
Settleable Solids (ml/l)					Report		002 and 006; equivalent to primary (CSO Control Policy)
pH (standard units)	6.0-9.0	—	—	—	—	—	T.C.A. 0400-40-3-.03
Flow (MGD):							CSO Control Policy
CSO releases, treated					Report		002 and 006; equivalent to primary (CSO Control Policy)
Annual CSO releases, untreated*					6 occurrences (annual maximum)		004 (CSO Control Policy)
Average CSO releases, untreated*					4 (average occurrences per year)		004 (CSO Control Policy)
*Alternative: % of combined sewage captured for treatment or storage and treatment					85 % (annually)		CSO Control Policy

Note: Weekly limitations on CBOD₅ and TSS concentrations are given as required per 40 CFR 133.102(a)(2) or 133.102(a)(4)(2) & 133.102 (b)(2) respectively; daily CBOD₅ and TSS limitations are authorized by T.C.A. 0400-40-5-.09; monthly and weekly mass loads are limited per 40 CFR 122.45(f) and based on the design flow as per 40 CFR 122.45(b); monthly average percent removal rates for CBOD₅ and TSS are required per 40 CFR 133.102(a)(3) or 133.102(a)(4)(iii) and 133.102 (b)(3) respectively. A minimum 40% daily removal rate is required as equivalent to a daily mass load limitation.

The permittee shall annually report either % captured or “CSO releases, untreated” on their DMR.

7.1 CBOD₅, NH₃-N TOXICITY, DISSOLVED OXYGEN, AND PERCENT REMOVALS REQUIREMENTS

- a. This permit retains all of the technology-based effluent limitations issued as planning limits for design purposes in 1997 upon reissue of this permit.
- b. The treatment facility is required to remove 85% of the CBOD₅ and TSS that enter the facility on a monthly basis from outfall 001. This is part of the minimum requirement for all municipal treatment facilities contained in Code of Federal Regulations 40 Part 133.102. The reasons stated by the U.S.E.P.A. for these requirements are to achieve these two basic objectives:
 - (1) To encourage municipalities to correct excessive inflow and infiltration (I/I) problems in their sanitary sewer systems, and
 - (2) To help prevent intentional dilution of the influent wastewater as a means of meeting permit limits.

7.2. CHLORINATION

The residual chlorine limit is derived using the mass balance formula and the EPA instream protection value of 0.019 mg/l for fish and aquatic life. Applying this formula yields the following calculation:

$$\frac{0.019 (Q_d + Q_s)}{Q_d} = \text{Limit (mg/l)} = \frac{0.019(25 + 722)}{25} = 0.568 \text{ mg/l} \approx 0.6 \text{ mg/l}$$

where:

- 0.019 = instream protection value (acute)
- 25 = Q_d, design flow of STP (MGD)
- 722 = Q_s, 1Q₁₀ flow of receiving stream (MGD)

Adjustment for time of travel and decay in outfall line. (Appendix 5)

$$\text{Limit (mg/l)} = 0.6 + 0.6 = 1.2 \text{ mg/l}$$

where:

- 0.6 mg/l = chlorine decay in outfall line at 25 MGD
(time of travel for 25 MGD ≈ 30 minutes)

7.3. TOTAL NITROGEN AND TOTAL PHOSPHOROUS LIMITATIONS

Quarterly monitoring for Total Nitrogen and Total Phosphorous is imposed in support of the joint State/Federal Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico. Monitoring results from major municipal and industrial facilities discharging within the Mississippi River Basin will help assess current point source loadings to the Gulf and enable the task force to track changes in loadings across

the basin over time. EPA believes that Section 308(a) of the Clean Water Act provides broad authority to require nutrient monitoring, even where there is no reasonable potential for a particular facility to cause or contribute to excursions of criteria within the immediate receiving waterbody. Additionally, influent monitoring of the same parameters and frequency is imposed by the state for use in evaluating ability of existing technologies to remove nutrients. Quarterly results are to be reported as typical averages (sum of results divided by the number of samples within the reporting period; average concentration with average flow for the reporting period).

7.4. E. COLI REQUIREMENTS

Disinfection of wastewater is required to protect the receiving stream from pathogenic microorganisms. Fecal coliform and *E. coli* are indicator organisms used as a measure of bacteriological health of a receiving stream and the effectiveness of disinfection.

As of September 30, 2004, the criterion for fecal coliform has been removed from the State's Water Quality Standards. Thus, the division imposes an *E. coli* limit on discharges of treated sewage for the protection of recreational use of the stream in lieu of the fecal coliform limit. The *E. coli* daily maximum limit of 487 colonies per 100 ml applies to lakes and exceptional Tennessee waters. A maximum daily limit of 941 colonies per 100 ml applies to all other recreational waters.

7.5. BIOMONITORING

The division evaluates all dischargers for reasonable potential to exceed the narrative water quality criterion, "no toxics in toxic amounts". The division has determined that for municipal facilities with stream dilutions of less than 500 to 1, any of the following conditions may demonstrate reasonable potential to exceed this criterion.

- a. Toxicity is suspected or demonstrated.
- b. A pretreatment program is required.
- c. The design capacity of the facility is greater than 1.0 MGD.

Since the design capacity of the facility exceeds 1.0 MGD and a pretreatment program is required, the facility is considered to have the reasonable potential to violate the narrative water quality criterion, "no toxics in toxic amounts". Therefore, toxicity testing is required.

OUTFALL 001, CHRONIC TOXICITY

$$IC_{25} \% = \frac{\text{Design Flow}}{\text{Low Flow}} * 100 \geq \frac{25}{722} * 100 > 3\%$$

where:

- 722 = Low Flow - 1Q10 (MGD)
- 25 = Design Flow Capacity (MGD)
- IC₂₅ = Concentration causing 25% reduction in survival, reproduction and growth of test organisms

7.6. METALS AND TOXICS

Pass-through limitations for heavy metals and other toxic substances have been recalculated as part of the permit issuance process and/or due to changes in industrial waste contribution to the POTW. This POTW is required to implement/maintain a pretreatment program. More frequent monitoring will be required **in the permit** if (a) the reported concentrations approach or exceed calculated allowable values, (b) significant amounts of particular pollutants are present which may impact the treatment process sludge character or the receiving stream, or (c) minimum information is lacking to accurately calculate water quality protection values, in which case additional stream monitoring may also be required.

A summary of the semi-annual report data does not indicate that the potential exists for the water quality criteria for any parameter to be exceeded. Appendix 3 lists the metal and toxic parameters calculations and the procedure used to derive the results.

7.7. VOLATILE ORGANIC, ACID-EXTRACTABLE, AND BASE-NEUTRAL COMPOUNDS

The division evaluated effluent concentrations of volatile organic, acid-extractable, and base-neutral compounds and antimony, arsenic, beryllium, selenium and thallium for potential to violate water quality criteria using the following mass balance equation:

$$C_m = \frac{Q_s C_s + Q_w C_w}{Q_s + Q_w}$$

where:

- C_m = resulting in-stream concentration after mixing
- C_w = concentration of pollutant in wastewater
- C_s = stream background concentration
- Q_w = wastewater flow, (STP design flow)
- Q_s = stream low flow

to protect water quality:

$$C_w \leq C_a$$

where:

$$\begin{aligned} C_a &= \text{STP effluent concentration allowable} \\ &= \frac{(S_A) [C_m (Q_s + Q_w) - Q_s C_s]}{Q_w} \end{aligned}$$

and (S_A) = the percent "Stream Allocation".

