

Attachment G

Lion Oil Response to EPA Additional Information Request



July 29, 2008

Mr. Miguel I. Flores, Director (6WQ)
Water Quality Protection Division
United States Environmental Protection Agency
Region 6
1445 Ross Avenue Suite 1200
Dallas, TX 75202-2733

Re: Response to Issues of Concern – Supporting Documentation for Site Specific
Water Quality Standards Revisions Associated with discharge from **Lion Oil
Corporation** in Union County, Arkansas
GBMc No. 2160-05-070

Dear Mr. Flores:

Lion Oil Company (Lion) is hereby responding to the above referenced issues raised by Region 6 EPA during their review of the documentation accompanying the modifications to water quality standards for dissolved minerals including chloride, sulfate, and total dissolved solids (TDS) in the Lion Oil Company's Outfall 001 discharge to Loutre Creek in Union County, Arkansas. The EPA issues were communicated as an enclosure to a letter from the Director of the Water Quality Protection Division, Mr. Miguel I. Flores and addressed to Ms. Teresa Marks, the Director of ADEQ dated January 3, 2008.

This response was developed in coordination with the ADEQ Water Division staff and incorporates ADEQ staff comments. It is our understanding that ADEQ concurs with this response and is in support of the modifications adopted by the ADEQ Commission action approving the rulemaking

The response to these issues is provided below as they appear in the above referenced enclosure.

Use Attainability Analyses vs. Section 2.306 Modification

The third-party rulemaking was not a use attainability analyses (UAA) and there were no proposed changes to the fishable/swimmable uses of the target waterbodies. The third-party rulemaking was developed, proposed and approved in accordance with Section 2.306 of the Arkansas Water Quality Standards (Reg. No 2.). That Regulation provides for removal of any designated use except fishable/swimmable, and modification of water quality criteria not related to fishable/swimmable uses. The rulemaking also followed those procedures as set forth in the most recent State of Arkansas Continuing Planning Process (CPP) (update and revisions January, 2000).

Specifically, those applicable sections of CPP include:

- Applying for Site Specific Water Quality Standards modifications in accordance with Section 2.306 of the WQS and
- Administrative Guidance Document (AGD) of the CPP.

Specifically, these implementation procedures set forth the level of documentation required to address modifications to the dissolved minerals criteria and/or the removal of the domestic water supply use. These procedures are not intended to supplement EPA's UAA guidance and the level of documentation required for the development of a UAA to modify a fishable/swimmable use.

The requirements as set forth in the CPP reflect the documentation required by ADEQ in the application of the Section 2.306. The level of documentation required by Section 2.306 is less than that required for the removal of a fishable/swimmable use through the UAA process. The fishable/swimmable uses are not the subject of the proposed rulemaking. When implemented, the approved rulemaking for dissolved solids (and the modified mineral criteria) will not preclude those existing and attainable fishable/swimmable uses of the subject water bodies.

The procedures utilized in this rulemaking and the accompanying level of documentation, have formed the basis for numerous third-party rulemakings in the state of Arkansas. These third-party rulemakings have resulted in site specific water quality standards for dissolved minerals and the removal of the domestic water supply use in numerous streams in Arkansas. These rulemakings and the procedures utilized as set forth in Regulation No 2. and the CPP have previously met with EPA approval.

Domestic Water Supply Use Removal Missing Letters from the Arkansas Department of Health (ADH)

Loutre Creek

The fact that the use removal does not conflict with the state water plan supports that the use is not an existing use. However, the ADH has been petitioned to request that a specific statement be included in their response. Attached is a copy of the letter from the ADH.

Bayou de Loutre

We respectfully disagree. The letter submitted with the documentation does apply to the main stem of Bayou de Loutre as well as to unnamed tributaries of Little Cornie Bayou (copy also attached).

