



MEMORANDUM

TO: Nate Nemani (U.S. EPA)

REF. NO.: 058502

FROM: Michael Tomka (CRA)/kf/5

DATE: February 26, 2014

CC: Dave Favero and Grant Trigger (RACER)

RE: **Stabilization Alternative Evaluation and Recommendation for the North Ditch
RACER Trust Saginaw Nodular Industrial Land
Saginaw, Michigan**

1.0 Introduction

This memorandum has been prepared by Conestoga-Rovers & Associates (CRA) on behalf of Revitalizing Auto Communities Environmental Response (RACER) Trust, for work associated with stabilizing the Former Stormwater Discharge Ditch (North Ditch) at the Saginaw Nodular Industrial Land (Site) located in Saginaw, Michigan [United States Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act (RCRA) ID No. MID 041 793 340]. Figure 1 presents the Site location and property boundaries. Work is currently being completed at the Site under an Administrative Order on Consent (AOC), which was executed by USEPA and RACER on September 29, 2011.

The purpose of this memorandum is to identify and evaluate potential stabilization alternatives to minimize potential exposures to constituents in the North Ditch and to improve stormwater drainage. The alternatives are evaluated consistent with the RCRA Corrective Measures Evaluation Criteria.

2.0 Site Background

The North Ditch is located north of the Former Nodular Iron Plant north parking lot as identified on Figure 1. Between 1965 and 1988 the North Ditch was utilized for discharging treated water from the Wastewater Treatment Plant (WWTP) to the Saginaw River under a National Pollutant Discharge Elimination System (NPDES) permitted outfall (Outfall 002). In addition, the North Ditch received water from two basement sumps in the Former Nodular Iron Plant basement and stormwater from surface water runoff. In 1988, at the advent of the recycle water system for the WWTP, the North Ditch no longer received treated water from the WWTP and Outfall 002 was plugged in 1995. In 2004, the closed outlet was found to be leaking. The former discharge pipes were located, filled with flowable fill and clay was placed over the ends of the pipes at the termination in the North Ditch. The North Ditch is 30 feet at its widest point, approximately 900 feet in length, and 8-10 feet in depth. Currently, the North Ditch only receives surface water runoff.

RACER obtained NPDES permit MI0059042 which includes a permitted discharge location at the North Ditch, however, currently the only potential for discharge is under extreme high water conditions when water has the

potential to overflow into an existing catchbasin adjacent to the North Ditch. The only outlet for stormwater runoff that accumulates in the North Ditch area are two catchbasins that were installed as part of the Tri-Cap property development and Saginaw Supplier Park development as identified on Drawing 1. The catchbasin rims are a few inches below the driveway level at an elevation of approximately 585.7 feet above mean sea level (ft amsl). Figure 2 presents a photo that was taken following a rain event in the fall of 2006. RACER is not aware of any discharge events to this outfall from the North Ditch since the NPDES permit was issued.

The Description of Current Conditions Report (DOCC) prepared by EMCON (1995) identified various incidents/spills associated with the North Ditch. The incidents/spills reported pesticides, Polychlorinated Biphenyl (PCBs), Base-Neutral Extractables (BNEs), Volatile Organic Compounds (VOCs), Semi-VOCs, and Metals in samples collected and analyzed.

3.0 North Ditch Investigations

Initial sampling of the North Ditch area was conducted as part of the RCRA Facility Investigation (RFI) which was completed by GMC. Two sediment samples were collected and analyzed for metals, SVOCs, PCBs and general chemistry. Two additional sediment samples were collected at a later date to further delineate PCBs. The results were screened against the Michigan Act 451, Part 201 Generic Cleanup Criteria and were found to all be below cleanup criteria. Figure 3 presents the sediment sample locations in the North Ditch. Table 1 presents a summary of the sediment results. One surface water sample was collected and analyzed for metals (total and dissolved) and PCBs. The results were screened against the Michigan Act 451, Part 201 Generic Cleanup Criteria and were found to be below cleanup criteria. Figure 3 presents the surface water sample location in the North. Table 2 presents a summary of the surface water results.

The surface water and sediment results from the North Ditch were evaluated for exposure risks to human and ecological receptors in the Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) which were submitted by GMC as part of the Phase 1C RFI, in March 2007 (Phase 1C RFI). The results of the risk assessments identified that there is no unacceptable risk to humans and the risk of adverse ecological effects is low to negligible.

