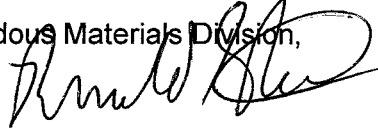


MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Nate Nemani, Resource Conservation and Recovery Act of 1976 Corrective Action Project Manager, Land and Chemicals Division, Remediation and Reuse Branch, U.S. Environmental Protection Agency

FROM: Ronald Stone, Senior Geologist, Waste and Hazardous Materials Division, Michigan Department of Environmental Quality 

DATE: January 12, 2010

SUBJECT: Implementation of a Mixing Zone Request; General Motors - Saginaw Metal Castings Operation (GM-SMCO); MID 041 793 340

The Michigan Department of Environmental Quality (MDEQ), Waste and Hazardous Materials Division (WHMD), has reviewed the request for a Mixing Zone Determination for venting groundwater to the Saginaw River from GM-SMCO in Saginaw County, Michigan and forwarded that request to the MDEQ, Water Bureau (WB). The attached response provided by the WB identifies the acceptable concentration limits for discharge of the various chemicals characterized in the mixing zone request to the Saginaw River.

Based on the information provided by the WB, it is determined that there is a reasonable potential for the discharge of some chemicals to cause or contribute to water quality standards (WQS) being exceeded.

Recommended mixing zone-based groundwater surface water interface (GSI) values are summarized in the table below:

Table 1: Plume Venting to the Saginaw River

Parameter	Final Acute Value	Final Chronic Value	Reported Worst Case Maximum Site Concentration
pH	6.5 - 9.0 S.U.		
Ammonia Nitrogen	3.1 mg/l		

General Comments

1. The final acute values listed above are the acute mixing zone-based GSI criteria. These limits are provided for chemicals determined to have a reasonable potential to exceed the acute mixing zone-based GSI criteria. These values (as well as the generic GSI criteria for other chemicals not specifically identified in the mixing zone request) must not be exceeded at the GSI compliance monitoring wells; if they are, further remedial action will be required. The facility has the following options in regards to parameters that exceed the acute mixing zone-based GSI criteria in site monitoring wells:
 - a. If any existing exceedances are upgradient of the compliance monitoring wells, GM-SMCO must demonstrate that data from all of the compliance monitoring wells in the Mixing Zone Compliance Monitoring Plan are, and will be, in compliance with acute

mixing zone-based GSI criteria for those parameters. Averaging of groundwater data is not allowed for comparison to generic GSI or acute mixing zone-based GSI criteria, nor is it allowed for bioaccumulative contaminants of concern. Acute mixing zoned-based or generic GSI criteria may not be exceeded in any individual GSI compliance monitoring well.

- b. Prevent the discharge of all parameters that exceed the acute mixing zone-based GSI criteria in the GSI compliance monitoring wells. This option would require the focus of subsequent site investigations to hydrogeologically define remediation designs for capturing the groundwater discharge, further plume characterization, and identification of sources for source control measures.
2. It has been determined that any other parameter on the mixing zone request form, not given a recommended mixing zone-based GSI criteria in the table above (if any) or in the attached memorandum, will not cause or contribute to WQS being exceeded at this time. This determination is based upon the reported maximum values in the mixing zone request, which was submitted to the WB by the WHMD.

In order to demonstrate the groundwater discharge long-term compliance with the mixing zone-based GSI criteria, GM-SMCO will need to submit a Mixing Zone Compliance Monitoring Plan for review and approval. The Mixing Zone Compliance Monitoring Plan should include a Sampling and Analysis Plan (to address both mixing zone chemicals and other chemicals reported in the mixing zone request), identification of the wells that GM-SMCO proposes to sample to show compliance with the mixing zone-based GSI criteria (along the GSI at the GSI point of compliance) and any sentinel wells within the appropriate portions of the plume, and provide an explanation of the monitoring schedule and reporting process.

Should you have any questions regarding this letter or the Mixing Zone Determination, please contact me via e-mail at stoner@michigan.gov or by telephone at 517-373-7141.

Attachment

cc/att: Ms. Cheryl Howe, WHMD
Ms. Rhonda Klann, Remediation and Redevelopment Division
Mr. David Slayton, WHMD
Corrective Action File

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Liane Shekter Smith, Assistant Division Chief
Waste and Hazardous Materials Division

FROM: Erik Sunday, Surface Water Assessment Section, Water Bureau

DATE: December 11, 2009

SUBJECT: General Motors Corp-Saginaw Metal Casting Operations (GM-SMCO)
Groundwater venting discharge

The Surface Water Assessment Section has evaluated Water Quality-Based Effluent Limits (WQBELs) for the GM-SMCO groundwater venting discharge. The existing GM-SMCO facility is continuously venting groundwater to the Saginaw River from four groundwater-surface water interfaces (GSIs) as described in the November 12, 2009, Mixing Zone Determination Request (MZDR) forwarded to SWAS by Waste and Hazardous Materials Division (WHMD):

