UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
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MAR 25 2009

Mr. David Schanbacher, P.E., Deputy Director
Office of the Chief Engineer (MC-168)
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Dear Mr. Schanbacher:

The Environmental Protection Agency (EPA) has completed its review of two provisions in the *Texas Surface Water Quality Standards* (TX WQS). These standards were adopted by the Texas Natural Resource Conservation Commission, now the Texas Commission on Environmental Quality (TCEQ), on July 26, 2000, and submitted to the EPA for approval on September 27, 2000. In today's action, EPA is approving the acute and chronic site-specific selenium criteria for Red Draw Reservoir (within segment 1412) in Appendix E of the TX WQS pursuant to §303(c) of the Clean Water Act (CWA) and the implementing regulation at 40 CFR Part 131. EPA is disapproving the site-specific acute selenium criterion for the freshwater portion of Heldenfels ditch (within segment 2484) in Appendix E. Documentation for EPA's actions is found in the enclosure to this letter.

The Endangered Species Act §7 states that "all Federal agencies shall...utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered and threatened species" and "each Federal agency shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species." EPA has determined that approval of the site-specific selenium criteria in Red Draw Reservoir will have no effect on federally-listed threatened and endangered species or on critical habitat.

The EPA has previously approved the human health provisions in the TX WQS; new and revised provisions in §307.2, §307.3, §307.4, §307.5, §307.7, §307.8 and §307.9; revised aquatic life criteria for saltwater in Table 1 and other items in §307.6; revised uses and criteria for numerous segments in Appendix A - Site-specific Uses and Criteria for Classified Segments; all new and revised provisions in Appendix C - Segment Descriptions and Appendix D - Site-specific Receiving Water Assessments; and, criteria based on water effects ratios for numerous segments in Appendix E - Site-specific Criteria. The EPA will take separate action on the remaining new and revised items in §307.6(c) and the temperature criterion for segment 1811 – Comal River in Appendix A of the TX WQS.

I would like to commend the TCEQ staff for its commitment in completing the task of reviewing and revising the state's water quality standards. If you have any questions or concerns, please contact me at (214) 665-7101, or have your staff contact Diane Evans at (214) 665-6677.

Sincerely yours,

Miguel I. Flores
Director
Water Quality Protection Division

Enclosure

cc: Laurie Curra, TCEQ – Monitoring and Assessment Section (MC-203)

Selenium criteria - Red Draw Reservoir

In the 2000 TX WQS, the selenium criteria for Red Draw Reservoir (Howard County) were revised from 20 ug/l to 219 ug/l (acute criterion) and from 5 ug/l to 7.5 ug/l (chronic criterion). The submission included a study conducted by the Fina Oil & Chemical Company (now Alon USA, Inc.).

Red Draw Reservoir is an off-channel reservoir constructed by the Colorado River Municipal Water District (CRMWD) in 1985. It was constructed to reduce salinity input from Beals Creek, which is the receiving water body for the City of Big Spring's wastewater facility, to segment 1412 - Colorado River below Lake J.B. Thomas. Flow is pumped from Beals Creek to Red Draw Reservoir, during low flow conditions. The Alon facility commenced its discharge to Red Draw Reservoir in 1995, but portions of the effluent are also directed to another water body (Refinery Lake) and, at times, sold for use in injection wells for oil field waterflood operations (diverted from Red Draw Reservoir).

Red Draw Reservoir is managed to minimize releases and has never discharged, nor been at full capacity, according to the CRMWD. In addition, the reservoir is located on private, fenced lands and the watershed area above Red Draw Reservoir is a relatively small area. CRMWD has noted that groundwater contamination from Red Draw Reservoir is not likely since no near-surface groundwater exists in immediate area and the Ogallala aquifer outcrops north of this area. Although Red Draw Reservoir is not lined, soils in the area are clay. Water quality in Red Draw Reservoir is not monitored by the facility, or by the state, as part of the Clean Rivers Program. In the site-specific criteria study, levels of total dissolved solids (TDS) in Red Draw Reservoir ranged from 19,000 mg/l - 20,800 mg/l and are likely higher now.

The Agency has conducted an extensive review of the submission package in order to understand whether the new criteria are scientifically-defensible and protective of the designated uses of Red Draw Reservoir. In the case of selenium, EPA is in a unique situation, because although the existing, published §304(a)-recommended criteria are based on concentrations of selenium in the water column, EPA has issued a draft fish tissue-based criterion for selenium (USEPA 2004). Accordingly, in reviewing the submission, we considered not only the data the TCEQ submitted to EPA but also data and information EPA has gathered on the aquatic risks of selenium as part of the process of revising the existing EPA-recommended criteria

In conducting its review, the Agency evaluated water column concentration data and fish tissue concentration data. EPA focused primarily on the extent to which selenium would bioaccumulate in fish tissue in Red Draw Reservoir. EPA used the chronic value, 7.5 ug/l, because for selenium, this lower value is more pertinent to the toxic effects of selenium and the derivation of permit limits and assessing of attainment of water quality standards. The chronic fish tissue criterion that EPA has developed represents the latest science regarding selenium concentrations that would be protective of aquatic life. Accordingly, EPA views this criterion (7.91 ug/g dry weight) as an appropriate value for purposes of evaluating the adequacy of the site-specific criteria to protect aquatic life uses.