Following the bankruptcy, RACER submitted the Supplemental RFI Report on September 21, 2012. The Supplemental RFI presented additional data associated with the RACER Site obtained since the Revised Phase 1C RFI and addressed comments received on the Phase 1C RFI which related to the RACER Site. No new data associated with the North Ditch was included in the Supplemental RFI and the conclusions remained the same from the Supplemental RFI to the GMC RFI.

More recently, an additional investigation of the North Ditch was completed to characterize impacts in North Ditch to assist in assessing alternatives to address the North Ditch. The work was completed in July 2013 in accordance with the Additional Investigation Sampling and Analysis Plan (SAP) prepared by CRA in April 2013, which was approved via email by the USEPA on July 8, 2013 via email.

Six water samples were collected from three locations at two depths (surface and mid depth) from the North Ditch. The samples were analyzed for: target analyte list (TAL) metals, polychlorinated biphenyls (PCBs), ammonia, biochemical oxygen demand (BOD), chemical oxygen demand (COD), cyanide (total and amenable), hardness, nitrate, oil and grease, pH, phenols, and total organic carbon (TOC). The results were screened against the Michigan Department of Environmental Quality (MDEQ) Groundwater Surface Water Interface (GSI) criteria and the DEQ Rule 57 Water Quality Values for surface water. All sample results were below criteria. Figure 3 presents the surface

water (SW) and mid-depth (MD) sample locations in the North Ditch and Figure 4 presents the depth of water and sediment at each sample location. Table 1 presents a summary of the surface water sample results.

Seven sediment samples were collected from six locations in the North Ditch. In addition, five soil samples were collected from the native material (soil) underlying the sediment. The seven sediment and five soil samples were analyzed for: TAL metals, PCBs, ammonia, cyanide (total), nitrate, pH, sulfide, and TOC. The seven sediment samples were also analyzed for acid volatile sulfide/simultaneously extracted metals (AVS/SEM). The results were first screened against the Michigan Statewide Default Background Levels then compared to the MDEQ GSI protection criteria. All the soil and sediment sample results exceeded GSI protection criteria for at least one of four metals (arsenic, chromium, cobalt, and selenium) or total cyanide.

AVS/SEM analyses consider the bioavailability of divalent metals and potential toxicity to benthic invertebrates. For the AVS/SEM data, USEPA guidance (USEPA 2005) indicates that values of carbon normalized excess (CNE) - SEM less than 130 umol/gram organic carbon (OC) are not toxic to benthic invertebrates. Values above 130 umol/gram OC but below 3,000 umol/gram OC are potentially toxic to benthic invertebrates, and values above 3,000 umol/gram OC are more likely to be toxic than nontoxic. The CNE-SEM values for all seven samples were calculated. Five of the seven sediment samples had CNE-SEM concentrations less than 130 umol/gram OC, indicating no reasonable potential for toxicity. The remaining two samples were above 130 umol/gram OC at 296 and 248 umol/gram OC. These two sediment samples were well below 3,000 umol/gram OC, above which sediments are predominantly toxic. Based on information provided in USEPA guidance (USEPA 2005), these two samples have a low probability, about 10 percent, of being toxic to benthic invertebrates from divalent metals. Figure 3 presents the sediment (SD) and native material (SO) sample locations in the North Ditch and Figure 4 presents the depth of water and sediment at each sample location. Table 2 presents a summary of the sediment and native soil sample results.

Eighteen soil samples were collected from nine locations at two depths (0-5 inches and 5-12 inches) on the banks of the North Ditch. The nine shallow samples were analyzed on a one week turn for: TAL metals, PCBs, ammonia, cyanide (total), Nitrate, pH and total organic carbon. The nine deeper samples were placed on hold pending the analysis of the shallow samples. The results of the shallow samples were first screened against the Michigan Statewide Default Background Levels then compared to the MDEQ GSI protection criteria and MDEQ Direct Contact Criteria. The sample results exceeded GSI protection criteria for three metals (arsenic, chromium, and selenium) as well as total cyanide but did not exceed Direct Contact criteria. The PCB results of the shallow samples were well below the TSCA high occupancy criteria of 1,000 micrograms per kilogram ($\mu\text{g}/\text{kg}$). The highest detection of PCBs in the bank soil was 0.35 $\mu\text{g}/\text{kg}$. Due to the low detected concentrations of PCBs as well as no North Ditch water sample results exceeding GSI criteria for those compounds that exceeded GSI protection criteria in soil, analysis of the deeper soil samples was not completed. Figure 3 presents the bank soil (SO) sample locations in the North Ditch. Table 3 presents a summary of the bank soil sample results.