Site Specific Mineral Criteria

There is all reasonable expectation that the new criteria approved by the recent rulemaking will maintain the existing fishable/swimmable uses and not adversely impact the existing aquatic life community. This is based on the following observations:

- the historical WET testing results completed on the effluent from the Outfall 001 (which continues to demonstrate compliance with the WET permit limits at the conservative critical dilutions at which those WET limitations are applied);
- the associated dissolved mineral analytical data for the discharge;
- the literature that indicates relative levels of dissolved minerals required to elicit a toxic response and a comparison of this data to the approved criteria; and
- the source of the dissolved minerals.

Toxicity Testing

We respectfully disagree that the supporting documentation relating to the toxicity testing is generally lacking. The level of documentation presented is in accordance with that specified in the CPP as discussed in the previous sections relating to the current and historical testing demonstrating that the discharge passes the lethality endpoints of the WET test requirements at the permitted critical dilution. The critical dilution is set at the Q7-10 stream flow and represents a conservative application and the Section 2.401 prohibition applies after instream mixing. Section 3.6.2 of the documentation package provided the results of 7-day chronic WET testing completed on the Outfall 001 effluent as required by the AGD in ADEQ's CPP (see attached). As provided in Section 2.(c)(i)2 on Page IX -7 of the AGD, current (within the last 2 year period) WET testing is required to demonstrate that the dissolved minerals are not contributing to any effluent toxicity. This information provided that during monthly WET testing, effluent had routinely passed the lethal endpoints for the period from January 2000 through November 2006 and there have been no persistent sub-lethal test failures of the sub-lethal endpoint in effluent concentrations of 75% or less for either species. In addition, the WET testing since November 2005 continues to meet the WET permit limits, passing 13 of 15 chronic WET tests.

Lion Oil continues to conduct monthly chronic toxicity tests as required by the existing NPDES permit. Since the original documentation package was developed and submitted eight WET tests were completed in 2006 and seven WET tests were completed in 2007. The WET tests passed seven of eight lethality endpoints at the critical dilution of 96% in 2006 and six of seven in 2007. Each of the test failures were followed by multiple tests that passed during the 2 year period.

Although, there are may be no specific dissolved mineral data associated with the individual WET tests, the discharge through Outfall 001 demonstrates that any toxicity demonstrated was not correlated with the conductivity and/or the calculated TDS.

In addition, since there was no lethality demonstrated to the *Ceriodaphnia dubia* or the fathead minnow in 100% effluent, (during the period on which the mass balance modeling was based and ultimately formed the basis of the proposed water quality standards), the WET testing history documents that the historical dissolved minerals (that exceeds the new approved criteria) does not contribute to toxicity since there were no WET test failures during the period when the maximum concentrations were implicated.

As provided in the previous discussion relating to the distinction between a UAA and a Section 2.306 modification, a general evaluation of toxicity from downstream reaches is not a prerequisite for the documentation in support of the proposed rulemaking. In accordance with the AGD under paragraph 2(c)(i) that the bioassessment be performed upstream and downstream of the point source.... and that in 2(c)(ii) where... "If the point source discharge represents the beginning of the receiving stream and no upstream monitoring is possible, the bioassessment data will also be collected at the first confluence where upstream and downstream stations can be established."

Based on this level of required documentation, downstream reaches were not evaluated for toxicity as it is related to the dissolved minerals. The downstream reaches are impacted from several other potential containment sources including historical and continuing sources of dissolved minerals from oil field impacts within the watershed. These other contributing sources are outside the control of Lion Oil Company.

Although not specifically required by the CPP and the AGD, the aquatic life information from the downstream reaches on Loutre Creek is provided in Section 4 of the third-party documentation as evidence supporting that the historical discharge does not preclude the maintenance of the aquatic life uses, including the fishery or aquatic life invertebrate communities. The information demonstrates that those uses are being maintained even with the historical watershed contributions and continuing historical discharge.

Bayou de Loutre (from mouth of Loutre Creek to the mouth of Gum Creek)

As previously discussed in the Section 2.306 regulation, the CPP and the AGD does not require the documentation to include an assessment of downstream ambient toxicity as related to dissolved minerals. Although, downstream toxicity data is not required in the support for the Section 2.306 rulemaking, the following additional information is provided in support of the proposed and approved modifications to the site specific criteria for all segments.

