January 17, 2019 Reference No. 058502

Mr. Zachary Sasnow
Corrective Action Project Manager
U.S. EPA, Region 5
77 West Jackson Boulevard DW-8J
Chicago, Illinois
U.S.A. 60604 3590

Dear Mr. Sasnow:

Re: 2019 CA 750 Environmental Indicator Annual Monitoring Results And Additional Monitoring Results
EPA ID #MID 041 793 340
RACER Nodular Facility - Saginaw, Michigan

This letter summarizes the CA 750 Environmental Indicators (EI) monitoring activities and additional monitoring results related to the Nodular Facility that is owned by Revitalizing Auto Communities Environmental Response (RACER) Properties, LLC, a wholly owned entity of RACER Trust in Saginaw, Michigan.

2019 CA 750 EI Monitoring

The annual CA 750 EI monitoring was completed between November 11 and 13, 2019 in accordance with the sampling program identified in the 2018 CA 750 EI Annual Monitoring Results letter dated February 15, 2019 (which proposed no changes to the EI monitoring program).

GHD (formerly CRA) submitted a memorandum that discussed ammonia in groundwater at the Site on April 6, 2015 for USEPA review and it was subsequently forwarded to MDEQ for review on April 8, 2015. Results submitted since submittal of that letter have been modified to incorporate evaluation of the toxic fraction of ammonia (unionized ammonia) consistent with the evaluation included in the memorandum.

Figure 1 presents databoxes for all RACER EI locations, as well as additional monitoring well data collected in the area of the high pH and ammonia. The databoxes show data for the past 10 years including the 2019 EI results. All EI monitoring data is presented in Attachment A. As indicated on Figure 1:

Groundwater/Surface Water/EI Wells (MW-03945, MW-04051, MW-04250R, MW-04257, and MW-04757)

- Unionized ammonia was calculated for each monitoring well utilizing the pH and temperature of each individual monitoring well and averaged with the Saginaw River pH and temperature. The calculated unionized ammonia results were compared to the warmwater unionized ammonia acute toxicity criterion of (420 micrograms per liter [µg/L]), which was the criteria recommended in the mixing zone determination, dated January 12, 2010. The results were below applicable criteria and are summarized in Table 1.

GHD
455 Phillip Street Unit #100A Waterloo Ontario N2L 3X2 Canada
T 519 884 0510 **F** 519 884 0525 **W** www.ghd.com

- pH was reported above the lowest applicable screening criterion (the Nonresidential Drinking Water criterion of 8.5 S.U.) in one monitoring well, MW-04250R at 8.80 S.U.

Source Area Wells (MW-04438R, MW-04836R, MW-05036R, MW-8R, MW-04040, MW-04336, MW-05038, and MW-05443)

- Unionized ammonia was calculated for each monitoring well utilizing the pH and temperature of each individual monitoring well and averaged with the Saginaw River pH and temperature. The calculated unionized ammonia results were compared to the warmwater unionized ammonia acute toxicity criterion of 420 µg/L), which was the criteria recommended in the mixing zone determination, dated January 12, 2010. Unionized ammonia was not reported above applicable criterion (FAV criterion of 420 µg/L) as summarized in Table 1.
- pH was reported above the lowest applicable screening criterion (the Nonresidential Drinking Water criterion of 8.5 S.U.) in three monitoring wells, MW-8R at 9.70 S.U., MW-05036 at 11.40 S.U., and MW-05038 at 10.10 S.U.

In summary, the results of the 2019 EI monitoring results are generally consistent with the data evaluated in the RCRA CA725 & CA750 Environmental Indicators Supporting Documentation dated September 17, 2003. Figures 2 and 3 present the concentration trend graphs for Ammonia and pH, respectively, for select monitoring wells MW-03945 (at the river), MW-04051 (at the river), MW-04836 (between source and river), and MW-8 (near the apparent source area). The observed exceedances of ammonia and pH do not represent an unacceptable risk or require further action because groundwater is prohibited for use as a potable source (deed restriction), Site use is limited to nonresidential (deed restriction), Site owners will have due care obligations pursuant to Michigan law, and based on the many years of groundwater monitoring data, groundwater/surface water interface compliance continues to be below the applicable criteria and levels are stable.

Based on the 2019 results, the only proposed change to the EI monitoring program for 2020 is the addition of MW-05443 for ammonia, pH, and temperature. The 2020 EI monitoring program is summarized in Table 2.

Additional Monitoring Results

Additional groundwater samples were collected during the 2018 EI sampling event in November 2018 and the 2019 EI sampling event in November 2019. The additional sampling was completed in accordance with the recommendations included in the Groundwater Evaluation Memorandum dated October 15, 2018. Site monitoring wells are illustrated on Figure 4 with the additional groundwater sampling locations highlighted.

The additional groundwater sampling results were screened using the Michigan Department of Environment, Great Lakes, and Energy (EGLE), formerly the Michigan Department of Environmental Quality (MDEQ), Part 201 Generic Cleanup Criteria and Screening Levels dated December 31, 2013 (Groundwater Surface Water Interface Criteria updated June 25, 2018). The data were compared to the following criteria:

- Groundwater Surface Water Interface (GSI) Criteria
- Residential Drinking Water (RDW) Criteria
- Nonresidential Groundwater Volatilization to Indoor Air Inhalation (GVIAI) Criteria
- Water Solubility
- Flammability/Explosivity Screening Level

The following additional information was considered when reviewing the exceedances of Drinking Water Criteria.

- Existing regulations set forth by EGLE (R325.10800 et seq.) establish controls for the installation of drinking water supply wells which include:
  - Drinking water supply wells must be cased to a depth of at least 25 feet below ground surface.
  - Drinking water supply wells must be located outside areas subject to flooding.
- There is an existing deed restriction prohibiting installation or use of drinking water wells on-Site.
- Drinking water for Saginaw (which also supplies water to Buena Vista) has been obtained from the Whitestone Point area in Lake Huron (SMP II-77) since 1948.
- The materials comprising the upper water bearing zone generally consist of black foundry sand fill, fluvially-deposited sand and gravel, and silt associated with a marsh environment. The upper water bearing zone was encountered at most locations across the Site and is found up to 60-feet thick near the Saginaw River and thins inland (generally less than 25-feet in depth). The upper water bearing zone is hydraulically isolated from the lower water bearing zone by a regional clay layer (15 to 80-feet thick). The lower water-bearing zone consists of subglacial deposits (sands and silts), weathered bedrock, and competent bedrock.

Only select monitoring wells located at the downgradient property boundary of RACER's Site were included in the additional sampling since RACER is proposing prohibition of groundwater extraction and use and requiring soil vapor management assessment or mitigation at the Site. Note that MW-05443 is identified as a downgradient property boundary monitoring well, however, historically, the downgradient property (Supplier Park, formerly a portion of the Nodular Plant) was part of the former larger General Motors Corporation (GMC) facility. Groundwater quality at the Site at the time of sale of the Supplier Park were acceptable and conditions since have only improved.

The results are presented in Table 3 and are further discussed in the following sections:

Summary of Results for Additional Groundwater Sampling

IU G - Former Nodular Iron Plant (a portion of)

MW-04040 - Iron

Total Iron was detected at 3.6 mg/L and 2.8 mg/L during the 2018 and 2019 groundwater sampling events, respectively, which exceed the generic aesthetic RDW criterion (0.3 mg/L) and the Health-Based

RDW Value (2.0 mg/L). The turbidity of the 2019 sample was 1.14 NTU and of the 2018 sample was 3.7 NTU. Suspended sediments in the groundwater sample may have influenced the total iron concentrations

No further action is recommended since:

- There is a deed restriction prohibiting installation or use of drinking water wells on-Site.
- Drinking water for Saginaw (which also supplies water to Buena Vista) has been obtained from the Whitestone Point area in Lake Huron (SMP II-77) since 1948.
- The upper water bearing zone is not continuous.
- The thickness of the upper water bearing zone is generally less than 25-feet (except near the Saginaw River). Existing regulations set forth by EGLE (further detailed above) requires a minimum casing depth of 25-ft. Where the upper water bearing zone is thicker, near the Saginaw River, and would extend below the minimum casing depth of 25-ft, the location would be prone to flooding and such location would be unacceptable per the regulations specified above. Therefore, the upper water bearing zone cannot be used for drinking water.

Note that the upper water bearing zone at the Site is hydraulically isolated from the lower water bearing zone by a regional clay layer and as such any impacts in the upper water bearing zone are not anticipated to migrate to the lower water bearing zone.

MW-04040 – Vanadium

Vanadium was non-detect at a limit of 0.004 mg/L during the 2018 groundwater sampling event, which does not exceed the 2013 RDW criterion (0.0045 mg/L). Therefore, no further action is recommended.

MW-04040 – pH

pH was reported at 7.5 and 7.69 during the 2018 and 2019 groundwater sampling events, respectively, which are within the acceptable RDW criterion range (6.5 to 8.5). Therefore, no further action is recommended.

IU H - Wastewater Treatment System and Stormwater Discharge Ditch

MW-15457 – Antimony

Antimony was non-detect at a limit of 0.0020 mg/L during the 2018 groundwater sampling event, which does not exceed the 2013 RDW criterion (0.006 mg/L). Therefore, no further action is recommended.

MW-15457 – Cobalt

Cobalt was non-detect at a limit of 0.0010 mg/L during the 2018 groundwater sampling event, which does not exceed the 2013 RDW criterion (0.04 mg/L). Therefore, no further action is recommended.