EPA then considered available fish tissue data and compared selenium levels in fish tissue from Red Draw Reservoir to the 7.91 ug/g dry weight criterion (hereafter, the "reference value") that EPA has issued in draft form. Because of the elevated TDS levels and other factors, only three fish species are found in Red Draw Reservoir - the inland silverside, the sheepshead minnow, and the Gulf killifish. The invertebrate population was limited to midges and a snail species (identified to family level). The sheepshead minnow, and some midge and snail species, are considered to be tolerant organisms.

Sampling for fish tissue was conducted in October 1998 and October 1999. Samples for water chemistry and sediment analyses were also collected at these events and in May 1999. A number of sampling stations were established in an arc pattern starting from the discharge point. Summary information on results from tissue analyses (dry weight) is presented in the following table.

Selenium Tissue Concentrations			
Organisms	1998 range (mg/kg)	1998 average (mg/kg)	1999 sampling (mg/kg)*
Periphyton	0.67 – 3.05 (eight stations)	1.72	0.41 – 3.23 (1.97, average of 10 results)
Snails	< 0.027 – 2.57 (eight stations, plus one station at 8.35)	2.06	4.18 (single composite)
Midges	4.47, 6.37, 10.6, 13.5, 27.1	12.4	
Inland silverside	7.08 - 18.1 (12 samples)	12.3	6.02
Sheepshead minnow	5.88 - 16.3 (16 samples)	8.14	1.62, 2.78, 2.88, 4.0 (2.82, average)
Gulf killifish	4.13 - 11.7 (16 samples)	8.20	8.06

* 1999 sampling – fish collected at one open-water station (W9); water, sediment and periphyton collected from most stations in 1998 sampling.

In the 1998 results, there was no clear relationship between selenium tissue concentrations and distance from the outfall for sampling of periphyton, snails or fish. Sampling of midges found higher selenium tissue concentrations (10.6 ug/l and 13.5 ug/l) at two stations near the outfall, but the value of 13.5 ug/g was obtained at an open water station. In 1999, composite samples for tissue analyses were collected at one open water station. Although the 1999 results for the benthic macroinvertebrate sampling were less than the 1998 results for midges, no information was provided on species collected for the 1999 composite sample. The submitted data show that the fish tissue samples in Red Draw Reservoir exceeded EPA's draft tissue criterion of 7.91 ug/g in 25 of the 44 samples from October 1998. While fewer samples were collected for the October 1999 sampling, only one of the six results exceeded the draft tissue criterion of 7.91 ug/g.

Results for total selenium in the water column indicate that concentrations decrease with distance from the outfall. The October 1998 and May 1999 sampling used two analytical methods for laboratory analysis of selenium including graphite furnace/atomic absorption spectrometry (GF/AAS, EPA method 270.2) and hydride generation/atomic fluorescence spectrometry (HG/AFS). Both methods showed a decrease in selenium concentrations in the water column with distance from the outfall, but the latter method (HG/AFS) is believed to be more accurate in waters with high salinity. Results from the HG/AFS method generally produced lower concentrations than the GF/AAS method. Of the 25 samples collected in October 1998, May 1999 and October 1999, from open water stations, 24 samples had concentrations less than 5 ug/l of total selenium, using the HG/AFS method.

The site-specific study also included an assessment of the benthic macroinvertebrate and fish communities using the state's metrics for biological sampling. EPA did not rely on this information as such measures do not necessarily account for chronic effects in aquatic organisms or bioaccumulation. Bioassessment analyses such as Index of Biotic Integrity (IBI) scores can reveal changes in the aquatic community as a result of chronic or acute effects. However, depending on the metrics selected, assessments conducted in support of criteria may not be sensitive to the effects associated with selenium toxicity, such as decreased reproduction or growth. The metrics included in Texas' IBI assessment measured total numbers of fish species, the trophic structure, and determined whether those species were considered "tolerant" of degraded habitats or pollution. Moderate pollution may produce changes in taxa so that diversity remains similar, but species composition has shifted. In response to increasing stressors, species richness can decline abruptly and the numbers of tolerant species can increase dramatically. Also, the state's indices were developed for freshwaters streams. As discussed above and in the site-specific criteria study, the characteristics of Red Draw Reservoir are not comparable to freshwater streams and high TDS levels preclude use by many freshwater species.