The results of the North Ditch surface water investigation identified no exceedances of MDEQ GSI criteria or Rule 57 Water Quality Values. The results of the North Ditch soil and sediment investigation identified exceedances of MDEQ GSI protection criteria. The soil or sediment sample results exceeded GSI protection criteria for four metals (arsenic, chromium, cobalt, and selenium) as well as total cyanide. However, since the surface water sample results did not exceed GSI criteria for these constituents, this indicates that the parameters exceeding criteria did not leach significantly into the surface water. The soil and sediment have been in place for many years, therefore, we expect that leaching, if any, is in equilibrium. Therefore, soil and sediment exceedances of GSI protection criteria do not warrant further consideration with the exception of the potential for re-suspension of solids.

The results of the AVS/SEM analyses identified that five of the seven samples would not be toxic to benthic invertebrates from divalent metals, while the remaining two samples have a low potential of being toxic (USEPA

2005). Hence, the sediments of the North Ditch, on overall average, have no significant toxicity to benthic invertebrates.

The alternatives discussed in this memorandum were selected to eliminate re-suspension of solids and to minimize potential unacceptable exposure to constituents, even though risk to human health and ecological receptors is low to negligible.

4.0 Alternatives

As presented in Section 7.0 of the Supplemental RFI, Site stabilization measures were recommended to reduce potential sediment migration and to improve stormwater drainage, thereby minimizing the potential for unacceptable risk to ecological receptors. The alternatives identified below will immobilize or remove sediments in the North Ditch and improve drainage to prevent stormwater from ponding.

The alternatives are as follows:

Alternative 1: Install a 6-inch storm sewer pipe and catchbasin, approximately 80 feet from existing catchbasin (CB01) to the North Ditch (complete with rodent grate); install geo-fabric on top of sediments to immobilize sediments but maintain groundwater communication and backfill ditch with a minimum of 2 feet of sand plus 4 inches of topsoil; grade North Ditch to drain towards new catchbasin and vegetate; and place a restrictive covenant on the area that identifies that caution is required and proper precautions should be in place while excavating or conducting other work in the area, and that requires submittal and approval of an excavation plan to prevent or repair damage to the geofabric and to properly manage any material below the geofabric that might be encountered.

Alternative 2: Excavate sediment from the North Ditch; stabilize, and dispose of material off-Site; install 6-inch storm sewer pipe and catchbasin, approximately 80 feet from catchbasin (CB01) to ditch, complete with rodent grate; backfill ditch with a minimum of 2 feet of sand plus 4 inches of topsoil; and grade North Ditch to drain towards new catchbasin and vegetate.

Drawing 1 presents the approximate stormwater catchment area that directs water to the North Ditch, cross-sections, the proposed connection to the existing catchbasin, and the ultimate discharge point to the Saginaw River.

The alternatives were developed with the following assumptions:

- Available capacity in the existing storm sewer network
- Concurrence from the following parties: County Drain Commission, Michigan Department of Environmental Quality (NPDES), neighbor (easement to discharge water into existing storm system and access for completing work), US Army Corp of Engineers and USEPA. In the event approval for the proposed work is not provided and a separate outfall is required, there will be significant additional costs

For construction sequencing, CRA would recommend conducting the work in late summer, which is typically the driest time of the year, to minimize the amount of water that will be required to be pumped from the ditch to complete the work. Water in the ditch will be required to be removed, prior to conducting the work. CRA recommends discharging the top half of the water column within the North Ditch under NPDES permit MI0059042. Water would be pumped from the surface so as to minimize disturbance of the sediments and to pump and

discharge water free of sediments. The remainder of the water within the ditch would be pumped and discharged into the secondary pond.

The alternatives were evaluated consistent with the RCRA Corrective Measures Evaluation Criteria as presented in Tables 4 and 5 for Alternatives 1 and 2, respectively. The approximate construction costs for Alternatives 1 and 2 are on the order of \$200,000 and \$1,000,000, respectively. Additional annual costs will be required to comply with any NPDES requirements.

5.0 Recommendation

The purpose of this memorandum was to identify and evaluate alternatives to minimize potential risk in the North Ditch and to improve stormwater drainage. Both alternatives offer the same drainage improvements; therefore, the only difference in the alternatives is how the low-level constituents are addressed. Since the constituents are low-level and have low to negligible risk to human and ecological receptors, removal of the sediments is not cost-effective. Covering the sediments will reduce potential risk, with the exception of future intrusive work in this area, which would be managed by restrictive covenant and is cost-effective. CRA recommends implementing Alternative 1.