MW-05443 – Iron

Total Iron was detected at 23 mg/L and 11 mg/L during the 2018 and 2019 groundwater sampling events, respectively, which exceed the generic aesthetic 2013 RDW criterion (0.3 mg/L) and the Health-Based RDW Value (2.0 mg/L). The turbidity of the 2019 sample was 35.4 NTU and of the 2018 sample was

10.34 NTU. Suspended sediments in the groundwater sample may have influenced the total iron concentrations.

No further action is recommended since:

- There is a deed restriction prohibiting installation or use of drinking water wells
- Drinking water for Saginaw (which also supplies water to Buena Vista) has been obtained from the Whitestone Point area in Lake Huron (SMP II-77) since 1948.
- The upper water bearing zone is not continuous.
- The thickness of the upper water bearing zone is generally less than 25-feet (except near the Saginaw River). Existing regulations set forth by EGLE (further detailed above) requires a minimum casing depth of 25-ft. Where the upper water bearing zone is thicker, near the Saginaw River, and would extend below the minimum casing depth of 25-ft, the location would be prone to flooding, and such location would be unacceptable per the regulations specified above. Therefore, the upper water bearing zone cannot be used for drinking water.

Note that the shallow saturated unit at the Site is hydraulically isolated from the lower aquifer by a regional clay layer and as such any impacts in the shallow saturated unit are not anticipated to migrate to the lower aquifer.

MW-05443 – Ammonia

Ammonia was detected at 6.7 mg/L during the 2018 and 2019 groundwater sampling events, which does not exceed the 2013 RDW criterion (10 mg/L) or USEPA's November 2018 generic groundwater vapor intrusion screening level (VISL) of 3,330 mg/L; therefore, no further action is recommended.

MW-17661 – Cobalt

Cobalt was detected at 0.0041 mg/L during the 2018 groundwater sampling event, which does not exceed the 2013 RDW criterion (0.04 mg/L). Therefore, no further action is recommended.

MW-17661 – Nickel

Nickel was detected at 0.13 mg/L and 0.22 mg/L during the 2018 and 2019 groundwater sampling events, respectively, which slightly exceed the 2013 RDW criterion (0.1 mg/L) and the 2013 GSI criterion (0.122 mg/L).

No further action is recommended since:

- There is a deed restriction prohibiting installation or use of drinking water wells.
- Drinking water for Saginaw (which also supplies water to Buena Vista) has been obtained from the Whitestone Point area in Lake Huron (SMP II-77) since 1948.
- This monitoring well was installed in the regional clay layer which would not produce sufficient water to warrant the installation of a drinking water well.

MW-17661 – Vanadium

Vanadium was detected at 0.0031 mg/L during the 2018 groundwater sampling event, which does not exceed the 2013 RDW criterion (0.0045 mg/L). Therefore, no further action is recommended.

IU I - Classified Sand Staging Area

MW-07959 – Cobalt

Cobalt was detected at an estimated concentration of 0.00090 mg/L during the 2018 groundwater sampling event, which does not exceed the 2013 RDW criterion (0.006 mg/L). Therefore, no further action is recommended.

MW-07959 – Total Cyanide

Total cyanide was detected at 0.054 mg/L during the 2018 groundwater sampling event, which exceeds the 2013 GSI criterion for free (amenable) cyanide (0.0052 mg/L).

There were no records of Site activities in the area of MW-07959. Per USEPA (EPA 815-B-16-012, August 2016), total cyanide is a conservative estimate of amenable cyanide. Given the low concentration of total cyanide, GHD does not expect there to be appreciable amounts of free (amenable) cyanide, therefore no further action is recommended.

MW-07959 – Pentachlorophenol

Pentachlorophenol was non-detect at a limit of 0.00010 mg/L during the 2018 groundwater sampling event, which does not exceed the 2013 RDW criterion (0.001 mg/L). Therefore, no further action is recommended.

MW-07959 – pH

pH was reported at 7.0 during the 2018 groundwater sampling event, which is within the acceptable RDW criterion range (6.5 to 8.5). Therefore, no further action is recommended.

Summary

In summary, based on the comparison of the additional groundwater investigation results to the Part 201 Generic Cleanup Criteria and Screening Levels dated December 31, 2013, only the following parameters were detected above screening levels:

- Iron was detected above 2013 RDW criterion at MW-05443 and MW-04040, however, no further action is recommended because of the deed restriction prohibiting installation or use of drinking water wells and the upper water bearing zone cannot be used for drinking water, in accordance with EGLE regulations.
- Nickel was detected above 2013 RDW criterion at MW-17661, however, no further action is recommended because of the deed restriction prohibiting installation or use of drinking water wells and the well was installed in the regional clay layer which would not produce sufficient water to warrant the installation of a drinking water well.

- Total cyanide was detected above 2013 GSI criterion for free (amenable) cyanide at MW-07959, however, total cyanide is a conservative estimate of amenable cyanide and given the low concentration of total cyanide, GHD does not expect there to be appreciable amounts of free (amenable) cyanide. There were no records of Site activities in the area of MW-07959.
- All other parameters analyzed as part of the additional groundwater sampling were below Part 201 Generic Cleanup Criteria and Screening Levels dated December 31, 2013.

Conclusions

As discussed above, there are no site-related concentrations in groundwater that represent a potential for significant exposure to on- or off-site receptors.

In conclusion, no further action is recommended for the Site with respect to groundwater beyond the proposed monitoring and revising the current Declaration of Restrictive Covenant (DRC) to include the following:

a) Prohibiting all uses of the Property that are not compatible with or are inconsistent with the exposure assumptions for the nonresidential cleanup criteria established pursuant to MCL 324.20120a(1)(b) of NREPA.

b) Providing notification of the presence of PCB remediation waste and prohibiting uses in that area that are not in accordance with requirements for Low Occupancy as defined in 40 CFR 761.3.

c) Providing notification of exceedance of aesthetic criteria for iron at two locations.

d) Prohibiting installation or use of drinking water wells.

e) Prohibiting installation or use of groundwater extraction wells or other devices for any purpose, except for wells and devices that are part of a USEPA or EGLE-approved response activity, and for short-term dewatering for construction purposes.

f) Prohibiting relocation of contaminated soils except as provided under Part 201, Section 20120c, MCL 324.20120c.

g) Prohibiting treating, storing or disposing or releasing any hazardous substances without required permits from USEPA or EGLE.

h) Prohibiting removal, disturbance or damage of monitoring wells or the PCB remediation waste area (without written approval from USEPA and RACER Trust).

i) Prohibiting construction of subsurface utilities or other subsurface features without written approval from USEPA and RACER Trust).

j) Prohibiting construction and/or occupancy of any building or structures on the Property without completing an evaluation of hazardous substances volatilizing into indoor air or implementing engineering controls to mitigate the potential for subsurface vapor migrating indoor and obtaining USEPA and RACER approval.

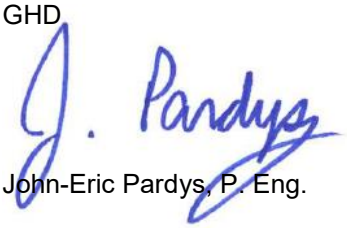
k) Providing notification of soil containing arsenic above Nonresidential Direct Contact Criteria remaining in the subsurface at one location on-Site.

Based on the many years of groundwater monitoring data with results generally consistent with the data evaluated in the RCRA CA725 & CA750 Environmental Indicators Supporting Documentation dated September 17, 2003, RACER would like to terminate groundwater monitoring if 2020 monitoring data is consistent with previous data or when USEPA completes its formal RCRA Corrective Action decision process, whichever comes first.

Should you have any questions, please do not hesitate to call.

Yours truly,

GHD



John-Eric Pardys, P. Eng.

JEP/kf/7

Encl.

cc: Dave Favero, RACER
Michael Tomka, GHD

List of Supporting Files:

Figure 1	Summary of EI Locations and Results (2010 – 2019)
Figure 2	Total Ammonia Trend Graph
Figure 3	pH Trend Graph
Figure 4	Additional Investigation Sampling Locations
Table 1	Groundwater Ammonia FAV Compliance Worksheet
Table 2	EI Monitoring Program
Table 3	Analytic Results Summary – Additional Groundwater Sampling (2018 and 2019)
Attachment A	Summary of EI Locations and Results

MW-04757	11/30/2010	11/1/2011	11/7/2012	7/16/2013	11/12/2013	11/14/2014	11/3/2015	11/7/2016	5/18/2017	11/28/2018	11/11/2019
Ammonia	300	-	14000	1700 J/1100 J	200 U	220	300	280	300	230	450
Chromium VI (hexavalent)	6 J	-	-	-	-	-	-	-	-	-	-
Cyanide (amenable)	10 U	10 UJ	10 U	-	10 U	-	-	-	-	-	-
Cyanide (total)	10 U	10 UJ	10 U	-	10 U	-	-	-	-	-	-
Un-ionized ammonia	-	-	-	-	-	-	10	5.5	10.7	3.7	6.03

