

**AUTHORIZATION TO DISCHARGE WASTEWATER UNDER
THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM AND
THE ARKANSAS WATER AND AIR POLLUTION CONTROL ACT**

In accordance with the provisions of the Arkansas Water and Air Pollution Control Act (Act 472 of 1949, as amended, Ark. Code Ann. 8-4-101 et seq.), and the Clean Water Act (33 U.S.C. § 1251 et seq.),

The applicant's mailing address is:

City of Fort Smith - Massard Wastewater Treatment Facility
3900 Kelley Hwy.
Fort Smith, AR 72904

The facility address is:

City of Fort Smith - Massard Wastewater Treatment Facility
1609 9th Street
Barling, AR 72923

is authorized to discharge from a facility located as follows: Hwy 22 east to Barling, then left on "H" Street to 4-way stop, then left on North 9th Street to plant entrance at 3/4 mile in Sebastian County, Arkansas.

Latitude: 35° 20' 25.65"; Longitude: 94° 18' 19.92"

to receiving waters named:

from the plant site through a 36-inch line to the Arkansas River at Pool 13 approximately 800 feet west of Lock and Dam 13 in Segment 3H of the Arkansas River Basin.

The outfall is located at the following coordinates:

Outfall 001: Latitude: 35° 21' 03.7"; Longitude: 94° 18' 02.4"

Discharge shall be in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, III, and IV hereof.

Issue Date: January 31, 2009

Effective Date: February 1, 2009

Expiration Date: January 31, 2014



Steven L. Drown
Chief, Water Division
Arkansas Department of Environmental Quality

**PART I
PERMIT REQUIREMENTS**

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS: OUTFALL 001 - treated municipal wastewater.

During the period beginning on the effective date and lasting until the date of expiration, the permittee is authorized to discharge from Outfall 001. Such discharges shall be limited and monitored by the permittee as specified below from a treatment system consisting of bar screen/grit removal, primary clarification, trickling filters, activated sludge basin, secondary clarifiers, and UV disinfection with a design flow of 10 MGD.

Effluent Characteristics	Discharge Limitations			Monitoring Requirements	
	Mass (lbs/day, unless otherwise specified)	Concentration (mg/l, unless otherwise specified)		Frequency	Sample Type
		Monthly Avg.	Monthly Avg.		
Flow ¹	N/A	Report	Report	once/day	* totalizing meter
Biochemical Oxygen Demand (BOD5)					
(Nov-Apr)	2502.0	30	45	once/weekday	24-hr composite
Carbonaceous Biochemical Oxygen Demand (CBOD5)					
(May-Oct)	2085.0	25	37.5	once/weekday	24-hr composite
Total Suspended Solids (TSS)	2502.0	30	45	once/weekday	24-hr composite
Ammonia Nitrogen (NH3-N)					
(May-Oct)	417.0	5	7.5	once/weekday	24-hr composite
Dissolved Oxygen ²	N/A	2.0, (Inst. Min.)		once/weekday	grab
Fecal Coliform Bacteria (FCB)		(colonies/100ml)			
(Apr-Sept)	N/A	200	400	once/weekday	grab
(Oct-Mar)	N/A	1000	2000	once/weekday	grab
Cyanide, Total Recoverable ³	5.9	71 µg/l	142 µg/l	once/quarter	grab
pH	N/A	<u>Minimum</u> 6.0 s.u.	<u>Maximum</u> 9.0 s.u.	once/weekday	grab
Chronic WET Testing ⁴	N/A	N/A	N/A	once/quarter	24-hr composite
Pimephales promelas (Chronic)⁴ Pass/Fail Lethality (7-day NOEC) TLP6C Pass/Fail Growth (7-day NOEC) TGP6C Survival (7-day NOEC) TOP6C Coefficient of Variation TQP6C Growth (7-day NOEC) TPP6C		<u>7-Day Average</u> Report (Pass=0/Fail=1) Report (Pass=0/Fail=1) Report % Report % Report %		once/quarter once/quarter once/quarter once/quarter once/quarter	24-hr composite 24-hr composite 24-hr composite 24-hr composite 24-hr composite
Ceriodaphnia dubia (Chronic)⁴ Pass/Fail Lethality (7-day NOEC) TLP3B Pass/Fail production (7-day NOEC) TGP3B Survival (7-day NOEC) TOP3B Coefficient of Variation TQP3B Reproduction (7-day NOEC) TPP3B		<u>7-Day Average</u> Report (Pass=0/Fail=1) Report (Pass=0/Fail=1) Report % Report % Report %		once/quarter once/quarter once/quarter once/quarter once/quarter	24-hr composite 24-hr composite 24-hr composite 24-hr composite 24-hr composite

- 1 Report monthly average and daily maximum as MGD.
- 2 See item #27(b) of Part IV (Dissolved Oxygen).
- 3 See Condition No. 8 of Part II
- 4 See Condition No. 9 of Part II (WET testing Condition).

There shall be no discharge of distinctly visible solids, scum, or foam of a persistent nature, nor shall there be any formation of slime, bottom deposits, or sludge banks. There shall be no visible sheen due to the presence of oil (Sheen means an iridescent appearance on the surface of the water).

Samples taken in compliance with the monitoring requirements specified above shall be taken after the UV disinfection unit at the following monitoring coordinates:

Flow: Latitude: 35° 20' 31.8"; Longitude: 94° 18' 31.5"

Other parameters: Latitude: 35° 20' 31.7"; Longitude: 94° 18' 31.5"

SECTION B. PERMIT COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

Compliance is required on the effective date of the permit.

2. Pretreatment Requirements

1. Within 60 days of the effective date of the permit, the permittee shall
 - (a) submit a **WRITTEN CERTIFICATION** that a technical evaluation has demonstrated that the existing technically based local limits (TBLL) are based on current state water quality standards and are adequate to prevent pass through of pollutants, inhibition of or interference with the treatment facility, worker health and safety problems, and sludge contamination, **OR**
 - (b) submit a **WRITTEN NOTIFICATION** that a technical evaluation revising the current TBLL and a draft sewer use ordinance which incorporates such revisions will be submitted within 12 months of the effective date of this permit.
2. Within 12 months of the effective date of the permit, the permittee shall submit all necessary proposed modifications to the Pretreatment Program necessary in order to demonstrate compliance with 40 CFR Part 403.
3. The permittee shall annually submit an updated pretreatment program status report during October. This report shall contain the items set forth in Part II, Condition #10.d.

**PART II
OTHER CONDITIONS**

1. The operator of this wastewater treatment facility shall be licensed as Class IV by the State of Arkansas in accordance with Act 211 of 1971, Act 1103 of 1991, Act 556 of 1993, and APCEC Regulation No. 3, as amended.
2. For publicly owned treatment works, the 30-day average percent removal for Biochemical Oxygen Demand (BOD5) or Carbonaceous Biochemical Oxygen Demand (CBOD5) and Total Suspended Solids shall not be less than 85 percent unless otherwise authorized by the permitting authority in accordance with 40 CFR Part 133.102, as adopted by reference in APCEC Regulation No. 6.
3. Produced sludge shall be disposed of by land application only when meeting the following criteria:
 - a. Sewage sludge from treatment works treating domestic sewage (TWTDS) must meet the applicable provisions of 40 CFR Part 503; and
 - b. The sewage sludge has not been classified as a hazardous waste under state or federal regulations.
4. The permittee shall give at least 120 days prior notice to the Director of any change planned in the permittee's sludge disposal practice or land use applications, including types of crops grown (if applicable).
5. The permittee shall report all overflows with the Discharge Monitoring Report (DMR) submittal. These reports shall be summarized and reported in tabular format. The summaries shall include: the date, time, duration, location, estimated volume, and cause of overflow; observed environmental impacts from the overflow; action taken to address the overflow; and ultimate discharge location if not contained (e.g., storm sewer system, ditch, tributary). All overflows which endanger health or the environment shall be orally reported to this department (Enforcement Section of the Water Division), within 24 hours from the time the permittee becomes aware of the circumstance. A written report of overflows which endanger health or the environment, shall be provided within 5 days of the time the permittee becomes aware of the circumstance.
6. In accordance with 40 CFR Parts 122.62 (a)(2) and 124.5, this permit may be reopened for modification or revocation and/or reissuance to require additional monitoring and/or effluent limitations when new information is received that actual or potential exceedance of State water quality criteria and/or narrative criteria are determined to be the result of the permittee's discharge(s) to a relevant water body or a Total Maximum Daily Load (TMDL) is established or revised for the water body that was not available at the time of the permit issuance that would have justified the application of different permit conditions at the time of permit issuance.

7. Other Specified Monitoring Requirements

The permittee may use alternative appropriate monitoring methods and analytical instruments other than as specified in Part I Section A of the permit without a major permit modification under the following conditions:

- The monitoring and analytical instruments are consistent with accepted scientific practices;
- The requests shall be submitted in writing to the Permits Section of the Water Division of the ADEQ for use of the alternate method or instrument.
- The method and/or instrument is in compliance with 40 CFR Part 136 or acceptable to the Director; and
- All associated devices are installed, calibrated, and maintained to insure the accuracy of the measurements and are consistent with the accepted capability of that type of device. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.

Upon written approval of the alternative monitoring method and/or analytical instruments, these methods or instruments must be consistently utilized throughout the monitoring period. ADEQ must be notified in writing and the permittee must receive written approval from ADEQ if the permittee decides to return to the original permit monitoring requirements.

8. The permittee may use any EPA approved method based on 40 CFR Part 136 provided the MQL for the chosen method is equal to or less than what has been specified in chart below:

Pollutant	MQL (µg/l)
Cyanide, Total Recoverable	10

The permittee may develop a matrix specific method detection limit (MDL) in accordance with Appendix B of 40 CFR Part 136. For any pollutant for which the permittee determines a site specific MDL, the permittee shall send to ADEQ, NPDES Permits Branch, a report containing QA/QC documentation, analytical results, and calculations necessary to demonstrate that a site specific MDL was correctly calculated. A site specific minimum quantification level (MQL) shall be determined in accordance with the following calculation:

$$\text{MQL} = 3.3 \times \text{MDL}$$

Upon written approval by Permits Branch, the site specific MQL may be utilized by the permittee for all future Discharge Monitoring Report (DMR) calculations and reporting requirements.

9. Whole Effluent Toxicity Testing (7-Day Chronic Noec Freshwater)

A. Scope And Methodology

- (1) The permittee shall test the effluent for toxicity in accordance with the provisions in this section.

APPLICABLE TO FINAL OUTFALL: **001**

CRITICAL DILUTION (%): **8 %**

EFFLUENT DILUTION SERIES (%): **3%, 5%, 6%, 8%, & 11%**

COMPOSITE SAMPLE TYPE: Defined at Part I

TEST SPECIES/METHODS: 40 CFR Part 136

Ceriodaphnia dubia (water flea) - chronic static renewal survival and reproduction test, Method 1002.0, EPA/600/4-91/002 or the most recent update thereof. This test should be terminated when 60% of the surviving females in the control produce three broods or at the end of eight days, whichever comes first.

Pimephales promelas (Fathead minnow) - chronic static renewal 7-day larval survival and growth test, Method 1000.0, EPA/600/4-91/002, or the most recent update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

- (2) The NOEC (No Observed Effect Concentration) is defined as the greatest effluent dilution at and below which lethality that is statistically different from the control (0% effluent) at the 95% confidence level does not occur. Chronic lethal test failure is defined as a demonstration of a statistically significant lethal effect at test completion to a test species at or below the critical dilution.
- (3) This permit may be reopened to require whole effluent toxicity limits, chemical specific effluent limits, additional testing, and/or other appropriate actions to address toxicity.
- (4) Test failure is defined as a demonstration of statistically significant sub-lethal or lethal effects to a test species at or below the effluent critical dilution.

B. Persistent Lethality

The requirements of this subsection apply only when a toxicity test demonstrates significant lethal effects at or below the critical dilution. Significant lethal effects are herein defined as a statistically significant difference at the 95% confidence level

between the survival of the appropriate test organism in a specified effluent dilution and the control (0% effluent).

