



North Carolina Department of Environment and Natural Resources
Division of Marine Fisheries

Pat McCrory
Governor

Dr. Louis B. Daniel III
Director

John E. Skvarla, III
Secretary

TO: Chuck Wakild and Cyndi Karoly, Division of Water Quality
FROM: Dr. Louis B. Daniel, III, Director
DATE: April 12, 2013
SUBJECT: Martin Marietta Mine Vanceboro Quarry NPDES NC0089168

Project Description

The following comments by the North Carolina Division of Marine Fisheries (NCDMF) on the subject project are offered pursuant to G.S. 113-131. The applicant is proposing mining a 649 acre area on a 1,664 acre site on the Beaufort and Craven County border. During the mining process the site will impact 6.69 acres of jurisdictional wetlands and 58,671 linear feet of jurisdictional waters. A total of 173.5 acres of wetlands and 40,388 linear feet of jurisdictional wetlands were avoided on the project site. The applicant has proposed payment to the Ecosystem Enhancement Program (EEP) for the wetland impacts.

To mine the area, the applicant proposes dewatering nine million gallons per day (MGD) and provided six alternatives for the groundwater discharge from the proposed mine. These alternatives included 1) 100% discharge to Blounts Creek, 2) raw water to Vanceboro and discharge to Blounts Creek, 3) groundwater reinjection (50%) and discharge to Blounts Creek (50%), 4) 100% reinjection, 5) raw water to Vanceboro and land application, and 6) 100% land application. The applicant states that Alternative #1, the 100% discharge to unnamed tributaries (UT) of Blounts Creek, is the most economical and technically feasible alternative.

This nine MGD discharge was reduced from the original twelve MGD requested in the June 26, 2012 Division of Water Resources Central Coastal Plain Capacity Use Area Permit (CCPCUA) application, which as of April 4, 2013 is still active. The water will be pumped from surficial and the Castle Hayne aquifers which contain elevated iron and manganese levels. The applicant proposes that 4.5 MGD will go into one branch of the UT, and the other 4.5 MGD will go into another branch as the mine grows. The NPDES draft permit has set limits of 50 NTUs for turbidity and 6.0 and 9.0 for pH. The applicant will be required to sample the effluent monthly for total suspended solids, total iron, settleable solids, and pH, and flows will be monitored continuously. Effluent turbidity will be monitored monthly unless a violation has been observed. If turbidity exceeds 50 NTU the applicant will be required to perform instream monitoring weekly during June, July, August, and September and monthly during the remaining months of the year until effluent turbidity is less than 50 NTU. The permit conditions also include benthic monitoring sampling at four locations with a report required six months prior to the expiration of the permit.

Wetlands

The NCDMF has no comments on the direct wetland impacts, but is concerned that the mine may be in phases and the remaining wetlands will be impacted in the future and may comment at that time. The applicant should be required to discuss the potential secondary impacts to wetlands that may arise from the ground water withdrawal for the subject project. These secondary impacts have not been discussed.

Fish and Habitat Impacts

The discharge is proposed to be sent to the headwater swamps of the Blounts Creek system, a brackish creek system that is used by resident species (catfish and pickerels), anadromous fish (i.e. striped bass and river herring) for spawning migrations and nursery areas, and utilized by catadromous fish (American eel) as a nursery area. The system supports dense submerged aquatic vegetation (SAV) and was identified as a Strategic Habitat Area by the NC Marine Fisheries

Commission due to the diversity and abundance of high quality habitat and fish that occur. The North Carolina Wildlife Resources Commission (NCWRC) has sampled Blounts Creek upstream of Herring Run on two occasions (March 2011 and April 1, 2013). During these sampling events river herring (both alewife and blueback herring), American eel and resident species (pumpkinseed, largemouth bass, red drum, white perch, and redbfin pickerel) were collected. The presence of these species makes this location a popular recreational fishing location. The salinity in the creek ranges from 0-5 ppt, depending on the season and weather. The depth contours in Blounts Creek allow for relatively high salinities compared to the Pamlico River even during times of low salinity in Blounts Bay and the Pamlico River, which seems to attract estuarine fish. For example spotted seatrout are known to be found in large numbers in Blounts Creek. With changes in salinity it is possible that spotted seatrout usage would decline. In addition to the salinity changes, flows will change in the swamps at the headwaters of Blounts Creek. The change in flows can have adverse impacts on all life stages of fishes as well as changing the prey for these fishes.

