2018 Impairment Assessment for Stream C (WBIC 4000013)

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November 2017

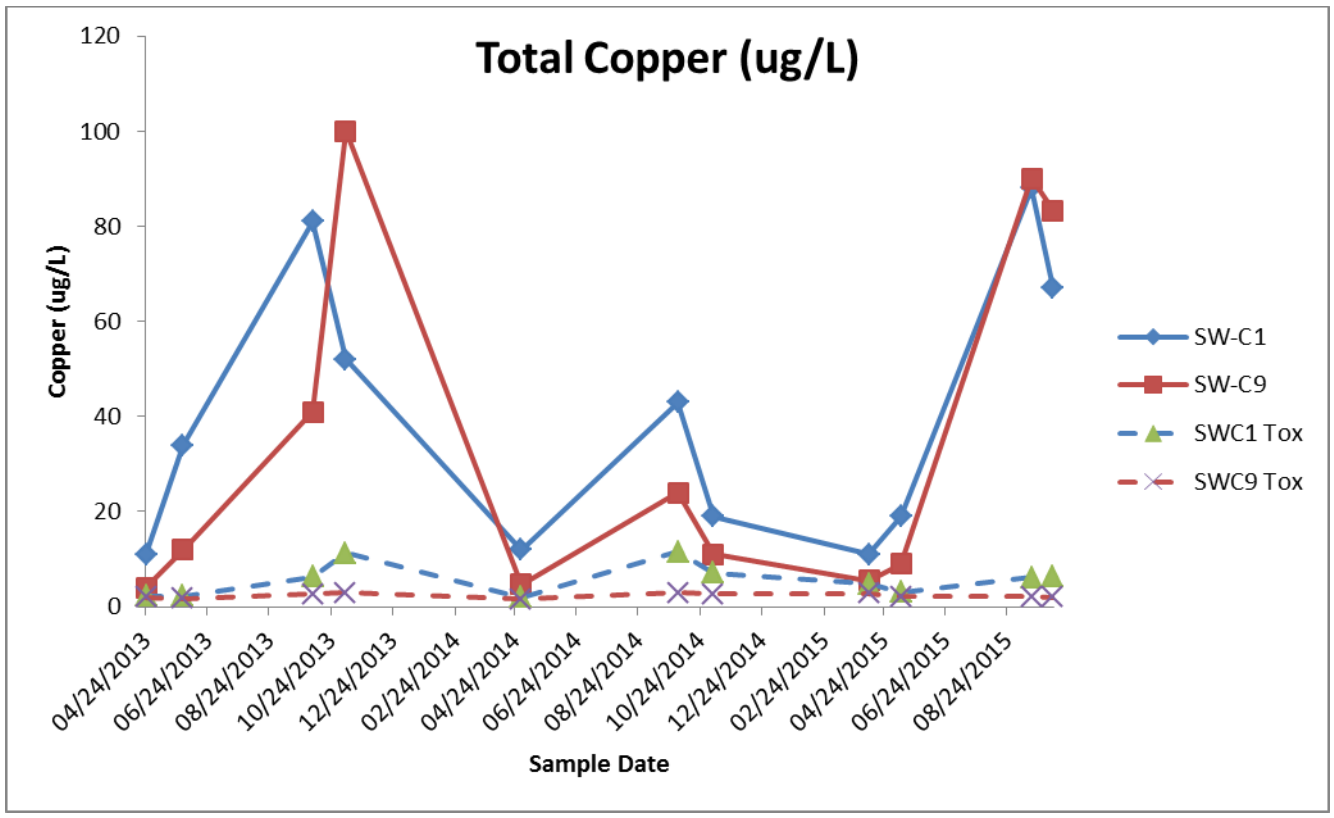
Surface water quality data was received from the Flambeau Mining Company of copper, zinc, and hardness (mg/L CaCO3) in Stream C (Site SW-C1) and an upstream connected waterway (Site SW-C9). Samples were taken from April 2013 to October 2015 and totaled 11 samples. Stream C is listed for Acute Aquatic Toxicity from zinc and copper. To determine if Stream C is still impaired for zinc and copper the formula for Acute Aquatic Toxicity Criteria (ATC) in Wisconsin's NR 105 Table 2 was used.