List of Figures, Drawings, and Tables

Figure 1 – Approximate RACER Trust Property Limits

Figure 2 – North Ditch – Fall 2006

Figure 3 – North Ditch Sediment and Soil Summary of Exceedances

Figure 4 – North Ditch Water Depth and Sediment Thicknesses

Drawing 1 – North Ditch Plan and Profile Recommended Alternative 1

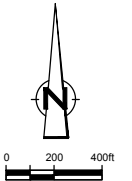
Table 1 – Analytical Results Summary – Sediment/Material Beneath Sediment

Table 2 – Analytical Results Summary – Surface Water Data

Table 3 – Analytical Results Summary – Bank Soil

Table 4 – North Ditch Stabilization Alternatives – Alternative 1

Table 5 – North Ditch Stabilization Alternatives – Alternative 2



LEGEND

- INVESTIGATIVE UNIT BOUNDARY AND IDENTIFIER
- APPROXIMATE FORMER PROPERTY BOUNDARY
- APPROXIMATE LIMITS OF RACER PROPERTY

AERIAL: NAP, 2009.

NOTE: TOPO - SANBORN, 1998

SCALE VERIFICATION

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



**RACER TRUST
SAGINAW NODULAR INDUSTRIAL LAND
SAGINAW, MICHIGAN**

**APPROXIMATE RACER TRUST
PROPERTY LIMITS**



Source Reference:
MICHIGAN STATE PLANE SOUTH, NAD 83 USING INTERNATIONAL FEET, NGVD 88

Project Manager: M.T.	Reviewed By: B.P.	Date: NOVEMBER 2013
Scale: 1" = 500'	Project N°: 58502-T02	Report N°: MEMO005
		Drawing N°: figure 1

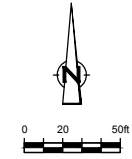
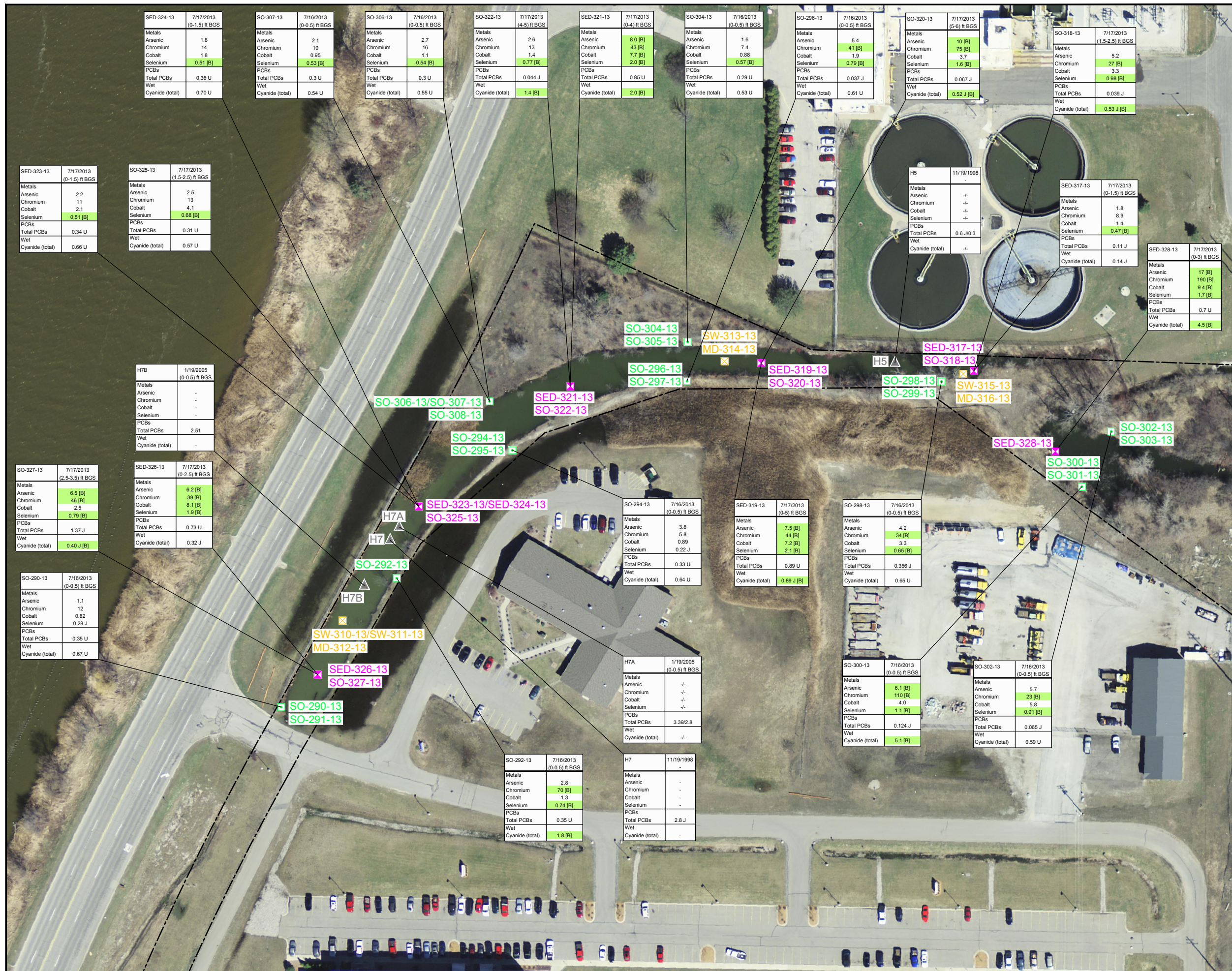