Information provided in the application regarding the fish community was inadequate to address variable and seasonal differences in fish assemblages since it was based on one sampling event with one gear type. Samples should have been performed during different time (i.e. seasonal) periods using multiple gears to fully assess the effect of this project on the current fish community. This system is a NCWRC designated Anadromous Fish Spawning Area but no sampling was performed by the applicant to survey for early life stages or for the presence of spawning adults. Past NCDMF reports show river herring eggs and larvae being collected at Herring Run in 1974 to 1976 and Atlantic sturgeon, a federally listed endangered species, was collected around Blounts Bay during the same time period (DMF 1976). During the April 1, 2013 NCWRC sampling event, 39 river herring were collected, many of which were ready to spawn (M. Dunn, pers. comm. NCWRC 2013). This sampling event may have collected more river herring in the Tar/Pamlico system than any other year since 2006 (J. Homan, pers. com. NCWRC 2013). The presence of these fishes shows that this area is still a spawning area for river herring. River herring adults spawn in flooded forested wetlands and juveniles use forested wetlands and adjacent shallow bottom as nursery areas. The increase in flows in the headwaters may also increase channelization of the headwater swamps that are critical for river herring spawning and development (NCDMF 2007). Studies have shown that the size, number and diversity of species in channelized streams are lower than unchannelized streams, essentially making the fisheries less productive (Deaton et al. 2010).

The changes to flow and pH may change olfactory cues for spawning migrations, allow more predators access to river herring spawning and nursery areas, or remove important food sources. Some species of anadromous fish (e.g. Pacific salmon and Sea lamprey) are known to use olfactory cues to home to their natal spawning grounds (Dittman and Quinn 1996 and Vrieze et al. 2010). Other anadromous fish experts suggest that these findings are also true for river herring (B. Wynne, pers. com. NCWRC 2013 and R. Rulifson pers. com. East Carolina University 2013). Thunberg (1971) performed tank experiments that suggest alewives use olfactory cues to home to natal waterbodies. Ross and Biagi (1990) state that it appears olfactory cues are the primary means for homing behavior in alewife. Several tagging studies have shown evidence that river herring will return to natal waterbodies to spawn and then return to spawn in subsequent years (Jessop 1994 and Messieh 1977). Any alterations to these cues could erase river herring's ability to find their natal spawning grounds.

The applicant states that the groundwater discharge will have high manganese concentrations (0.249 mg/l). Under anaerobic conditions such as those found in swamps, manganese is reduced to soluble manganese which can be more toxic to aquatic organisms (Kaiser 1980). For freshwater organisms (*Hyalella azteca* and *Ceriodaphnia dubia*), LC50 values ranged from 3.0 to 15.2mg/L (Lasier et al. 2000). Although the levels of manganese found in the aquifers are less than the LC50 values bioaccumulation should be examined to determine if lethal affects will occur from the discharge. These lethal affects may alter the food web removing critical forage items for fishes currently found in Blounts Creek.

The applicant has developed a model to predict how the flow, salinity, and pH of Blounts Creek will be affected by the proposed discharge. In the development of the model the applicant sampled water quality three times (April 4, 2012; April 13, 2012; and May 31, 2012) to obtain water quality information during what is stated as a variety of flow and salinity conditions. Although these events were performed to cover a range of rainfall events (0.5 to 3.5" of rainfall) they do not accurately describe yearly or monthly conditions. These sampling events should have been performed throughout the year over several years to adequately understand the affects of the discharge. The applicant has stated that the mine discharge will change the pH of the headwater/swamps from 4.0 to 5.5 to 6.5 to 6.9 and the flows from 2 cfs to 18 cfs. The pH values will be similar to those currently at the confluence of Herring Run and Blounts Creek. Although the applicant

states that this increased pH will be beneficial by creating more suitable habitat for spawning, egg and larval development, and increase the invertebrate population (CZR 2012), the NCDMF questions if this is beneficial. Blounts Creek is a unique system that is currently highly functioning and productive.

The NCDWQ NPDES permit contains a permit condition to sample benthic invertebrates following the latest version of Standard Operating Procedures for Collection and Analysis of Benthic Macroinvertebrates by the Division of Water Quality Environmental Sciences Section. Although this document provides information as to the sampling and evaluation techniques, it does not provide information on the number of sampling events that have to be performed (i.e. monthly, yearly, or multiple years). Although the NCDMF does not have jurisdiction over these benthic invertebrates, they perform a vital function in the food web providing nutrients to fishes. If permitted the applicant should collect a second year of baseline data prior to discharge. The addition of a second year will provide more information as to invertebrate community and the potential yearly variations found at the headwaters of Blounts Creek.