Previous rulemakings within the Bayou de Loutre watershed provides sufficient data demonstrating that the fishery use (and the associated aquatic life communities) of

Bayou de Loutre is being maintained by the historical mineral discharge. These studies include:

- the third-party rulemaking for temperature completed, submitted and approved by the ADPEC Commission (See Reg. No 2, Page A-31 and Page A-34 #29) and
- the third-party rulemaking for dissolved minerals for Clean Harbors.

In an effort to evaluate the toxicity of dissolved salts to freshwater organisms, the Gas Research Institute (GRI) evaluated common ions and ionic salts, including chloride and sulfate, to develop the Salinity/Toxicity Relationship (STR) model to predict the potential toxicity of dissolved ions to freshwater organisms (Mount and Gulley, 1992) This effort included over 3,000 toxicity tests using a multitude of combinations with either *Ceriodaphnia dubia*, *Daphnia magna* (water fleas) or *Pimephales promelas* (fathead minnow). Although, these tests were typically acute in nature, the results implicate the concentrations of chlorides and sulfates required to elicit a toxic response by the tests organisms. Several references within the model development document (Mount & Gulley, 1992) illustrate the limited potential for the modified dissolved mineral criteria to adversely impact the aquatic life of the subject receiving streams, especially given the concentrations that exist in downstream reaches of Bayou de Loutre.

As related to chlorides, studies have documented that measurable changes to native benthic invertebrate communities were not apparent in waters with chlorides concentrations less than 615 mg/L (O' Neil et. al., 1989). This chloride concentration is approximately double the chloride criteria proposed in the third-party rulemaking supported by ADEQ and approved by the ADPCE Commission.

In the development of the STR model, evaluating the comparative sensitivity of the 3 test species to chloride, and as indicated in Figure 3-14 of the document, *Ceriodaphnia dubia* had 80% survival at 1,400 mg/L and it required approximately 1,000 mg/L chloride to elicit any lethality response. The fathead minnow had 80% survival in 3,000 mg/L chloride and it required approximately 2,000 mg/L chloride to elicit any lethality. Clearly, the approved criteria for chloride (a maximum of 264 mg/L) are appropriately protective of the aquatic life in the receiving streams and present little potential for instream adverse impacts after mixing at the appropriate critical flows. This has been demonstrated by numerous other third-party rulemakings where chloride criteria to maintain the aquatic life use have been established at 250mg/L during low flow conditions. The Lion Oil rulemaking proposed that the chloride criteria be modified to a maximum of 264 mg/L (only 14 mg/L more) when there is a background flow of 4 cfs. Considering the background flow, chloride concentrations after mixing, would be substantially less than the 250mg/L criteria that apply at minimum flows conditions. These rulemakings are summarized in Regulation No 2.

In the development of the STR model, evaluating the comparative sensitivity of the 3 test species to sulfate, and as indicated in Figure 3-14 of the document, *Ceriodaphnia*

dubia had 80% survival at approximately 2,500 mg/L and it required approximately 1,500 mg/L sulfate to elicit any lethality response. The fathead minnow required over 3,000 mg/L sulfate to elicit any lethality response. Clearly, the approved criteria for sulfate, (997 mg/L maximum) are protective of the aquatic life in the receiving streams and presents little potential or instream adverse impacts after mixing

In addition, there are numerous other rulemakings for Gulf Coastal streams that have received ADEQ, ADPCE Commission and EPA approval modifying the sulfate criteria to concentrations greater than that approved for individual reaches of Bayou de Loutre in the subject rulemaking (range from 171 mg/L to 635 mg/L). These include:

- Hurricane Creek, various reaches, Sulfate 500 to 730 mg/L (See Page 5-10 and A-31 #19),
- Holly Creek, Sulfate 860 mg/L (See Page 5-11 and A-31 #20),
- Bluff Creek and unnamed tributary, Sulfate 651 mg/L (See Page A-31 #10),
- Caney Creek, Sulfate 283 mg/L (See Page A-31 #12),
- Unnamed trib. to Town Branch, Sulfate 330 mg/L (See Page A-31 #14),
- Boggy Creek, Sulfate 330 mg/L (See Page A-31 #14).