MW-04257	11/30/2010	11/2/2011	11/8/2012	7/16/2013	11/12/2013	11/14/2014	11/3/2015	11/8/2016	5/18/2017	11/28/2018	11/13/2019
Ammonia	1200	820	340	-	630	350	620	380	500	780	680
Chromium VI (hexavalent)	10 J	20 UJ	20 U	-	-	-	-	-	-	-	-
Cyanide (amenable)	10 U	10 UJ	10 U	-	10 U	-	-	-	-	-	-
Cyanide (total)	10 U	10 UJ	10 U	-	10 U	-	-	-	-	-	-
pH	6.84/7.2 J	7.0 J/6.88	6.97 J/6.79	7.22	7.35/7.30 J	7.32 J	6.96 J	7.06	7.32/7.3 J	7.3 J	7.5
Un-ionized ammonia	-	-	-	-	-	-	5	1.8	6.0	3.6	4.07

MW-04250R	11/23/2010	11/1/2011	11/8/2012	7/16/2013	11/12/2013	11/14/2014	11/3/2015	11/7/2016	5/17/2017	11/29/2018	11/11/2019
Ammonia	9100	4400	4800/6800	-	5000/5200	2700 J/1600 J	2200/2400	2700/2900	2000	4200	3700
Chromium VI (hexavalent)	40 U	20 UJ	20 UJ/20 U	-	-	-	-	-	-	-	-
Cyanide (amenable)	10 U	10 UJ	10 U/10 U	-	10 U/10 U	-	-	-	-	-	-
Cyanide (total)	10 U	10 UJ	10 U/10 U	-	10 U/10 U	-	-	-	-	-	-
Mercury	0.00065 UJ	0.0024 J	0.20 U/0.20 U	-	0.20 U/0.20 U	0.20 U/0.20 U	0.20 U/0.20 U	0.20 U/0.20 U	-	-	-
pH	9.9 J/10.05	9.43/9.3 J	9.95/9.55 J/9.49 J	10.83	9.68 J/9.7/9.68 J	9.98 J/10.0 J	9.26 J/9.31 J	8.77	8.9 J/8.93	8.8 J	8.8
Un-ionized ammonia	-	-	-	-	-	-	122	60.3	99.8	89.3	50.48

MW-04051	11/23/2010	11/1/2011	11/8/2012	7/16/2013	11/12/2013	11/14/2014	11/3/2015	11/8/2016	5/18/2017	11/28/2018	11/13/2019
Ammonia	5600	5700/5300	5800	-	4600	4400	5800	530	6300	7200	5900
Chromium VI (hexavalent)	200 U	9.7 J/4.7 J	100 U	-	-	-	-	-	-	-	-
Cyanide (amenable)	10 U	10 UJ/10 UJ	10 U	-	10 U	-	-	-	-	-	-
Cyanide (total)	10 U	10 UJ/10 UJ	10 U	-	10 U	-	-	-	-	-	-
Mercury	0.0005 UJ	0.0005 UJ/0.0005 UJ	0.20 U	-	-	-	-	-	-	-	-
pH	7.6 J/6.72	6.58/6.8 J/6.8 J	6.88/6.89 J	6.85	7.03 J/6.94	7.13 J	6.60 J	6.71	6.84/6.7 J	6.8 J	7.0
Un-ionized ammonia	-	-	-	-	-	-	19	1.3	28.6	12.5	15.65

MW-03945	11/23/2010	11/1/2011	11/8/2012	7/16/2013	11/12/2013	11/14/2014	11/3/2015	11/8/2016	5/18/2017	11/28/2018	11/11/2019
Ammonia	7000/7200	6700	8800	9100	5100	7300	7600	7400	8300	8000	9500/9500
Chromium VI (hexavalent)	200 U/200 U	3.4 J	200 U	-	-	-	-	-	-	-	-
Cyanide (amenable)	10 U/10 U	10 UJ	10 U	-	10 U	-	-	-	-	-	-
Cyanide (total)	10 U/10 U	10 UJ	10 U	-	10 U	-	-	-	-	-	-
Mercury	0.0005 UJ/0.0005 UJ	0.0005 UJ	0.20 U	-	-	-	-	-	-	-	-
pH	6.9 J/6.89/6.9 J	6.57/6.7 J	6.63/6.70 J	6.68	6.7/6.93 J	7.01 J	6.63 J	6.56	6.7/6.6 J	6.7 J	7.0/6.9
Un-ionized ammonia	-	-	-	-	-	-	20	11.3	27.4	9.5	21.64

MW-04040	11/12/2014	11/3/2015	11/7/2016	5/17/2017	11/28/2018	11/12/2019
Ammonia	610	460	710	450	1100	860
pH	-	-	7.47	9.62/7.9 J	7.5 J	7.8
Un-ionized ammonia	-	7	4.6	22.9	6.4	6.66

MW-04438R	11/27/2018	11/12/2019
Ammonia	2000	96 J
pH	11.5 J	7.8
Un-ionized ammonia	50.1	0.71

MW-04438	5/17/2017
Ammonia	1100
pH	11.6 J/11.81
Un-ionized ammonia	60.4

MW-04836R	11/27/2018	11/11/2019
Ammonia	25000	17000
pH	7.4 J	7.8
Un-ionized ammonia	123.5	124.46

MW-04836	7/16/2013	11/13/2013	11/12/2014	11/3/2015	11/7/2016	5/17/2017
Ammonia	11000	35000	33000	51000	18000	3400/3500
pH	7.72	7.31 J/7.45	7.39 J	6.82 J	7.33	8.01/7.4 J/7.3 J/8.01
Un-ionized ammonia	-	-	-	161	47.8	107.2

MW-04336	11/28/2018	11/12/2019
Ammonia	7900	7500
pH	7.3 J	7.4
Un-ionized ammonia	32.0	33.89

MW-04835	11/13/2013
Ammonia	900
pH	7.29/7.20 J

MW-05443	7/16/2013	11/27/2018	11/13/2019
Ammonia	7200	6700	6700
pH	7.21	-	7.4
Un-ionized ammonia		-	31.52

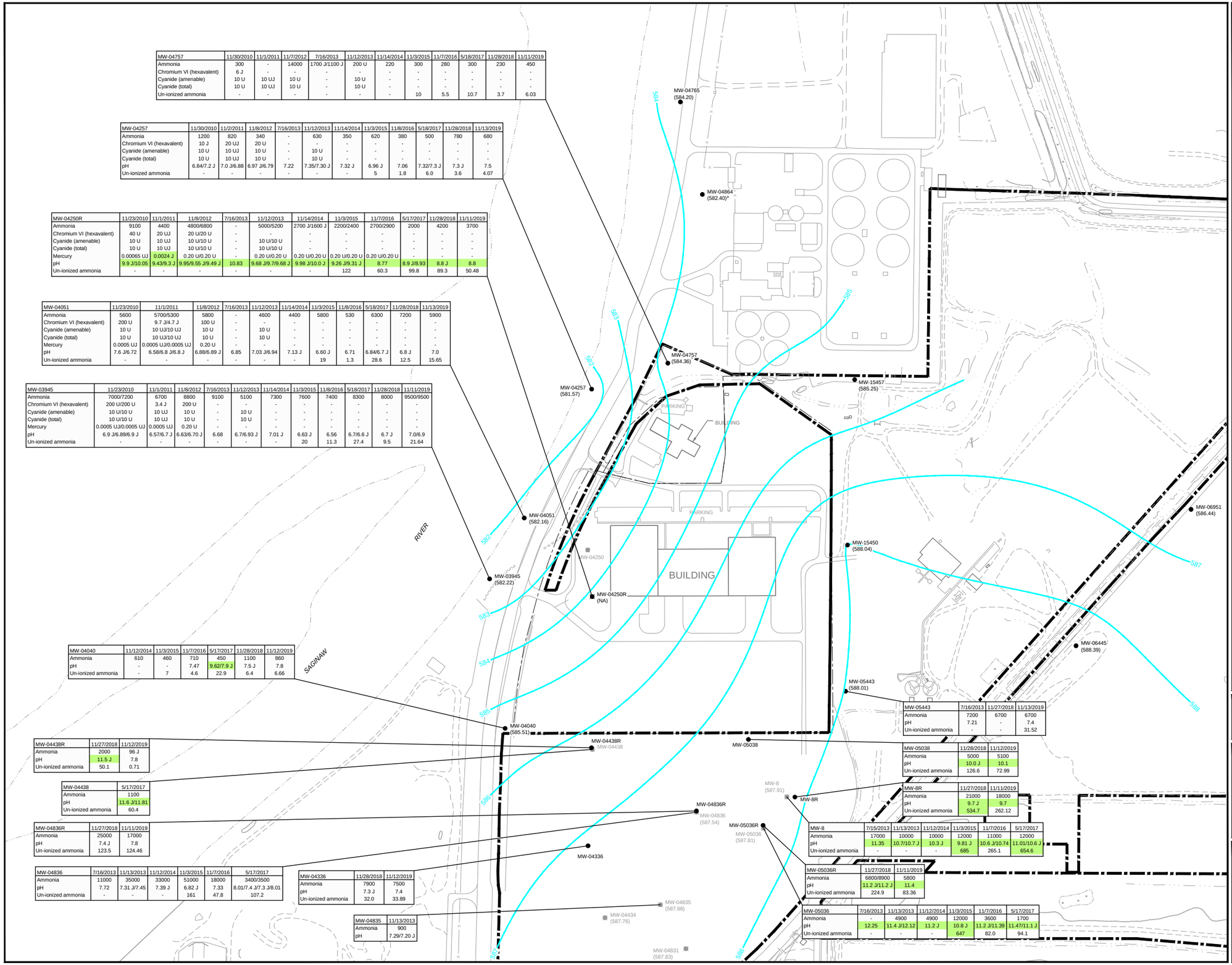
MW-05038	11/28/2018	11/12/2019
Ammonia	5000	5100
pH	10.0 J	10.1
Un-ionized ammonia	126.6	72.99