Ammonia Part 1 – 1.73 cubic feet per second (cfs) (1.12 million gallons per day (MGD))
Ammonia Part 2 – 0.81 cfs (0.52 MGD)
pH-High – 0.76 cfs (0.49 MGD)
pH-Low – 2.05 cfs (1.33 MGD)

The above venting flow rates are maximum flows. The vents are located in Sections 7, 17, and 18 of T12N, R5E of Saginaw County. The pH-High groundwater venting flows to the Saginaw River through the Ammonia Part 1 venting area. Therefore, these two vents have been treated as a single vent with a maximum flow rate of 2.49 cfs (1.73 cfs + 0.76 cfs) in developing WQBELs. The combined Ammonia Part 1 and pH-High vent discharges to the Saginaw River downstream of the Carrollton Bar, while the Ammonia Part 2 and pH-Low vents discharge to a channel of the Saginaw River southeast of the Carrollton Bar.

The monthly exceedance flows (in cfs) for the Saginaw River below the Carrollton Bar at the point of discharge of the combined Ammonia Part 1 and pH-High vents are as follows:

	<u>JAN.</u>	<u>FEB.</u>	<u>MAR.</u>	<u>APR.</u>	<u>MAY</u>	<u>JUNE</u>
50%	2200	2510	6950	6830	3640	1880
95%	750	800	1560	2220	1180	740
	<u>JULY</u>	<u>AUG.</u>	<u>SEP.</u>	<u>OCT.</u>	<u>NOV.</u>	<u>DEC.</u>
50%	1150	980	1000	1250	2010	2380
95%	550	500	510	600	750	780

The monthly exceedance flows (in cfs) for the channel of the Saginaw River southeast of the Carrollton Bar at the point of discharge of the Ammonia Part 2 and pH-Low vents are as follows:

	<u>JAN.</u>	<u>FEB.</u>	<u>MAR.</u>	<u>APR.</u>	<u>MAY</u>	<u>JUNE</u>
50%	1630	1860	5140	5050	2700	1390
95%	560	590	1160	1640	870	550
	<u>JULY</u>	<u>AUG.</u>	<u>SEP.</u>	<u>OCT.</u>	<u>NOV.</u>	<u>DEC.</u>
50%	850	730	740	930	1490	1760
95%	410	370	380	440	560	580

The Saginaw River is protected for warmwater fish, other indigenous aquatic life and wildlife, agriculture, navigation, industrial water supply, public water supply at the point of intake, partial body contact recreation, total body contact recreation from May 1 to October 31, and fish consumption.

Ammonia concentrations and pH are the primary concerns for this facility's venting groundwater. Average values of groundwater pH in the four venting areas were computed from data contained in the MZDR:

Ammonia Part 1 – 7.06 S.U.
Ammonia Part 2 – 6.86
pH-High – 11.19
pH-Low – 5.48

SWAS recommends a pH range of 6.5 to 9.0 S.U. for all venting groundwater discharges to the Saginaw River year-round. Table 1 contains total ammonia recommendations based on meeting the 0.420 mg/l warmwater un-ionized ammonia acute toxicity criterion in the combined Ammonia Part 1 and pH-High venting. No ammonia recommendations for any other GM-SMCO groundwater venting should be necessary to protect against acute or chronic un-ionized ammonia toxicity based on data provided in the MZDR. Pollutants affecting dissolved oxygen in the receiving water are not expected to be present at problematic levels in the venting discharges.

The fraction of total ammonia existing as un-ionized ammonia is calculated, in part, from the pH of the venting groundwater. For the combined Ammonia Part 1 and pH-High venting, the upper value of the WQBEL pH range, 9.0 S.U., was used in the calculation of WQBELs based on un-ionized ammonia toxicity. The recommendations in Table 1 apply for groundwater pH's of 9.0 S.U. or lower. If the groundwater venting is permitted to discharge at a pH greater than 9.0 S.U., WQBELs for the combined Ammonia Part 1 and pH-High venting will need to be recalculated. For evaluation of the pH-Low and Ammonia Part 2 ventings, a pH of 7.1 S.U. was used based on the calculated average pH for the Ammonia Part 1 venting.

The attached effluent limit recommendations are based on water quality standards. We have not addressed treatment practicality or cost effectiveness. Our recommendations do not imply that other considerations should not be taken into account when deciding on permit limits.

Table 1. GM-SMCO pH and ammonia toxicity-based WQBEL recommendations
Combined Ammonia Part 1 and pH-High groundwater venting
WQBELs assume a pH of 9.0 S.U. or less in venting groundwater

Parameter	Months	Conc. (mg/l)	Load (lb/d)	Basis	Rationale
NH3-N	Year round	3.1	42	Daily Max.	Acute warmwater toxicity

Design Flow = 2.49 cfs (1.61 MGD)

cc: Jon Bloemker, Saginaw Bay District Supervisor, SWAS, WB
Eric Alexander/Groundwater Venting File, SWAS, WB