(1) Part I Testing Frequency Other Than Monthly

- (a) The permittee shall conduct a total of two (2) additional tests for any species that demonstrates significant lethal effects at or below the critical dilution. The two additional tests shall be conducted monthly during the next two consecutive months. The permittee shall not substitute either of the two additional tests in lieu of routine toxicity testing. The full report shall be prepared for each test required by this section in accordance with procedures outlined in Item E of this section and submitted with the period DMR to the permitting authority for review.
- (b) If one or both of the two additional tests demonstrates significant lethal effects at or below the critical dilution, the permittee shall initiate Toxicity Reduction Evaluation (TRE) requirements as specified in Item G of this section. The permittee shall notify ADEQ in writing within 5 days of the failure of any retest, and the TRE initiation date will be the test completion date of the first failed retest. A TRE may also be required due to a demonstration of persistent significant sub-lethal effects or intermittent lethal effects at or below the critical dilution, or for failure to perform the required retests. Monthly retesting is not required if the permittee is performing a TRE.
- (c) If one or both of the two additional tests demonstrates significant lethal effects at or below the critical dilution, the permittee shall henceforth increase the frequency of testing for this species to once per quarter for the life of the permit.
- (d) The provisions of Item B(1)(a) of this condition are suspended upon submittal of the TRE Action Plan.

(2) Part I Testing Frequency of Monthly

The permittee shall initiate the Toxicity Reduction Evaluation (TRE) requirements as specified in Item G of this section when any two of three consecutive monthly toxicity tests exhibit significant lethal effects at or below the critical dilution. A TRE may also be required due to a demonstration of persistent significant sub-lethal effects or intermittent lethal effects at or below the critical dilution, or for failure to perform the required retests.

C. Sub-Lethal Failures

If a statistically significant sub-lethal effect is demonstrated at or below the critical dilution during any quarterly test, the permittee shall conduct two additional tests. The additional tests shall be conducted monthly during the next two consecutive months. The

permittee shall not substitute either of the two additional in lieu of routine toxicity testing.

If during the first four quarters, statistically significant sub-lethal effects are exhibited, quarterly testing will be required for that species until the effluent passes both the lethal and sub-lethal tests endpoints for the affected species, for four consecutive quarters. After passing four consecutive quarters for the affected species the permittee may request a reduction in testing frequency. Monthly retesting is not required if the permittee is performing a TRE.

D. Required Toxicity Testing Conditions

(1) Test Acceptance

The permittee shall repeat a test, including the control and all effluent dilutions, if the procedures and quality assurance requirements defined in the test methods or in this permit are not satisfied, including the following additional criteria:

- (a) The toxicity test control (0% effluent) must have survival equal to or greater than 80%.
- (b) The mean number of *Ceriodaphnia dubia* neonates produced per surviving female in the control (0% effluent) must be 15 or more.
- (c) 60% of the surviving control females must produce three broods.
- (d) The mean dry weight of surviving Fathead minnow larvae at the end of the 7 days in the control (0% effluent) must be 0.25 mg per larva or greater.
- (e) The percent coefficient of variation between replicates shall be 40% or less in the control (0% effluent) for: the young of surviving females in the *Ceriodaphnia dubia* reproduction test; the growth and survival endpoints of the Fathead minnow test.
- (f) The percent coefficient of variation between replicates shall be 40% or less in the critical dilution, unless significant lethal or nonlethal effects are exhibited for: the young of surviving females in the *Ceriodaphnia dubia* reproduction test; the growth and survival endpoints of the Fathead minnow test.
- (g) Test failure may not be construed or reported as invalid due to a coefficient of variation value of greater than 40%. A repeat test shall be conducted within the required reporting period of any test determined to be invalid.
- (h) PMSD range of 13 - 47 for *Ceriodaphnia dubia* reproduction.

(i) PMSD range of 12 – 30 for Fathead minnow growth.

(2) Statistical Interpretation

- (a) For the *Ceriodaphnia dubia* survival test, the statistical analyses used to determine if there is a significant difference between the control and the critical dilution shall be Fisher's Exact Test as described in EPA/600/4-91/002 or the most recent update thereof.
- (b) For the *Ceriodaphnia dubia* reproduction test and the Fathead minnow larval survival and growth test, the statistical analyses used to determine if there is a significant difference between the control and the critical dilution shall be in accordance with the methods for determining the No Observed Effect Concentration (NOEC) as described in EPA/600/4-91/002 or the most recent update thereof.
- (c) If the conditions of Test Acceptability are met in Item D(1) above and the percent survival of the test organism is equal to or greater than 80% in the critical dilution concentration and all lower dilution concentrations, the test shall be considered to be a passing test, and the permittee shall report an NOEC of not less than the critical dilution for the DMR reporting requirements found in Item E below.

(3) Dilution Water

- (a) Dilution water used in the toxicity tests will be receiving water collected as close to the point of discharge as possible but unaffected by the discharge. The permittee shall substitute synthetic dilution water of similar pH, hardness, and alkalinity to the closest downstream perennial water for:
 - i. Toxicity tests conducted on effluent discharges to receiving water classified as intermittent streams; and
 - ii. Toxicity tests conducted on effluent discharges where no receiving water is available due to zero flow conditions.
- (b) If the receiving water is unsatisfactory as a result of instream toxicity (fails to fulfill the test acceptance criteria of Item D(1)), the permittee may substitute synthetic dilution water for the receiving water in all subsequent tests provided the unacceptable receiving water test met the following stipulations:
 - i. A synthetic dilution water control which fulfills the test acceptance requirements of Item D(1) was run concurrently with the receiving water control;

- ii. The test indicating receiving water toxicity has been carried out to completion (i.e., 7 days);
- iii. The permittee includes all test results indicating receiving water toxicity with the full report and information required by Item E below; and
- iv. The synthetic dilution water shall have a pH, hardness, and alkalinity similar to that of the receiving water or closest downstream perennial water not adversely affected by the discharge, provided the magnitude of these parameters will not cause toxicity in the synthetic dilution water.

(4) Samples and Composites

- (a) The permittee shall collect a minimum of three flow-weighted composite samples from the outfall(s) listed at Item A(1) above.
- (b) The permittee shall collect second and third composite samples for use during 24-hour renewals of each dilution concentration for each test. The permittee must collect the composite samples such that the effluent samples are representative of any periodic episode of chlorination, biocide usage or other potentially toxic substance discharged on an intermittent basis.
- (c) The permittee must collect the composite samples so that the maximum holding time for any effluent sample shall not exceed 72 hours. The permittee must have initiated the toxicity test within 36 hours after the collection of the last portion of the first composite sample. Samples shall be chilled to 6 degrees Centigrade during collection, shipping, and/or storage.
- (d) If the flow from the outfall(s) being tested ceases during the collection of effluent samples, the requirements for the minimum number of effluent samples, the minimum number of effluent portions and the sample holding time are waived during that sampling period. However, the permittee must collect an effluent composite sample volume during the period of discharge that is sufficient to complete the required toxicity tests with daily renewal of effluent. When possible, the effluent samples used for the toxicity tests shall be collected on separate days if the discharge occurs over multiple days. The effluent composite sample collection duration and the static renewal protocol associated with the abbreviated sample collection must be documented in the full report required in Item E of this section.
- (e) Multiple Outfalls: If the provisions of this section are applicable to multiple outfalls, the permittee shall combine the composite effluent samples in proportion to the average flow from the outfalls listed in Item A(1) above for the day the sample was collected. The permittee shall perform the toxicity test on the flow-weighted composite of the outfall samples.

- (f) The permittee shall not allow the sample to be dechlorinated at the laboratory. At the time of sample collection the permittee shall measure the TRC of the effluent. The measured concentration of TRC for each sample shall be included in the lab report submitted by the permittee.

E. Reporting

- (1) The permittee shall prepare a full report of the results of all tests conducted pursuant to this section in accordance with the Report Preparation Section of EPA/600/4-91/002, or the most current publication, for every valid or invalid toxicity test initiated whether carried to completion or not. The permittee shall retain each full report pursuant to the provisions of Part III.C.7 of this permit. The permittee shall submit full reports to the Department. For any test which fails, is considered invalid or which is terminated early for any reason, the full report must be submitted for review.
- (2) A valid test for each species must be reported on the DMR during each reporting period specified in Part I of this permit unless the permittee is performing a TRE which may increase the frequency of testing and reporting. Only ONE set of whole effluent toxicity test data for each species is to be recorded on the DMR for each reporting period. The data submitted should reflect the LOWEST survival results for each species during the reporting period. All invalid tests, repeat tests (for invalid tests), and retests (for tests previously failed) performed during the reporting period must be attached to the DMR for ADEQ review.
- (3) The permittee shall submit the results of each valid toxicity test on DMR for that reporting period in accordance with Part III.D.4 of this permit, as follows below. Submit retest information clearly marked as such with the following DMR. Only results of valid tests are to be reported on the DMR.

(a) *Pimephales promelas* (Fathead minnow)

- i. If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TLP6C.
- ii. If the NOEC for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TGP6C.
- iii. Report the NOEC value for survival, Parameter No. TOP6C.
- iv. Report the NOEC value for growth, Parameter No. TPP6C.
- v. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP6C.

(b) *Ceriodaphnia dubia*

- i. If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TLP3B.
- ii. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TGP3B.
- iii. Report the NOEC value for survival, Parameter No. TOP3B.
- iv. Report the NOEC value for reproduction, Parameter No. TPP3B.
- v. Report the higher (critical dilution or control) Coefficient of Variation, Parameter No. TQP3B.

F. Monitoring Frequency Reduction

- (1) The permittee may apply for a testing frequency reduction upon the successful completion of the first four consecutive quarters of testing for one or both test species, with no lethal or sub-lethal effects demonstrated at or below the critical dilution without a major modification. If granted, the monitoring frequency for that test species may be reduced to not less than once per year for the less sensitive species (usually the Fathead minnow) and not less than twice per year for the more sensitive test species (usually the *Ceriodaphnia dubia*).
- (2) Certification: The permittee must certify in writing that no test failures have occurred and that all tests meet all test acceptability criteria in Item D(1) above. In addition the permittee must provide a list with each test performed including test initiation date, species, NOECs for lethal and sub-lethal effects and the maximum coefficient of variation for the controls. Upon review and acceptance of this information the Department will issue a letter of confirmation of the monitoring frequency reduction. A copy of the letter will be forwarded to the Permit Compliance System section to update the permit reporting requirements.
- (3) This monitoring frequency reduction applies only until the expiration date of this permit, at which time the monitoring frequency for both test species reverts to once per quarter until the permit is re-issued.

G. Toxicity Reduction Evaluation (TRE)

- (1) Within ninety (90) days of confirming lethality in the retests, the permittee shall submit a Toxicity Reduction Evaluation (TRE) Action Plan and Schedule for conducting a TRE. The TRE Action Plan shall specify the approach and methodology to be used in performing the TRE. A Toxicity Reduction Evaluation is an investigation intended to determine those actions necessary to achieve compliance with water quality-based effluent limits by reducing an effluent's toxicity to an acceptable level. A TRE is defined as a step-wise process which combines toxicity testing and analyses of the physical and chemical characteristics of a toxic effluent to identify the constituents causing effluent toxicity and/or treatment methods which will reduce the effluent toxicity. The TRE Action Plan shall lead to the successful elimination of effluent toxicity at the critical dilution and include the following:

(a) Specific Activities

The plan shall detail the specific approach the permittee intends to utilize in conducting the TRE. The approach may include toxicity characterizations, identifications and confirmation activities, source evaluation, treatability studies, or alternative approaches. When the permittee conducts Toxicity Characterization Procedures the permittee shall perform multiple characterizations and follow the procedures specified in the documents "Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures" (EPA-600/6-91/003) and "Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I" (EPA-600/6-91/005F), or alternate procedures. When the permittee conducts Toxicity Identification Evaluations and Confirmations, the permittee shall perform multiple identifications and follow the methods specified in the documents "Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/080) and "Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/081), as appropriate.

The documents referenced above may be obtained through the National Technical Information Service (NTIS) by phone at (800) 553-6847, or by writing:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

- (b) Sampling Plan (e.g., locations, methods, holding times, chain of custody, preservation, etc.)