MW-8R	11/27/2018	11/11/2019
Ammonia	21000	18000
pH	9.7 J	9.7
Un-ionized ammonia	534.7	262.12

MW-8	7/15/2013	11/13/2013	11/12/2014	11/3/2015	11/7/2016	5/17/2017
Ammonia	17000	10000	10000	12000	11000	12000
pH	11.35	10.7/10.7 J	10.3 J	9.81 J	10.6 J/10.74	11.01/10.6 J
Un-ionized ammonia	-	-	-	685	265.1	654.6

MW-05036R	11/27/2018	11/11/2019
Ammonia	6800/8900	5800
pH	11.2 J/11.2 J	11.4
Un-ionized ammonia	224.9	83.36

MW-05036	7/16/2013	11/13/2013	11/12/2014	11/3/2015	11/7/2016	5/17/2017
Ammonia	-	4900	4900	12000	3600	1700
pH	12.25	11.4 J/12.12	11.2 J	10.8 J	11.2 J/11.39	11.47/11.1 J
Un-ionized ammonia	-	-	-	647	82.0	94.1



0 100 200 ft

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- MW-8 — ABANDONED MONITORING WELL LOCATION
- MW-04765 — MONITORING WELL LOCATION
- (582.12) — GROUNDWATER ELEVATION - NOVEMBER 2015
- 586 — UPPER WATER BEARING ZONE GROUNDWATER CONTOUR - FT. AMSL (NAVD 88) - NOVEMBER 2015

MW-04438R	11/27/2018	11/12/2019
Ammonia	2000	96 J
pH	11.5 J	7.8
Un-ionized ammonia	50.1	-

SAMPLE LOCATION
SAMPLE DATE
RESULT (ug/L) EXCEPT pH WHICH IS IN s.u.
PARAMETER
EXCEEDS CRITERIA

MICHIGAN PART 201 CRITERIA

fraction	Parameter	Lowest Criteria (ug/L or s.u. for pH)	
METAL	Chromium (total)	100	A
METAL	Chromium (VI)	11	B
METAL	Mercury	0.0013	B
METAL	Vanadium	12	B
WET	Cyanide (total)	5.2	B
WET	Cyanide (amenable)	5.2	B
WET	pH	6.5 - 8.5	A
WET	Unionized Ammonia	420	B

Chromium (total) use Chromium III (Trivalent) criteria.
A: Non-Residential Drinking Water Criteria
B: GSI Criteria

NOTES:

1. SEE TABLE 1 FOR HOW UNIONIZED AMMONIA WAS CALCULATED.
2. NOTE THAT THE GSI CRITIERIA DEVELOPED FOR TOTAL CHROMIUM WAS DEVELOPED FROM THE FINAL CHRONIC VALUE CALCULATION FOR TRIVALENT CHROMIUM, AS SPECIFIED IN THE MDEQ GUIDANCE. TOTAL CHROMIUM RESULTS WERE COMPARED TO TRIVALENT CHROMIUM CRITERIA SINCE EXTENSIVE SITE DATA SUPPORTS THAT THE MAJORITY OF THE TOTAL CHROMIUM IS TRIVALENT CHROMIUM. HEXAVALENT CHROMIUM IS STILL SAMPLED AT NUMEROUS LOCATIONS AND IS COMPARED TO HEXAVALENT CHROMIUM CRITERIA.
3. GROUNDWATER ELEVATION NOT USED IN DETERMINATION OF GROUNDWATER CONTOURS.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

RACER
SAGINAW NODULAR INDUSTRIAL LAND

SAGINAW, MICHIGAN

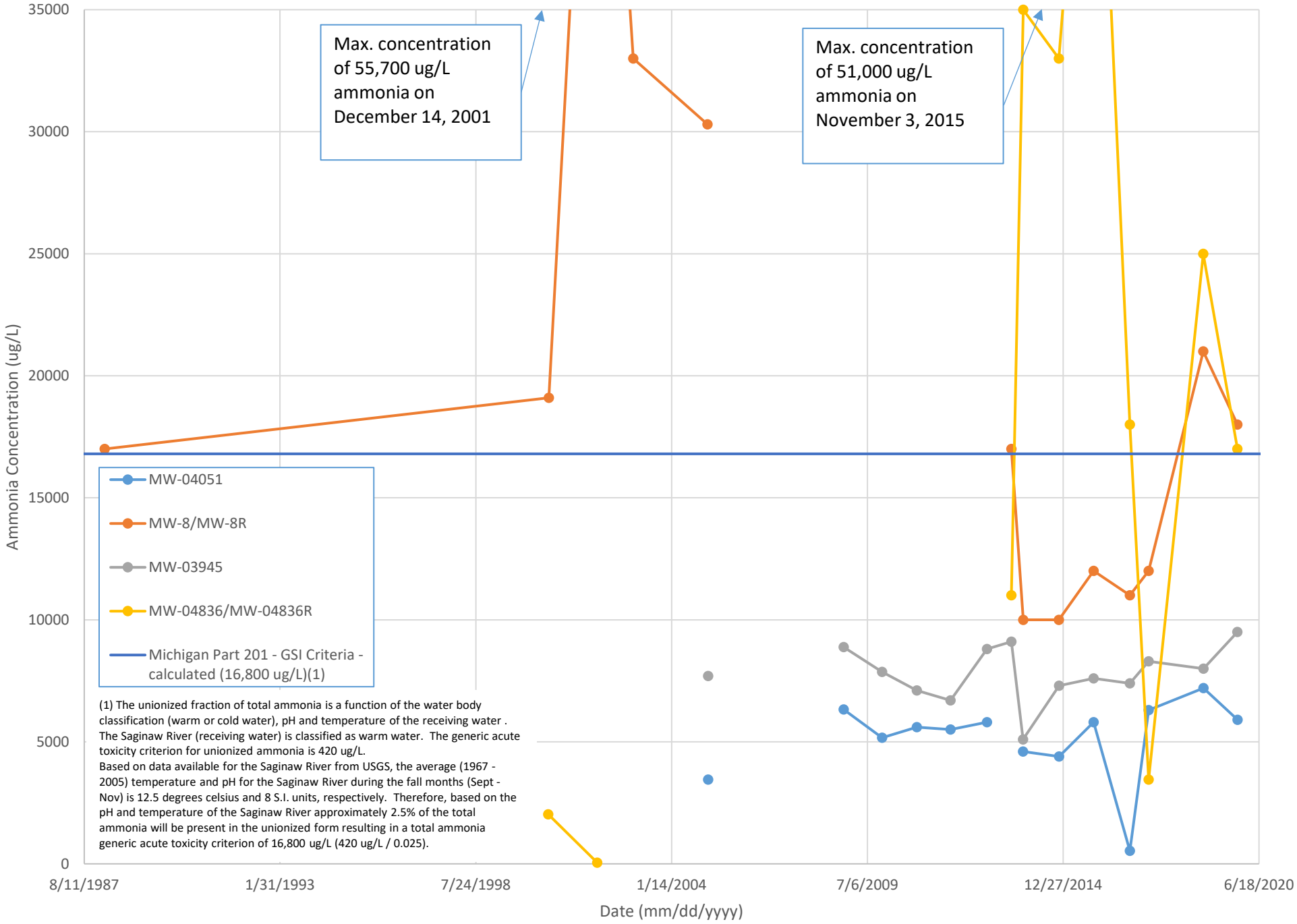
SUMMARY OF EI LOCATIONS AND RESULTS (2010 - 2019)

GHD

Source Reference:

