

Update on Selenium Projects at Tilden and Empire Mines

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Purpose Statement:

Cliffs Natural Resources' Michigan Operations Tilden and Empire Mines move over 60 million tons of rock annually in order to produce approximately 12 million tons of iron pellets. This large scale operation generates significant environmental interest. This newsletter will focus on selenium.

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Updated Consumption Advisory for Goose Lake Fish

By: DEQ Staff

The Michigan Department of Community Health (MDCH) has issued an updated fish consumption advisory for portions of the East and Middle Branches of the Escanaba River in Marquette County. Cliffs Michigan Operations (CMO) collected and analyzed fillets from brook trout for selenium from streams surrounding their operation. Selenium fillet concentrations were compared with chemical-specific health protective fish consumption screening values. Based on this MDCH evaluation, an updated fish consumption advisory was issued for:

East Branch Escanaba River – upstream of Gwinn including Warner Creek, Goose Lake Outlet, Goose Lake Inlet, Schweitzer Creek, Ely Creek and other tributaries.

Green Creek – from the Empire tailings dam to the Middle Branch of the Escanaba River.

Middle Branch of the Escanaba River – Gwinn to the Cataract Dam.

This advisory is based on the concentration of selenium in fish fillets. The MDCH advises the public to eat no more than 52 meals per year (average of one meal per week) of brook trout or white sucker from these streams. White sucker are included in the advisory because previous Michigan Department of

Environmental Quality (MDEQ) analysis of whole fish showed similar levels in brook trout and white sucker in these streams.

The MDCH previously placed a fish consumption advisory on northern pike and white sucker for Goose Lake. This advisory (12 meals per year or one per month) remains in effect.

The MDEQ also collected and analyzed fish fillet samples from Schweitzer Reservoir, which receives wastewater discharge from the Empire tailings basin. The selenium levels in these fillets do not warrant any special consumption advisories. The MDCH does recommend limiting consumption of certain species from inland lakes and reservoirs statewide due to elevated levels of mercury. Please consult the Michigan Fish Advisory for details.

In general, all fish consumption advisories in Michigan, regardless of location, address the concern of repeated consumption of contaminated fish fillets over many years (i.e. chronic exposure). The MDCH does not expect the consumption of a single fish meal containing any contaminant listed in the fish consumption advisory will pose a health hazard requiring immediate medical treatment. The concern is that repeated consumption of contaminated fish will result in elevated contaminant levels in people's blood. Some people who are sensitive to the negative effects of a particular chemical may experience an illness they would not have otherwise

acquired due to prolonged consumption of contaminated fish.

Therefore, the MDCH recommends that all people who eat fish from Michigan waters, including the Great Lakes, check the Michigan Fish Advisory before making your catch your dinner. For details on the Michigan Fish Advisory, go to www.michigan.gov/eatsafefish or call 1-800-648-6942.



DEQ NPDES Permitting Process

By: DEQ staff

The National Pollutant Discharge Elimination System (NPDES) permit for the Empire Mine will expire on September 30, 2011. Empire Mine has three outfalls which discharge treated process wastewater, treated mine dewatering water, treated sanitary wastewater, noncontact cooling water, and storm water runoff to Green Creek, Schweitzer Reservoir, and Goose Lake Inlet. The NPDES permit for the Tilden Mine will expire on October 1, 2011. Tilden Mine has two active outfalls that discharge treated process water, treated mine dewatering water, treated sanitary wastewater, mine drainage water, and storm water runoff to Warner Creek and Goose Lake Outlet. Copies of the current NPDES permits can be found at the following link:

(The link provided was broken and has been removed).

Applications for reissuance of these permits were submitted on April 1, 2011. The permits are scheduled to be reissued on or before September 30, 2012.

The purpose of the NPDES permit process is to control the discharge of pollutants into surface waters by imposing effluent limitations to protect the environment. This is a federally promulgated program administered by the Water Resources Division of the Michigan Department of Environmental Quality.

A NPDES permit is required for most discharges into surface waters of the state and can be issued for a period of no more than five years. Any individual(s) or entity(s) proposing to discharge wastewater into a surface water of the state must submit a NPDES permit application.

The NPDES permits regulate a number of water quality parameters. Since every facility is different, each individual NPDES permit is different too. The permit processor, together with aquatic biologists and stream modelers, decides which parameters require limits. Sometimes a limit is not necessary, but further monitoring is required to gain more information about the quality of the facility's effluent.

Staff develops Water Quality Based Effluent Limits (WQBELs) and Treatment Technology Based Effluent Limits (TTBELs) based on information provided in the application and the characteristics of the receiving water body. The WQBELs are effluent limits that will ensure that the level of water quality to be achieved by

the discharge complies with all applicable water quality standards. The State of Michigan's Part 4 Rules specify water quality standards which shall be met in all waters of the state. The rules require that all designated uses of the receiving water be protected. Designated uses include: agriculture, fish consumption, navigation, industrial water supply, public water supply at the point of water intake, warm water or cold water fish and other indigenous aquatic life and wildlife, partial body contact recreation, and total body contact recreation from May 1 to October 31. The TTBELs are permit limits for a pollutant that are based on available, economically achievable technology for a particular type of industry. The more restrictive the WQBEL or the TTBEL is included in the permit for each pollutant. Other conditions in the permit may include specific monitoring or studies to address water quality concerns as a result of the discharge.

