Michigan Department of Environment, Great Lakes, and Energy
Fate of Chromium (Total and Hexavalent) Release from Tribar Plant 5
August 12, 2022

Purpose

The purpose of this report is to document the fate of the release of chromium (total and hexavalent) from Tribar Plant 5 (Tribar). The release from Tribar occurred the evening of Friday, July 29, 2022, flowed through the Tribar treatment system, then through the Wixom sanitary sewer system, into the Wixom Wastewater Treatment Plant (WWTP), and finally into Norton Creek and the Huron River. Stream sampling will also be discussed. This report is intended to address fate for public health concerns and the Michigan Department of Environment, Great Lakes, and Energy (EGLE) is confident of the conclusions. Some details may be revised and/or described more thoroughly for compliance/enforcement actions with Tribar and potentially Wixom. Violation Notice (SVN-01235) was issued on August 9, 2022, to Tribar Technologies.

Background

On the afternoon of August 1, 2022, Pollution Emergency Alerting System (PEAS) reports were submitted to EGLE reporting a release of 10,000 gallons (8,000 pounds [lbs.] hexavalent chromium) and then revised to a five percent solution of a chromium acid etch material solution (4,170 lbs. hexavalent chromium) from Tribar to the Wixom WWTP. The initial determination assumed that 4170 lbs. of hexavalent chromium from the Tribar release completely passed through the Wixom WWTP and into Norton Creek and then the Huron River. The concern of a significant hexavalent chromium discharge to the Huron River system with significant recreational uses and a downstream drinking water source at Barton Pond for the city of Ann Arbor mobilized EGLE to start sampling the Huron River on August 2, 2022. The following is a summary of activities that took place between August 2, 2022, and the date of this report.

- Time of passage ranges for stream flow were determined for the Huron River from Wixom to Barton Pond. This information helped adaptively adjust successive sampling with the goal of finding any plume of hexavalent or total chromium.
- Daily sampling with either two or three survey crews between Tuesday, August 2, 2022, and Saturday, August 6, 2022.
- Continued discussion and sharing of information with Wixom.
- Inspections of Tribar by EGLE staff, with the goal of collecting sufficient information to adequately describe the fate of the release.

Based on these activities and evaluations, EGLE is now confidentially lowering the original discharge estimate from the Wixom WWTP to receiving waters from 4170 lbs. (3892 pounds in Tribar Fate report, Barr) of hexavalent chromium to less than 20 lbs. total chromium. A chronology and details on how the revised load have been determined follows. In addition, the stream sampling effort described in the attached supplemental report indicates that the designated uses along the Huron River are protected. These designated uses include swimming, fishing, boating, and protection of aquatic life, wildlife, and human health. Monitoring to ensure protection (assurance monitoring) of the Ann Arbor drinking water intake will be initiated, sediment sampling for chromium downstream of the Wixom discharge will be completed, and compliance/enforcement activities at Tribar and possibly Wixom will be continued.

Chronology

- **20:30 Friday – 00:00 Saturday**.
  Assume solution was released to sewer system either as a slug or bled slowly sometime around midnight on Friday. This is a conservative assumption, as this discharge might have occurred later in the weekend. Tribar has provided estimates of release period of 3.5 hours, and it is used here.

- **01:30 – 05:00 Saturday**.
  Saturday morning – first of release arrives at Wixom WWTP at 01:30. Used 4.25 miles of sewer from Tribar to Wixom WWTP, mean velocity in sewers 1 foot per second (ft/s), therefore time of travel is 5 hours (EGLE had determined 6 hours so verified with this determination by Wixom).

- **07:00 Sunday**.
  Wixom 24-hour composite sampler is started for effluent. Verified by Wixom.

- **22:30 Sunday.**
  First portion of contaminated flow through WWTP is captured in the 24-hour composite sampler from the Wixom WWTP effluent pipe to Norton Creek (Outfall 001). The influent composite sampler was not able to capture a complete 24-hour influent sample for this event. Detention time of 2.7 million gallons (MG) (adding volumes of grit system, one oxidation ditch, three secondary clarifiers, two Equalization Basins - half full based on a discussion with Wixom). Daily flow is 1.44 MGD, therefore time of detention through WWTP is 2.7 MG/1.44 millions of gallons per day (MGD) ~= 1.88 days or 45 hours (this is verified with the updated Wixom Basis of Design but is modified by EGLE based on reduced storage in EQ basins). Some attenuation of the event likely occurred at the WWTP.