Mass Balance Calculations Utilized in the Derivation of Site Specific Minerals Criteria for Loutre Creek and the Bayou de Loutre Segments

Loutre Creek

As presented in the background introduction, (Section 1.1) of the documentation package, Lion Oil entered into a consent decree with ADEQ and EPA that required the installation of additional wet scrubbers to reduce SO₂ air emissions. This equipment was added and functional as of March 2004. This air pollution control equipment increased the Na₂SO₄ (and TDS) in the process wastewater and subsequently into the wastewater discharge.

Lion Oil and ADEQ discussed the increase of dissolved minerals that would result from the installation and operation of the air pollution control equipment prior to the development of the proposed rulemaking documentation. These discussions continued during the development of the rulemaking documentation and ADEQ's review of initial draft versions. Ultimately, it was determined jointly (by both ADEQ and Lion Oil) that the mass balance calculations could be adjusted to account for the estimated increases in sulfate and TDS resulting from the air pollution control equipment. The 20% added to the respective data sets represents the additional contributions to the dissolved mineral concentrations in the treated wastewater discharge that is anticipated from the recent upgrades to air pollution control technologies at the facility.

The dissolved mineral concentrations of typical storm water were summarized and used in the mass balance determinations without any increase to the historical data.

Bayou de Loutre (from the mouth of Loutre Creek to the mouth of Gum Creek)

Background Flows

The background flows for GLCC Outfall 002 and 004 were not exclusively excluded but combined into a single background flow to include Bayou de Loutre upstream of Loutre Creek. This application resulted from concerns expressed by ADEQ regarding the background flow that could reasonably be generated from the very small watersheds of GLCC Outfall 002 (0.3489 sq miles) and GLCC Outfall 004 (0.078 sq. miles). The original mass balance calculations applied the default 4 cfs background flows for all three sources, GLCC Outfalls 002 and 004, and Bayou de Loutre.

However, during preliminary review of the documentation development, the concerns by ADEQ resulted in the approach to combine the background flows to a single source (Bayou de Loutre) represented by a single 4 cfs background flow due to the proximity of these discharges and the limited watersheds. This approach was justified by ADEQ due to the combined watershed sizes of Bayou de Loutre and Loutre Creek. The watershed size of Bayou de Loutre including the Loutre Creek watershed is approximately 10 square miles. Ten square mile watershed is the minimum size typically required for the designation of a perennial fishery use designation.

Exclusion of GLCC Outfall 001

The discharge from GLCC Outfall 001 is typically routed to Lion Oil as a source water and does not discharge to Bayou de Loutre. The historical discharge from Outfall 001 was diverted to Lion Oil under a mutual operating agreement between GLCC and Lion Oil in 2004. This Project was completed as a groundwater conservation alternative to reduce the continued depletion of the Sparta Aquifer in south Arkansas. The joint operating agreement continues and although there is a potential for the discharge from Outfall 001 into Bayou de Loutre, the past operating conditions have demonstrated that the majority of the discharge continues to be diverted to Lion Oil. Since this flow is routinely diverted to Lion Oil and ultimately becomes part of the discharge through Lion Oil's Outfall 001, it was not included as an upstream source in the mass balance computations.

Bayou de Loutre Sources as applied in Mass balance computations

The following tables represent the flow weighted mixed concentrations for Bayou de Loutre reach from mouth of Loutre Creek downstream to the City of El Dorado's wastewater treatment discharge.

