Enclosure

Technical Comments on:

Several Documents associated with the 3rd Party Request Submitted by Halliburton Energy Services Inc.: APC&E Commission Docket #16-003-R

These comments are being provided to the Arkansas Department of Environmental Quality (ADEQ) in response to several documents submitted in support of a temporary water quality standards modification associated with an Environmental Improvement Project for the Dresser Industries-Magcobar Former Mine Site. Temporary water quality standards modifications are proposed for Chamberlain Creek, Cove Creek, Lucinda Creek, Reyburn Creek, Rusher Creek, Scull Creek, and Clearwater Lake.

Several comments have page numbers following the comment to indicate where in the document this item was discussed. The page numbers reflect the page counted by Adobe Acrobat, rather than the page number listed in the document.

General Questions/Comments for the Halliburton Energy Services, Inc. Environmental Improvement Project

1. How will achievement of downstream criteria, particularly in Cove Creek, be ensured? In Cove Creek the 2000-2012 data demonstrates exceedances of several criteria with the maximum values measured in the creek. Will the discharge be limited to a certain amount of flow to ensure that the criteria will be met? What fail safes are in place to alter the permit if downstream criteria are being exceeded?

2. Whole effluent toxicity (WET) tests downstream of the current water treatment facility have demonstrated toxicity in Chamberlain Creek and at times in Cove Creek, even when toxicity isn't seen in the discharge of the plant. Some of this toxicity is likely due to elements of acid rock drainage (ARD) originating from additional seepage that is not currently being treated by the water treatment facility, but may be captured with the new French drain. After remediation work begins, will toxicity still be monitored downstream on Chamberlain and Cove Creek to assure that the remediation plan is addressing this toxicity from seepage? If toxicity is still found, what steps will be taken to determine the source of the toxicity (i.e. metals vs. pH vs. minerals) and address remediation of this source of toxicity?

3. Will toxicity tests be performed for Lucinda Creek, Reyburn Creek, Rusher Creek, Scull Creek, and Clearwater Lake once remediation work has begun?

4. It appears from the Remedial Action Decision Document (RADD), in the Effectiveness Monitoring Program section, that the remediation plan can be altered if progress towards compliance isn't occurring and new remediation activities need to be considered. Is there a schedule for periodic evaluation of the progress of the remediation and for investigation into new technology to treat minerals? Is there a number of years estimated to see effects of some of the non-point source remediation activities such as revegetation?

Enclosure

Questions/Comments for Dresser Industries-Magcobar Mine Site Site Investigation Report, Hot Springs, Arkansas, April 19, 2007 (Appendix A)

5. Is there any concern that the pH of the sludge ponds will drop? Could the pH drop to a level that would potentially make ARD constituents soluble again? (pg. 223)

6. In determining the risk presented by metals in the aquatic sediments, was the risk of benthic organisms taking up metals and then the metals bioaccumulating in the food chain considered? (pg. 258)

7. What is the risk of metals becoming soluble again from the sediments? Is there a pH threshold that would allow these metals to enter into solution again? (pg. 258)

8. For fish sampling associated with future monitoring, it would be useful to quantify the number of fish caught per unit effort so that sampling at the various locations can be compared. For some locations in the past it appeared that much larger areas were sampled at one site location compared to another.

9. Streams need to be clearly defined as either perennial or intermittent. In particular the site investigation (SI) switches back and forth between calling Lucinda Creek an intermittent and a perennial stream (pg. 415)

10. Where did the Region 6 screening level value for sulfate come from? Is there a document that specifies this value? Was this screening level set for aquatic life or for human health? (pg. 436)

11. In several instances it appears that discussion about the precipitate that has been created from pulling the metals out of solution is separated from the discussion about the risk posed by the sediments to the aquatic species. In some instances the precipitate exceeds the no effect concentration (NEC) while the sediment does not. Given this, how does the presence of the precipitate factor into how the health of the streams was evaluated? Was is assumed that the precipitate was not bioavailable, and if so, why? Also, at what pH would the metals in the precipitate become bioavailable? (pg. 470)