The site-specific chronic criterion of 7.5 ug/l is based on protection of birds which may consume fish or invertebrates from Red Draw Reservoir. A model was used to predict water concentration based on acceptable selenium ingestion rates. It combines equations for dietary exposure based on lab and field studies of selenium effects and consumption of food and water containing selenium to estimate selenium exposure. The model is similar to the procedure found in the EPA's Great Lakes Initiative for wildlife criteria (see 40 CFR Part 132, Appendix D). The site-specific criteria study was used to derive bioaccumulation factors (BAFs) for both fish and invertebrates, which are within the range of values published by EPA its 2004 draft criteria document. Data for most parameters used in the model were obtained from EPA guidance (USEPA 1993).

The site-specific acute criterion of 219 ug/l for Red Draw Reservoir in TX WQS is derived from toxicity data for selenite. The acute criterion was derived using the recalculation procedures in EPA's aquatic life guidelines, data used in the Agency's 1987 acute criterion recommendation and additional toxicity data published since development of EPA's 1987 criteria document (Stephan et. al. 1985, Canton 1999, USEPA 1987). This review found 13 studies to add to the existing database. Of these 13 studies, 11 studies were also reviewed for EPA's 2004 draft criteria document. None of the 11 studies were eliminated as un-usable data in Appendix G

of EPA's draft criteria document. Several results in Canton's calculations are included in Appendix F - Other Data of EPA 2004, rather used in EPA's 2004 calculations. Of the four lowest genus mean acute values (GMAVs) for selenite in the Canton article, three are the same values as used in EPA's 1987 criteria document. Additional data for cladocerans (Daphnia sp.) resulted in a lower GMAV for this genus, as compared to the 1987 criteria document. Although several of the GMAVs in the Canton calculations are different values than those used in EPA's 2004 draft document (for a particular species), the site-specific acute criterion of 219 ug/l for total selenium in Red Draw Reservoir is acceptable, as it is more stringent than EPA's current draft criterion for selenite (258 ug/l) and draft criterion equation for selenate (417 ug/l, calculated with a sulfate concentration that is significantly lower than found in Red Draw Reservoir).

Because Red Draw Reservoir is managed to divert high mineral concentrations in upstream reaches of Beals Creek, it is extremely unlikely that water Red Draw Reservoir will ever be released to Beals Creek. EPA relied on this factor in its approval of the acute criterion of 219 ug/l and the chronic criterion of 7.5 ug/l for Red Draw Reservoir. Based on the weight of evidence and the unique characteristics of Red Draw Reservoir, EPA believes that the site-specific criteria will be protective of the uses in this water body. EPA notes that the same type of methodology and assumptions used to derive these site-specific selenium criteria may not be appropriate in most water bodies where downstream effects are possible.

Selenium criterion - freshwater portion of Heldenfels ditch

In Appendix E of the 2000 TX WQS, the acute selenium criterion for the freshwater portion of Heldenfels ditch was also revised from 20 ug/l to 219 ug/l. The chronic selenium criterion was not revised. The 2000 submission included a literature review of acute toxicity data conducted by the Coastal Refining and Marketing, Inc. (now Valero Refining), along with a limited number of water chemistry analyses. Since the chronic criterion was not revised, the facility's study did not include additional types of analyses such as sampling of fish tissue or sediment.

Our review found that Appendix E of the 2000 TX WQS does not characterize the affected water bodies correctly, as it only includes the freshwater portion of Heldenfels ditch (second receiving water) for application of site-specific criterion. The facility's request only included the application of site-specific criterion to the unnamed ditch (initial receiving water). Surveys conducted by the facility in 2007 confirmed that the entire length of Heldenfels ditch is tidally-influenced, as is a portion of the unnamed ditch. Additionally, the facility has recently decided that it will move the discharge directly to segment 2484 - Corpus Christi Inner Harbor, in order to obtain increased dilution to meet effluent limitations for selenium and other parameters.

The Agency reviewed the submission package in order to understand whether the site-specific acute criterion would be scientifically-defensible and protective of the presumed uses of Heldenfels ditch, as well as the unnamed ditch (if corrected in a future revision). Although the site-specific water quality criterion is only intended to apply to a portion of the unclassified ditch, water chemistry analyses in the original study found elevated levels of selenium in Heldenfels

ditch (three of four samples exceeded 30 ug/l). A number of aquatic-dependent bird species may be found in this area, including the federally-listed piping plover. It is not known whether selenium is accumulating in fish or other aquatic organisms in Heldenfels ditch, which may serve as a food supply for the piping plover and other birds.

At this time, the Agency has concluded that the available supporting documentation does not provide sufficient scientific justification to demonstrate that the site-specific selenium criterion will protect the aquatic life uses in downstream water bodies. Thus, EPA is disapproving the site-specific criterion in Appendix E for the freshwater portion of Heldenfels ditch. Under 40 CFR §131.21(c), new and revised standards do not go into effect for CWA purposes until approved by EPA. Therefore, the statewide selenium criteria in Table 3 of the TX WQS will continue to apply to Heldenfels ditch and the unclassified ditch. The site-specific criterion in Appendix E of the TX WQS should be removed at the time of the next triennial revision.

References

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