The effluent sample volume collected for all tests shall be adequate to perform the toxicity test, toxicity characterization, identification and confirmation procedures, and conduct chemical specific analyses when a probable toxicant has been identified;

Where the permittee has identified or suspects specific pollutant(s) and/or source(s) of effluent toxicity, the permittee shall conduct, concurrent with toxicity testing, chemical specific analyses for the identified and/or suspected pollutant(s) and/or source(s) of effluent toxicity. Where lethality was demonstrated within 48 hours of test initiation, each composite sample shall be analyzed independently. Otherwise the permittee may substitute a composite sample, comprised of equal portions of the individual composite samples, for the chemical specific analysis;

- (c) Quality Assurance Plan (e.g., QA/QC implementation, corrective actions, etc.); and
 - (d) Project Organization (e.g., project staff, project manager, consulting services, etc.).
- (2) The permittee shall initiate the TRE Action Plan within thirty (30) days of plan and schedule submittal. The permittee shall assume all risks for failure to achieve the required toxicity reduction.
- (3) The permittee shall submit a quarterly TRE Activities Report, with the Discharge Monitoring Report in the months of January, April, July and October, containing information on toxicity reduction evaluation activities including:
- (a) Any data and/or substantiating documentation which identifies the pollutant(s) and/or source(s) of effluent toxicity;
 - (b) Any studies/evaluations and results on the treatability of the facility's effluent toxicity; and
 - (c) Any data which identifies effluent toxicity control mechanisms that will reduce effluent toxicity to the level necessary to meet no significant lethality at the critical dilution.
- (4) The permittee shall submit a Final Report on Toxicity Reduction Evaluation Activities no later than twenty-eight (28) months from confirming lethality in the retests, which provides information pertaining to the specific control mechanism selected that will, when implemented, result in reduction of effluent toxicity to no significant lethality at the critical dilution. The report will also provide a specific corrective action schedule for implementing the selected control mechanism.

Quarterly testing during the TRE is a minimum monitoring requirement. EPA recommends that permittees required to perform a TRE not rely on quarterly testing alone to ensure success in the TRE, and that additional screening tests be performed to capture toxic samples for identification of toxicants. Failure to identify the specific chemical compound causing toxicity test failure will normally result in a permit limit for whole effluent toxicity limits per federal regulations at 40 CFR 122.44(d)(1)(v).

10. CONTRIBUTING INDUSTRIES AND PRETREATMENT REQUIREMENTS

- a. The permittee shall operate an industrial pretreatment program in accordance with Section 402(b)(8) of the Clean Water Act, the General Pretreatment Regulations (40 CFR Part 403) and the approved POTW pretreatment program submitted by the permittee. The pretreatment program was approved on August 31, 1985 and modified on December 5, 1997. The POTW pretreatment program is hereby incorporated by reference and shall be implemented in a manner consistent with the following requirements:
 - i. Industrial user information shall be updated at a frequency adequate to ensure that all IUs are properly characterized at all times;
 - ii. The frequency and nature of industrial user compliance monitoring activities by the permittee shall be commensurate with the character, consistency and volume of waste. The permittee must inspect and sample the effluent from each Significant Industrial User in accordance with 40 CFR 403.8(f)(2)(v). This is in addition to any industrial self-monitoring activities;
 - iii. The permittee shall enforce and obtain remedies for noncompliance by any industrial users with applicable pretreatment standards and requirements;
 - iv. The permittee shall control through permit, order, or similar means, the contribution to the POTW by each Industrial User to ensure compliance with applicable Pretreatment Standards and Requirements. In the case of Industrial Users identified as significant under 40 CFR 403.3 (v), this control shall be achieved through individual or general control mechanisms, in accordance with 40 CFR 403.8(f)(1)(iii). Both individual and general control mechanisms must be enforceable and contain, at a minimum, the following conditions:
 1. Statement of duration (in no case more than five years);
 2. Statement of non-transferability without, at a minimum, prior notification to the POTW and provision of a copy of the existing control mechanism to the new owner or operator;
 3. Effluent limits, including Best Management Practices, based on applicable general Pretreatment Standards, categorical Pretreatment Standards, local limits, and State and local law;

4. Self-monitoring, sampling, reporting, notification and recordkeeping requirements, including an identification of the pollutants to be monitored (including the process for seeking a waiver for a pollutant neither present nor expected to be present in the Discharge in accordance with § 403.12(e)(2), or a specific waiver for a pollutant in the case of an individual control mechanism), sampling location, sampling frequency, and sample type, based on the applicable general Pretreatment Standards in 40 CFR 403, categorical Pretreatment Standards, local limits, and State and local law;
 5. Statement of applicable civil and criminal penalties for violation of Pretreatment Standards and requirements, and any applicable compliance schedule. Such schedules may not extend the compliance date beyond federal deadlines; and Requirements to control slug discharges, if determined by the POTW to be necessary.
- v. The permittee shall evaluate, whether each Significant Industrial User needs a plan or other action to control slug discharges, in accordance with 40 CFR 403.8(f)(2)(vi);
 - vi. The permittee shall provide adequate staff, equipment, and support capabilities to carry out all elements of the pretreatment program; and
 - vii. The approved program shall not be modified by the permittee without the prior approval of ADEQ.
- b. The permittee shall establish and enforce specific limits to implement the provisions of 40 CFR Parts 403.5(a) and (b), as required by 40 CFR Part 403.5(c). POTWs may develop Best Management Practices (BMPs) to implement paragraphs 40 CFR 403.5 (c)(1) and (c)(2). Such BMPs shall be considered local limits and Pretreatment Standards. Each POTW with an approved pretreatment program shall continue to develop these limits as necessary and effectively enforce such limits.

The permittee shall submit, within sixty (60) days of the effective date of this permit, (1) a **WRITTEN CERTIFICATION** that a technical evaluation has demonstrated that the existing technically based local limits (TBLL) are based on current state water quality standards and are adequate to prevent pass through of pollutants, inhibition of or interference with the treatment facility, worker health and safety problems, and sludge contamination, **OR** (2) a **WRITTEN NOTIFICATION** that a technical evaluation revising the current TBLL and a draft sewer use ordinance which incorporates such revisions will be submitted within 12 months of the effective date of this permit.

All specific prohibitions or limits developed under this requirement are deemed to be conditions of this permit. The specific prohibitions set out in 40 CFR Part 403.5(b) shall be enforced by the permittee unless modified under this provision.

- c. The permittee shall analyze the treatment facility influent and effluent for the presence of the toxic pollutants listed in 40 CFR 122 Appendix D (NPDES Application Testing Requirements) Table II at least once/year and the toxic pollutants in Table III at least 4 times/year (quarterly). If, based upon information available to the permittee, there is reason to suspect the presence of any toxic or hazardous pollutant listed in Table V, or any other pollutant, known or suspected to adversely affect treatment plant operation, receiving water quality, or solids disposal procedures, analysis for those pollutants shall be performed at least 4 times/year (quarterly) on both the influent and the effluent.

The influent and effluent samples collected shall be composite samples consisting of at least 12 aliquots collected at approximately equal intervals over a representative 24 hour period and composited according to flow. Sampling and analytical procedures shall be in accordance with guidelines established in 40 CFR 136. Where composite samples are inappropriate, due to sampling, holding time, or analytical constraints, at least 4 grab samples, taken at equal intervals over a representative 24 hour period, shall be taken.

- d. The permittee shall prepare annually a list of Industrial Users which during the preceding twelve months were in significant noncompliance with applicable pretreatment requirements. For the purposes of this Part, significant noncompliance shall be determined based upon the more stringent of either criteria established at 40 CFR Part 403.8(f)(2)(viii) [rev. 10/14/05] or criteria established in the approved POTW pretreatment program. This list is to be published annually in the newspaper of general circulation that provides meaningful public notice within the jurisdiction(s) served by the POTW during the month of October.

In addition, during the month of October the permittee shall submit an updated pretreatment program status report to the ADEQ containing the following information:

- i. An updated list of all significant industrial users and identify which Industrial Users are Non-Significant Categorical Industrial Users (NSCIUs) or Middle Tier CIUs. The list must also identify:
 - (a) Industrial Users subject to categorical Pretreatment Standards that are subject to reduced monitoring and reporting requirements under 40 CFR 403.12(e)(2) & (3),
 - (b) Industrial Users subject to the following categorical Pretreatment Standards [Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) (40 CFR Part 414), Petroleum Refining (40 CFR Part 419), and Pesticide Chemicals (40 CFR Part 455)] and for which the Control Authority has chosen to use the concentration-based standards rather than converting them to flow-based mass standards as allowed at 40 CFR 403.6(c)(6).

- (c) Categorical Industrial Users subject to concentration-based standards for which the Control Authority has chosen to convert the concentration-based standards to equivalent mass limits, as allowed at 40 CFR 403.6(c)(5).
 - (d) General Control Mechanisms used for similar groups of SIUs along with the substantially similar types of operations and the types of wastes that are the same, for each separate General Control Mechanism, as allowed at 40 CFR 403.8(f)(1)(iii).
 - (e) Best Management Practices or Pollution Prevention alternatives required by a categorical Pretreatment Standard or as a local limit requirement that are implemented and documentation to demonstrate compliance, as required at 40 CFR 403 (b), (e) and (h).
- (2) For each industrial user listed the following information shall be included:
- (a) Standard Industrial Classification (SIC) and NAICS code and categorical determination;
 - (b) Control document status. Whether the user has an effective control document, and the date such document was last issued, reissued, or modified, (indicate which industrial users were added to the system (or newly identified) within the previous 12 months);
 - (c) A summary of all monitoring activities performed within the previous 12 months. The following information shall be reported:
 - * total number of inspections performed;
 - * total number of sampling visits made;
 - (d) Status of compliance with both effluent limitations and reporting requirements. Compliance status shall be defined as follows:
 - * Compliant (C) - no violations during the previous 12 month period;
 - * Non-compliant (NC) - one or more violations during the previous 12 months but does not meet the criteria for significantly noncompliant industrial users;
 - * Significant Noncompliance (SNC) - in accordance with requirements described in d. above; and
 - (e) For significantly noncompliant industrial users, indicate the nature of the violations, the type and number of actions taken (notice of violation, administrative order, criminal or civil suit, fines or penalties collected, etc.) and current compliance status. If ANY industrial user was on a schedule to attain compliance with effluent limits, indicate the date the schedule was issued and the date compliance is to be attained;

- (3) A list of all significant industrial users whose authorization to discharge was terminated or revoked during the preceding 12 month period and the reason for termination;
- (4) A report on any interference, pass through, upset or POTW permit violations known or suspected to be caused by industrial contributors and actions taken by the permittee in response;
- (5) The results of all influent and effluent analyses performed pursuant to paragraph (c) above;
- (6) A copy of the newspaper publication of the significantly noncompliant industrial users giving the name of the newspaper and the date published;
- (7) The information requested may be submitted in tabular form as per the example tables provided for your convenience (See Attachment A, B and C); and
- (8) The monthly average water quality based effluent concentration necessary to meet the state water quality standards as developed in the approved technically based local limits.

E. The permittee shall provide adequate notice of the following:

- (1) Any new introduction of pollutants into the treatment works from an indirect discharger which would be subject to Sections 301 and 306 of the Act if it were directly discharging those pollutants; and
- (2) Any substantial change in the volume or character of pollutants being introduced into the treatment works by a source introducing pollutants into the treatment works at the time of issuance of the permit.

Adequate notice shall include information on (i) the quality and quantity of effluent to be introduced into the treatment works, and (ii) any anticipated impact of the change on the quality or quantity of effluent to be discharged from the POTW.

PART IV DEFINITIONS

All definitions contained in Section 502 of the Clean Water Act shall apply to this permit and are incorporated herein by reference. Additional definitions of words or phrases used in this permit are as follows:

1. **“Act”** means the Clean Water Act, Public Law 95-217 (33.U.S.C. 1251 et seq.) as amended.
2. **“Administrator”** means the Administrator of the U.S. Environmental Protection Agency.
3. **“Applicable effluent standards and limitations”** means all State and Federal effluent standards and limitations to which a discharge is subject under the Act, including, but not limited to, effluent limitations, standards of performance, toxic effluent standards and prohibitions, and pretreatment standards.
4. **“Applicable water quality standards”** means all water quality standards to which a discharge is subject under the federal Clean Water Act and which has been (a) approved or permitted to remain in effect by the Administrator following submission to the Administrator pursuant to Section 303(a) of the Act, or (b) promulgated by the Director pursuant to Section 303(b) or 303(c) of the Act, and standards promulgated under (APCEC) Regulation No. 2, as amended.
5. **“Bypass”** means the intentional diversion of waste streams from any portion of a treatment facility.
6. **“Daily Discharge”** means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. *Mass Calculations:* For pollutants with limitations expressed in terms of mass, the “daily discharge” is calculated as the total mass of pollutant discharged over the sampling day. *Concentration Calculations:* For pollutants with limitations expressed in other units of measurement, determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used; the “daily discharge” determination of concentration shall be the arithmetic average (weighted by flow value) of all the samples collected during that sampling day by using the following formula: where C= daily concentration, F=daily flow and n=number of daily samples

$$\frac{C_1F_1 + C_2F_2 + \dots + C_nF_n}{F_1 + F_2 + \dots + F_n}$$

7. **“Monthly average”** means the highest allowable average of “daily discharges” over a calendar month, calculated as the sum of all “daily discharges” measured during a calendar month divided by the number of “daily discharges” measured during that month. For Fecal Coliform Bacteria (FCB) report the monthly average (see 30-day average below).
8. **“Daily Maximum”** discharge limitation means the highest allowable “daily discharge” during the calendar month. The 7-day average for Fecal Coliform Bacteria (FCB) is the geometric mean of the values of all effluent samples collected during the calendar week in colonies per 100 ml.