12. How were the physical impacts of the precipitate on the benthic organisms considered in the risk assessment? (pg. 470)

13. EPA is concerned that manganese was not retained as a contaminant of potential concern (COPC) for sediments, as in many creeks its hazard quotient (HQ) was between 1 and 1.5. When this value was rounded, the justification given for not retaining it as a COPC was that the HQ was not greater than 1, even though it was when the value was not rounded. (pg. 507) This occurs with a few other parameters as well.

14. Is there an upper limit of hardness tolerance in aquatic species? (pg. 523)

15. In Table 7-3, there appears to be many more values that exceed the lower benchmark value than are actually noted in this table. (pg. 559)

Questions/Comments for Draft Feasibility Study Report Dresser Industries-Magcobar Mine Site, Hot Spring County, Arkansas, August 20, 2009 (Appendix B)

16. The report states that "Recovery of affected streams is anticipated to be nearly immediate when the pH is controlled". EPA believes this is an overstatement of how quickly the streams will recover and the impact the streams will still experience from elevated minerals and metals that will remain partially elevated even after pH control. (pg. 20)

17. It is unclear from the report how the cost estimate for Alternative 2 was calculated as $6,910,000. The report states that alternative 2 assumes a periodic cost of $1,000,000 every 5 years, beginning in year 15 and that the life span of the water treatment system (WTS) is 100 years. 100yrs-15yrs = 85 yrs /5 yrs = 17. At a minimum this cost should be $17,000,000 just for periodic cost. What other factors are in this equation that makes this cost estimate so much less than 17 million dollars? (pg. 133)

18. Why wasn't an alternative that considered upgraded source control without pit treatment considered in the alternatives analysis (a combination of alternative 3 and 5 rather than alternative 5 just expanding on alternative 4)? (pg. 150)

Questions/Comments for Remedial Action Decision Document, Dresser Industries- Magcobar Mine Site, Magnet Cove, Hot Spring County, Arkansas (Appendix C)

19. It is not clear that the improvement in the headwaters surface water quality will lead to sediment improvement without any direct remediation on the sediments. What processes are occurring in the sediments that would make the metals unavailable to the benthic organisms? Also, how long are the metals that are already present in the sediment expected to persist?

20. SP3 spoil pile alternative (extensive regrading and revegetating) should potentially be thought of as a next step in the remediation process if monitoring demonstrates that initial actions are not sufficient to meet remediation goals (pg.33)

21. Reference sites should be included in the biological sampling plan (upstream of mine influence and potentially one off site) to act as a control while monitoring the progress of the remediation and so that any outside impacts unrelated to the remediation work at the site can be taken into account. (pg. 43)

22. What sort of monitoring will be performed to assure that no metals are leaching from sludge ponds and that contact by terrestrial receptors is prevented? Is there a monitoring plan to test the soil cover that will be placed over the sludge piles to make sure that no metals are leaching?

23. The current plan is designed for 100 years and involves active management, including active water treatment, to assure that the level of water in the pit is kept at a non-dangerous depth and that the water released from the pit is not toxic to wildlife. The plan does not seem to address a longer term solution, so what actions are anticipated after the hundred years that will assure that the pit lake and its water are not a risk to the environment?

24. If Halliburton Energy Services, Inc. (HESI) isn't going to pay for new residents to be connected to the municipal water source, how is it assured that new residents will not drill into the ground water for a drinking water supply that may potentially be impacted by the mine site?
    - What expense is the company responsible for in terms of adding new municipal water source connections? In the comments on the RADD HESI seems to imply they are not responsible for this cost, but the cost estimate is included in the feasibility study.

25. Is there any enforcement power for the metals that do not have state criteria? Is there any enforcement power to assure that the remediation work is completed, aside from the NPDES permit for the water treatment facility?