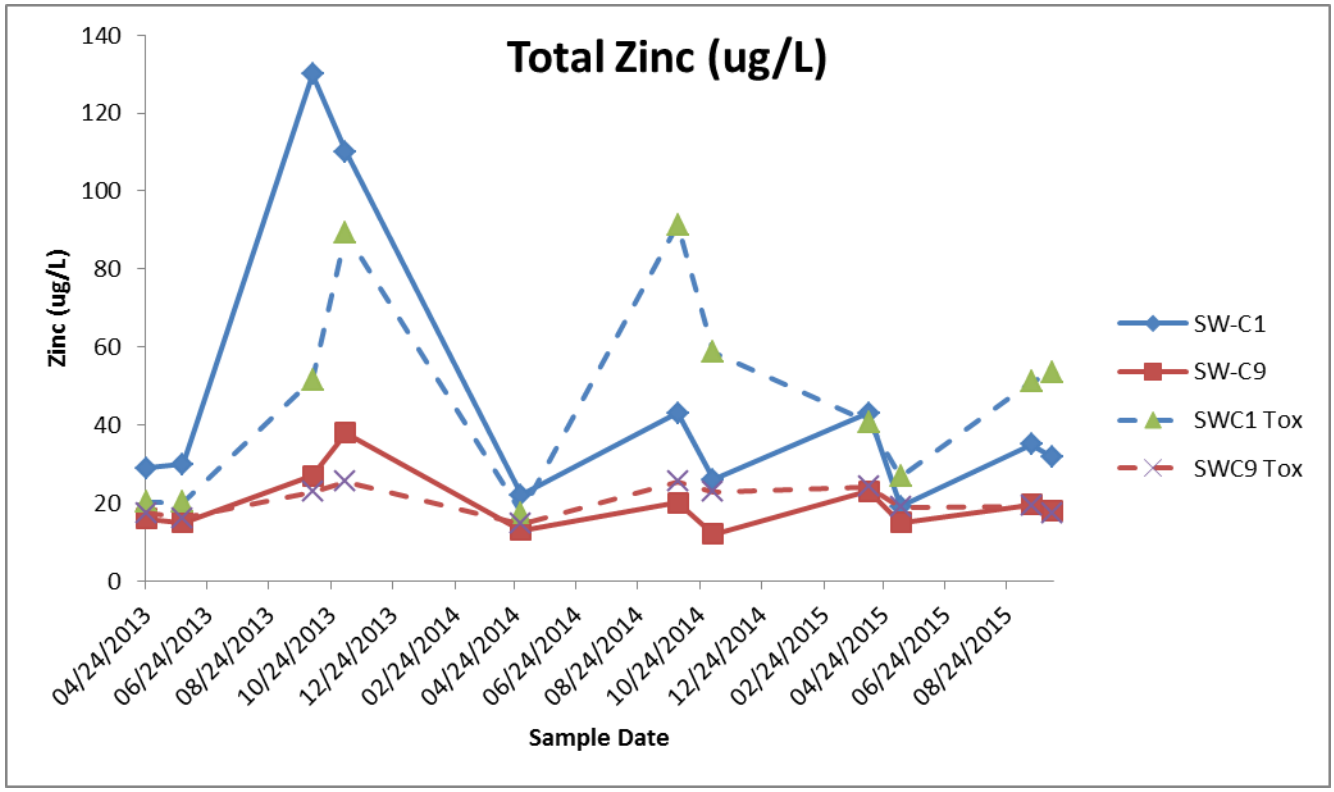
$$ATC = e^{(V*(\ln(Hardness))+\ln ACI)}$$

Values for V and ln ACI are provided in NR 105 Table 2. Hardness was provided in the sample data. A site is considered impaired if it exceeds the criteria more than one every 3 years (WisCALM 2018).

Site	Copper Exceedances	Zinc Exceedances	Impairment Status
Stream C (SW-C1)	11/11	5/11	**Remains impaired for both metals.**
Upstream Site (SW-C9)	11/11	4/11	Potential impairment – water not on hydrolayer.

This assessment show high levels of zinc and copper at both sites, slightly higher zinc exceedances in Stream C. Based on the data provided more surface water sampling should be done; this is planned for in the Flambeau Mining Company's monitoring plan.