The reasonable potential evaluation uses the following assumptions and procedures:

- a. Stream background concentrations, C_s , for all volatile organic, acid-extractable, and base-neutral compounds equal zero unless actual stream data exists to show otherwise. Use of the effluent concentrations of such pollutants contributed by upstream dischargers as background is not justifiable due to the volatility and reactivity of these pollutants.
- b. The stream allocation, S_A , is 90% and is used as a factor of safety.
- c. A mass balance uses the STP design flow, the receiving stream critical low flow (7Q10 or 1Q10), the state water quality numeric criteria, and the stream allocation safety factor to derive the allowable effluent concentrations.
- d. When pollutants have potential to violate standards because the concentrations are below the scan detection levels but could be above the allowable water quality based effluent concentrations, the pollutants are handled one of three (3) ways:
 - i. Additional testing of detected and non-detected pollutants is required if contributing industrial processes are likely to contain them and the effluent scans have not met the minimum required detection levels (RDL) in the state water quality standards or approximated the method detection limits (MDL) of the approved test methods for the pollutants in 40 CFR Part 136.
 - ii. If the required RDL has been used and resulted in non-detection, or if an MDL has been used with non-detection and the contributing industrial processes do not reasonably contain that pollutant, the division drops the pollutant from further consideration.
 - iii. Pollutants detected at levels high enough to violate standards are limited in the permit to the allowable concentration, C_w , based on STP design flow.

Calculations for this permit have been done using a standardized spreadsheet, titled "WQ Based Effluent Calculations- Other Compounds", and are located in Appendix 4. All metals other than antimony, arsenic, beryllium, selenium, and thallium have been evaluated using procedures described in the rationale, or fact sheet, section headed, "METALS & TOXICS".

The evaluation indicates that volatile organic, acid extractable, and base neutral compounds and antimony, arsenic, beryllium, selenium, and thallium do not exhibit the potential to violate water quality criteria and thus will not be given effluent limitations and monitoring requirements in the permit.

7.8. OVERFLOW AND BYPASS REPORTING

For the purposes of demonstrating proper operation of the collection, transmission, and treatment system, the permit defines overflow as any release of sewage other than through permitted outfalls. This definition includes, but is not necessarily limited to, sanitary sewer overflows and dry weather overflows as defined. For example, a collection system blockage or hydraulic overload that causes backup and release of sewage into a building during a wet weather event may not clearly fit either the definition of a sanitary sewer overflow or a dry weather overflow. Still, any unpermitted release potentially warrants permittee mitigation of human health and/or water quality impacts via direct or indirect contact and demonstrates a hydraulic problem in the system that warrants permittee consideration as part of proper operation and maintenance of the system.

However, for the more typical, unpermitted, releases into the environment, this permit intends interchangeable use of the terms, “overflow” and “sanitary sewer overflow” for compliance reporting purposes.

8. OTHER REQUIREMENTS AND CONDITIONS

8.1. CERTIFIED WASTEWATER TREATMENT OPERATOR

The waste treatment facilities shall be operated under the supervision of a certified wastewater treatment operator in accordance with the Water Environmental Health Act of 1984.

8.2. COLLECTION SYSTEM CERTIFIED OPERATOR

The collection system shall be operated under the supervision of a certified collection system operator in accordance with the Water Environmental Health Act of 1984.

8.3. PRETREATMENT PROGRAM

The Clarksville STP has an approved pretreatment program. An updated Industrial Waste Survey must be completed within 120 days of permit reissuance.

At least once each reporting period, all permittees with approved pretreatment programs are required to analyze the STP influent and effluent for the following pollutant parameters: chromium (trivalent and hexavalent and total if drinking water use applies), copper, lead, nickel, zinc, silver, cadmium, mercury, total phenols, and cyanide. These pollutants were selected because, historically, they are the ones that tend to be predominant in industrial wastewaters. Other pollutants may be added to the list, as required.

During preparation of this permit, data from ten previous semiannual reports were analyzed. If any particular value of a pollutant equals or exceeds 85% of the pass-through limit, the pollutant was added to the list of those that are required to be sampled. Based on our review of the semiannual reports and other documents, sampling for additional pollutants is not required at this time.

8.4. COMBINED SEWER OVERFLOWS

On April 11, 1994, the Environmental Protection Agency issued its Combined Sewer Overflow (CSO) policy. This policy established a national approach for controlling discharges into the nation's waters from combined sewer systems (CSS). This policy included three phases of permitting: Phase I, Phase II, and Post-Phase II.

Phase I permitting includes the identification of combined sewer outfalls in the permit, the implementation of the technology based requirements (nine minimum controls), and the development of a long-term control plan. Phase II permitting includes the identification of the combined sewer discharge outfalls in the permit, the continued implementation of the technology based requirements (nine minimum controls), and implementation of the selected long-term control plan. Post-Phase II permitting includes the post construction compliance monitoring and revisions to the long-term control plan if necessary. Post Phase II compliance monitoring consists of technology-based controls (nine minimum controls), narrative water quality and performance-based standards, and numeric water quality-based effluent limits where appropriate. The division proposes the following controls in accordance with the updated Long Term Control Plan (LTCP), entitled, "Long Term Control Plan Update", June 27, 2014 by Hazen and Sawyer, Nashville.

TECHNOLOGY-BASED REQUIREMENTS (NINE MINIMUM CONTROLS)

Compliance with these controls was required by January 1, 1997.

PERFORMANCE-BASED WATER QUALITY STANDARDS

For Performance Standards:

This permit will utilize a performance-based control related to the number of untreated discharge events occurring on average over time and maximum during each year and as an alternative will utilize the performance-based control related to the percent of combined sewage captured for treatment or storage and treatment. The August 1994 LTCP (Engineering Report, CSO Control Plan, J.R. Wauford & Co.) called for construction vortex separators large enough to provide primary treatment of 100% of the combined sewer flows for all but an average of four events per year. In accordance with EPA's 1994 CSO Control Policy, this permit will allow up to six untreated overflow events per year and additionally require that the number of untreated events over a permit term of greater than one year to average less than or equal to four events per year. The updated LTCP calls for storage in the Gallows Hollow basin and once implemented, the system will meet the 85 % capture requirement of the CSO Control Policy. The improvements will reduce the number,

duration and volume of both treated discharge from the vortex separators (McClure Street and Gallows Hollow) and untreated discharge from Commerce Street.

PROPOSED WATER QUALITY-BASED CONTROLS

The selected long term control plan (LTCP) utilizes the approach that discharges will be limited such that violations of water quality standards will not occur. Therefore, the permittee's combined sewer discharges may not cause pollution in the receiving stream. For the purposes of this permit, any deviation from the stated water quality criteria of Chapter 0400-40-3 will constitute pollution. The Division will consider pollution resulting from a combined sewer discharge a violation of this permit. Having said that, the Division does not intend this permit to require compliance with daily maximum waterbody *E. coli* standard of 487 colonies per 100 ml at the end of the combined sewer discharge pipes.

The CSO Control Policy states that a program that meets the criteria of the presumption approach is presumed to provide an adequate level of control to comply with water quality-based requirements. Characterization, monitoring and modeling must demonstrate that the selected level of control (LOC) meets those requirements. In this case, the updated LTCP fully characterizes the system and includes monitoring and modeling results that support attainment of water quality-based requirements.

8.5. PERMIT TERM

This permit is being reissued for 4 years in order to coordinate its reissuance with other permits located within the Cumberland-Lower-Barkley Lake Watershed.

9. ANTIDegradation STATEMENT/WATER QUALITY STATUS

Tennessee's Antidegradation Statement is found in the Rules of the Tennessee Department of Environment and Conservation, Chapter 0400-40-3-.06. It is the purpose of Tennessee's standards to fully protect existing uses of all surface waters as established under the Act.

Stream determinations for this permit action are associated with the waterbody segment identified by the division as segment ID# TN05130205015_1000.

The division has made a water quality assessment of the receiving waters associated with the subject discharge(s) and has found the receiving stream to be available conditions waters. Additionally, this water does not support the fish and aquatic life and recreation designated uses due to temperature and dissolved oxygen from industrial thermal discharges.