26. Please include a description of how the physical presence of precipitates will be evaluated and how their impacts on benthic organisms will be minimized.

Questions/Comments for Seasonal Monitoring in Chamberlain and Cove Creeks, Per CAO LIS 03-061 Section B.3. December 9, 2005 (Appendix D)

27. Please make sure that monitoring data is appropriately described. For instance, one sentence states "The percent of total individuals as EPT was relatively constant across Cove Creek stations and decreased slightly during the monitoring period across all stations." This statement appears to be misleading as the percent of total individuals as EPT was about 65% in October 2003 and was about 18% in April 2005. A loss of approximately 45% is more than a slight decrease. (pg. 26,28)

28. Please also make sure that all information is accurately represented. In table 4.3, two metals, aluminum and manganese, are listed as having 0 permit violations. However, both of these metals are listed as report in the 2008 permit and do not have a limit, so listing them as having 0 violations is misleading. This is operating under the assumption that the 2008 permit contains the same limits as the previous permit. This should have an n/a since there was no limit in place that could be violated. In addition, both of these metals are still being discharged at concentrations that are quite high, even though the treatment has resulted in a large reduction in their concentrations (pg. 29)

29. In Table 4.3, why is there no average pH or median pH values? (pg. 29)

30. For Table 4.3, it appears that according to the 2008 permit TDS and sulfate both actually had permit violations. A previous version of the permit could not be located online, but according to the 2008 permit, sulfate values and TDS values are both in violation. The listed TDS limit is 212 mg/L for monthly average and for sulfate is 31 mg/L. Was another standard or permit value in place that made these values not in violation for the time period reported in this report?

31. For the biological monitoring results, please specify why particular taxa were excluded from the total taxa count. It appears that the highlighted taxa could potentially fit into another counted taxa, which is why they were excluded, but this is not clear from the footnote. (pg. 40)

Questions/Comments for Appendix E: Historical Database

32. Even when the WTS was operating, aluminum concentrations, although reduced, were still very high and at times the pH was still below 6. What elements of the remediation plan will work to bring the aluminum and pH into ranges that are not harmful to aquatic life? What sort of fail safes are in place if the initial remediation plan is not sufficient?

33. Several concentrations are listed as less than concentrations rather than exact measurements, while exact measurements were attained during another monitoring season for concentrations below that less than threshold (ex: Lead at Scull Creek was measured at a maximum of 0.6 µg/L during the SI monitoring, but was measured at <40 µg/L during 2006 monitoring). Going forward, please make sure that the assessment methods utilized for the monitoring can detect the parameter in the range that is necessary to determine whether it is causing impairments to aquatic life.

Questions/Comments for Halliburton Energy Services, Inc. Dresser Industrie-Magcobar Former Mine Site Notice of Intent of an Environmental Improvement Project, October 29, 2014.

34. Currently the notice of intent (NOI) states that no direct remediation will be conducted to treat the elevated concentrations of minerals that are a result of the ARD from the Magcobar mine. It also implies that no work will be done to investigate new remediation techniques in the future that may assist in lowering minerals levels and may be more practical than reverse osmosis techniques. EPA would like to encourage the inclusion of consideration of new minerals treatment techniques over the course of the EIP so that minerals can potentially undergo remediation in the future.

35. In several locations the temporary minerals criteria that are being proposed are much higher than the maximum concentration of that parameter that had been measured in that creek over the past 12 years. EPA would recommend dividing some of these creeks into upstream and downstream sections to designate different criteria for those area more impacted by the mine versus those less impacted by the mine. This seems to be appropriate for Scull Creek upstream and downstream of Clearwater Lake, Cove Creek upstream and downstream of Chamberlain Creek, and Reyburn Creek upstream and downstream of Scull Creek. Also for some creeks, such as Rusher and Lucinda, a lower criteria than 500 mg/L TDS and 250 mg/L sulfate seems more appropriate as these creeks are not demonstrating concentrations this high. If the higher minerals criteria are anticipated due to the construction effort associated with the remediation project than perhaps the higher standard can be applied just during the construction period and then reduced to a lower value after the regrading/revegetating is complete.