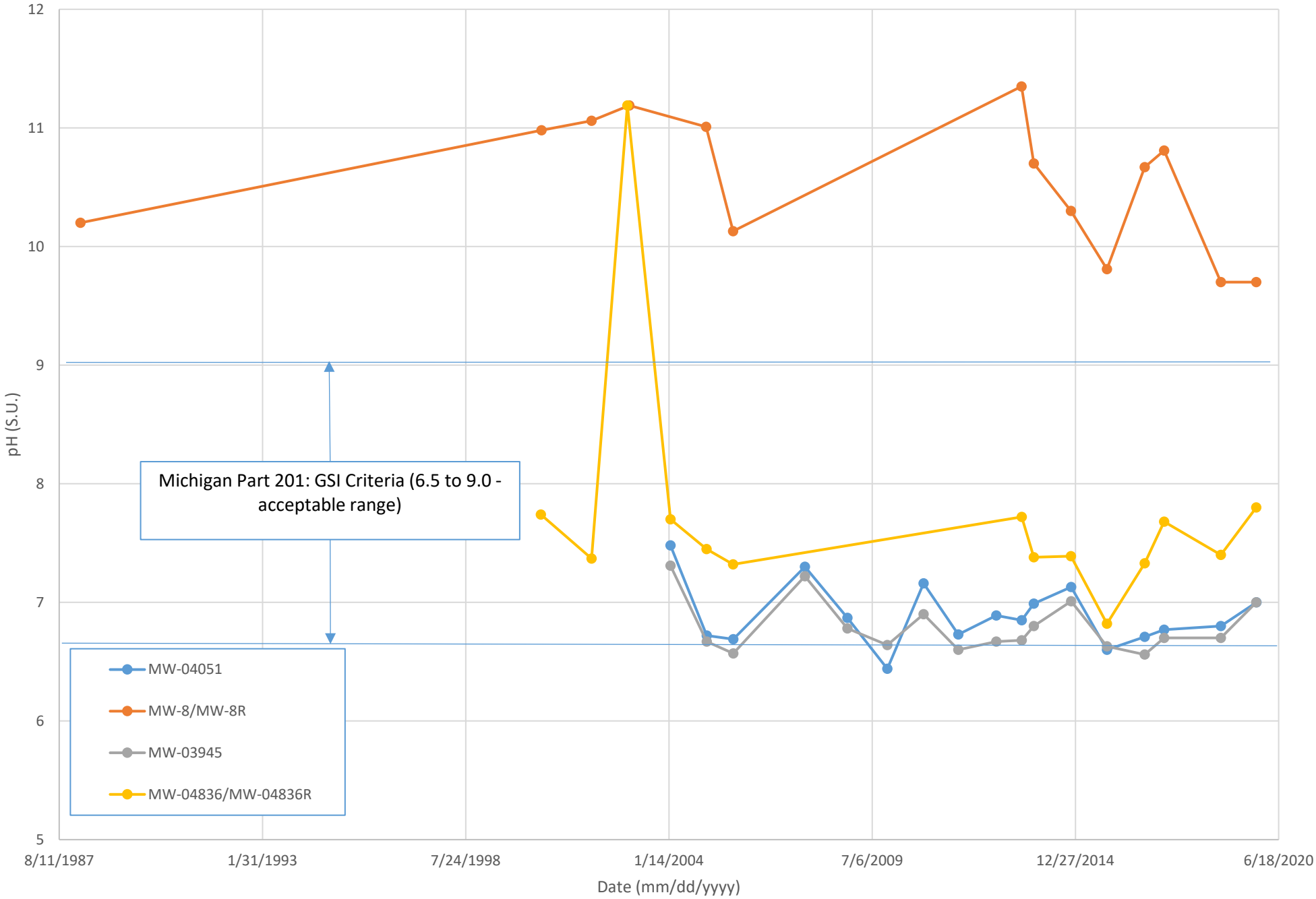
Project Manager:	Reviewed By:	Date:	
M.T.	J.P.	DECEMBER 2019	
Scale: 1" = 200'	Project N²: 58502-A01	Report N²: SASN007	Drawing N²: figure 1

Figure 2 Total Ammonia Trend Graph



(1) The unionized fraction of total ammonia is a function of the water body classification (warm or cold water), pH and temperature of the receiving water . The Saginaw River (receiving water) is classified as warm water. The generic acute toxicity criterion for unionized ammonia is 420 ug/L.
Based on data available for the Saginaw River from USGS, the average (1967 - 2005) temperature and pH for the Saginaw River during the fall months (Sept - Nov) is 12.5 degrees celsius and 8 S.I. units, respectively. Therefore, based on the pH and temperature of the Saginaw River approximately 2.5% of the total ammonia will be present in the unionized form resulting in a total ammonia generic acute toxicity criterion of 16,800 ug/L (420 ug/L / 0.025).

Figure 3 pH Trend Graph



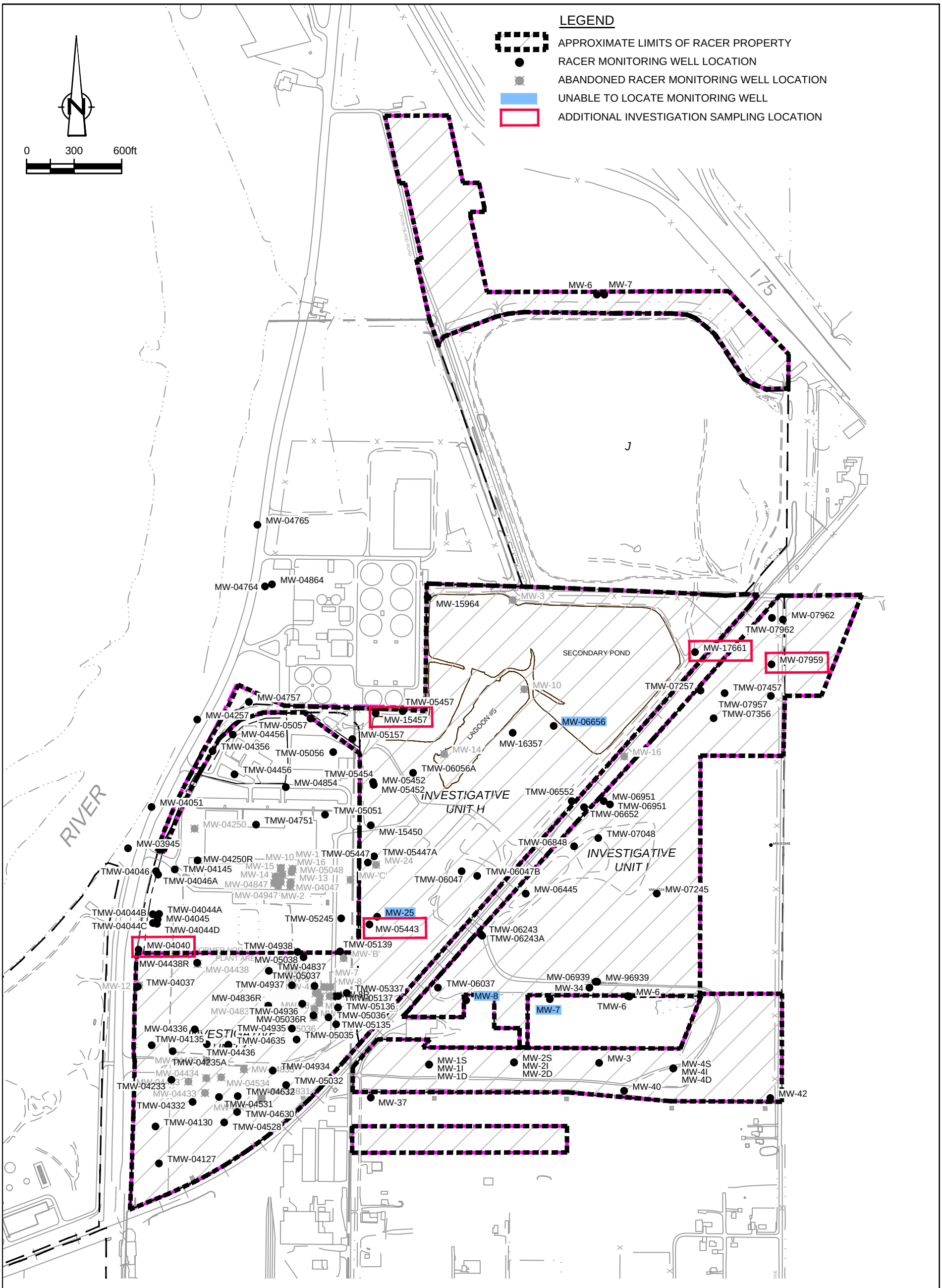


figure 4

ADDITIONAL INVESTIGATION SAMPLING LOCATIONS
SAGINAW NODULAR INDUSTRIAL LAND
Saginaw, Michigan

SOURCE:
MICHIGAN STATE PLANE SOUTH, NAD 83 USING
INTERNATIONAL FEET, NGVD 88, TOPO - SANBORN, 1996,

\\ghdnet\ghd\CA\Waterloo\Legacy\CAD\drawings\58000s\58502\58502-CORR\58502-A01(SASN007)\58502-A01(SASN007)GN\58502-A01(SASN007)GN-WA002.DWG Plot Date: DEC 09, 2019

Table 1

Groundwater Ammonia FAV Compliance Worksheet
GSI Compliance Sampling Event of November 2019
Nodular Iron Industrial Land
Saginaw, Michigan

GSI Compliance Point Number (Well ID)	Measured Total NH3 (µg/L)	Groundwater Temperature (°C)	Groundwater pH	Saginaw River Temperature (°C)[4]	Saginaw River pH [4]	Average Temperature (°C)[1]	Average pH[2]	% Unionized NH_3[3]	Calculated Unionized NH3 (µg/L)
MW-04257	680	13.10	7.50	1.3	7.75	7.20	7.61	0.60%	4.1
MW-04051	5900	14.40	7.00	1.3	7.75	7.85	7.23	0.27%	15.6
MW-03945	9500	10.60	7.00	1.3	7.75	5.95	7.23	0.23%	21.6
Other Wells									
MW-04250R	3700	10.50	8.80	1.3	7.75	5.90	8.01	1.36%	50.5
MW-04757	450	12.00	8.50	1.3	7.75	6.65	7.98	1.34%	6.0
MW-04836R	17000	8.60	7.80	1.3	7.75	4.95	7.77	0.73%	124.5
MW-04040	860	10.00	7.80	1.3	7.75	5.65	7.77	0.77%	6.7
MW-8R	18000	10.30	9.70	1.3	7.75	5.80	8.05	1.46%	262.1
MW-05036R	5800	9.70	11.40	1.3	7.75	5.50	8.05	1.44%	83.4
MW-04438R	96	8.90	7.80	1.3	7.75	5.10	7.77	0.74%	0.7
MW-05038	5100	9.70	10.10	1.3	7.75	5.50	8.05	1.43%	73.0
MW-04336	7500	9.90	7.40	1.3	7.75	5.60	7.54	0.45%	33.9
MW-05443	6700	10.90	7.40	1.3	7.75	6.10	7.54	0.47%	31.5