- **06:00 Monday**.
  WWTP operators notice an abnormally low pH and blue tint to influent in WWTP. This makes observational sense. Note that WWTP operators were on site on Saturday and Sunday for four hours each day but there were no indications of anything unusual occurring at the WWTP.

- **07:00 Monday**.
  Samples taken of influent and effluent. Effluent Composite sample for previous 24-hours is 1.15 mg/l (total chromium). Sunday flow was 1.44 MGD. Therefore 1.44 MGD (8.34) 1.15 ~= 14 lbs. total chromium. The table below summarized the effluent loads for total chromium associated with the event. The vast bulk of the 14 lbs. load was discharged in two days. Flows Sunday and Monday are 1.44 MGD and 1.64 MGD, respectively.

Effluent composites	Hex Chromium (Milligrams per liter [mg/l])	Total Chromium(mg/l)	Source	Load (lbs.) total chromium
Monday (end)	Not analyzed	1.15	Wixom – analyzed at Tribar	13.8
Tuesday (end)	ND	0.016	Eurofins	0.2

Discussion

EGLE is confident that the release of hexavalent chromium from Tribar was partially reduced to trivalent chromium through the use of reducing agents in the waste treatment system at Tribar. There are reports that the release passed through on-site treatment units at Tribar but no verification that adequate treatment occurred as required per their pretreatment permit. Additional hexavalent chromium could have been reduced in the sanitary sewer system in anaerobic zones along the sewer walls. The discharge at Tribar also went through the four granulated activated carbon (GAC) units. The four GAC units are reported by EGLE inspection staff to be clogged with material, so EGLE believes that it is likely that significant chromium loads remain at Tribar. EGLE has received results that the material in the GAC has high concentrations of total chromium (35,300 milligrams per kilogram [mg/Kg]) and lesser concentrations of hexavalent chromium (1770 mg/Kg). The Barr Report from Tribar indicates that the load contained in the GAC units is 1500 lbs. of predominately total chromium. The Barr Report indicates that the chromium that was released from the fourth GAC unit to the Wixom sewer system is 0.12% hexavalent chromium. Wixom has determined that the influent concentrations of total chromium to the WWTP are in the 300–400-lbs. range.

The travel time in the sewer system to the WWTP (5 hours) means that the chromium influent to Wixom WWTP started before the 07:00 Sunday composite sampler was placed online. However, detention time through the WWTP means that the effluent composite sampler placed online on Sunday, and subsequent days, was able to sample the entire load of discharge through the WWTP. Wixom was able to divert flow during the event on Monday to an unused oxidation ditch and one equalization basin. Based on measured concentrations of mixed liquor suspended solids (MLSS, aka biomass) and return activated sludge (RAS) stored in biosolids tanks, the chromium load through the WWTP concentrated in solids at the WWTP. Wixom has determined that 275 lbs. of total chromium are in the WWTP and have not been discharged. EGLE agrees with this assessment.

Conclusion

It is EGLE's determination that the reported hexavalent chromium load released (originally 4170 lbs. from Tribar, and now revised to 3892 lbs.) to the Wixom WWTP has been determined to be less than 20 lbs. total chromium to Norton Creek. Assumptions from EGLE were based on the original PEAS report and assumed 100 percent pollutant pass-through the Wixom WWTP with discharge to Norton Creek. After additional sampling data, engineering calculations and inspections these loads are being lowered. The chromium discharged has largely been reduced from hexavalent chromium to trivalent chromium and as such are less toxic in surface waters. The chromium that was released is largely stored at Tribar in the spent GAC units and in solids at the WWTP. The stored liquid volumes at the WWTP (in one EQ basin, in one oxidation ditch), and the dewatering from the stored waste activated sludge during the event, must be addressed by Wixom per a recovery plan to meet newly calculated effluent limits for total chromium, as approved by EGLE.

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Attachment: Supplemental Information (stream surveys)