Creek Sampling Site	Proposed TDS Criteria (mg/L)	Max TDS from 2000-2012 (mg/L)	Proposed Sulfate Criteria (mg/L)	Max Sulfate from 2000-2012 (mg/L)
RUS-1W	500	220	250	140
RUS-1E	500	280	250	190
RUS-0	500	230	250	160
LUC-0	500	82	250	72
COV-5	500	72	250	16
COV-4	500	84	250	21

COV-3	500	640	250	440
COV-2	500	1500	250	1050
COV-1	500	793	250	538
SCL-1	500	570	250	430
SCL-0	500	94	250	63
CRL-4S (mean)	500	100	250	62
CRL-4B (mean)	500	120	250	67
CRL-1S (mean)	500	110	250	63
CRL-1B (mean)	500	110	250	66
REY-3	500	400	250	230
REY-2	500	240	250	150

36. In several instances there are places where a maximum value is listed as less than a number and then an exact number is provided for the mean. This seems to imply that two different techniques were used to measure the concentration of this parameter over the years. Moving forward, as these streams continue to be monitored, a measurement technique that can provide an exact value rather than a less than value should be selected. Without an exact value, the effectiveness of the remediation cannot be appropriately assessed.

37. Is there any data for pH in Scull Creek? (pg. 39)

38. Please explain why metals weren't assessed in Clearwater Lake? (pg. 40)

39. Is there any pH data for Reyburn Creek? (pg. 41)

40. Are the bench sheets available for the WET testing that was performed? (pg. 42)

41. In Table 3.8, on November 3, 2008 there is no value for percent mortality, but it is still marked as significantly different. How is it known that the results were significantly different if the data values are unknown? (pg. 43)

42. The language indicating significance is inappropriate for the toxicity data tables. It states "*Significantly different ($p \geq 0.95$) from control." If the p value was greater than or equal to 0.95, than these values would not be significantly different; the p value should be less than 0.05 to indicate a statistically significant difference. After speaking to the EPA Houston Lab it appears that they are determining significance by seeing if the data falls outside of the 95% confidence interval. This footnote should be corrected to appropriately indicate how significance was determined. (pg. 43)

43. In Table 3.9, please provide the bench sheets for the 3/23/2009 toxicity test. It is surprising that 47.5% mortality was not significantly different from the control. EPA would like to see the bench sheets to review the amount of variation between the samples and review the amount of mortality present in the controls. (pg. 43)

44. In section 3.3.1, please state when this fish sampling was conducted.

45. Please provide the lab sheets for the WET testing results presented in Table 5.1. The discharge monitoring reports (DMR) data appendix only provides the lab sheets for the water chemistry data and not for the WET testing. (pg. 50)

46. During what years was the water treatment system operational? DMR values from Outfall 001 seem to indicate that it was operational from 2003 to 2012, but with various points of non-operation within that time frame. Please indicate when the plant was and was not operational and why operation was suspended during this time.

47. Was any chronic WET testing performed? If so, what were these results? The 2008 permit indicates that WET testing for growth for fathead minnows and reproduction for *Ceriodaphnia dubia* were supposed to be conducted. Please provide the results from that testing. (pg. 50)

48. Please also provide the minerals, pH, and metals DMR data for all of the WET tests performed while the plant was operational. Please include this data for tests where toxicity was and was not present. (pg. 50)

49. Please justify why the secondary drinking water standards for TDS and sulfate are used as the criteria for Lucinda Creek, Rusher Creek, Scull Creek, Clearwater Lake, and Reyburn Creek when the most sensitive use is aquatic life. How are these criteria protective of aquatic life? (pg. 55)

50. Please discuss what the anticipated time frame is for meeting metals and pH criteria.