TMDLs have been developed and approved for this waterbody segment (Barkley Reservoir Watershed in Cheatham, Dickson, Houston, Humphreys, Montgomery, Robertson and Stewart Counties) on the following parameters and dates:

Parameter
E. coli

TMDL Approval Date
December 26, 2007

The proposed terms and conditions of this permit comply with the wasteload allocations of these TMDLs.

APPENDIX 1 PREVIOUS PERMIT LIMITS

Outfall 001

PARAMETERS	MONTHLY AVERAGE CONCENTRATION (MG/L)	MONTHLY AVERAGE AMOUNT (LB/DAY)	WEEKLY AVERAGE CONCENTRATION (MG/L)	WEEKLY AVERAGE AMOUNT (LB/DAY)	DAILY MAXIMUM CONCENTRATION (MG/L)	DAILY MAXIMUM AMOUNT (LB/DAY)	MEASUREMENT FREQUENCY
CBOD ₅	25	5213	35	7298	40	8340	7/week
NH ₃ -N	Report		Report		Report	—	7/week
Total Suspended Solids	30	6255	40	8340	45	9383	7/week
Total Nitrogen	Report				Report		quarterly
Total phosphorous	Report				Report		quarterly
Dissolved Oxygen (mg/l)	1.0 (daily minimum instantaneous)	—	—	—	—	—	7/week
<i>E. coli</i> (colonies/100ml)	126/100 ml	—	—	—	487/100 ml	—	7/week
Settleable Solids (ml/l)		—	—	—	1.0 (daily maximum)	—	7/week
pH (standard units)	6.0-9.0	—	—	—	—	—	7/week
Flow, Outfall 001 (MGD):							
Influent	Report	—	—	—	Report	—	7/week
Effluent	Report	—	—	—	Report	—	7/week
Combined flow receiving partial treatment (MGD):	Report				Report		7/week
Whole Effluent Toxicity:							
IC ₂₅	Survival, reproduction and growth in 3% effluent						1/ 6 months
Combined discharge event, treated	Report occurrences						monthly
Sanitary Sewer Overflows, Total Occurrences					Report	continuous	
Dry Weather Overflows, Total Occurrences					Report	continuous	
Bypass of Treatment, Total Occurrences					Report	continuous	

Outfalls 002 and 006

Effluent Characteristics	Effluent Limitations						Monitoring Requirements	
	Monthly Average Conc. (mg/l)	Monthly Average Amount (lb/day)	Weekly Average Conc. (mg/l)	Weekly Average Amount (lb/day)	Daily Maximum Conc. (mg/l)	Daily Minimum Percent Removal	Measurement Frequency	Sample Type
BOD ₅	Report	Report			Report		1 event/year	composite
Suspended Solids	Report	Report			Report		1 event/year	composite

Effluent Characteristics	Effluent Limitations			Monitoring Requirements	
	Monthly Average	Daily Minimum	Daily Maximum	Measurement Frequency	Sample Type
<i>E. coli</i> *	Report			1 event/quarter	grab
Settleable solids			Report	1 event/quarter	grab
Dissolved oxygen		Report		1 event/year	grab
pH (Standard Units)		6.0	9.0	1 event/year	grab
Flow (MGD)	Report		Report	monthly	continuous
Discharge event, treated	Report occurrences			monthly	visual
Discharge event, untreated	6 occurrences (annual maximum)			annually	visual
Discharge event, untreated	4 (average occurrences per year)			once/prmt cycle	calculated

APPENDIX 2 Discharge Monitoring Report Summary

Outfall 001:

	Flow (MGD)		Biochemical Oxygen Demand			Suspended Solids			Settleable Solids (ml/l)	pH (std. units)		Cl ₂ Daily Max	Effluent (mg/l)			By-passing			
	Monthly Average	Daily Max	Influent (mg/l)		Effluent (mg/l)	Influent (mg/l)	Effluent (mg/l)			Min	Max		Monthly Average	Daily Max	Daily Min		Monthly Average	Daily Max	
			Report	Report			Report	Report											Report
Limits	Report	Report	Report	Report	Report	Report	Report	Report	1.0	6.0	9.0	Report	Report	Report	Report	Report	Report	Report	
Summer				25	40			30	45				Report	Report					
Winter				25	40			30	45				Report	Report					
Average	9.581	17.202	226	13	40	94	244.3	28	79	88	6.3	6.8	7.3	8.6	19.9	4.2	17	519	
Maximum	13.860	40.240	326	83	274	99	396.0	137	350	98	44.0	7.3	7.8	48.0	74.7	5.4	44	2420	
Minimum	7.600	8.890	178	2	5	63	188.0	5	8	40	0.1	5.5	4.5	0.2	0.5	0.2	1	2	
+ = Exceedence				4	9	3		10	18	10	19	1				1		12	2
Date																			
Aug/10			261				227	67 +	93 +		0.4	6.8	7.3			2.9	2.09	26.9	
Sep/10			244	63 +	195 +	73 +	239	50 +	124 +	79 +	17.0 +	6.9	7.4			3.5	1.7	1414 +	
Oct/10			249	83 +	274 +	67 +	237	137 +	200 +	40 +	44.0 +	7.0	7.5	25.00	53.00	2.4	5.42	2420 +	
Nov/10	7.640	14.430	257	56 +	200 +	63 +	224	115 +	350 +	50 +	39.0 +	7.1	4.5	48.00	63.00	4.2	4.58	1299 +	
Dec/10			256	29 +	168 +	89	246	77 +	300 +	61 +	40.0 +	7.1	7.5	32.00	58.00	5.0	2.05	33.1	
Jan/11			231	19	33	89	215	63 +	176 +	71 +	40.0 +	6.6	7.3	10.20	74.00	4.8	4.71	344	
Feb/11	9.710	20.200	235	18	33	93	230	30	90 +	87	0.3	6.6	7.7	4.90	12.00	4.4	15	326	
Mar/11	10.520	20.100	200	6	13	97	202	11	23	94	0.2	7.0	7.4	0.43	2.08	4.5	14	365	
Apr/11	13.590	29.410	193	13	43 +	92	192	34 +	112 +	83 +	7.0 +	6.9	7.3	1.25	9.23	3.4	1.3	1120 +	
May/11	11.670	27.250	215	8	46 +	97	197	23	268 +	89	8.5 +	6.9	7.3	0.89	3.40	4.1	24	1167 +	
Jun/11	8.650	12.410	246	14	29	94	269	55 +	177 +	79 +	14.0 +	7.0	7.5	1.27	18.10	4.8	40	1770 +	
Jul/11	8.160	15.480	245	17	82 +	93	282	52 +	290 +	81 +	2.5 +	7.2	7.7	12.40	38.00	4.2	44	2420 +	
Aug/11	7.810	11.320	253	15	44 +	94	265	46 +	144 +	83 +	2.8 +	7.1	7.8	9.80	31.00	3.2	40	2420 +	
Sep/11	8.680	13.190	215	9	23	96	228	25	125 +	89	2.5 +	7.1	7.5	1.15	3.27	3.8	12	670 +	
Oct/11	7.750	8.890	233	9	13	96	243	19	33	92	0.5	6.1	7.6	2.50	8.00	4.9	23	281	
Nov/11	10.200	17.760	198	7	19	96	197	28	84 +	83 +	34.0 +	6.7	7.3	0.59	2.00	4.0	17	39	
Dec/11	11.040	21.960	180	7	12	96	188	17	24	88	1.2 +	6.6	7.2	0.60	2.00	4.1	30	131	
Jan/12	10.420	17.500	198	8	16	96	220	14	18	93	0.4	6.7	7.4	0.58	3.00	4.3	25	227	
Feb/12	8.830	10.480	214	11	20	95	257	24	39	90	0.7	6.9	7.3	1.34	6.10	5.0	32	108	
Mar/12	9.900	19.750	204	8	14	96	240	17	25	93	0.6	7.0	7.8	0.37	1.00	5.0	22	238	
Apr/12	8.090	10.050	229	6	10	98	256	16	33	94	1.0	6.9	7.5	0.29	0.71	4.9	21	407	
May/12	8.000	9.880	214	8	12	96	245	20	43	92	2.0 +	6.9	7.5	1.65	14.05	4.7	19	132	
Jun/12	7.600	9.670	217	9	16	96	250	24	47 +	90	1.5 +	6.5	7.1	0.68	8.90	3.4	16	1013 +	
Jul/12	8.250	12.010	194	2	5	99	219	7	12	97	0.4	6.6	7.0	0.15	0.52	5.0	0.78	2	
Aug/12	8.130	11.250	200	4	9	98	221	10	19	95	0.5	6.6	7.4	0.22	0.45	4.5	8	29	
Sep/12	8.270	10.290	213	4	8	98	214	8	12	96	0.5	6.6	7.2	0.16	0.63	4.9	5	14	
Oct/12	8.100	12.870	226	5	8	98	200	15	27	89	0.9	6.9	7.3	0.17	0.56	4.6	11	85	
Nov/12	7.610	10.070	234	5	7	98	246	16	22	93	0.7	6.8	7.0	0.22	0.94	4.8	6	21	
Dec/12	9.500	17.610	198	5	9	97	234	12	20	94	1.2 +	6.8	7.3	0.55	1.95	3.7	6	127	
Jan/13	10.720	39.780	189	8	15	96	216	18	36	91	1.7 +	6.8	7.2	2.25	5.80	4.1	14	116	
Feb/13	9.690	13.870	202	8	13	96	211	19	39	91	1.3 +	6.5	7.1	1.50	4.21	5.2	21	73	
Mar/13	11.230	21.850	178	9	21	94	190	21	54 +	89	0.9	6.7	7.2	2.85	9.75	2.2	15	1705 +	
Apr/13	13.860	40.240	185	7	15	96	196	20	45	90	1.0	6.8	7.1	0.53	2.49	4.3	16	29	
May/13	10.630	16.400	207	5	10	97	240	11	23	95	0.7	6.5	7.4	0.18	0.81	5.4	29	190	
Jun/13	8.540	15.110	206	7	17	95	242	21	47 +	91	3.0 +	6.8	7.4	4.06	21.10	5.0	13	123	
Jul/13	9.540	17.000	213	5	15	97	246	12	33	94	0.5	6.8	7.3	9.48	23.10	3.7	2	18	
Aug/13	9.130	14.480	237	5	9	98	268	9	26	97	0.8	6.8	7.5	9.56	25.95	4.9	1	4	
Sep/13	8.980	15.420	279	4	9	99	295	5	8	98	0.3	7.1	7.6	17.89	35.27	0.2 +	12	35	
Oct/13	8.860	12.120	326	6	12	98	317	7	16	98	0.2	7.2	7.5	16.84	43.27	4.5	17	78	
Nov/13	9.590	20.740	274	8	19	97	293	7	17	97	0.2	7.0	7.6	17.34	33.29	5.0	23	728 +	
Dec/13	10.590	18.610	250	6	19	97	294	9	26	97	0.1	7.2	7.6	29.21	41.80	4.7	38	399	
Jan/14	10.230	15.130	244	8	21	97	316	11	24	96	0.1	7.3	7.7	32.92	74.70	4.4	35	65	
Feb/14	12.310	30.500	252	18	120 +	93	396	20	104 +	95	0.1	7.3	7.6	28.78	49.24	4.6	29	184	
Mar/14	11.630	17.800	266	11	28	96	347	12	37	96	0.1	5.5 +	7.7	31.62	49.99	2.6	21	426	