Notes:

1. Temperature is the average of the groundwater temperature and the Saginaw River temperature
2. pH value for average of groundwater and Saginaw River H^+ concentrations
3. Ammonia toxicity equations taken from Steven C. Chapra "Surface Water-Quality Modeling", McGraw-Hill Series in Water Resources and Environmental Engineering 1997
4. The Saginaw River temperature and pH were measured on November 11, 2019

Boxed Value indicates exceedance of FAV criterion of 420 µg/L

Table 2

EI Monitoring Program
Nodular Facility, Saginaw, Michigan

IU	Location	Parameter	Monitoring Purpose	Propose to Eliminate from EI Monitoring	Comments
G	MW-04250/MW-04250R	pH	GSI	No	
G	MW-04250/MW-04250R	ammonia	GSI	No	
G	MW-04250/MW-04250R	temperature	GSI	No	
G	MW-04757	ammonia	GSI	No	
G	MW-04757	pH	GSI	No	
G	MW-04757	temperature	GSI	No	
Wells added in 2007 per EPA's email request dated August 8, 2007.					
G	MW-03945	pH	GSI	No	
G	MW-03945	ammonia	GSI	No	
G	MW-03945	temperature	GSI	No	
G	MW-04051	pH	GSI	No	
G	MW-04051	ammonia	GSI	No	
G	MW-04051	temperature	GSI	No	
G	MW-04257	pH	GSI	No	
G	MW-04257	ammonia	GSI	No	
G	MW-04257	temperature	GSI	No	
Wells added in 2013 per RACER's recommendation dated October 23, 2013					
G	MW-04836R	pH	GSI	No	
G	MW-04836R	ammonia	GSI	No	
G	MW-04836R	Temperature	GSI	No	
G	MW-05036R	pH	GSI	No	
G	MW-05036R	ammonia	GSI	No	
G	MW-05036R	Temperature	GSI	No	
G	MW-8R	pH	GSI	No	
G	MW-8R	ammonia	GSI	No	
G	MW-8R	Temperature	GSI	No	
Well added to the 2014 monitoring program					
G	MW-04040	ammonia	GSI	No	
G	MW-04040	pH	GSI	No	
G	MW-04040	temperature	GSI	No	
Sampling Location added to the 2016 monitoring program					
G	Saginaw River (next to MW-03945)	pH	GSI	No	
G	Saginaw River (next to MW-03945)	temperature	GSI	No	
Well added to the 2019 monitoring program					
G	MW-05443	ammonia	GSI	No	
		pH	GSI	No	
		temperature	GSI	No	

Notes:

- Table updated to remove select parameters based on 4 consecutive rounds below criteria.
- Wells evaluated using most recent groundwater data compared to appropriate EI criteria.
- Since 2005 all samples for metals analyses have been collected using low flow sampling techniques and were unfiltered.
- GSI = Selected to monitor stability based on exceedances of groundwater surface water interface criteria in most recent samples.

Table 3

Analytical Results Summary - Additional Groundwater Sampling (2018 and 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:							MW-04040	MW-04040	MW-05443	MW-05443	MW-07959	MW-15457	MW-17661	MW-17661
Sample ID:							GW-58502-112818-SSH-1865	GW-58502-111219-SSH-4119	GW-58502-112718-SSH-1863	GW-58502-111319-SSH-4419	GW-58502-112718-SSH-1860	GW-58502-112718-SSH-1862	GW-58502-112718-SSH-1861	GW-58502-111219-SSH-4319
Sample Date:							11/28/2018	11/12/2019	11/27/2018	11/13/2019	11/27/2018	11/27/2018	11/27/2018	11/12/2019
Parameters	**Units**	**Groundwater Surface Water Interface**	**Residential Drinking Water**	**Non-Residential GW Volatilization to Indoor Air Inhalation**	**Water Solubility**	**Flammability and Explosivity Screening Level**								
Metals		a	b	c	d	e								
Antimony	mg/L	0.13	0.006				-	-	-	-	-	0.0020 U	-	-
Cobalt	mg/L	0.1	0.04				-	-	-	-	0.00090 J	0.0010 U	0.0041	-
Iron	mg/L		0.3				3.6[b]	2.8[b]	23[b]	11[b]	-	-	-	-
Nickel	mg/L	0.122	0.1				-	-	-	-	-	-	0.13[ab]	0.22[ab]
Vanadium	mg/L	0.027	0.0045				0.0040 U	-	-	-	-	-	0.0031 J	-
Herbicides														
Pentachlorophenol	mg/L	0.002	0.001		1850		-	-	-	-	0.00010 U	-	-	-
Wet														
Ammonia	mg/L	16.8	10	7100	530000		1.1	0.86	6.7	6.7	-	0.63	-	-
Cyanide (total)	mg/L	0.0052	0.2				-	-	-	-	0.054[a]	-	-	-
pH, lab	s.u.		6.5 - 8.5				7.5 J	7.8	-	7.4	7.0 J	-	-	-
FPARAM														
Un-ionized ammonia	mg/L						0.0064	0.0067	-	0.0315	-	-	-	-

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
10.98[b] Exceedance of Part 201 Generic Cleanup Criteria and Screening Levels dated December 31, 2013

Attachment A
Summary of EI Locations and Results

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8R	MW-8R	MW-03945	MW-03945	MW-03945
Sample ID:			MW8	M30224	M70001	W70102	M-6-0509	MW-8	GW-58502-071513-SSH-276	GW-58502-111313-SSH-282	GW-58502-111214-SSH-14001	GW-58502-110315-SSH-1596	GW-58502-110716-SSH-1710	GW-58502-051717-SSH-17007	GW-58502-112718-SSH-1855	GW-58502-111119-SSH-3619	MW-03945	M-6-0531	M-6-0532Q
Sample Date:			3/7/1988	8/7/2000	12/14/2001	12/19/2002	1/14/2005	10/7/2005	7/15/2013	11/13/2013	11/12/2014	11/3/2015	11/7/2016	5/17/2017	11/27/2018	11/11/2019	1/29/2004	1/21/2005	1/21/2005 (Duplicate)
Parameters	**Units**	**Lower Criteria**																	
FPARAM																			
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																			
Chromium	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0 U	5.0 U
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.0 U	10.0 U
WET																			
Ammonia	µg/L		17000	19100	55700	33000	30300	-	17000	10000	10000	12000	11000	12000	21000	18000	-	7700	7700
Cyanide (amenable)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	s.u.	6.5-8.5	10.2	10.98	11.06	11.19	11.01	10.13	11.35	10.7 J	10.3 J	9.81 J	10.74 / 10.6 J	11.01 / 10.6 J	9.7 J	9.7	7.31	6.32 / 6.82	6.87
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	685	265.1	654.6	534.7	262.1	-	-	-

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated.
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945	MW-03945
Sample ID:			**MW-03945**	**M50564**	**M50574**	**M50607**	**M50608**	**GW-58502-112310-SSH-001**	**GW-58502-112310-SSH-002**	**GW-58502-110111-JY-255**	**GW-58502-110812-SSH-264**	**GW-58502-071613-SSH-285**	**GW-58502-111213-SSH-274**	**GW-58502-111414-SSH-14010**	**GW-58502-110315-SSH-1589**	**GW-58502-110816-SSH-1712**	**GW-58502-051817-SSH-17013**
Sample Date:			**10/8/2005**	**9/14/2007**	**11/5/2008**	**12/3/2009**	**12/3/2009 (Duplicate)**	**11/23/2010**	**11/23/2010 (Duplicate)**	**11/1/2011**	**11/8/2012**	**7/16/2013**	**11/12/2013**	**11/14/2014**	**11/3/2015**	**11/8/2016**	**5/18/2017**
Parameters	**Units**	**Lower Criteria**															
FPARAM																	
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																	
Chromium	µg/L	100	-	5 U	5 U	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	50 UJ	50 UJ	8 J	8 J	200 U	200 U	3.4 J	200 U	-	-	-	-	-	-
Mercury	µg/L	0.0013	-	0.0008 J	0.001 U	R	R	0.0005 UJ	0.0005 UJ	0.0005 UJ	0.20 U	-	-	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	10 U	10 U	10.0 U	10.0 U	-	-	-	-	-	-	-	-	-	-
WET																	
Ammonia	µg/L		-	-	8880	7690	8040	7000	7200	6700	8800	9100	5100	7300	7600	7400	8300
Cyanide (amenable)	µg/L	5.2	-	-	-	R	R	10 U	10 U	10 UJ	10 U	-	10 U	-	-	-	-
Cyanide (total)	µg/L	5.2	-	6 J	2 J	R	R	10 U	10 U	10 UJ	10 U	-	10 U	-	-	-	-
pH	s.u.	6.5-8.5	6.57	7.22	6.87 J	6.64 J	6.59 J	6.9 J	6.9 J	6.57 / 6.7 J	6.63 / 6.70 J	6.68	6.93 J	7.01 J	6.63 J	6.56	6.6 J / 6.7
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	20	11.3	27.4