Total Copper (ug/L)
Copper (ug/L)
120
100
80
60
40
20
0
04/24/2013
06/24/2013
08/24/2013
10/24/2013
12/24/2013
02/24/2014
04/24/2014
06/24/2014
08/24/2014
10/24/2014
12/24/2014
02/24/2015
04/24/2015
06/24/2015
08/24/2015
Sample Date
SW-C1
SW-C9
SWC1 Tox
SWC9 Tox


Total Zinc (ug/L)
Zinc (ug/L)
140
120
100
80
60
40
20
0
04/24/2013
06/24/2013
08/24/2013
10/24/2013
12/24/2013
02/24/2014
04/24/2014
06/24/2014
08/24/2014
10/24/2014
12/24/2014
02/24/2015
04/24/2015
06/24/2015
08/24/2015
Sample Date
SW-C1
SW-C9
SWC1 Tox
SWC9 Tox

Attachment A

Sampling Site Map

NOTES

1. Digital orthophoto imagery provided by Aero-Metric, Inc., Sheboygan, WI. Date of Acquisition: May 17, 2008.
2. Digital orthophoto imagery outside project area courtesy of the Wisconsin Regional Orthophotography Consortium (WROC). Downloaded from wiscview.org. Date of Acquisition: Spring 2010.
4. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).
5. Topographic contours created from October 2011 through May 2012 field surveys completed by Foth.

LEGEND

- Sand Point Location
- Basin Monitoring Location
- 2ft Contours
- Existing Culvert
- Intermittent Stream
- Stormwater Drainage Path
- Flambeau Mine Area Boundary
- Industrial Outlot
- Infiltration Basin

Foth

N

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY: SVF			DATE:FEB. '13
APPROVED BY: SVD1			DATE:FEB. '13
APPROVED BY:			DATE:

FLAMBEAU MINING COMPANY

FIGURE 1

FLAMBEAU MINE
SURFACE WATER MONITORING LOCATIONS

Scale: 0 100 200 Feet | Date: FEBRUARY 2013

Prepared by: DAT | Project No: 11F777

Path: X:\GB\IE\2011\11F777\GIS\mxd\Maintenance_Monitoring_Plan_Jan13.mxd Date: 2/15/2013

Attachment B

Flambeau Mining Company Monitoring Plan

Flambeau Mining Company Surface Water
Monitoring Plan 9/24/2015

Flambeau Mining Company shall implement a Surface Water Monitoring Program in 2016 after completion of construction and restoration activities undertaken pursuant to this permit.

The surface water monitoring program shall include the following:

- Continued surface water sampling at existing locations SW-C9 (representing the upstream conditions of the connected waterway's connection to Intermittent Stream C) and SW-Cl (representing downstream conditions of the connected waterway's connection to Intermittent Stream C).

- The targeted frequency of sampling at SW-C9 and SW-Cl shall be as follows:
    - 8 samples of qualified flow events during the period from April 1 to November 30 of each year
    - Samples obtained to reflect a variety of qualifying precipitation / runoff conditions
    - If 8 qualified flow events do not occur during the calendar year, the sampling frequency shall be reduced accordingly

- Sample points SW-C9 and SW-Cl will be sampled up to 8 times per year for a period of three (3) years.

- Sampling will consist of collecting samples only during qualifying storm / flow events with a *qualified flow event* being defined as a precipitation event with rainfall equal or greater than 0.5 inches which exhibits continuous and simultaneous visible flow at both monitoring locations (SW-C9 and SW-Cl).

- The depth of stream flow shall be measured at the time of water sampling utilizing a removable staff gauge at the STH 27 culvert outlet adjacent to SW-C9 and at the Copper Park lane culvert outlet proximal to SW-Cl. Permanent brackets will be attached at the exit of both culverts to allow a portable staff gage to be set in place to obtain depth of water measurements. The bracket system will be constructed such that the portable staff gage will be held at the same elevation for all sampling events providing repeatable and comparative results. Upon the completion of sampling a given event, the staff gage will be removed and stored on site.

- Field parameters shall be obtained associated with the grab sample and will consist of dissolved oxygen, electrical conductivity, Oxidation Reduction Potential (ORP), pH, and temperature.

  Flow shall be determined based on the size of the culvert, measured depth of flow at the culvert outlet, and the standard mathematical relationship between depth of flow and culvert characteristics (standardized culvert hydraulics).
- The grab samples shall be collected, documented, and preserved as per the current Quality Assurance Project Plan and transported to a certified laboratory for analysis of total copper, total zinc, hardness as $CaCO_3$, total suspended solids, pH, and electrical conductivity.

- The field and analytical results collected to date shall be summarized and provided to the Department by July 1 of the year the sample(s) is taken and within 45 days following collection of the last sample of the year.

Note that for ease of reference, the drainageway between SW-C9 and SW-CI is referred to as Intermittent Stream C.