APPENDIX 3 Metal and Toxic Parameter Calculations

The following procedure is used to calculate the allowable instream concentrations for pass-through guidelines and permit limitations.

- a. The most recent background conditions of the receiving stream segment are compiled. This information includes:
 - * 1Q10 of receiving stream (722 MGD, USGS)
 - * Calcium hardness (129.179 mg/l, water quality monitoring data)
 - * Total suspended solids (16.571 mg/l, water quality monitoring data)
 - * Background metals concentrations (½ water quality criteria and water quality monitoring data)
 - * Other dischargers impacting this segment (none)
 - * Downstream water supplies, if applicable
- b. The chronic water quality criteria are converted from total recoverable metal at lab conditions to dissolved lab conditions for the following metals: cadmium, copper, trivalent chromium, lead, nickel and zinc. Then translators are used to convert the dissolved lab conditions to total recoverable metal at ambient conditions.
- c. The acute water quality criteria are converted from total recoverable metal at lab conditions to dissolved lab conditions for the following metals: cadmium, copper, trivalent chromium, lead, nickel, zinc and silver. Then translators are used to convert the dissolved lab conditions to total recoverable metal at ambient conditions for the following metals: cadmium, copper, lead, nickel and silver.
- d. The resulting allowable trivalent and hexavalent chromium concentrations are compared with the effluent values characterized as total chromium on permit applications. If reported total chromium exceeds an allowable trivalent or hexavalent chromium value, then the calculated value will be applied in the permit for that form of chromium unless additional effluent characterization is received to demonstrate reasonable potential does not exist to violate the applicable state water quality criteria for chromium.
- e. A standard mass balance equation determines the total allowable concentration (permit limit) for each pollutant. This equation also includes a percent stream allocation of no more than 90%.

The following formulas are used to evaluate water quality protection:

$$C_m = \frac{Q_s C_s + Q_w C_w}{Q_s + Q_w}$$

where:

C_m = resulting in-stream concentration after mixing
C_w = concentration of pollutant in wastewater
C_s = stream background concentration
Q_w = wastewater flow
Q_s = stream low flow

to protect water quality:

$$C_w \leq \frac{(S_A) [C_m (Q_s + Q_w) - Q_s C_s]}{Q_w}$$

where (S_A) is the percent "Stream Allocation".

Calculations for this permit have been done using a standardized spreadsheet, titled "Water Quality Based Effluent Calculations." Division policy dictates the following procedures in establishing these permit limits:

1. The critical low flow values are determined using USGS data:

Fish and Aquatic Life Protection

7Q10 - Low flow under natural conditions

1Q10 - Regulated low flow conditions

Other than Fish and Aquatic Life Protection

30Q2 - Low flow under natural conditions

2. Fish & Aquatic Life water quality criteria for certain Metals are developed through application of hardness dependent equations. These criteria are combined with dissolved fraction methodologies in order to formulate the final effluent concentrations.
3. For criteria that are hardness dependent, chronic and acute concentrations are based on a Hardness of 25 mg/L and Total Suspended Solids (TSS) of 10 mg/L unless STORET or Water Supply intake data substantiate a different value. Minimum and maximum limits on the hardness value used for water quality calculations are 25 mg/L and 400 mg/L respectively. The minimum limit on the TSS value used for water quality calculations is 10 mg/L.
4. Background concentrations are determined from the division database, results of sampling obtained from the permittee, and/or obtained from nearby stream sampling data. If this background data is not sufficient, one-half of the chronic "In-stream Allowable" water quality criteria for fish and aquatic life is used. If the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, then the measured background concentration is used in lieu of the chronic "In-stream Allowable" water quality criteria for the purpose of calculating the appropriate effluent limitation (C_w). Under these circumstances, and in the event the "stream allocation" is less than 100%, the calculated chronic effluent limitation for fish and aquatic life should be equal to the chronic "In-stream Allowable" water quality criteria. These guidelines should be strictly followed where the industrial source water is not the receiving stream.