9. **“Department”** means the Arkansas Department of Environmental Quality (**ADEQ**).
10. **“Director”** means the Administrator of the U.S. Environmental Protection Agency and/or the Director of the Arkansas Department of Environmental Quality.
11. **“Grab sample”** means an individual sample collected in less than 15 minutes in conjunction with an instantaneous flow measurement.
12. **“Industrial User”** means a nondomestic discharger, as identified in 40 CFR Part 403, introducing pollutants to a POTW.
13. **“National Pollutant Discharge Elimination System”** means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under Sections 307, 402, 318, and 405 of the Clean Water Act.
14. **“POTW”** means a Publicly Owned Treatment Works.
15. **“Severe property damage”** 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. Severe property damage does not mean economic loss caused by delays in products.
16. **“APCEC”** means the Arkansas Pollution Control and Ecology Commission.
17. **“Sewage sludge”** means the solids, residues, and precipitate separated from or created in sewage by the unit processes at a POTW. Sewage as used in this definition means any wastes, including wastes from humans, households, commercial establishments, industries, and stormwater runoff that are discharged to or otherwise enter a POTW.
18. **“7-day average”** discharge limitation, other than for Fecal Coliform Bacteria (FCB), is the highest allowable arithmetic mean of the values for all effluent samples collected during the calendar week. The 7-day average for Fecal Coliform Bacteria (FCB) is the geometric mean of the values of all effluent samples collected during the calendar week in colonies/100 ml. The Discharge Monitoring Report should report the highest 7-day average obtained during the calendar month. For reporting purposes, the 7-day average values should be reported as occurring in the month in which the Saturday of the calendar week falls in.
19. **“30-day average”**, other than for Fecal Coliform Bacteria (FCB), is the arithmetic mean of the daily values for all effluent samples collected during a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month. The 30-day average for Fecal Coliform Bacteria (FCB) is the geometric mean of the values for all effluent samples collected during a calendar month. For Fecal Coliform Bacteria (FCB), report the monthly average as a 30-day geometric mean in colonies per 100 ml.
20. **“24-hour composite sample”** consists of a minimum of 12 effluent portions collected at equal time intervals over the 24-hour period and combined proportional to flow or a sample collected at frequent intervals proportional to flow over the 24-hour period.
21. **“12-hour composite sample”** consists of 12 effluent portions, collected no closer together than one hour and composited according to flow. The daily sampling intervals shall include the highest flow periods.
22. **“6-hour composite sample”** consists of six effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.

23. **“3-hour composite sample”** consists of three effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.
24. **“Treatment works”** means any devices and systems used in storage, treatment, recycling, and reclamation of municipal sewage and industrial wastes, of a liquid nature to implement section 201 of the Act, or necessary to recycle reuse water at the most economic cost over the estimated life of the works, including intercepting sewers, sewage collection systems, pumping, power and other equipment, and alterations thereof; elements essential to provide a reliable recycled supply such as standby treatment units and clear well facilities, and any works, including site acquisition of the land that will be an integral part of the treatment process or is used for ultimate disposal of residues resulting from such treatment.
25. **“Upset”** means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. Any upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventive maintenance, or careless of improper operations.
26. **“For Fecal Coliform Bacteria (FCB)”**, a sample consists of one effluent grab portion collected during a 24-hour period at peak loads. For Fecal Coliform Bacteria (FCB) report the monthly average as a 30-day geometric mean in colonies per 100 ml.
27. **“Dissolved oxygen limit”**, shall be defined as follows:
 - a. When limited in the permit as a minimum monthly average, shall mean the lowest acceptable monthly average value, determined by averaging all samples taken during the calendar month;
 - b. When limited in the permit as an instantaneous minimum value, shall mean that no value measured during the reporting period may fall below the stated value.
28. **The term “MGD”** shall mean million gallons per day.
29. **The term “mg/l”** shall mean milligrams per liter or parts per million (ppm).
30. **The term “µg/l”** shall mean micrograms per liter or parts per billion (ppb).
31. **The term “cfs”** shall mean cubic feet per second.
32. **The term “ppm”** shall mean parts per million.
33. **The term “s.u.”** shall mean standard units.
34. **The term “Instantaneous Maximum”** when limited in the permit as an instantaneous maximum value, shall mean that no value measured during the reporting period may fall above the stated value.
35. **Monitoring and Reporting:**

When a permit becomes effective, monitoring requirements are of the immediate period of the permit effective date. Where the monitoring requirement for an effluent characteristic is monthly or more frequently, the Discharge Monitoring Report (DMR) shall be submitted by the 25th of the month following the sampling. Where the monitoring requirement for an effluent characteristic is Quarterly, Semi-Annual, Annual, or Yearly, the DMR shall be submitted by the 25th of the month following the monitoring period end date.

MONTHLY:

is defined as a calendar month or any portion of a calendar month for monitoring requirement frequency of once/month or more frequently.

QUARTERLY:

(1) is defined as a fixed calendar quarter or any part of the fixed calendar quarter for a non-seasonal effluent characteristic with a measurement frequency of once/quarter.

Fixed calendar quarters are: January through March, April through June, July through September, and October through December; or

(2) is defined as a fixed three month period (or any part of the fixed three month period) of or dependent upon the seasons specified in the permit for a seasonal effluent characteristic with a monitoring requirement frequency of once/quarter that does not coincide with the fixed calendar quarter. Seasonal calendar quarters are: May through July, August through October, November through January, and February through April.

SEMI-ANNUAL:

is defined as the fixed time periods January through June, and July through December (or any portion thereof) for an effluent characteristic with a measurement frequency of once/6 months or twice/year.

ANNUAL or YEARLY:

is defined as a fixed calendar year or any portion of the fixed calendar year for an effluent characteristic or parameter with a measurement frequency of once/year. A calendar year is January through December, or any portion thereof.

36. **The term “Weekday”** means Monday – Friday.

Fact Sheet

for renewal of final discharge Permit Number AR0021750 to discharge to Waters of the State

1. PERMITTING AUTHORITY.

The issuing office is:

Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

2. APPLICANT.

The applicant's mailing address is:

City of Fort Smith - Massard Wastewater Treatment Facility
3900 Kelley Hwy.
Fort Smith, AR 72904

The facility address is:

City of Fort Smith - Massard Wastewater Treatment Facility
1609 9th Street
Barling, AR 72923

3. PREPARED BY.

The permit was prepared by:

Marysia Jastrzebski, P.E.
Staff Engineer
Discharge Permits Section, Water Division
(870) 446-5939
E-mail: marysia@adeq.state.ar.us

4. PREVIOUS PERMIT ACTIVITY.

Effective Date: September 1, 2003
Expiration Date: August 31, 2008

The permit application was received on 3/10/2008 and was deemed administratively complete on March 13, 2008. It is proposed that the current discharge permit be reissued for a 5-year term in accordance with regulations promulgated at 40 CFR Part 122.46(a).

The following is a summary of DMR data for the period of January 2002 through January 2008:

CBOD5 and TSS – No violations were reported.

Cyanide – One violation reported in October 2005.

pH – One violation was reported in August 2004.

BOD5 – Violations were reported for 3 out of 47 reported monthly periods. No violations have been reported since February 2003.

NH3-N - Violations were reported for 4 out of 26 reported monthly periods. No violations have been reported since June 2005.

FCB - Violations were reported for 9 out of 73 reported monthly periods. No violations since August 2007.

It appears that the only parameter the facility has recently had problem meeting is Fecal Coliform Bacteria. Fecal Coliform Bacteria violations were discussed during the site visit on May 30, 2008. The facility representative stated that these violations were due to algae blinding the UV modules. The proposed addition of more UV modules should allow for more frequent cleaning and increase treatment efficiencies.

5. SIGNIFICANT CHANGES FROM THE PREVIOUSLY ISSUED PERMIT.

The permittee is responsible for carefully reading the permit in detail and becoming familiar with all of the changes therein:

1. The physical address of the facility has changed based on the submitted application.
2. The coordinates of the facility and Outfall 001 have been corrected based on the GPS readings and a Google Earth satellite photo.
3. The narrative description of the facility location has been revised based on the submitted application.
4. The 7-Day Average effluent limitation for Carbonaceous Biochemical Oxygen Demand (5 day) has been slightly revised.
5. The mass limitation for Total Recoverable Cyanide has been slightly revised.
6. An effluent limitation for Dissolved Oxygen has been included.
7. The effluent limitations for pH have been changed from 6- 9 s.u. to 6.0 - 9.0 s.u.
8. The monitoring frequency for Total Recoverable Cyanide has been revised.
9. The narrative description and coordinates of the sampling location have been included.
10. A schedule of compliance related to pretreatment and stormwater requirements has been included.
11. A special condition No. 1 requiring a Class IV Licensed Operator has been included.
12. The special conditions No. 10 and 11 of Part III from the previous permit have been deleted.
13. Part II, Part III, and Part IV have been revised.

6. RECEIVING STREAM SEGMENT AND DISCHARGE LOCATION.

The outfall is located at the following coordinates based on a google earth satellite image and Attachment No. 4 submitted with the application:

Latitude: 35° 21' 03.7" Longitude: 94° 18' 02.4"

The receiving waters named:

from the plant site through a 36-inch line to the Arkansas River at Pool 13 approximately 800 feet west of Lock and Dam 13 in Segment 3H of the Arkansas River Basin. The receiving stream with USGS Hydrologic Unit Code (H.U.C) of 11110104 and reach # 001 is a Water of the State classified for primary contact recreation, raw water source for domestic, industrial, and agricultural water supplies, propagation of desirable species of fish and other aquatic life, and other compatible uses.

a. 303(d) LIST AND ENDANGERED SPECIES CONSIDERATIONS.

i. 303(d) List:

This facility discharges to the Arkansas River in reach # 001 of HUC 11110104. This reach of the receiving stream is listed on the 2008 303(d) list for Total Dissolved Solids (TDS) and Chlorides. The permittee submitted information showing TDS and Chlorides concentrations in the effluent. In order to ensure that this discharge does not contribute to the impairment, a review of the potential to violate water quality standards has been performed in Part 13. d. (page 10) of this Fact Sheet. Neither the WQS for the Arkansas River or EPA's Secondary Drinking Water Standards were exceeded or showed the potential to be exceeded for both parameters. Therefore, no monitoring and reporting requirements for TDS and/or Chlorides are included in the permit.

A reopener clause is established in Part II of the permit, which allows the permit to be modified, if necessary, to conform with final effluent limitations established by an approved Water Quality Management Plan (WQMP), an approved waste load allocation(WLA) as part of a Total Maximum Daily Load (TMDL), or pollutant specific limits if a more specific 303(d) list is approved.

ii. Endangered Species:

No comments on the application were received from the U.S. Fish and Wildlife Service (USF&WS).

7. OUTFALL AND TREATMENT PROCESS DESCRIPTION.

The following is a description of the facility described in the application:

a. Design Flow: 10 MGD

b. Type of Treatment: bar screen/grit removal, primary clarification, trickling filters, activated sludge, secondary clarifiers, and UV disinfection.

c. Discharge Description: treated municipal wastewater

8. ACTIVITY.

Under the Standard Industrial Classification (SIC) code of 4952 or North American Industry Classification System (NAICS) code of 22132, the applicant's activities are the operation of a sewage treatment plant.

9. INDUSTRIAL WASTEWATER CONTRIBUTIONS.

This facility receives process wastewater from five Significant Industrial Users and six Categorical Industrial Users.

Industrial Contributor	Principal Product	Process Wastewater Flow
Exide Technologies, Inc.	Parts for the manufacture and assembly of industrial batteries	0.0021 MGD
Copper Fab, Inc.	Copper and metal parts	0.0 MGD
Whirlpool Corp.	Residential appliances	0.0042 MGD
Hiram Walker Pernod Ricard USA	Custom blended distilled spirits	0.029 MGD
Owens Corning Composite Materials LLC	Fiberglass mats	0.035 MGD
QualServ Corp – Fort Smith Division	Furniture & fixture for retail & fast food services	0.0 MGD
Quanex, MacSteel Division	Steel bars	0.079 MGD
Rheem Manufacturing Company	Commercial & Residential heating and air conditioning units	0.011 MGD
St. Edwards Mercy Medical Center	Medical care procedures, residential patient care	0.097 MGD
Trane	Commercial & Residential heating and air conditioning units	0.051 MGD
Twin Rivers Foods	Further processes poultry	0.020 MGD

Based on the applicant's effluent compliance history and the type of industrial contributions, standard Pretreatment Program implementation conditions are deemed appropriate at this time.