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-03945	MW-03945	MW-03945	MW-04040	MW-04040	MW-04040	MW-04040	MW-04040	MW-04040	MW-04040	MW-04040	MW-04040	MW-04040	MW-04040
Sample ID:			GW-58502-112818-SSH-1869	GW-58502-111119-SSH-3419	GW-58502-111119-SSH-3519	M10004	M20217	H90132	W-17075-020504-CA-123	M-2-0522	MW-04040	GW-58502-111214-SSH-14004	GW-58502-110315-SSH-1593	GW-58502-110716-SSH-1707	GW-58502-051717-SSH-17012	GW-58502-112818-SSH-1865
Sample Date:			11/28/2018	11/11/2019	11/11/2019 (Duplicate)	11/18/1998	8/2/2000	12/19/2002	2/5/2004	1/20/2005	10/7/2005	11/12/2014	11/3/2015	11/7/2016	5/17/2017	11/28/2018
Parameters	**Units**	**Lower Criteria**														
FPARAM																
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Chromium	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WET																
Ammonia	µg/L		8000	9500	9500	-	-	490	600	-	-	610	460	710	450	1100
Cyanide (amenable)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	s.u.	6.5-8.5	6.7 J	7.0	6.9	7.3	7.81	7.22	7.4 / 7.44	7.36	7.11	-	-	7.47	7.9 J / **9.62**	7.5 J
Un-ionized ammonia	µg/L	420	9.5	21.6	21.6	-	-	-	-	-	-	-	7	4.6	22.9	6.4

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-04040	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051	MW-04051
Sample ID:			**GW-58502-111219-SSH-4119**	**MW-04051**	**M-6-0534**	**MW-04051**	**M50565**	**M50575**	**MW-04051**	**M50610**	**GW-58502-112310-SSH-003**	**GW-58502-110111-JY-253**	**GW-58502-110111-JY-254**	**GW-58502-110812-SSH-265**	**GW-58502-111213-SSH-275**	**GW-58502-111414-SSH-14009**	**GW-58502-110315-SSH-1590**	**GW-58502-110816-SSH-1713**
Sample Date:			**11/12/2019**	**1/29/2004**	**1/21/2005**	**10/8/2005**	**9/14/2007**	**11/5/2008**	**11/5/2008**	**12/3/2009**	**11/23/2010**	**11/1/2011**	**11/1/2011 (Duplicate)**	**11/8/2012**	**11/12/2013**	**11/14/2014**	**11/3/2015**	**11/8/2016**
Parameters	**Units**	**Lower Criteria**																
FPARAM																		
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																		
Chromium	µg/L	100	-	-	5.0 U	-	5 U	5 U	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	50 UJ	50 UJ	-	8 J	200 U	9.7 J	4.7 J	100 U	-	-	-	-
Mercury	µg/L	0.0013	-	-	-	-	0.0007 J	0.001 U	-	R	0.0005 UJ	0.0005 UJ	0.0005 UJ	0.20 U	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	10.0 U	-	10 U	10 U	-	10.0 U	-	-	-	-	-	-	-	-
WET																		
Ammonia	µg/L		860	-	3450	-	-	6330	-	5170	5600	5700	5300	5800	4600	4400	5800	530
Cyanide (amenable)	µg/L	5.2	-	-	-	-	-	-	-	R	10 U	10 UJ	10 UJ	10 U	10 U	-	-	-
Cyanide (total)	µg/L	5.2	-	-	-	-	4 J	10 U	-	R	10 U	10 UJ	10 UJ	10 U	10 U	-	-	-
pH	s.u.	6.5-8.5	7.8	7.48	6.91 / 6.53	6.69	7.30	6.98 J	6.76	6.83 J	7.6 J	6.8 J / 6.58	6.8 J	6.89 J / 6.88	7.03 J	7.13 J	6.60 J	6.71
Un-ionized ammonia	µg/L	420	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	19	1.3

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-04051	MW-04051	MW-04051	MW-04250	MW-04250	MW-04250	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R
Sample ID:			GW-58502-051817-SSH-17014	GW-58502-112818-SSH-1871	GW-58502-111319-SSH-4519	M30029	M30030	M30205	M7-0540	MW-04250	M05515	M05516	M50563	M50572	M50573	M50590	M50611	GW-58502-112310-SSH-004	GW-58502-110111-JY-250	GW-58502-110812-SSH-262
Sample Date:			5/18/2017	11/28/2018	11/13/2019	12/4/1998	12/4/1998 (Duplicate)	7/18/2000	9/28/2005	10/7/2005	8/31/2006	8/31/2006 (Duplicate)	9/13/2007	11/5/2008	11/5/2008 (Duplicate)	12/17/2008	12/3/2009	11/23/2010	11/1/2011	11/8/2012
Parameters	**Units**	**Lower Criteria**																		
FPARAM																				
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																				
Chromium	µg/L	100	-	-	-	186	173	28	5.5	-	2.2 J	2.2 J	5 U	5 U	5 U	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	5 U	5 U	5 U	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	-	10 U	-	-	20 J	20 J	50 U	50 UJ	50 UJ	-	50 UJ	40 U	20 UJ	20 U
Mercury	µg/L	0.0013	-	-	-	0.2	0.2 U	-	-	-	0.0041	0.00443	0.0062	0.00477	0.00462	-	0.0027 J	0.00065 UJ	0.0024 J	0.20 U
Mercury (dissolved)	µg/L	0.0013	-	-	-	0.2 U	0.2 U	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	89	84	33	13.7	-	6.8 J	6.1 J	10 U	10 U	10 U	-	10.0 U	-	-	-
WET																				
Ammonia	µg/L		6300	7200	5900	-	-	-	-	-	-	-	-	-	-	4080	4330	9100	4400	4800
Cyanide (amenable)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	10 U	10 UJ	10 U
Cyanide (total)	µg/L	5.2	-	-	-	10 U	10 U	7	-	-	30 J	140 J	10 U	10 U	10 U	-	R	10 U	10 UJ	10 U
pH	s.u.	6.5-8.5	6.7 J / 6.84	6.8 J	7.0	-	-	-	11.01 J	10.48	11.16	11.12	10.90	10.76 J	10.85 J	10.98	10.72 J	9.9 J	9.43 / 9.3 J	9.95 / 9.55 J
Un-ionized ammonia	µg/L	420	28.6	12.5	15.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R	MW-04250R
Sample ID:			**GW-58502-110812-SSH-263**	**GW-58502-111213-SSH-272**	**GW-58502-111213-SSH-273**	**GW-58502-111414-SSH-14005**	**GW-58502-111414-SSH-14006**	**GW-58502-110315-SSH-1587**	**GW-58502-110315-SSH-1588**	**GW-58502-110716-SSH-1705**	**GW-58502-110716-SSH-1706**	**GW-58502-051717-SSH-17006**	**GW-58502-112818-SSH-1868**	**GW-58502-111119-SSH-3219**
Sample Date:			**11/8/2012 (Duplicate)**	**11/12/2013**	**11/12/2013 (Duplicate)**	**11/14/2014**	**11/14/2014 (Duplicate)**	**11/3/2015**	**11/3/2015 (Duplicate)**	**11/7/2016**	**11/7/2016 (Duplicate)**	**5/17/2017**	**11/28/2018**	**11/11/2019**
Parameters	**Units**	**Lower Criteria**												
FPARAM														
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-
Metals														
Chromium	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	20 U	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	0.0013	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	-	-	-	-	-	-	-	-	-
WET														
Ammonia	µg/L		6800	5000	5200	2700 J	1600 J	2200	2400	2700	2900	2000	4200	3700
Cyanide (amenable)	µg/L	5.2	10 U	10 U	10 U	-	-	-	-	-	-	-	-	-
Cyanide (total)	µg/L	5.2	10 U	10 U	10 U	-	-	-	-	-	-	-	-	-
pH	s.u.	6.5-8.5	**9.49 J**	**9.68 J**	**9.68 J**	**9.98 J**	**10.0 J**	**9.26 J**	**9.31 J**	**8.77**	-	**8.93 / 8.9 J**	**8.8 J**	**8.8**
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	122	60.3	-	99.8	89.3	50.5

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257	MW-04257
Sample ID:			MW-04257	M-2-0531	M50557	M50579	M50609	GW-58502-113010-SSH-008	GW-58502-110211-JY-257	GW-58502-110812-SSH-266	GW-58502-111213-SSH-271	GW-58502-111414-SSH-14008	GW-58502-110315-SSH-1591	GW-58502-110816-SSH-1714	GW-58502-051817-SSH-17015	GW-58502-112818-SSH-1870	
Sample Date:			1/29/2004	1/24/2005	9/12/2007	11/12/2008	12/3/2009	11/30/2010	11/2/2011	11/8/2012	11/12/2013	11/14/2014	11/3/2015	11/8/2016	5/18/2017	11/28/2018	
Parameters	**Units**	**Lower Criteria**															
FPARAM																	
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Metals																	
Chromium	µg/L	100	-	5.0 U	150	116 J	-	-	-	-	-	-	-	-	-	-	
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chromium VI (hexavalent)	µg/L	11	-	-	50 U	R	5 J	10 J	20 UJ	20 U	-	-	-	-	-	-	
Mercury	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Vanadium	µg/L	27	-	10.0 U	10 U	10 U	10.0 U	-	-	-	-	-	-	-	-	-	
WET																	
Ammonia	µg/L		-	990	-	1170	1070	1200	820	340	630	350	620	380	500	780	
Cyanide (amenable)	µg/L	5.2	-	-	-	-	R	10 U	10 UJ	10 U	10 U	-	-	-	-	-	
Cyanide (total)	µg/L	5.2	-	-	10 U	10 U	R	10 U	10 UJ	10 U	10 U	-	-	-	-	-	
pH	s.u.	6.5-8.5	6.90	6.79 / 7.25	7.27	7.13 J	6.97 J	7.2 J	7.0 J / 6.88	6.97 J / 6.79	7.30 J	7.32 J	6.96 J	7.06	7.3 J / 7.32	7.3 J	
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	5	1.8	6.0	3.6	