Where the industrial source water is the receiving stream, and the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, consideration may be given as to the degree to which the permittee should be required to meet the requirements of the water quality criteria in view of the nature and characteristics of the receiving stream.

The spreadsheet has fifteen (15) data columns, all of which may not be applicable to any particular characteristic constituent of the discharge. A description of each column is as follows:

Column 1: The "Stream Background" concentrations of the effluent characteristics.

Column 2: The "Chronic" Fish and Aquatic Life Water Quality criteria. For cadmium, copper, trivalent chromium, lead, nickel, and zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Continuous Concentration (CCC) is calculated using the equation:

$$CCC = (\exp \{ m_C [\ln (\text{stream hardness})] + b_C \}) (CCF)$$

CCF = Chronic Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 0400-40-3-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent; no chronic criterion exists for silver. Published criteria are used for non-metal parameters.

Column 3: The "Acute" Fish and Aquatic Life Water Quality criteria. For cadmium, copper, trivalent chromium, lead, nickel, silver, and zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Maximum Concentration (CMC) is calculated using the equation:

$$CMC = (\exp \{ m_A [\ln (\text{stream hardness})] + b_A \}) (ACF)$$

ACF = Acute Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 0400-40-3-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent. Published criteria are used for non-metal parameters.

Column 4: The "Fraction Dissolved" converts the value for dissolved metal at laboratory conditions (columns 2 & 3) to total recoverable metal at in-stream ambient conditions (columns 5 & 6). This factor is calculated

using the linear partition coefficients found in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996) and the equation:

$$\frac{C_{\text{diss}}}{C_{\text{total}}} = \frac{1}{1 + \{ [K_{\text{po}}] [\text{ss}^{(1+a)}] [10^{-6}] \}}$$

ss = in-stream suspended solids concentration [mg/l]

Linear partition coefficients for streams are used for unregulated (7Q10) receiving waters, and linear partition coefficients for lakes are used for regulated (1Q10) receiving waters. For those parameters not in the dissolved form in columns 2 & 3 (and all non-metal parameters), a Translator of 1 is used.

- Column 5:** The "Chronic" Fish and Aquatic Life Water Quality criteria at in-stream ambient conditions. This criteria is calculated by dividing the value in column 2 by the value in column 4.
- Column 6:** The "Acute" Fish and Aquatic Life Water Quality criteria at in-stream ambient conditions. This criteria is calculated by dividing the value in column 3 by the value in column 4.
- Column 7:** The "Chronic" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the chronic limit.
- Column 8:** The "Acute" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the acute limit.
- Column 9:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Organism Consumption (Recreation).
- Column 10:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Water and Organism Consumption. These criteria are only to be applied when the stream use classification for the receiving stream includes both "Recreation" and "Domestic Water Supply."
- Column 11:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Domestic Water Supply.
- Column 12:** The Calculated Effluent Concentration associated with Organism Consumption.
- Column 13:** The Calculated Effluent Concentration associated with Water and Organism Consumption.

Column 14: The Calculated Effluent Concentration associated with Domestic Water Supply.

Column 15: The Effluent Limited criteria. This upper level of allowable pollutant loading is established if (a) the calculated water quality value is greater than accepted removal efficiency values, (b) the treatment facility is properly operated, and (c) full compliance with the pretreatment program is demonstrated. This upper level limit is based upon EPA's 40 POTW Survey on levels of metals that should be discharged from a POTW with a properly enforced pretreatment program and considering normal coincidental removals.

The most stringent water quality effluent concentration from Columns 7, 8, 12, 13, 14, and 15 is applied if the receiving stream is designated for domestic water supply. Otherwise, the most stringent effluent concentration is chosen from columns 7, 8, 12, and 15 only.

Water Quality Based Effluent Calculations:

2013 WQC

**PASS-THROUGH LIMITATIONS FOR METALS AND OTHER TOXIC SUBSTANCES
 WATER QUALITY BASED EFFLUENT CALCULATIONS
 OUTFALL 001**

FACILITY: Clarksville STP PERMIT #: TN0021253 DATE: 7/27/15 CALC BY: MTS

regulated stream worksheet (1Q10)

Stream (1Q10)	Stream (30Q5)	Waste Flow (MGD)	Ttl. Susp. Solids (mg/l)	Hardness (as CaCO3) (mg/l)	Margin of Safety (%)
722	1,300	25.665	16.571	129.179	50

Cumberland River is considered non-wadeable.
 Calculations for Cadmium, Copper, Lead, and Zinc only.

PARAMETER	Fish/Aqua. Life (F & AL) WQC			F & AL- instream allowable		Calc. Effluent Concentration based on F & AL		Human Health Water Quality Criteria *			effluent		
	Conc. (ug/l)	Chronic (ug/l)	Acute (ug/l)	Dissolved (Fraction)	Chronic (ug/l)	Acute (ug/l)	Organisms (ug/l)	Water/Organisms (ug/l)	DWS (ug/l)	Organisms (ug/l)	Water/Organisms (ug/l)	DWS (ug/l)	limited case (ug/l)
Copper (a,b)	2.625	11.146	17.105	0.209	53.208	81.658	738.10	1152.50	N/A	N/A	N/A	N/A	80.0
Chromium III	824.021	91.405	702.685	0.055	1648.042	12669.501	12414.57	172951.48	N/A	N/A	N/A	N/A	N/A
Chromium VI	5.500	11.000	16.000	1.000	11.000	16.000	82.86	155.69	N/A	N/A	N/A	N/A	N/A
Chromium, Total	1.125	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100.0	N/A	2554.14
Nickel (a,b)	5.000	64.584	581.478	0.186	346.322	3118.075	4974.14	45347.07	4600.0	610.0	100.0	118674.44	15627.42
Cadmium (a,b)	0.500	0.294	2.583	0.187	1.572	13.818	15.87	194.23	N/A	N/A	5.0	NA	116.47
Lead (a,b)	1.125	3.322	85.246	0.119	27.926	716.618	390.94	10422.32	N/A	N/A	5.0	NA	100.64
Mercury (T) (c,e)	0.006	0.770	1.400	1.000	0.770	1.400	11.13	20.31	0.051	0.05	2.0	1.17	1.14
Silver (a,b,f)	2.498	N/A	4.997	1.000	NA	4.997	N/A	37.64	N/A	N/A	N/A	NA	NA
Zinc (a,b)	4.500	146.759	145.569	0.108	1354.594	1343.603	19667.51	19507.43	26000.0	7400.0	N/A	671370.35	191000.80
Cyanide (d)	2.600	5.200	22.000	1.000	5.200	22.000	39.17	283.88	140.0	140.0	200.0	3549.84	3549.84
Toluene									15000.0	1300.0	1000.0	387394.80	33574.22
Benzene									510.0	22.0	5.0	13171.42	568.18
1,1,1 Trichloroethane									N/A	N/A	200.0	NA	5165.26
Ethylbenzene									2100.0	530.0	700.0	54235.27	13687.95
Carbon Tetrachloride									16.0	2.3	5.0	413.22	59.40
Chloroform									4700.0	57.0	N/A	121383.70	1472.10
Tetrachloroethylene									33.0	6.9	5.0	852.27	178.20
Trichloroethylene									300.0	25.0	5.0	7747.90	645.66
1,2 trans Dichloroethylene									10000.0	140.0	100.0	NA	3615.68
Methylene Chloride									5900.0	46.0	N/A	152375.29	1188.01
Total Phenols									860000.0	10000.0	N/A	22210635.11	258263.20
Naphthalene									N/A	N/A	N/A	NA	NA
Total Phthalates									N/A	N/A	N/A	NA	NA
Chlorine (T. Res.)	5.500	11.000	19.000	1.000	11.000	19.000	165.72	398.78	NA	NA	NA	NA	NA

a Denotes metals for which Fish & Aquatic Life Criteria are expressed as a function of total hardness.
 b The criteria for this metal is in the dissolved form at lab conditions. The calculated effluent concentration is in the total recoverable form.
 c The chronic criteria for mercury is not converted to dissolved, since it is based on fish tissue data rather than toxicity.
 d The criteria for this parameter is in the total form.
 e Previously, the Division established that 0.006 ug/L would be maximum background default if no sample data available or if all samples were <RDL (<0.2 ug/L), based on reference stream monitoring by DOE.
 f Silver limit is daily max if column 8 is most stringent.
 g When columns 7 or 8 result in a negative number, use results from columns 5 or 6, respectively.
 h When columns 12, 13 or 14 result in a negative number, use results from columns 9, 10 or 11, respectively, as applicable.