10. SEWAGE SLUDGE PRACTICES.

Sludge is hauled off site to the city's sanitary landfill.

11. PERMIT CONDITIONS.

The Arkansas Department of Environmental Quality has made a determination to issue a final permit for the discharge described in the application. Permit requirements are based on federal regulations (40 CFR Parts 122, 124, and Subchapter N), the National Pretreatment Regulation in 40 CFR Part 403 and regulations promulgated pursuant to the Arkansas Water and Air Pollution Control Act (Act 472 of 1949, as amended, Ark. Code Ann. 8-4-101 et. seq.).

a. **Final Effluent Limitations**

Outfall 001- treated municipal wastewater

i. **Conventional and/or Toxic Pollutants**

<u>Effluent Characteristics</u>	<u>Discharge Limitations</u>			<u>Monitoring Requirements</u>	
	Mass (lbs/day, unless otherwise specified)	Concentration (mg/l, unless otherwise specified)		Frequency	Sample Type
		Monthly Avg.	Monthly Avg.		
Flow (MGD)	N/A	Report	7-Day Avg. (Daily Max) Report	once/day	totalizing meter
Biochemical Oxygen Demand (BOD5)					
(Nov-Apr)	2502.0	30	45	once/weekday	24-hr composite
Carbonaceous Biochemical Oxygen Demand (CBOD5)					
(May-Oct)	2085.0	25	37.5	once/weekday	24-hr composite
Total Suspended Solids (TSS)	2502.0	30	45	once/weekday	24-hr composite
Ammonia Nitrogen (NH3-N)					
(May-Oct)	417.0	5	7.5	once/weekday	24-hr composite
Dissolved Oxygen	N/A	2.0, (Inst. Min.)		once/weekday	grab
Fecal Coliform Bacteria (FCB)		(colonies/100ml)			
(Apr-Sept)	N/A	200	400	once/weekday	grab
(Oct-Mar)	N/A	1000	2000	once/weekday	grab
Cyanide, Total Recoverable	5.9	71 µg/l	142 µg/l	once/quarter	grab
pH	N/A	<u>Minimum</u> 6.0 s.u.	<u>Maximum</u> 9.0 s.u.	once/weekday	grab
Chronic WET Testing	N/A	N/A	N/A	once/quarter	24-hr composite

ii. **Solids, Foam, and Free Oil:** There shall be no discharge of distinctly visible solids, scum, or foam of a persistent nature, nor shall there be any formation of slime, bottom deposits, or sludge banks. There shall be no visible

sheen due to the presence of oil (Sheen means an iridescent appearance on the surface of the water).

12. BASIS FOR PERMIT CONDITIONS.

The following is an explanation of the derivation of the conditions of the final permit and the reasons for them or, in the case of notices of intent to deny or terminate, reasons suggesting the decisions as required under 40 CFR Part 124.7 (48 FR 1413, April 1, 1983).

Technology-Based Versus Water Quality-Based Effluent Limitations And Conditions

Following regulations promulgated at 40 CFR Part 122.44 (1)(2)(ii), the final permit limits are based on either technology-based effluent limits pursuant to 40 CFR Part 122.44 (a) or on State water quality standards and requirements pursuant to 40 CFR Part 122.44 (d), whichever are more stringent as follows:

Parameter	Water Quality-Based		Technology-Based/BPJ		Previous Permit		Permit Limit	
	Monthly Avg. mg/l	7-day Avg. mg/l	Monthly Avg. mg/l	7-day Avg. mg/l	Monthly Avg. mg/l	7-day Avg. mg/l	Monthly Avg. mg/l	7-day Avg. mg/l
BOD5								
(Nov-April)	30*	45*	30	45	30	45	30	45
CBOD5								
(May-Oct)	25*	37.5*	25	40	25	38	25	37.5
TSS	N/A	N/A	30	45	30	45	30	45
NH3-N								
(May-Oct)	5	7.5	N/A	N/A	5	7.5	5	7.5
Dissolved Oxygen	2.0 (Inst. Min.)		N/A		N/A		2.0 (Inst. Min.)	
FCB (col/100 ml)								
(Apr-Sept)	200	400	N/A	N/A	200	400	200	400
(Oct-Mar)	1000	2000	N/A	N/A	1000	2000	1000	2000
Cyanide, Total Recoverable	71 µg/l	142 µg/l	N/A	N/A	71 µg/l	142 µg/l	71 µg/l	142 µg/l
pH	6.0-9.0 s.u.		6.0-9.0 s.u.		6-9 s.u.		6.0-9.0 s.u.	

* These effluent limitations for BOD5 and CBOD5 are based 40 CFR 133.102.

Parameter	Water Quality or Technology	Justification
CBOD5/BOD5*	Technology	40 CFR 133.102
TSS	Technology	40 CFR 133.102
NH3-N	Water Quality	Section 2.512 of Regulation No. 2/ MultiSMP Model dated January 4, 2008
DO**	Water Quality	Section 2.505 of Regulation No. 2
Fecal Coliform Bacteria	Water Quality	Section 2.507 of Regulation No. 2
pH***	Water Quality	Section 2.504 of Regulation No. 2
Total Recoverable Cyanide****	Water Quality	Previous permit, 40 CFR 122.44 (1)(2)(i), Section 2.508 of Regulation No. 2

* CBOD5

The Daily Maximum Effluent Limitation for CBOD5 has been slightly revised in accordance with the following equation:

$$\text{Daily Maximum limits} = \text{Monthly average limits} \times 1.5$$

** Dissolved Oxygen

The Instantaneous Minimum effluent limitation for Dissolved Oxygen of 2 mg/l has been included to ensure that the in-stream Dissolved Oxygen does not fall below established criteria based on APCEC Regulation No. 2 Section 2.505.

Based on the submitted Part B of Form 2A, the average daily DO concentration of 5.10 mg/l has been recorded. It is the best engineering judgment of the permit writer that the existing facility is capable of meeting the proposed limit. No schedule of compliance is included. The final limitation must be met on the effective date of the permit.

*** pH

The effluent limitations for this parameter have been revised from 6-9 s.u. to 6.0-9.0 s.u. to be consistent with Reg.2.504 of Regulation No. 2.

*** Total Recoverable Cyanide

The effluent concentration limitations based on Arkansas Water Quality Standards have been continued from the previous permit. The mass limitation has been slightly revised. It is now expressed to the nearest tenth. A review of the submitted Discharge Monitoring Reports indicates relatively consistent concentrations of this pollutant in the effluent. During the last two years, only 4 out of 24 samples showed concentrations above the required Minimum Quantification Level (MQL). Furthermore, during the discussion with the permittee on May 30, 2008, the permittee was advised that any test results which are less than the MQL may be reported as zero on DMRs. It appears that

the permittee was not aware of this condition in his current permit, which means that several submitted DMRs should have shown values of “zero”. Based on the available DMR data, it is proposed to reduce monitoring frequency from once/month to once/quarter.

a. **Anti-backsliding**

The final permit is consistent with the requirements to meet Anti-backsliding provisions of the Clean Water Act (CWA), Section 402(o) [40 CFR 122.44(l)]. The final effluent limitations for reissuance permits must be as stringent as those in the previous permit, unless the less stringent limitations can be justified using exceptions listed in 40 CFR 122.44 (l)(2)(i).

The final permit maintains the requirements of the previous permit with the exception of revised monitoring frequency for Total Recoverable Cyanide. This decrease in monitoring frequencies does not constitute backsliding based on 40 CFR 122.44 (l)(2)(i)(B)(1) since there is new information available which was not available at the time of permit issuance.

b. **Limits Calculations**

i. Mass limits:

The calculation of the loadings (lbs per day) uses a design flow of 10 MGD and the following equation: $\text{lbs/day} = \text{Concentration (mg/l)} \times \text{Flow (MGD)} \times 8.34$

ii. Daily Maximum Limits:

Daily Maximum limits = Monthly average limits X 1.5

iii. Ammonia-Nitrogen (NH₃-N):

The water quality effluent limitations for Ammonia are based either on DO-based effluent limits or on toxicity-based standards, whichever are more stringent. The toxicity-based effluent limitations are based on Chapter 5, Section 2.512 of APCEC Regulation No. 2 and an ADEQ internal memo dated March 28, 2005.

The following formula has been used to calculate toxicity based Ammonia limits:
 $C_d = (IWC(Q_d + Q_b) - C_b Q_b) / Q_d$,

Where:

C_d = effluent limit concentration

IWC = Ammonia toxicity standard for Ecoregion

Q_d = design flow

Q_b = Critical flow of the receiving stream This flow is 25 percent of the 7-day, 10-year low-flow (7Q₁₀) for the receiving stream.

C_b = background concentration

c. **208 Plan (Water Quality Management Plan)**

The 208 Plan, developed by the ADEQ under provisions of Section 208 of the federal Clean Water Act, is a comprehensive program to work toward achieving federal water goals in Arkansas. The initial 208 Plan, adopted in 1979, provides for annual updates, but can be revised more often if necessary. The 208 Plan has been revised to add the effluent limitation for Dissolved Oxygen to the existing water quality limitations:

May-October: CBOD5/TSS/NH3-N/DO = 25/30/5/2 mg/l
November-March: BOD5/TSS/DO = 30/30/2 mg/l
Design flow (Q): 10 MGD
Background Flow of the receiving stream (7Q10): 700 cfs

d. **Total Dissolved Solids(TDS) and Chlorides(Cl)**

The permittee discharges to the Arkansas River approximately 800 feet upstream from monitoring station ARK38, Arkansas River at Van Buren. The 11-mile reach 001 directly below this monitoring station is listed in Category 5f on the 2008 303(d) list as impaired for Total Dissolved Solids and Chlorides. The facility submitted information showing TDS and Chlorides concentrations in the effluent and the Department performed the following analysis to ensure that this discharge does not contribute to the TDS and/or Chlorides impairment (See calculations below).

Neither the water quality standards for TDS and Chlorides for the Arkansas River or EPA's Secondary Drinking Water Standards for TDS and Chlorides were exceeded or showed the potential to be exceeded. Therefore, no limitations for these minerals will be required.

Total Dissolved Solids and Chlorides Discussion

ADEQ has reviewed information submitted by the permittee indicating the amounts of minerals present in the effluent. The concentrations of these minerals after mixing with the receiving stream (IWC) were compared to the applicable water quality standards as established in the Arkansas Water Quality Standards (WQS), Regulation No. 2 and the US EPA's Secondary Drinking Water Standards. The water quality standard of 500 mg/l for TDS and 250 mg/l for Chlorides can be found in Section 2.511 of Arkansas Regulation No. 2.

CALCULATION OF INSTREAM WASTE CONCENTRATION (IWC) FOR TDS AND CHLORIDES

The following expression was used to calculate the mineral Instream Waste Concentrations (IWC):

$$IWC = \{(C_e \times Q_e) + (C_b \times Q_b)\} / (Q_e + Q_b)$$

For the instream waste concentration determination of minerals as compared to the stream mineral standards:

$$IWC_{stream} = [(C_e \times Q_e) + (C_b \times Q_b)] / [(Q_e + Q_b)]$$

For the instream waste concentration determination of minerals as compared to EPA's Secondary Drinking Water Standards:

$$IWC_{drink} = [(C_e \times Q_e) + (C_b \times Q_{7Q10})] / [(Q_e + Q_{7Q10})]$$

Where:

IWC = The calculated instream concentration of mineral after mixing with receiving stream, in mg/l. IWC_{stream} will reference IWC's for comparison with the WQS for minerals. IWC_{drink} will reference IWC for comparison with the EPA's Secondary Drinking Water Standards

C_e TDS = **307** mg/l. $C_{e(TDS)}$ is the reported TDS concentration in effluent.

C_e Cl = **41** mg/l. $C_{e(Cl)}$ is the reported Chlorides concentration in effluent.

C_b TDS = **448** mg/l. The highest reported background concentration of TDS in receiving stream from the closest upstream monitoring station ARK0154 for period of October 26, 2004 through May 20, 2008.

C_b Cl = **150** mg/l. The highest reported background concentration of Chlorides in receiving stream from the closest upstream monitoring station ARK0154 for period of October 26, 2004 through May 20, 2008.