Chloride

Source	Flow		Conc.	Mixed Load	Mixed Conc.
	cfs	mgd	mg/L	lb/day	(mg/L)
Chemtura - Outfall 002	0.24	0.15504	1029	1330.531574	
Chemtura - Outfall 004	0.64	0.41344	1702	5868.648499	
Lion - Outfall 001	4.06	2.62276	504	11024.40447	
Totals	4.94	3.19124		18223.58455	685

Sulfate

Source	Flow		Conc.	Mixed Load	Mixed Conc.
	cfs	mgd	mg/L	lb/day	mg/L
Chemtura - Outfall 002	0.24	0.15504	374	483.5945664	
Chemtura - Outfall 004	0.64	0.41344	63.7	219.6433075	
Lion - Outfall 001	4.06	2.62276	1967	43025.80079	
Totals	4.94	3.19124		43729.03867	1643

TDS

Source	Flow		Conc.	Load	Mixed conc.
	cfs	mgd	mg/L	lb/day	mg/L
Chemtura - Outfall 002	0.24	0.15504	1376	1779.214234	
Chemtura - Outfall 004	0.64	0.41344	1932	6661.709107	
Lion - Outfall 001	4.06	2.62276	3420	74808.45893	
Totals	4.94	3.19124		83249.38227	3128

The computations for this reach of Bayou de Loutre did not utilize the instream concentrations developed in the GLCC rulemaking for the upstream reach of Bayou de Loutre (upstream of the mouth of Loutre Creek) due to the modification in the application of the default background flows as requested by ADEQ.

References Cited

ADEQ, 1998, TMDL Investigation of Water Quality Impairments to Unnamed Tributary to Flat Creek Union County, Arkansas, WQ-98-04-1.

EPA, 1983, Technical Support Manual: Waterbody Surveys and Assessments for Conducting Use Attainability Analyses.

EPA, 1973. Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents. EPA 670/4-73-001.

Kerbs, C.J. 1985, Ecology, the Experimental Analysis of Distribution and Abundance, 3rd edition ISBN 0-06-350391-3, 800pp.

Mount, D.R. and D.D. Gulley. Development of a Salinity/Toxicity Relationship to Predict Acute Toxicity of Saline waters to Freshwater Organisms. Gas Research Institute GRI92/0301.

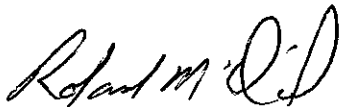
O'Neal, et al. 1989 Biomonitoring of a Produced Water Discharge from Cedar Cover Degasification Field. Alabama. Gas Research institute. GRI 89/0073.

Summary

In summary, this response provides additional information requested by EPA and further supports the action taken by the ADPCE Commission in adopting the modifications to the Arkansas Regulation No. 2 increasing the dissolved mineral criteria and removing the domestic water supply use for the targeted waterbodies.

Please do not hesitate to contact me or Vince Blubaugh at 501-847-7077, should you have any further questions or require additional information.

Respectively submitted,
GBM^c & Associates



Roland McDaniel
Principal/ Senior Scientist

Cc: Chuck Hammock, Lion Oil
Steve Cousins, Lion Oil
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May 12, 2008

Mr. Vince Blubaugh
c/o GBMc & Associates
219 Brown Lane
Bryant, AR 72022

Re: Domestic Water Supply Determination
Loutre Creek, Union County, AR

Dear Mr. Blubaugh:

In response to your E-Mail request of May 8, 2008, please be advised that Loutre Creek in Union County AR is not currently being used as a source for public water supply, nor are we aware of the above creek being considered for such use, by any regulated public water system in AR.

We do not keep information regarding Loutre Creek's possible use as an unregulated private or individual water supply. By copy of this letter, if the Union County Sanitarian is aware of such use, he/she is requested to respond to you in writing.

Should you have any questions in this regard, feel free to contact ADH Engineering's Office at 501-661-2623.

Sincerely,

Dennis Taylor, P.E.
Engineer Supervisor
ADH Engineering Section

cc: Union County Sanitarian
Steve Drown, c/o ADEQ Water Division, 5301 Northshore Drive,
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