* Domestic supply included in river use so pick from columns 7,8,12,13,14,15
 ** Water Quality criteria for stream use classifications other than Fish & Aquatic Life are based on the 30Q5 flow.

2013 WQC

PASS-THROUGH LIMITATIONS FOR METALS AND OTHER TOXIC SUBSTANCES			
WATER QUALITY BASED EFFLUENT CALCULATIONS			
OUTFALL 001			
FACILITY: Clarksville STP	PERMIT #: TN0021253	DATE: 7/27/15	CALC BY: MTS

regulated stream worksheet (1Q10)

Stream (1Q10)	Stream (30Q5)	Waste Flow (MGD)	Ttl. Susp. Solids (mg/l)	Hardness (as CaCO3) (mg/l)	Margin of Safety (%)
722	1,300	25.0	16.571	129.179	50

Cumberland River is considered non-wadeable.
 Calculations for Chromium, Nickel, Mercury, Silver, and Cyanide

PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	PARAMETER	
	Stream (1Q10)	Fish/Aqua. Life (F & AL) WQC			F & AL: instream allowable			Calc. Effluent Concentration		Human Health Water Quality Criteria *							effluent
	Bckgmd. Conc.	lab conditions		Fraction Dissolved	ambient conditions (Tot)		based on F & AL		In-Stream Criteria			Calc. Effluent Concentration **			limited case		
	[ug/l]	Chronic [ug/l]	Acute [ug/l]	[Fraction]	Chronic [ug/l]	Acute [ug/l]	Chronic [ug/l]	Acute [ug/l]	Organisms [ug/l]	Water/Organisms [ug/l]	DWS [ug/l]	Organisms [ug/l]	Water/Organisms [ug/l]	DWS [ug/l]	ug/l		
Copper (a,b)	2.625	11.146	17.105	0.209	53.208	81.658	757.03	1182.07		N/A	N/A	N/A	NA	NA	NA	80.0	Copper (a,b)
Chromium III	824.021	91.405	702.685	0.055	1648.042	12669.501	12722.88	177383.48		N/A	N/A	N/A	NA	NA	NA		Chromium III
Chromium VI	5.500	11.000	16.000	1.000	11.000	16.000	84.92	159.62		N/A	N/A	N/A	NA	NA	NA		Chromium VI
Chromium, Total	1.125	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	100.0	NA	NA	2620.75	60.0	Chromium, Total
Nickel (a,b)	5.000	64.584	581.478	0.186	346.322	3118.075	5101.85	46511.84	4600.0	610.0	100.0	121770.00	16035.00	2520.00	180.0	Nickel (a,b)	
Cadmium (a,b)	0.500	0.294	2.583	0.187	1.572	13.818	16.27	199.21		N/A	N/A	5.0	NA	NA	119.50	5.0	Cadmium (a,b)
Lead (a,b)	1.125	3.322	85.246	0.119	27.926	716.618	400.96	10690.02		N/A	N/A	5.0	NA	NA	103.25	45.0	Lead (a,b)
Mercury (T) (c,e)	0.006	0.770	1.400	1.000	0.770	1.400	11.42	20.83	0.051	0.05	2.0	1.20	1.17	52.84	0.4	Mercury (T) (c,e)	
Silver (a,b,f)	2.498	N/A	4.997	1.000	NA	4.997	N/A	38.57		N/A	N/A	N/A	NA	NA	5.0	5.0	Silver (a,b,f)
Zinc (a,b)	4.500	146.759	145.569	0.108	1354.594	1343.603	20172.65	20008.45	26000.0	7400.0	N/A	688883.00	195983.00	NA	200.0	Zinc (a,b)	
Cyanide (d)	2.600	5.200	22.000	1.000	5.200	22.000	40.14	291.14	140.0	140.0	200.0	3642.40	3642.40	5232.40	230.0	Cyanide (d)	
Toluene									15000.0	1300.0	1000.0	397500.00	34450.00	26500.00	15.0	Toluene	
Benzene									510.0	22.0	5.0	13515.00	583.00	132.50	3.0	Benzene	
1,1,1 Trichloroethane									N/A	N/A	200.0	NA	NA	5300.00	30.0	1,1,1 Trichloroethane	
Ethylbenzene									2100.0	530.0	700.0	55650.00	14045.00	18550.00	4.0	Ethylbenzene	
Carbon Tetrachloride									16.0	2.3	5.0	424.00	60.95	132.50	15.0	Carbon Tetrachloride	
Chloroform									4700.0	57.0	N/A	124550.00	1510.50	NA	85.0	Chloroform	
Tetrachloroethylene									33.0	6.9	5.0	874.50	182.85	132.50	25.0	Tetrachloroethylene	
Trichloroethylene									300.0	25.0	5.0	7950.00	662.50	132.50	10.0	Trichloroethylene	
1,2 trans Dichloroethylene									10000.0	140.0	100.0	NA	3710.00	2650.00	1.5	1,2 trans Dichloroethylene	
Methylene Chloride									5900.0	46.0	N/A	156350.00	1219.00	NA	50.0	Methylene Chloride	
Total Phenols									860000.0	10000.0	N/A	22790000.00	265000.00	NA	50.0	Total Phenols	
Naphthalene									N/A	N/A	N/A	NA	NA	NA	1.0	Naphthalene	
Total Phthalates									N/A	N/A	N/A	NA	NA	NA	64.5	Total Phthalates	
Chlorine (T. Res.)	5.500	11.000	19.000	1.000	11.000	19.000	169.84	408.88	NA	NA	NA	NA	NA	NA	n/a	Chlorine (T. Res.)	

- a Denotes metals for which Fish & Aquatic Life Criteria are expressed as a function of total hardness.
- b The criteria for this metal is in the dissolved form at lab conditions. The calculated effluent concentration is in the total recoverable form.
- c The chronic criteria for mercury is not converted to dissolved, since it is based on fish tissue data rather than toxicity.
- d The criteria for this parameter is in the total form.
- e Previously, the Division established that 0.006 ug/L would be maximum background default if no sample data available or if all samples were <RDL (<0.2 ug/L), based on reference stream monitoring by DOE.
- f Silver limit is daily max if column 8 is most stringent.
- g When columns 7 or 8 result in a negative number, use results from columns 5 or 6, respectively.
- h When columns 12, 13 or 14 result in a negative number, use results from columns 9, 10 or 11, respectively, as applicable.

* Domestic supply included in river use so pick from columns 7,8,12,13,14,15
 ** Water Quality criteria for stream use classifications other than Fish & Aquatic Life are based on the 30Q5 flow.