Q_e = **10** MGD = **15.4** cfs. Q_e is the effluent flow for Outfall **001**, and is based on the design flow.

Q_b = the background flow of receiving stream:

$Q_{b,stream} = Q_{hm} = 876$ MGD = **1353** cfs. For instream determination of exceedances of stream mineral standards, the background flow is the harmonic mean flow calculated using flow data for the sampling station ARK0038, Arkansas River at Van Buren.

$Q_{b,drink} = Q_{7Q10} = 455$ MGD = **700** cfs. For instream determination of exceedances of secondary drinking water standards, the background flow is the lowest mean discharge during 7 consecutive days of a year which, on average, occurs once every 10 years (7Q10).

Therefore:

For the instream waste concentration determination of minerals as compared to the stream mineral standards

TDS:

$$IWC_{stream} = [(C_e \times Q_e) + (C_b \times Q_{hm})] / [(Q_e + Q_{hm})] = [(307 \times 15.4) + (448 \times 1353)] / [(15.4 + 1353)] = 446.4 \text{ mg/l}$$

Cl:

$$IWC_{stream} = [(C_e \times Q_e) + (C_b \times Q_{hm})] / [(Q_e + Q_{hm})] = [(41 \times 15.4) + (150 \times 1353)] / [(15.4 + 1353)] = 148.8 \text{ mg/l}$$

For the instream waste concentration determination of minerals as compared to EPA's Secondary Drinking Water Standards:

TDS:

$$IWC_{drink} = [(C_e \times Q_e) + (C_b \times Q_{7Q10})] / [(Q_e + Q_{7Q10})] = [(307 \times 15.4) + (448 \times 700)] / [(15.4 + 700)] = 445.0 \text{ mg/l}$$

Cl:

$$IWC_{drink} = [(C_e \times Q_e) + (C_b \times Q_{7Q10})] / [(Q_e + Q_{7Q10})] = [(41 \times 15.4) + (150 \times 700)] / [(15.4 + 700)] = 147.7 \text{ mg/l}$$

APPLICABLE MINERAL STANDARDS

Stream Mineral

As established in the Arkansas Water Quality Standards, Regulation No. 2, the stream mineral water quality standard (instream, after mixing) is 500 mg/l.

Secondary Drinking Water

Independent of Ecoregion water quality standards and specific stream water quality standards, Section 2.511 of Arkansas Regulation No. 2 states "In no case shall discharges cause concentrations in any waterbody to exceed 250, 250, 500 mg/l of chlorides, sulfates and total dissolved solids, respectively....". These water quality standards are EPA's Secondary Drinking Water Standards, and the NPDES permit must assure compliance with these standards also, as they are included in Arkansas Regulation No. 2.

COMPARISON OF IWC's TO WATER QUALITY STANDARDS

Pollutant	WQS IWC, mg/l	Water Quality Mineral Standards, mg/l	Secondary Drinking Water IWC, mg/l	Secondary Drinking Water Standards, mg/l
Total Dissolved Solids	446.4	500	445.0	500
Chlorides	148.8	250	147.7	250

RESULTS OF BOTH MINERAL IWC's COMPARISONS TO WATER QUALITY STANDARDS

Neither the WQS for the **Arkansas River** or EPA's Secondary Drinking Water Standards were exceeded or showed the potential to be exceeded. Therefore, no limitations for these minerals will be required.

e. **Toxics Pollutants**

i. Post Third Round Policy and Strategy

Section 101 of the Clean Water Act(CWA) states that "...it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited...". To insure that the CWA's prohibitions on toxic discharges are met, EPA has issued a "Policy for the Development of Water Quality-Based Permit Limitations by Toxic Pollutants"(49 FR 9016-9019,3/9/84). In support of the national policy, Region 6 adopted the "Policy for post Third Round Permitting" and the "Post Third Round Permit Implementation Strategy" on October 1, 1992. The Regional policy and strategy are designed to insure that no source will be allowed to discharge any wastewater which (1) results in instream aquatic toxicity; (2) causes a violation of an applicable narrative or numerical State water quality standard resulting in non-conformance with the provisions of 40 CFR Part 122.44(d); (3) results in the endangerment of a drinking water supply; or (4) results in aquatic bioaccumulation which threatens human health.

ii. Implementation

The State of Arkansas is currently implementing EPA's Post Third-Round Policy in conformance with the EPA Regional strategy. The 5-year discharge permits contain technology-based effluent limitations reflecting the best controls available. Where these technology-based permit limits do not protect water quality or the designated uses, or where there are no applicable technology-based limits, additional water quality-based effluent limitations and/or conditions are included in the discharge permits. State narrative and numerical water quality standards from Regulation No. 2 are used in conjunction with EPA criteria and other available toxicity information to determine the adequacy of technology-based permit limits and the need for additional water quality-based controls.

iii. Priority Pollutant Scan (PPS)

In accordance with the regional policy ADEQ has reviewed and evaluated the effluent in evaluating the potential toxicity of each analyzed pollutant:

- (a) The results were evaluated and compared to EPA's Minimum Quantification Levels (MQLs) to determine the potential presence of a respective toxic pollutant. Those pollutants which are greater than or equal to the MQLs are determined to be reasonably present in the effluent and an evaluation of their potential toxicity is necessary.

- (b) Those pollutants with one datum shown as "non-detect" (ND), providing the level of detection is equal to or lower than MQL are determined to be not potentially present in the effluent and eliminated from further evaluation.
- (c) Those pollutants with a detectable value even if below the MQL are determined to be reasonably present in the effluent and an evaluation of their potential toxicity is necessary.
- (d) For those pollutants with multiple data values and all values are determined to be non-detect, therefore no further evaluation is necessary. However, where data set includes some detectable concentrations and some values as ND, one-half of the detection level is used for those values below the level of detection to calculate the geometric mean of the data set.

The concentration of each pollutant after mixing with the receiving stream was compared to the applicable water quality standards as established in the Arkansas Water Quality Standards, Reg. No. 2 and with the aquatic toxicity, human health, and drinking water criteria obtained from the "Quality Criteria for Water, 1986 (Gold Book)". The following expression was used to calculate the pollutant instream waste concentration(IWC):

$$IWC = ((C_e \times Q_e) + (C_b \times Q_b)) / (Q_e + Q_b)$$

where:

- IWC = instream concentration of pollutant after mixing with receiving stream ($\mu\text{g/l}$)
- C_e = pollutant concentration in effluent ($\mu\text{g/l}$)
- Q_e = effluent flow of facility (cfs)
- C_b = background concentration of pollutant in receiving stream ($\mu\text{g/l}$)
- Q_b = background flow of receiving stream (cfs)

The following values were used in the IWC calculations:

- C_e = varies with pollutant. A single value from the Priority Pollutant Screen (PPS) submitted by the permittee as part of the discharge permit application or the geometric mean of a group of data points (less than 20 data points) is multiplied by a factor of 2.13. This factor is based on EPA's Region VI procedure (See attachment IV of Continuing Planning Process(CPP)) to extrapolate limited data sets to better evaluate the potential toxicity for higher effluent concentrations to exceed water quality standards. This procedure employs a statistical approach which yields an estimate of a selected upper percentile value (the 95th percentile) of an effluent data set which would be expected to exceed 95% of effluent concentrations in a discharge. If 20 or more data points during the last two years are available, do not multiply by 2.13, but instead use the maximum reported values.

$Q_e = 10 \text{ MGD} = 15.4 \text{ cfs}$

$C_b =$ varies, based on the highest recorded value at station ARK0154 located approximately 14 miles upstream from the discharge location on the Arkansas River Hwy. 64 Bridge (Garrison Avenue) in $\mu\text{g/l}$

$Q_b =$ (See below):

I. Aquatic Toxicity

Chronic Toxicity: Flow = 175 cfs, for comparison with chronic aquatic toxicity. This flow is 25 percent of the 7-day, 10-year low-flow (7Q10) for the receiving stream. The 7Q10 of 700 cfs is based on "Identification and Classification of Perennial Stream of Arkansas", Arkansas Geological Commission Map.

Acute Toxicity: Flow = 42 cfs, for comparison with acute aquatic toxicity. This flow is 6 percent of the 7Q10 for the receiving stream.

II. Bioaccumulation

Flow = 1353 cfs, for comparison with bioaccumulation criteria. This flow is the harmonic mean of the receiving stream which is based on EPA's STORET (Storage and retrieval), Water Quality Data Base System, utilizing ADEQ accumulated data for Station ARK38.

III. Drinking Water

Flow = 700 cfs, for comparison with drinking water criteria. This flow is the 7Q10 for the receiving stream.

The following values were used to determine limits for the pollutants:

Hardness = 125 mg/l, based on attachment VI of CPP.

TSS = 12 mg/l, based on attachment V of CPP

pH = 7.45 s.u., based on compliance data from Arkansas Water Quality Inventory Report "305(b)" for station ARK0038.

iv. Water Quality Standards for Metals and Cyanide

Standards for Chromium (VI), Mercury, Selenium, and Cyanide are expressed as a function of the pollutant's water-effect ratio (WER), while standards for cadmium, chromium (III), copper, lead, nickel, silver, and zinc are expressed as a function of the pollutant's water-effect ratio, and as a function of hardness.

The Water-effect ratio (WER) is assigned a value of 1.0 unless scientifically defensible study clearly demonstrates that a value less than 1.0 is necessary or a value greater than 1.0 is sufficient to fully protect the designated uses of the receiving stream from the toxic effects of the pollutant.

The WER approach compares bioavailability and toxicity of a specific pollutant in receiving water and in laboratory test water. It involves running toxicity tests for at least two species, measuring LC50 for the pollutant using the local receiving water collected from the site where the criterion is being implemented, and laboratory toxicity testing water made comparable to the site water in terms of chemical hardness. The ratio between site water and lab water LC50 is used to adjust the national acute and chronic criteria to site specific values.

v. Conversion of Dissolved Metals Criteria for Aquatic Life to Total Recoverable Metal

Metals criteria established in APCEC Regulation No. 2, Section 2.508 for aquatic life protection are based on dissolved metals concentrations and hardness values. However, Federal Regulations cited at 40 CFR Part 122.45(c) require that effluent limitations for metals in discharge permits be expressed as total recoverable based on Attachment V of CPP. Therefore a dissolved to the total recoverable metal conversion must be implemented. This involves determining a linear partition coefficient for the metal of concern and using this coefficient to determine the fraction of metal dissolved, so that the dissolved metal ambient criteria may be translated to a total effluent limit. The formula for converting dissolved metals to total recoverable metals for streams and lakes are provided in Attachment V of CPP and Region 6 Implementation Guidance for Arkansas Water Quality Standards promulgated at 40 CFR Part 131.36.

vi. Comparison of the submitted information with the water quality standards and criteria

The following pollutants were determined to be present in the effluent for each pollutant as reported by the permittee.

Pollutant,	Concentration Reported, µg/l	MQL, µg/l
All metals as Total Recoverable		
Arsenic	> 1, use 1 *	0.5
Cadmium	0.55**	0.5
Copper	8.13***	0.5
Lead	>1, use 1*	0.5
Mercury	0.0055**	0.005
Nickel	4**	0.5
Thallium	>1, use 1*	0.5
Zinc	61.35***	20
Phenols	5.2**	5
Cyanide	11.48****	10

- * Arsenic, Lead, and Thallium. Based on a single data point from the PPS form. The actual detection level achieved was higher than required required MQL, therefore, the achieved detection concentration was used as actual concentration. The historical pretreatment data have not been used due to high detection levels.
- ** Cadmium, Mercury, Nickel, and Phenols. The actual reported concentrations. Based on a single data point value from the PPS form. The historical pretreatment data have not been used due to high detection levels.
- *** Copper and Zinc. Geometric mean. Based on 12 historical data points submitted with e-mail dated June 4, 2008 from Steve Floyd and PPS form.

Copper:

$$(8.8 \times 6.0 \times 6.0 \times 8.0 \times 6.0 \times 6.0 \times 8.8 \times 8.0 \times 6.0 \times 9.6 \times 6.0 \times 17 \times 18)^{1/13} \mu\text{g/l} = 8.13 \mu\text{g/l}$$

Several results were shown as non detect with detection level of 6 $\mu\text{g/l}$. Since at this time the required MQL for Copper is 0.5 $\mu\text{g/l}$, 6 $\mu\text{g/l}$ values have been used for these data points.