Once the draft permit has been developed, the applicant is given the opportunity to review the permit (usually 2-3 weeks) prior to the permit being placed on Public Notice and posted on the MDEQ website. Thirty days are allowed for the submittal of comments from interested parties. Interested parties may also request a public meeting or hearing during this time. The Department will evaluate all concerns and comments received and then either issue or deny the permit. Once the permit is issued or denied, 60 days are allowed for any aggrieved party to file a petition for a

contested case hearing. The Department has the authority to modify or revoke a permit after it has been issued under certain conditions, such as a change in the conditions, a violation of a term of the permit, or a new regulation of a parameter not previously addressed in the permit but present in the source's discharge.

The sources used to summarize the information above were compiled from the following:

For additional details related to the NPDES permit process, go to:

(The link provided was broken and has been removed).

For a link to applicable rules and regulations for NPDES permit development, go to: <https://www.michigan.gov/egle/about/Organization/Water-Resources/npdes/rules-and-regulations>.

For a copy of A Citizen's Guide to Water Quality Permitting prepared by the Tip of the Mitt Watershed Council, go to:

http://www.watershedcouncil.org/uploads/7/2/5/1/7251350/npdes_ebook.pdf.



Avian Studies Continued

By: Cliffs Natural Resources' Michigan Operations

Cliff's Michigan Operations began avian studies last year and the studies continue through 2011. The avian studies aim to assess the hatch success, fledge success, and selenium exposure of birds in the areas

surrounding the Empire and Tilden Mines. The 2010 results offered positive insight.

Last year, field staff logged more than 6,000 hours, installed nearly 300 bird boxes, and monitored them for nesting activity. Where activity was observed, nest initiation date, date of first egg laid, total number of eggs, hatch success and fledge success were recorded. This was a very time intensive process that required monitoring each active nest box approximately every other day. The geographic extent of the study area added another challenge as it covered more than eighty square miles.

Two waterfowl and five passerine (songbird) species utilized the bird boxes for nesting and 39 bird eggs were obtained. The eggs were collected in accordance with a scientific collection permit and analyzed for selenium concentrations. Selenium thresholds are not available for the species of birds that are participating in the nest box study, and there is not enough data to develop threshold concentrations for these species. However, hatch and fledge rates near Cliffs Michigan Operations are comparable to the regional norms in 2010.

Avian efforts in 2011 include continued nest monitoring and egg collection from the 2010 locations as well as two additional locations; as expected, bird participation has increased during the second year of the study. The results from the continuation of the study through 2011 will bolster this encouraging

dataset and avian reproduction and selenium exposure will be further examined and incorporated into the ongoing selenium minimization program.

(Field staff monitoring a bird box)



Selenium Reduction Efforts

By: Cliffs Natural Resources' Michigan Operations

In the last newsletter (August 2010) Cliffs Michigan Operations described its extensive sampling program to characterize selenium concentrations and flows in the waters

surrounding the Empire and Tilden mines along with the mass loading model that was being developed. Since last August, Cliffs' personnel have continued sampling and further developed the mass loading model. This article provides an update on these efforts and outlines the next steps.

As more selenium concentration and flow measurements have been added to the mass loading model, the model's capabilities have been refined. Once emerging capability is the identification of areas where natural processes may be removing and sequestering selenium. Environmental professionals are evaluating whether conditions in the chemical environment described as "reducing conditions" may be causing selenium to be transformed from the more soluble chemical form of selenite or selenate to a less soluble form such as elemental selenium. Once this transformation to a less soluble form occurs, the potential exists for the elemental selenium to become trapped (sequestered) in sediments and unavailable for future uptake by biological organisms. It is possible that this process could be optimized in other areas at and around the Empire and Tilden mines.

The mass loading model that is being developed is also playing an important role in evaluating and targeting areas where selenium loading in mill and mine water can be reduced. This year a significant change is planned for the handling of pit dewatering at Empire. The plan is to reroute that water to an inactive pit

on the property and thereby prevent it from being discharged. The rerouting of the pit dewatering also has the potential to increase water management efficiency in the future.

The mass loading model provides a foundation for designing a storm water management plan. The model suggests that selenium that leaves areas of the mining operations may relate to storm water that contacts the rock stockpiles. The model helps to track the portions of selenium in storm water and to prioritize efforts to curtail the contributions of selenium to surround waters.

Cliffs is encouraged by the promising results from the mass loading model described above, and remains committed to continuing the development of the model to further assist in addressing the presence of selenium.

(Pump station used to recycle rock pile runoff with elevated selenium)



This newsletter was developed and distributed by the Michigan Department of Environmental Quality with cooperation from Cliffs Natural Resources. It is intended to assist the public with information on the activities in and around the Empire and Tilden mines. If you have any questions, suggestions or would like to be added to the electronic mailing list, please contact Steve Casey by e-mail at caseys@michigan.gov.