

Friday, November 22, 2013

Mr. Randy Conroy
Michigan Department of Environmental Quality
1504 West Washington Street
Marquette, MI 49855

**Subject: Eagle Mine, Mine Site Water Treatment Plant (WTP) Effluent Discharge pH
Groundwater Discharge Permit - GW1810162**

Dear Mr. Conroy,

As previously discussed during a phone conversation on Friday, November 15th, water was discharged on November 11th, 13th, and 14th that was outside of the pH discharge limit of 6.5-9.0.

Date	Daily Minimum pH	Daily Maximum pH	Discharge Volume (gallons)*
11/11/13	5.2	8.7	481
11/13/13	4.6	8.6	604
11/14/13	7.8	9.8	380

*Discharge volume was calculated based on average flow over the length of the deviation

On all three occasions the discharge was in the process of shutting down when the lowest or highest daily reading was recorded.

Background

In accordance with the Groundwater Discharge Permit, effluent discharged to the Treated Water Infiltration System (TWIS) must be within the pH range of 6.5-9.0. Upon completion of the treatment process and prior to discharge, the pH of the effluent is near 11. Therefore, HCl is added to bring the pH down into the acceptable discharge range of 6.5-9.0. A pH probe is utilized in the control loop for HCl addition and also controls the valve which allows for discharge if water is within the specified pH range. If the pH meter detects that the effluent is outside of the selected set points of 6.8 or 8.7 then the discharge valve begins to close, a process that was programmed to take approximately two minutes with the flow decreasing simultaneously as the valve closes. The pH meter is continuously taking readings of the effluent quality and recording values every ten seconds. The set points are set slightly inside the permit limits to minimize the chance of discharging water outside of the permitted pH range. A second inline pH meter has also been installed. This meter has set points of 6.6 and 6.9 and also has the capability of closing the discharge valve. The only time this meter would activate the discharge valve is if the first pH probe failed.

Due to the high purity of the effluent, there is very little to zero buffering capacity in the water. Therefore, it is constant challenge to maintain a highly stable pH on a continuous basis. As you may recall, citric acid

was originally utilized for pH adjustment of the product water because it is a weak acid and offers better control of the pH in a highly pure water. The use of this acid was discontinued due to detection of BOD in the effluent in 2011 and replaced with a dilute HCL.

Event

While discharging on November 11th, 13th, and 14th, the pH was detected at levels outside of the designated set points and as required the discharge valve started to close. However, the pH continued to drop or rise to a level that was outside of the permitted limits while the valve was in the process of closing, thus resulting in a discharge of water that was outside of the permitted range. Approximately 1,465 gallons of water was discharged outside of the acceptable range over the course of the three events.

Outcome/Follow-up Actions

The discharge was ceased until the events could be reviewed to determine ways to rectify the situation and further reduce the likelihood of future occurrences. During discussions with plant operators it was discovered that there were some recent programming changes to the discharge valve control loop which forced it to react slower. Although this change allowed the WTP to attain a steadier pH, it doesn't appear to allow the discharge valve to close fast enough when out of spec water is detected.

The programming associated with the discharge valve control loop was modified to increase the reaction time of the discharge valve, thus allowing it to close faster. Other aspects of the system are also being reviewed including moving the pH adjustment point further upstream in the process to minimize system fluctuations. These modifications will result in additional protection against future pH discharge events.

If you require any additional information, or should you have any questions about this report, please do not hesitate to contact me at 906-204-6500.

Sincerely,



Amanda Zeidler
Environmental Advisor
Eagle Mine