The discharge is likely to have significant impacts on Blounts Creek, Blounts Bay, and the diverse and healthy aquatic community they support. With the proposed 100% discharge, the biogeochemical water quality characteristics of Blounts Creek spawning grounds will change, effectively altering a functioning system. The presence of running ripe river herring in Blounts Creek show that this area still functions as a nursery area for a declining species. River herring are declining in numbers in NC and along the entire east coast. Despite a fishing moratorium since 2007, North Carolina has not seen a recovery in river herring stocks. Habitat degradation, including discharges, is one of the leading causes for this decline (NCDMF 2007 and Limburg and Waldman 2009). The NCDMF has designated the stock status of river herring as unknown in the Tar/Pam region and the Atlantic States Marine Fisheries Commission has classified river herring stocks as declining and not recovering. River herring are currently being reviewed for listing as endangered under the Endangered Species Act.

Given the extremely low population of river herring and the potential and unknown impacts of the discharge on one of the few remaining areas in the Pamlico system known to be supporting river herring, as well as impacts to other estuarine and anadromous fish species, the NCDMF objects to the proposed Alternative #1. The division is interested in developing solutions that utilize aspects of Alternatives #2-6. Groundwater reinjection is a possibility if the applicant has a location where the discharge does not contaminate the aquifer. If the applicant was to reinject the water, there would likely be no adverse impacts to Blounts Creek and the aquatic community. This alternative would avoid all impacts to fishes and the potential economic impact on the fisheries that utilize Blounts Creek and the businesses that support it. We look forward to working with the applicant to develop a reasonable and viable alternative to Alternative #1. The NCDMF appreciates the opportunity to review and comment on this project. If you have any comments or questions, please call me at (252) 808-8013 or email me at Louis.Daniel@ncdenr.gov.

Deaton, A.S., W.S. Chappell, K. Hart, J. O'Neal. 2010. North Carolina Coastal Habitat Protection Plan. North Carolina Department of Environment and Natural Resources. Division of Marine Fisheries, NC. 617 pages.

Dittman, A.H. and T.P. Quinn. 1996. Homing in Pacific Salmon: Mechanisms and Ecological Basis. *The Journal of Experimental Biology* 199: 83-91.

DMF (North Carolina Division of Marine Fisheries). 1976. Anadromous Fisheries Research Program Tar River, Pamlico River, and Northern Pamlico Sound. Completion Report for Project AFCS-10.

Jessop, B. M. 1994. Homing of alewives (*Alosa pseudoharengus*) and blueback herring (*A. aestivalis*) to and within the Saint John River, New Brunswick, as indicated by tagging data. Canadian Technical Report of Fisheries and Aquatic Sciences 2015.

Kaiser KLE (1980) Correlation and prediction of metal toxicity to aquatic biota. *Canadian Journal of Fisheries and Aquatic Sciences* 37:211–218.

Lasier, P.J., P.V. Winger, and K.J. Bogenrieder. 2000. Toxicity to manganese to *Ceriodaphnia dubia* and *Hyalella azteca*. *Archives of Environmental Contamination and Toxicology*. 38(3):298-304.

- Limburg, K. E. and J.R. Waldman. 2009. Dramatic Declines in North Atlantic Diadromous Fishes. *BioScience* 59(11): 955-965.
- Messieh, S. N. 1977. Population structure and biology of alewives (*Alosa pseudoharengus*) and blueback herring (*A. aestivalis*) in the Saint John River, New Brunswick. *Environmental Biology of Fishes* 2(3):195-210.
- North Carolina Division of Marine Fisheries (NCDMF). 2007. North Carolina Fishery Management Plan Amendment 1: River Herring. Morehead City, NC.
- Ross, R. M., and R.C. Biagi. 1990. Marine recreational fisheries of Massachusetts: River herring. University of Massachusetts Cooperative Extension, Massachusetts Division of Marine Fisheries, Marine Recreational Fisheries Series Informational Pamphlet No. CR 162: 6/90-10M, Amherst, Massachusetts.
- Thunberg, B. E. 1971. Olfaction in parent stream selection by the alewife (*Alosa pseudoharengus*). *Animal Behavior* 19: 217-225.
- Vrieze, L.A., R. Bjerselius, and P.W. Sorensen. 2010 Importance of the Olfactory Sense to Migratory Sea Lampreys *Petromyzon marinus* Seeking Riverine Spawning Habitat. *Journal of Fish Biology* 76(4): 949-964.

3441 Arendell Street, P.O. Box 769, Morehead City, North Carolina 28557
Phone: 252-726-7021 \ FAX: 252-726-0254 \ Internet: portal.ncdenr.org/web/mf

An Equal Opportunity \ Affirmative Action Employer