Zinc:

$$(65 \times 49 \times 60 \times 92 \times 43 \times 51 \times 78 \times 70 \times 56 \times 82 \times 40 \times 55 \times 82)^{1/13} \mu\text{g/l} = 61.35 \mu\text{g/l}$$

- **** Cyanide. Geometric mean. Based on 24 data points submitted on DMR for the period of February 2006 through January 2008.

$$(10 \times 13 \times 10 \times 10 \times 10 \times 25 \times 17 \times 25 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10)^{1/24} \mu\text{g/l} = 11.48 \mu\text{g/l}$$

However, ADEQ has determined from the information submitted by the permittee that no water quality standards or Gold Book criteria are exceeded. Therefore, no permit action is necessary to maintain these standards or criteria (See Attachment 1.)

Arsenic. While the PPS has not shown potential to violate Arkansas aquatic water quality standards for this parameter, it did show potential to violate EPA's bioaccumulation criterion. Typically, this determination would require monitoring and reporting for Arsenic in the NPDES permit. However, in this specific case it is important to note that this potential cannot be contributed to the discharge. The actual reported value was below the detection level of 1 $\mu\text{g/l}$. This value was used in the PPS analysis since the achieved detection level was higher than the required MQL of 0.5 $\mu\text{g/l}$. At this level effluent would not show any potential for violation of the bioaccumulation criterion. This violation was shown due to the background concentration of 3.21 $\mu\text{g/l}$ (the highest reported value for ARK 0154). There may be numerous reasons for this value

being erroneous. It is the best engineering judgment of the permit writer that the facility does not cause or contribute to a violation of the Arsenic bioaccumulation criterion, and, therefore, no monitoring and reporting requirements must be included in the permit.

13. WHOLE EFFLUENT TOXICITY TESTING.

Section 101(a)(3) of the Clean Water Act states that ".....it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited." In addition, ADEQ is required under 40 CFR Part 122.44(d)(1), adopted by reference in Regulation 6, to include conditions as necessary to achieve water quality standards as established under Section 303 of the Clean Water Act. Arkansas has established a narrative criteria which states "toxic materials shall not be present in receiving waters in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of aquatic biota."

Whole effluent toxicity (WET) testing is the most direct measure of potential toxicity which incorporates the effects of synergism of effluent components and receiving stream water quality characteristics. It is the national policy of EPA to use bioassays as a measure of toxicity to allow evaluation of the effects of a discharge upon a receiving water (49 Federal Register 9016-9019, March 9, 1984). EPA Region 6 and the State of Arkansas are now implementing the Post Third Round Policy and Strategy established on September 9, 1992, and EPA Region 6 Post-Third Round Whole Effluent Toxicity Testing Frequencies, revised March 13, 2000. Whole effluent toxicity testing of the effluent is thereby required as a condition of this permit to assess potential toxicity. The whole effluent toxicity testing procedures stipulated as a condition of this permit are as follows:

TOXICITY TESTS

FREQUENCY

Chronic WET

Once/quarter

Requirements for measurement frequency are based on appendix D of CPP.

Since 7Q10 is less than 100 cfs (ft³/sec) and dilution ratio is less than 100:1, chronic WET testing requirements will be included in the permit.

The calculations for dilution used for chronic WET testing are as follows:

$$\text{Critical dilution (CD)} = (Q_d / (Q_d + Q_b)) \times 100$$

$$Q_d = \text{Design flow} = 10 \text{ MGD} = 15.4 \text{ cfs}$$

$$7Q_{10} = 700 \text{ Cfs}$$

$$Q_b = \text{Background flow} = (0.25) \times 7Q_{10} = 175 \text{ cfs}$$

$$CD = (15.4) / (15.4 + 175) \times 100 = 8.1 \%$$

Toxicity tests shall be performed in accordance with protocols described in "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", EPA/600/4-91/002, July 1994. A minimum of five effluent dilutions in addition to an appropriate control (0%) are to be used in the toxicity tests. These additional effluent

concentrations are **3%, 5%, 6%, 8%, and 11%** (See **Attachment I** of CPP). The low-flow effluent concentration (critical dilution) is defined as **8 %** effluent. The requirement for chronic WET tests is based on the magnitude of the facility's discharge with respect to receiving stream flow. The stipulated test species, *Ceriodaphnia dubia* and the Fathead minnow (*Pimephales promelas*) are indigenous to the geographic area of the facility; the use of these is consistent with the requirements of the State water quality standards. The WET testing frequency has been established to provide data representative of the toxic potential of the facility's discharge, in accordance with the regulations promulgated at 40 CFR Part 122.48.

Results of all dilutions as well as the associated chemical monitoring of pH, temperature, hardness, dissolved oxygen conductivity, and alkalinity shall be reported according to EPA/600/4-91/002, July 1994 and shall be submitted as an attachment to the Discharge Monitoring Report (DMR).

This permit may be reopened to require further WET testing studies, Toxicity Reduction Evaluation (TRE) and/or effluent limits if WET testing data submitted to the Department shows toxicity in the permittee's discharge. Modification or revocation of this permit is subject to the provisions of 40 CFR 122.62, as adopted by reference in ADEQ Regulation No. 6. Increased or intensified toxicity testing may also be required in accordance with Section 308 of the Clean Water Act and Section 8-4-201 of the Arkansas Water and Air Pollution Control Act (Act 472 of 1949, as amended).

Administrative Records

The following information summarized toxicity test submitted by the permittee during the term of the current permit at outfall **001**:

WHOLE EFFLUENT TOXICITY TESTING FREQUENCY RECOMMENDATION AND RATIONALE FOR ADDITIONAL REQUIREMENTS

Permit Number: **AR0021750**

Facility Name: **City of Fort Smith - Massard Wastewater Treatment Facility**

Previous Critical Dilution: **8%** Proposed Critical Dilution: **8%**

Date of Review: **5/22/08** Name of Reviewer: **Barnett**

Number of tests performed during previous 5 years by species:

***Pimephales promelas* (Fathead minnow): 8**

***Ceriodaphnia dubia* (water flea): 8**

Failed test dates during previous 5 years by species:

<i>Pimephales promelas</i> (Fathead minnow):	<u>Lethal</u> none	<u>Sublethal</u> none
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<i>Ceriodaphnia dubia</i> (water flea):	<u>Lethal</u> none	<u>Sublethal</u> none
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Previous TRE activities: None

Frequency recommendation by species:

***Pimephales promelas* (Fathead minnow): four/year**

***Ceriodaphnia dubia* (water flea): four/year**

Additional requirements (including WET Limits) rationale/comments concerning permitting:

Rationale: According to the EPA Region 6 Post-Third Round Whole Effluent Toxicity Testing Frequencies: "All major dischargers, and those minor dischargers specifically identified by EPA or the State permitting authority (based on available information on a case-by case basis) as posing a significant unaddressed toxic risk, will be required to perform Whole Effluent Toxicity testing at a frequency of once per quarter for the vertebrate and invertebrate tests species for the first year of a new or reissued permit."

Reasonable Potential Calculation

N/A- No test failures were reported in 8 tests performed for each species during the previous five-year period.

14. SAMPLE TYPE AND FREQUENCY.

Regulations require permits to establish monitoring requirements to yield data representative of the monitored activity [40 CFR Part 122.48(b)] and to ensure compliance with permit limitations [40 CFR Part 122.44(i)(1)].

Requirements for sample type and sampling frequency for all parameters except the sampling frequency for Total Recoverable Cyanide have been based on the current discharge permit.

A review of DMR data submitted for Total Recoverable Cyanide for the period of February 2006 through January 2008 indicates that only five out of 24 data points were above the MQL level of 10 µg/l. The effluent limitations for this parameter have been continued in the proposed permit but the monitoring frequencies have been decreased from once/month to once/quarter. This decrease in monitoring frequencies does not constitute backsliding based on 40 CFR 122.44 (1)(2)(i)(B)(1) since there is new information available which was not available at the time of permit issuance.

Requirements for sample type and sampling frequency for Dissolved Oxygen are consistent with the requirements for Fecal Coliform Bacteria.

Parameter	Previous Permit		Final Permit	
	Frequency of Sample	Sample Type	Frequency of Sample	Sample Type
Flow	once/day	totalizing meter	once/day	totalizing meter
BOD5				
(Nov-Apr)	once/weekday	24-hr composite	once/weekday	24-hr composite
CBOD5				
(May-Oct)	once/weekday	24-hr composite	once/weekday	24-hr composite
TSS	once/weekday	24-hr composite	once/weekday	24-hr composite
NH3-N				
(May-Oct)	once/weekday	24-hr composite	once/weekday	24-hr composite
Dissolved Oxygen	N/A	N/A	once/weekday	grab
FCB				
(Apr-Sept)	once/weekday	grab	once/weekday	grab
(Oct-Mar)	once/weekday	grab	once/weekday	grab
Cyanide	once/month	grab	once/quarter	grab
pH	once/weekday	grab	once/weekday	grab
WET testing	once/quarter	24-hr composite	once/quarter	24-hr composite

15. STORMWATER POLLUTION PREVENTION PLAN REQUIREMENTS.

In lieu of storm water pollution prevention plan requirements, on January 22, 2009, the permittee submitted a “No exposure certification for exclusion from NPDES Storm water.” The tracking permit No. ARR000413 was assigned to this permittee. The storm water pollution prevention plan requirements contained in special Condition No. 10 of Part II and a Schedule of Compliance pertaining to storm water have been deleted from the final permit.

16. PERMIT COMPLIANCE.

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

Compliance is required on the effective date of the permit.

2. Pretreatment Requirements

1. Within 60 days of the effective date of the permit, the permittee shall
 - (a) submit a **WRITTEN CERTIFICATION** that a technical evaluation has demonstrated that the existing technically based local limits (TBLL) are based on current state water quality standards and are adequate to prevent pass through of pollutants, inhibition of or interference with the treatment facility, worker health and safety problems, and sludge contamination, **OR**
 - (b) submit a **WRITTEN NOTIFICATION** that a technical evaluation revising the current TBLL and a final sewer use ordinance which incorporates such revisions will be submitted within 12 months of the effective date of this permit.
2. Within 12 months of the effective date of the permit, the permittee shall submit all necessary proposed modifications to the Pretreatment Program necessary in order to demonstrate compliance with 40 CFR Part 403.
3. The permittee shall annually submit an updated pretreatment program status report during October. This report shall contain the items set forth in Part II, Condition #10.d.

17. MONITORING AND REPORTING.

The applicant is at all times required to monitor the discharge on a regular basis and report the results monthly. The monitoring results will be available to the public.

18. SOURCES.

The following sources were used to prepare the final permit:

- a. Application No. AR0021750 received 3/10/2008.
- b. Arkansas Water Quality Management Plan (WQMP).
- c. APCEC Regulation No. 2.
- d. APCEC Regulation No. 6
- e. APCEC Regulation No. 3.
- f. 40 CFR Parts 122, 125, 133 and 403.
- g. Discharge permit file AR0021750.
- h. Discharge Monitoring Reports (DMRs) for months of January 2002 through January 2008.
- i. "Arkansas Water Quality Inventory Report 2004 (305B)", ADEQ, proposed 2006 303(d) list, and proposed 2008 303(d) list.
- j. Memo from Mo Shafii to Engineers dated March 28, 2005
- k. "Identification and Classification of Perennial Streams of Arkansas", Arkansas Geological Commission.
- l. Continuing Planning Process (CPP).
- m. Technical Support Document For Water Quality-based Toxic Control.
- n. Region 6 Implementation Guidance for Arkansas Water Quality Standards promulgated at 40 CFR Part 131.36.
- o. Inspection Report dated 11/16/2006.

- p. E-mail dated April 24, 2008, from Amy Cotter to Marysia Jastrzebski.
- q. E-mail dated May 22, 2008, from Mary Barnett to Marysia Jastrzebski.
- r. E-mails dated June 3, 2008, and June 18, 2008, from Steve Floyd to Marysia Jastrzebski.
- s. E-mail dated May 27, 2008, from Alan Price to Marysia Jastrzebski.
- t. E-mails dated May 23, 2008, and May 28, 2008, from Allen Gilliam to Marysia Jastrzebski.
- u. Site visit on May 30, 2008.
- v. E-mail dated June 17, 2008, from Matt Flowers to Marysia Jastrzebski.
- w. Letter dated September 15, 2008, from Paul R. Easley to Kimberly Fuller.
- x. No exposure certification for exclusion from NPDES Storm water submitted on January 22, 2009.