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-04257	MW-04336	MW-04336	MW-04438	MW-04438	MW-04438R	MW-04438R	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757
Sample ID:			**GW-58502-111319-SSH-4619**	**GW-58502-112818-SSH-1866**	**GW-58502-111219-SSH-4219**	**M-2-0534**	**GW-58502-051717-SSH-17011**	**GW-58502-112718-SSH-1859**	**GW-58502-111219-SSH-4019**	**M20001**	**M20215**	**M80155**	**M-6-0539**	**M05513**	**M50553**	**M50581**	**M50604**	**GW-58502-113010-SSH-007**	**GW-58502-110111-JY-251**
Sample Date:			**11/13/2019**	**11/28/2018**	**11/12/2019**	**1/24/2005**	**5/17/2017**	**11/27/2018**	**11/12/2019**	**11/16/1998**	**7/18/2000**	**1/5/2003**	**1/25/2005**	**8/31/2006**	**9/12/2007**	**11/12/2008**	**12/2/2009**	**11/30/2010**	**11/1/2011**
Parameters	**Units**	**Lower Criteria**																	
FPARAM																			
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																			
Chromium	µg/L	100	-	-	-	-	-	-	-	**126 J**	97.1	-	5.0 U	5 U	5 U	11.5 J	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	-	-	-	-	10 U	-	-	50 UJ	50 U	R	50 U	6 J	-
Mercury	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	-	-	-	-	**54 J**	**36.3**	-	10.0 U	10 U	10 U	10 U	-	-	-
WET																			
Ammonia	µg/L		680	7900	7500	-	1100	2000	96 J	-	-	700	-	-	-	170	178	300	-
Cyanide (amenable)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10 U	10 UJ
Cyanide (total)	µg/L	5.2	-	-	-	-	-	-	-	10 U	**7**	-	-	**8 J**	10 U	**10**	10 U	10 U	10 UJ
pH	s.u.	6.5-8.5	7.5	7.3 J	7.4	**11.89 / 11.76**	**11.81 / 11.6 J**	**11.5 J**	7.8	-	-	-	-	-	-	-	-	-	-
Un-ionized ammonia	µg/L	420	4.1	32.0	33.9	-	60.4	50.1	0.7	-	-	-	-	-	-	-	-	-	-

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04757	MW-04835	MW-04835	MW-04835
Sample ID:			GW-58502-110712-SSH-261	GW-58502-071613-SSH-283	GW-58502-071613-SSH-284	GW-58502-111213-SSH-270	GW-58502-111414-SSH-14007	GW-58502-110315-SSH-1592	GW-58502-110716-SSH-1711	GW-58502-051817-SSH-17016	GW-58502-112818-SSH-1867	GW-58502-111119-SSH-3319	M60015	M90129	MW-04835
Sample Date:			11/7/2012	7/16/2013	7/16/2013	11/12/2013	11/14/2014	11/3/2015	11/7/2016	5/18/2017	11/28/2018	11/11/2019	12/17/2001	12/19/2002	1/29/2004
Parameters	**Units**	**Lower Criteria**													
FPARAM															
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals															
Chromium	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	-	-	-	-	-	-	-	-	-	-
WET															
Ammonia	µg/L		14000	1100 J	1700 J	200 U	220	300	280	300	230	450	-	-	-
Cyanide (amenable)	µg/L	5.2	10 U	-	-	10 U	-	-	-	-	-	-	-	-	-
Cyanide (total)	µg/L	5.2	10 U	-	-	10 U	-	-	-	-	-	-	-	-	-
pH	s.u.	6.5-8.5	-	-	-	-	-	-	-	-	-	-	8.05	6.91	8.44
Un-ionized ammonia	µg/L	420	-	-	-	-	-	10	5.5	10.7	3.7	6.0	-	-	-

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-04835	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836	MW-04836R
Sample ID:			**GW-58502-111313-SSH-279**	**M10218**	**M60011**	**MW-04836**	**MW-04836**	**M-2-0512**	**MW-04836**	**GW-58502-071613-SSH-281**	**GW-58502-111313-SSH-280**	**GW-58502-111214-SSH-14003**	**GW-58502-110315-SSH-1594**	**GW-58502-110716-SSH-1708**	**GW-58502-051717-SSH-17009**	**GW-58502-051717-SSH-17010**	**GW-58502-112718-SSH-1858**
Sample Date:			**11/13/2013**	**8/2/2000**	**12/14/2001**	**12/1/2002**	**1/29/2004**	**1/18/2005**	**10/7/2005**	**7/16/2013**	**11/13/2013**	**11/12/2014**	**11/3/2015**	**11/7/2016**	**5/17/2017**	**5/17/2017 (Duplicate)**	**11/27/2018**
Parameters	**Units**	**Lower Criteria**															
FPARAM																	
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																	
Chromium	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WET																	
Ammonia	µg/L		900	2030	50	-	-	-	-	11000	35000	33000	51000	18000	3400	3500	25000
Cyanide (amenable)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	s.u.	6.5-8.5	7.20 J	7.74	7.37	**11.19**	7.70	7.45	7.32	7.72	7.31 J	7.39 J	6.82 J	7.33	8.01 / 7.4 J	7.3 J / 8.01	7.4 J
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	161	47.8	107.2	-	123.5

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-04836R	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036	MW-05036R	MW-05036R
Sample ID:			GW-58502-111119-SSH-3819	M30024	M10208	M60010	MW-05036	M-2-0511	MW-05036	MW-05036	GW-58502-111313-SSH-281	GW-58502-111214-SSH-14002	GW-58502-110315-SSH-1595	GW-58502-110716-SSH-1709	GW-58502-051717-SSH-17008	GW-58502-112718-SSH-1856	GW-58502-112718-SSH-1857
Sample Date:			11/11/2019	12/3/1998	8/2/2000	12/14/2001	1/29/2004	1/18/2005	10/7/2005	7/16/2013	11/13/2013	11/12/2014	11/3/2015	11/7/2016	5/17/2017	11/27/2018	11/27/2018 (Duplicate)
Parameters	**Units**	**Lower Criteria**															
FPARAM																	
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																	
Chromium	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WET																	
Ammonia	µg/L		17000	-	-	2400	-	-	-	-	4900	4900	12000	3600	1700	6800	8900
Cyanide (amenable)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	s.u.	6.5-8.5	7.8	6.76	**10.49**	**9.35**	**10.80**	**9.94**	**9.49**	**12.25**	**11.4 J**	**11.2 J**	**10.8 J**	**11.39 / 11.2 J**	**11.1 J / 11.47**	**11.2 J**	**11.2 J**
Un-ionized ammonia	µg/L	420	124.5	-	-	-	-	-	-	-	-	-	**647**	82.0	94.1	-	224.9

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.

Attachment A

Summary of EI Locations and Results (1988 to 2019)
Nodular Iron Industrial Land
Saginaw, Michigan

Sample Location:			MW-05036R	MW-05038	MW-05038	MW-05443	MW-05443	MW-05443	MW-05443	MW-05443	MW-05443	MW-05443	MW-05443
Sample ID:			**GW-58502-111119-SSH-3719**	**GW-58502-112818-SSH-1864**	**GW-58502-111219-SSH-3919**	**M10207**	**M20004**	**W-17075-020504-CA-120**	**M-2-0503**	**MW-05443**	**GW-58502-071613-SSH-282**	**GW-58502-112718-SSH-1863**	**GW-58502-111319-SSH-4419**
Sample Date:			**11/11/2019**	**11/28/2018**	**11/12/2019**	**7/14/2000**	**1/29/2004**	**2/5/2004**	**1/14/2005**	**10/7/2005**	**7/16/2013**	**11/27/2018**	**11/13/2019**
Parameters	**Units**	**Lower Criteria**											
FPARAM													
Un-ionized ammonia	µg/L	420	-	-	-	-	-	-	-	-	-	-	-
Metals													
Chromium	µg/L	100	-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	µg/L	100	-	-	-	-	-	-	-	-	-	-	-
Chromium VI (hexavalent)	µg/L	11	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-
Mercury (dissolved)	µg/L	0.0013	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	27	-	-	-	-	-	-	-	-	-	-	-
WET													
Ammonia	µg/L		5800	5000	5100	-	-	4900	-	-	7200	6700	6700
Cyanide (amenable)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-
Cyanide (total)	µg/L	5.2	-	-	-	-	-	-	-	-	-	-	-
pH	s.u.	6.5-8.5	**11.4**	**10.0 J**	**10.1**	6.77	**11.37**	6.9 / 7.52	7.21	6.84	7.21	-	7.4
Un-ionized ammonia	µg/L	420	83.4	126.6	73.0	-	-	-	-	-	-	-	31.5

Footnotes:

U Not detected at the associated reporting limit.
J Estimated concentration.
UJ Not detected; associated reporting limit is estimated
R Rejected.