Semi-Annual report (SAR) Summary:

	proposed PTL 7/27/2015	85% PTL	PTLs 2/10/2010	Apr-15	Oct-14	Apr-14	Oct-13	Apr-13	Oct-12	Apr-12	Oct-11	Apr-11	Oct-10
TN 0020656													
COPPER	0.08000	0.06800	0.08000	0.01500	0.00440	0.01400	0.01300	0.01200	0.00900	0.01100	0.01000	0.00540	0.05600
CHROMIUM, III	report	n/a	n/a	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	
CHROMIUM, VI	report	n/a	n/a	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	0.01000	
CHROMIUM, TOTAL	0.06000	0.05100	0.06000	0.00140	0.00100	0.00330	0.00100	0.00100	0.00100	0.00170	0.00100	0.00100	0.00230
NICKEL	0.18000	0.15300	0.18000	0.00220	0.00340	0.00310	0.00360	0.00390	0.00460	0.00270	0.00280	0.00280	0.00340
CADMIUM	0.00500	0.00425	0.00500	0.00100	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
LEAD	0.04500	0.03825	0.04500	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100
MERCURY	0.00040	0.00034	0.00040	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
SILVER	0.00500	0.00425	0.00500	0.00100	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00100
ZINC	0.20000	0.17000	0.20000	0.05600	0.02300	0.02600	0.03700	0.05400	0.03600	0.04600	0.04200	0.04100	0.07700
CYANIDE	0.04140	0.03134	0.03687	0.00500	0.00580	0.00560	0.00500	0.01600	0.00500	0.00500	0.00700	0.00500	0.02600
TOLUENE	0.01500	0.01275	0.01500						0.00500				
BENZENE	0.00300	0.00255	0.00300						0.00100				
1,1,1 TRICHLOROETHANE	0.03000	0.02550	0.03000						0.00100				
ETHYLBENZENE	0.00400	0.00340	0.00400						0.00100				
CARBON TETRACHLORIDE	0.01500	0.01275	0.01500						0.00100				
CHLOROFORM	0.08500	0.07225	0.08500						0.01700				
TETRACHLOROETHYLENE	0.02500	0.02125	0.02500						0.00100				
TRICHLOROETHYLENE	0.01000	0.00850	0.01000						0.00100				
1,2 TRANS-DICHLOROETHYL	0.00150	0.00128	0.00150						0.00100				
METHYLENE CHLORIDE	0.05000	0.04250	0.05000						0.00500				
TOTAL PHENOLS	0.05000	0.04250	0.05000	0.04000	0.04600	0.04000	0.04000	0.04000	0.04000	0.04000	0.04000	0.04000	0.09500
NAPHTHALENE	0.00100	0.00085	0.00100						0.00100				
TOTAL PHTHALATES	0.06450	0.05483	0.06450						0.00600				
Bolded in effluent data exceeds 85% of proposed PTLs Shaded means detection level													

APPENDIX 4 WQ Based Effluent Calculations- Other Compounds

WATER QUALITY BASED EFFLUENT CALCULATIONS OUTFALL 001															
FACILITY: Clarksville STP PERMIT #: TN0020656 DATE: 7/27/2015															
Stream (10/0)	Stream (30/25)	Waste Flow (MGD)	Tl. Susp. Solids (mg/l)	Nonhaz. (as CaCO3) (mg/l)	Margin of Safety (%)	Human Health Water Quality Criteria (30/25)									
722.5	4810.0	25.0	16.671	129.179	50	In-Stream Criteria					Calc. Effluent Concentration, Ca				
						Organisms		DWS			Water/Organisms		DWS		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Stream Backgd. Conc.	Detection Levels		F & AL - in-stream allowable ambient conditions (Tot)		Calc. Effluent Concentration based on F & AL, Ca		Human Health Water Quality Criteria (30/25)								mg daily effluent (c.-), Cw
PARAMETER	Scan	WQC RDL	Chronic	Acute	Chronic	Acute	Organisms	Organisms	DWS	Water/Organisms	Water/Organisms	DWS	Water/Organisms	DWS	PARAMETER
[ug/l]	[ug/l]	*EPA MDL	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]
ANTHRACENE	2.0	3.0													1.1
ARSENIC	5.0	1.0	190.0	360.0	2840.622	5382.23	50.0	50.0	50.0	4835.0	4835.0	4835.0	4835.0	4835.0	1.1
BERYLLIUM	2.0	1.0													2.2
SELENIUM	5.0	2.0			74.753	299.013									1.2
THALLIUM	5.0	*													1.2
ACROLEIN	0.0	50.0	1.0				780.0	320.0		75426.0	30944.0				<5
ACRYLONITRILE	0.0	50.0	1.0				5.6	0.6		638.2	57.1				<5
BENZENE	0.0	1.0	1.0				710.0	12.0	5.0	68657.0	1160.4	483.5			<1
BROMOFORM	0.0	1.0	1.0				3600.0	43.0		348120.0	4158.1				<1
CARBON TETRACHLORIDE	0.0	1.0	1.0				44.0	2.5	5.0	4254.8	241.8	483.5			<1
CHLOROBENZENE	0.0	1.0	*				21000.0	680.0		2030700.0	65756.0				<1
CHLORODIBROMO-METHANE	0.0	1.0	*				340.0	4.1		3287.0	396.5				<1
CHLOROETHANE	0.0	1.0	*												<1
2-CHLOROETHYL VINYL ETHER	0.0	1.0	*												<1
CHLOROFORM	0.0	50.0	0.5				4700.0	57.0		454490.0	5511.9				<5
DICHLOROBROMO-METHANE	0.0	1.0	1.0				460.0	5.6		44482.0	541.5				<1
1,1-DICHLOROETHANE	0.0	1.0	1.0				32.0	0.6	7.0	3094.4	55.1	676.9			<1
1,2-DICHLOROETHANE	0.0	1.0	1.0				990.0	3.8	5.0	95733.0	367.5	483.5			<1
TRANS 1,2-DICHLOROETHYLENE	0.0	1.0	*				14000.0	700.0	100.0	1353800.0	67690.0	9670.0			<1
1,1-DICHLOROETHYLENE	0.0	1.0	1.0												<1
1,2-DICHLOROPROPANE	0.0	1.0	*				39.0	0.5	5.0	3771.3	50.3	483.5			<1
1,3-DICHLOROPROPYLENE	0.0	1.0	1.0				1700.0	10.0		16330.0	967.0				<1
ETHYLBENZENE	0.0	1.0	1.0				29000.0	3100.0	700.0	2804300.0	299770.0	67690.0			<1
METHYL BROMIDE	0.0	1.0	*				4000.0	48.0		386800.0	4641.6				<1
METHYL CHLORIDE	0.0	5.0	1.0												<5
METHYLENE CHLORIDE	0.0	5.0	1.0				16000.0	47.0		1547200.0	4544.9				<5
1,1,2,2-TETRACHLOROETHANE	0.0	1.0	0.5				110.0	1.7		10637.0	164.4				<1
TETRACHLOROETHYLENE	0.0	1.0	0.5				85.5	0.9	5.0	8558.0	773.6	483.5			<1
TOLUENE	0.0	1.0	1.0				20000.0	6900.0	1000.0	1934000.0	657560.0	96700.0			<1
1,1,1-TRICHLOROETHANE	0.0	1.0	1.0						200.0						<1
1,1,2-TRICHLOROETHANE	0.0	1.0	0.2				420.0	6.0	5.0	40614.0	580.2	483.5			<1
TRICHLOROETHYLENE	0.0	1.0	1.0				810.0	27.0	5.0	78327.0	2610.9	483.5			<1
VINYL CHLORIDE	0.0	1.0	2.0				5250.0	20.0	2.0	50767.0	1934.0	193.4			<1
P-CHLOROPHENOL	0.0	10.0	*												<10
2-CHLOROPHENOL	0.0	10.0	*				400.0	120.0		38680.0	11604.0				<10
2,4-DICHLOROPHENOL	0.0	10.0	*				790.0	93.0		76393.0	8993.1				<10
2,4-DIMETHYLPHENOL	0.0	10.0	*				2300.0	540.0		222410.0	52218.0				<10
4,6-DINITRO-O-CRESOL	0.0	10.0	24.0				765.0	13.4		73975.5	1295.8				<10
2,4-DINITROPHENOL	0.0	10.0	42.0				14000.0	70.0		1353800.0	6769.0				<10
2-NITROPHENOL	0.0	10.0	*												<10
4-NITROPHENOL	0.0	10.0	*												<10
PENTACHLOROPHENOL	0.0	10.0	5.0		13.000	20.000	194.4	299.0	82.0	2.8	1.0	7929.4	270.8	96.7	<10
PHENOL	0.0	10.0	*						460000.0	21000.0		44482000.0	2030700.0		<10
2,4,6-TRICHLOROPHENOL	0.0	10.0	2.7				65.0	21.0		6285.5	2030.7				<10
ACENAPHTHENE	0.0	10.0	*				2700.0	1200.0		261090.0	116040.0				<10
ACENAPHTHYLENE	0.0	10.0	2.3												<10
ANTHRACENE	0.0	10.0	0.7				110000.0	9600.0		10637000.0	928320.0				<10
BENZIDINE	0.0	50.0	*				0.0054	0.0012		0.522	0.1				<5
BENZOAANTHRACENE	0.0	10.0	0.3				0.49	0.044		47.4	4.3				<10
BENZOPHENANTHRENE	0.0	10.0	0.3				0.49	0.044	0.2	47.4	4.3	19.3			<10
1,2,3-BENZOPHENANTHRENE	0.0	10.0	0.3				0.49	0.044		47.4	4.3				<10
BENZOPHENYLENE	0.0	10.0	*												<10
BENZOKYFLURANTHENE	0.0	10.0	0.3				0.49	0.044		47.4	4.3				<10
BIS (2-CHLOROETHOXY) METHANE	0.0	10.0	*				14.0	0.31		1353.8	30.0				<10
BIS (2-CHLOROETHYL) ETHER	0.0	10.0	1.0												<10
BIS (2-CHLOROSO-PROPYL) ETHER	0.0	10.0	*				17000.0	1400.0		1643900.0	135380.0				<10
BIS (2-ETHYLHEXYL) PHTHALATE	0.0	10.0	2.5				59.0	18.0	6.0	5705.3	1740.6	580.2			<10
4-BROMOPHENYL PHENYL ETHER	0.0	10.0	*												<10
BUTYL BENZYL PHTHALATE	0.0	10.0	*				5200.0	3000.0		502840.0	290100.0				<10
2-CHLOROPHTHALENE	0.0	10.0	*				4300.0	1700.0		415810.0	164390.0				<10
4-CHLOROPHENYL PHENYL ETHER	0.0	10.0	*												<10
CHRYSENE	0.0	10.0	2.5				0.49	0.044		47.4	4.3				<10
DIN-BUTYL PHTHALATE	0.0	10.0	2.5				12000.0	2700.0		1160400.0	261090.0				<10
DIN-OCTYL PHTHALATE	0.0	10.0	*												<10
DIBENZO[AH]ANTHRACENE	0.0	10.0	*				0.49	0.044		47.4	4.3				<10
1,2-DICHLOROBENZENE	0.0	1.0	2.0				17000.0	2700.0		1643900.0	261090.0				<1
1,3-DICHLOROBENZENE	0.0	1.0	2.0				2600.0	400.0		251420.0	38680.0				<1
1,4-DICHLOROBENZENE	0.0	1.0	2.0				2600.0	400.0		251420.0	38680.0				<1
3,3-DICHLOROBENZIDINE	0.0	1.0	*				0.77	0.4		74.5	38.7				<1
DIETHYL PHTHALATE	0.0	10.0	1.9				12000.0	23000.0		1160400.0	2224100.0				<10
DIMETHYL PHTHALATE	0.0	10.0	1.6				290000.0	313000.0		28043000.0	30267100.0				<10
2,4-DINITROTOLUENE	0.0	10.0	*				91.0	1.1		8799.7	106.4				<10
2,6-DINITROTOLUENE	0.0	10.0	*												<10
1,2-DIPHENYLHYDRAZINE	0.0	10.0	*				5.4	0.4		522.2	38.7				<10
FLUORANTHENE	0.0	10.0	2.2				370.0	300.0		35779.0	29010.0				<10
FLUORENE	0.0	10.0	0.3				14000.0	1300.0		1353800.0	125710.0				<10
HEXACHLOROBENZENE	0.0	10.0	1.9				0.0077	0.0075	1.0	0.745	0.7	96.7			<10
HEXACHLOROBUTADIENE	0.0	10.0	5.0				500.0	4.4		48350.0	425.5				<10
HEXACHLOROCYCLO-PENTADIENE	0.0	10.0	*				17000.0	240.0	5.0	1643900.0	23208.0	483.5			<10
HEXACHLOROETHANE	0.0	10.0	0.5				89.0	19.0		8696.3	1837.3				<10
INDENYL 2,3-DIOPYRENE	0.0	10.0	*				0.49	0.044		47.4	4.3				<10
ISOPHORONE	0.0	10.0	*				26000.0	360.0		2514200.0	34812.0				<10
NAPHTHALENE	0.0	10.0	*												<10
NITROBENZENE	0.0	10.0	10.0				1900.0	17.0		183730.0	1643.9				<10