19. POINT OF CONTACT.

For additional information, contact:

Marysia Jastrzebski, P.E.
Permits Branch, Water Division
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317
Telephone: (870) 446-5939

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
1	Attachment No. 1																
CALCULATIONS OF ARKANSAS WATER QUALITY-BASED EFFLUENT LIMITATIONS																	
For an Arkansas River/Stream																	
2																	
3	(Reserved)																
4	STEP 1:	INPUT TWO LETTER CODE FOR ECOREGION (Use Code at Right)					AV										
5		Basin Name					Arkansas River Valley										
6	Codes & TSS for Ecoregions and Large Rivers																
7	FACILITY																
8																	
9	Permittee						Ft. Smith-massard Cre	Ozark Highlands Eco (OH) =	2.5 mg/l	Arkansas (Ft. Smith to Dardanelle Dam)	12.0 mg/l						
10	NPDES Permit No.						AR0021750	Boston Mts. Eco (BM) =	1.3 mg/l	Arkansas (Dardanelle Dam to Terry L&D No. 5)	10.5 mg/l						
11	Outfall No.(s)						1.00	Ark River Valley Eco (AV) =	3.0 mg/l	Arkansas (Terry L&D to L&D No. 5)	8.3 mg/l						
12	Plant Effluent Flow (MGD)						10.00	Gulf Coastal Eco (GC) =	5.5 mg/l	Arkansas (L&D No. 5 to Mouth)	9.0 mg/l						
13	Plant Effluent Flow (cfs)						15.45	Delta Ecoregion (DL) =	8.0 mg/l	White (Above Beaver Lake)	2.5 mg/l						
14																	
15	RECEIVING STREAM																
16																	
17	Is this a large river? (see list at right)(enter "1" if yes, "0" if no; make entry as a number)																
18	Name of Receiving Stream:																
19	Waterbody Segment Code No.																
20	Is this a lake or reservoir? (enter '1' if yes, '0' = no; make entry as a number)																
21	Second Enter Enter 7Q10 in Cell H31																
22	(Reserved) DO NOT INPUT DATA INTO CELL H22, H23 & H24....LEAVE BLANK= (Reserved)																
23	(Reserved)																
24	(Reserved)																
25	(Reserved)																
26	(Reserved)																
27	(Reserved)																
28	(Reserved)																
29	Ecoregion TSS (mg/l) (For Large River, See List to Right)					12.00					Large Rivers						
30	Ecoregion Hardness (mg/l)					125.00					Mississippi River, Arkansas River, Red River						
31	Enter 7Q10 (cfs) as the Critical Flow (Reserved) (Reserved)					700.00 (Reserved)					White (Below confluence with Black River)						
32	Long Term Ave / Harmonic Mean Flow (cfs)					1350.00 (Reserved) (Reserved)					Ouachita (Below confluence with Little Miss. River)						
33	Using Diffusers (Yes/No)																
34	pH (Avg)																
35	Percent (%) of Critical Flow for Chronic Criteria																
36	Percent (%) of Critical Flow for Acute Criteria																
37	Water Effect Ratio (WER)																
38	Ave Monthly Limit LTA Multiplier (Ref: page 103 TSD for WQ-Based Toxics Control)																
39	Max Daily Limit LTA Multiplier (Ref: " " " " " ")																

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
41	STEP 2:	INPUT AMBIENT AND EFFLUENT DATA														
42		CALCULATE IN-STREAM WASTE CONCENTRATIONS														
43																
44	DATA INPUT	For less than 20 data enter geometric mean concentration as micro-gram per liter (ug/l or ppb); enter 2.13 in cell H38.														
45		For 20 or more set data enter highest concentration as micro-gram per liter (ug/l or ppb); enter 1 in cell H38.														
46																
47		Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, the 1/2 DL is used.														
48		Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, "0" is used.														
49		If a firm value is reported, even less than MQL, the reported value is used.														
50																
51		The following formulae is used to calculate the Instream Waste Concentration (IWC)														
52		(Please refer to CPP for detail)														
53		$IWC = [(F \cdot Q_a \cdot C_b) + (Q_e \cdot 2.13 \cdot C_e)] / (F \cdot Q_a + Q_e)$														
54		Where:														
55		IWC = Instream Waste Concentration														
56		F = Fraction of stream allowed for mixing														
57		C _e = Reported concentration in effluent														
58		C _b = Ambient stream concentration upstream of discharge														
59		Q _e = Plant effluent flow														
60		Q _b = Critical low flow of stream at discharge point expressed as the 7Q10 or harmonic mean flow for human health criteria														
61		Upstream Flow (Q _b)= (% of 7Q10) X 7Q10 for Chronic and Acute														
62																
63		The following formulae convert metals reported in total form to dissolved form if criteria are in dissolved form														
64																
65		$K_p = K_{po} \cdot (TSS)^a$					K _p = Linear partition coefficient; K _{po} and a can be found in table below									
66		$C/C_t = 1 / (1 + K_p \cdot TSS \cdot 10^{-6})$					TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)									
67		Total Metal Criteria (C _t) = C _r / (C/C _t)					C/C _t = Fraction of metal dissolved; and C _r = Dissolved criteria value									
68																
69		*Stream Linear Partition Coefficient (Insert "Dissolved" Conc in Column B to convert Lake Linear Partition Coefficient														
70	Total Metals	Dissolved Value in Stream	K _{po}	alpha (a)	K _p	C/C _t	Total Value					K _{po}	alpha (a)	K _p	C/C _t	Total Value
71																
72	Arsenic		480000	-0.73	78241.8171	0.515755877	0.00					480000.00	-0.73	78241.82	0.5157559	0
73	Cadmium		4000000	-1.13	241315.481	0.256687626	0.00					3520000.00	-0.92	357845.79	0.1888878	0
74	Chromium(3)		3360000	-0.93	333196.721	0.200065596	0.00					2170000.00	-0.27	1109381.19	0.0698686	0
75	Copper		1040000	-0.74	165363.333	0.335080219	0.00					2850000.00	-0.9	304496.10	0.2148711	0
76	Lead		2800000	-0.8	383542.094	0.178491582	0.00					2040000.00	-0.53	546593.05	0.1322906	0
77	Mercury		2900000	-1.14	170659.857	0.328092786	0.00					1970000.00	-1.17	107602.95	0.4364458	0
78	Nickel		490000	-0.57	118867.402	0.412131703	0.00					2210000.00	-0.76	334360.16	0.1995083	0
79	Zinc		1250000	-0.7	219524.573	0.275156539	0.00					3340000.00	-0.68	616457.61	0.1190832	0
80	Silver		2400000	-1.03	185632.733	0.309828428	0.00					2400000.00	-1.03	185632.73	0.3098284	0
81		*Note: Use this section to convert lab concentrations shown as "dissolved" to "total"														

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
82											Dissolved	Total					
83	The following formulas are used to calculate water quality criteria based on Regulation No. 2 (Act 472 of Ark 1949)										WQC (ug/l)	WQC(ug/l)					
84	Cadmium			Acute			$WER \times CF1 \times e^{(1.128 \ln(\text{hardness})) - 3.828}$				4.72		$CF1 = 1.136672 - [0.041838 \ln(\text{hardness})]$				
85				Chronic			$WER \times CF2 \times e^{(0.7852 \ln(\text{hardness})) - 3.490}$				1.22		$CF2 = 1.101672 - [0.041838 \ln(\text{hardness})]$				
86																	
87	Chromium Tri			Acute			$WER \times 0.316 \times e^{(0.819 \ln(\text{hardness})) + 3.688}$				658.77						
88				Chronic			$WER \times 0.86 \times e^{(0.819 \ln(\text{hardness})) + 1.561}$				213.70						
89																	
90	Chromium Hex			Acute			$WER \times 0.982 \times 16$				15.71						
91				Chronic			$WER \times 11 \times 0.962$				10.58						
92																	
93	Copper			Acute			$WER \times 0.96 \times e^{(0.9422 \ln(\text{hardness})) - 1.464}$				21.00						
94				Chronic			$WER \times 0.96 \times e^{(0.8545 \ln(\text{hardness})) - 1.465}$				13.74						
95																	
96	Lead			Acute			$WER \times e^{(1.273 \ln(\text{hardness})) - 1.460} \times CF3$				82.27		$CF3 = 1.46203 - [0.145712 \ln(\text{hardness})]$				
97				Chronic			$WER \times e^{(1.273 \ln(\text{hardness})) - 4.705} \times CF3$				3.21						
98																	
99	Mercury			Acute			$WER \times 0.85 \times 2.4$				2.04						
100				Chronic			$WER \times 0.012$				0.01						
101																	
102	Nickel			Acute			$WER \times 0.998 \times e^{(0.8460 \ln(\text{hardness})) + 3.3612}$				1709.49						
103				Chronic			$WER \times 0.997 \times e^{(0.8460 \ln(\text{hardness})) + 1.1645}$				189.85						
104																	
105	Zinc			Acute			$WER \times 0.978 \times e^{(0.8473 \ln(\text{hardness})) + 0.8604}$				138.27						
106				Chronic			$WER \times 0.986 \times e^{(0.8473 \ln(\text{hardness})) + 0.7614}$				126.26						
107																	
108	Silver			Acute			$WER \times 0.85 \times e^{(1.72 \ln(\text{hardness})) - 6.52}$				5.06						
109																	
110	Cyanide			Acute			$WER \times 22.36$				22.36						
111				Chronic			$WER \times 5.2$				5.20						
112																	
113	Arsenic			Acute			$WER \times 360$				360.00						
114				Chronic			$WER \times 190$				190.00						
115																	
116	Beryllium			Acute			$WER \times 130$				130.00						
117				Chronic			$WER \times 5.3$				5.30						
118																	
119	Selenium			Acute			$WER \times 20$				20.00						
120				Chronic			$WER \times 5$				5.00						
121																	
122	The following formulas are applicable to the Jet Stream Model for lakes for calculating the Dilution Factor (DF):																
123	$DF = ((2.8 \times D \times 3.1416^{0.5}) / X)$ where DF is % of effluent at distance X, D is the diameter of the outfall pipe																
124	and X is aquatic life criteria--25 feet for ZID; 100 feet for mixing zone; human health criteria 200 feet for mixing zone.																
125	DF =	#VALUE!	Acute	#VALUE!	Chronic	#VALUE!	Bioacc.										
126																	
127	The following formulas are used to calculate the instream waste concentration (IWC) for each pollutant:																
128																	
129	$IWC = [(Frac \times Critical \text{ Flow} \times Cb) + (2.13 \times Ce \times Qd)] / [Frac \times Critical \text{ Flow} + Qd]$ where the critical flow is the 7Q10 except for lakes with the Jet Stream Model.																
130	Use EPA Statistical Factor of 2.13 for less than 20 Ce data points with the Geometric Mean of the Ce's; use 1 for more than 20 data points with the maximum Ce.																
131	$IWC = (DF \times Ce) + Cb$ for lakes with Jet Stream Model.																

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
132	POLLUTANTS			MQL	EPA Statistical	Background Conc. Cb	Effluent Conc. Ce	Domestic Supply IWC	Acute Aquatic IWC	Chronic Aquatic IWC	Bioacc. IWC	Domestic Criteria	Arkansas Acute Aquatic	Arkansas Chronic Aquatic	Arkansas Bioacc.	
133				ug/l	Factor	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
137	METALS AND CYANIDE															
139	2. Arsenic Total			0.5	2.13	3.21	1	3.19	3.05	3.12	3.20	50	698.00	368.39	1.4	
141	4. Cadmium Total			1	2.13	0.14	0.55	0.16	0.29	0.22	0.15	10	18.37	4.74	#####	
144	8. Copper Total			0.5	2.13	2.72	8.13	3.04	4.84	3.90	2.89	#####	62.66	40.99	#####	
145	9. Lead Total			0.5	2.13	1	1	1.02	1.16	1.09	1.01	50	460.92	17.96	#####	
146	10. Mercury Total			0.005	2.13	0	0.0055	0.00	0.00	0.00	0.00	2	6.22	0.012	0.15	
147	12. Nickel Total			0.5	2.13	1.26	1	1.28	1.39	1.33	1.27	#####	4147.93	460.66	4600	
150	15. Thallium Total			0.5	2.13	0.5	1	0.54	0.74	0.63	0.52	#####	1400.00	#####	6.3	
151	16. Zinc Total			20	2.13	7.76	61.4	10.42	25.62	17.74	9.15	#####	502.50	458.86	#####	
152	129. Phenols, Total			5	2.13	0	5.2	0.24	1.61	0.90	0.13	#####	9999999.00	#####	#####	
153	17. Cyanide Total			10	2.13	0	11.48	0.53	3.55	1.98	0.28	#####	22.36	5.2	220000	