APPENDIX 5

Flow Rate (MGD)	Flow Rate (ft ³ /sec)	Area of Pipe (ft ²)	Velocity (ft/sec)	Length of Pipe (ft)	Time (sec)	Time (min)	Time (hr)
1	1.55	12.57	0.12	6,388	51,882.43	864.71	14.41
2	3.09	12.57	0.25	6,388	25,941.21	432.35	7.21
3	4.64	12.57	0.37	6,388	17,294.14	288.24	4.80
4	6.19	12.57	0.49	6,388	12,970.61	216.18	3.60
5	7.74	12.57	0.62	6,388	10,376.49	172.94	2.88
6	9.28	12.57	0.74	6,388	8,647.07	144.12	2.40
7	10.83	12.57	0.86	6,388	7,411.78	123.53	2.06
8	12.38	12.57	0.98	6,388	6,485.30	108.09	1.80
9	13.93	12.57	1.11	6,388	5,764.71	96.08	1.60
10	15.47	12.57	1.23	6,388	5,188.24	86.47	1.44
11	17.02	12.57	1.35	6,388	4,716.58	78.61	1.31
12	18.57	12.57	1.48	6,388	4,323.54	72.06	1.20
13	20.11	12.57	1.60	6,388	3,990.96	66.52	1.11
14	21.66	12.57	1.72	6,388	3,705.89	61.76	1.03
15	23.21	12.57	1.85	6,388	3,458.83	57.65	0.96
16	24.76	12.57	1.97	6,388	3,242.65	54.04	0.90
17	26.30	12.57	2.09	6,388	3,051.91	50.87	0.85
18	27.85	12.57	2.22	6,388	2,882.36	48.04	0.80
19	29.40	12.57	2.34	6,388	2,730.65	45.51	0.76
20	30.94	12.57	2.46	6,388	2,594.12	43.24	0.72
21	32.49	12.57	2.59	6,388	2,470.59	41.18	0.69
22	34.04	12.57	2.71	6,388	2,358.29	39.30	0.66
23	35.59	12.57	2.83	6,388	2,255.76	37.60	0.63
24	37.13	12.57	2.95	6,388	2,161.77	36.03	0.60
25	38.68	12.57	3.08	6,388	2,075.30	34.59	0.58
30	46.42	12.57	3.69	6,388	1,729.41	28.82	0.48
60	92.83	12.57	7.39	6,388	864.71	14.41	0.24
65	100.57	12.57	8.00	6,388	798.19	13.30	0.22
75	116.04	12.57	9.23	6,388	691.77	11.53	0.19