NORTH DITCH AFTER RAINFALL EVENT - FALL 2006. PHOTOGRAPH TAKEN FROM THE DRIVEWAY INTO THE SUPPLIER PARK OFF OF VETERANS MEMORIAL PARKWAY LOOKING TO THE NORTHEAST.

figure 2

NORTH DITCH - FALL 2006
RACER TRUST
SAGINAW NODULAR INDUSTRIAL LAND
Saginaw, Michigan





- LEGEND**
- SURVEYED PROPERTY BOUNDARY
 - ▲ HISTORICAL SEDIMENT SAMPLE LOCATION
 - SEDIMENT SAMPLE LOCATION
 - SOIL SAMPLE LOCATION
 - ⊗ SURFACE WATER SAMPLE LOCATION

NOTES:
 SO = SOIL
 SED = SEDIMENT
 SW = SURFACE WATER
 MD = DEPTH OF WATER COLUMN

EXAMPLE DATA TABLE

SED-317-13	7/17/2013	(0-1.5) ft BGS	PARAMETER	RESULT (mg/kg)	EXCEEDS CRITERIA
Metals					
Arsenic				1.8	
Chromium				8.9	
Cobalt				1.4	
Selenium				0.47 [B]	YES
PCBs					
Total PCBs				0.11 J	
Wet					
Cyanide (total)				0.14 J	

CHEMICAL NAME CRITERIA TABLE

Chemical Name	A	B	C	Unit
Arsenic	5.8	4.6	37	mg/kg
Chromium	18	3.3	9200	mg/kg
Cobalt	6.8	2	9000	mg/kg
Selenium	0.41	0.4	9600	mg/kg
Total PCBs	-	-	16	mg/kg
Cyanide (total)	0.39	0.1	250	mg/kg

- A: Statewide Default Background Levels
- B: GSI Criteria
- C: Non_RES/Direct Contact

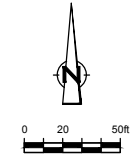
SCALE VERIFICATION
 THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

**RACER TRUST
 SAGINAW NODULAR INDUSTRIAL LAND
 SAGINAW, MICHIGAN
 NORTH DITCH SEDIMENT AND SOIL
 SUMMARY OF EXCEEDANCES**



Source Reference:
 MICHIGAN STATE PLANE SOUTH, NAD 83 USING INTERNATIONAL FEET, NGVD 88
 AERIAL PHOTO BY USGS, DATED MARCH 2010.

Project Manager: M.T.	Reviewed By: B.P.	Date: NOVEMBER 2013
Scale: 1" = 50'	Project N°: 58502-T02	Report N°: MEMO005 Drawing N°: figure 3



- LEGEND**
- SURVEYED PROPERTY BOUNDARY
 - ▲ HISTORICAL SEDIMENT SAMPLE LOCATION
 - ✕ SEDIMENT SAMPLE LOCATION
 - SOIL SAMPLE LOCATION
 - ⊠ SURFACE WATER SAMPLE LOCATION
 - ∇ WATER DEPTH
 - 1.5' SEDIMENT THICKNESS

SOURCE: 2010 USGS

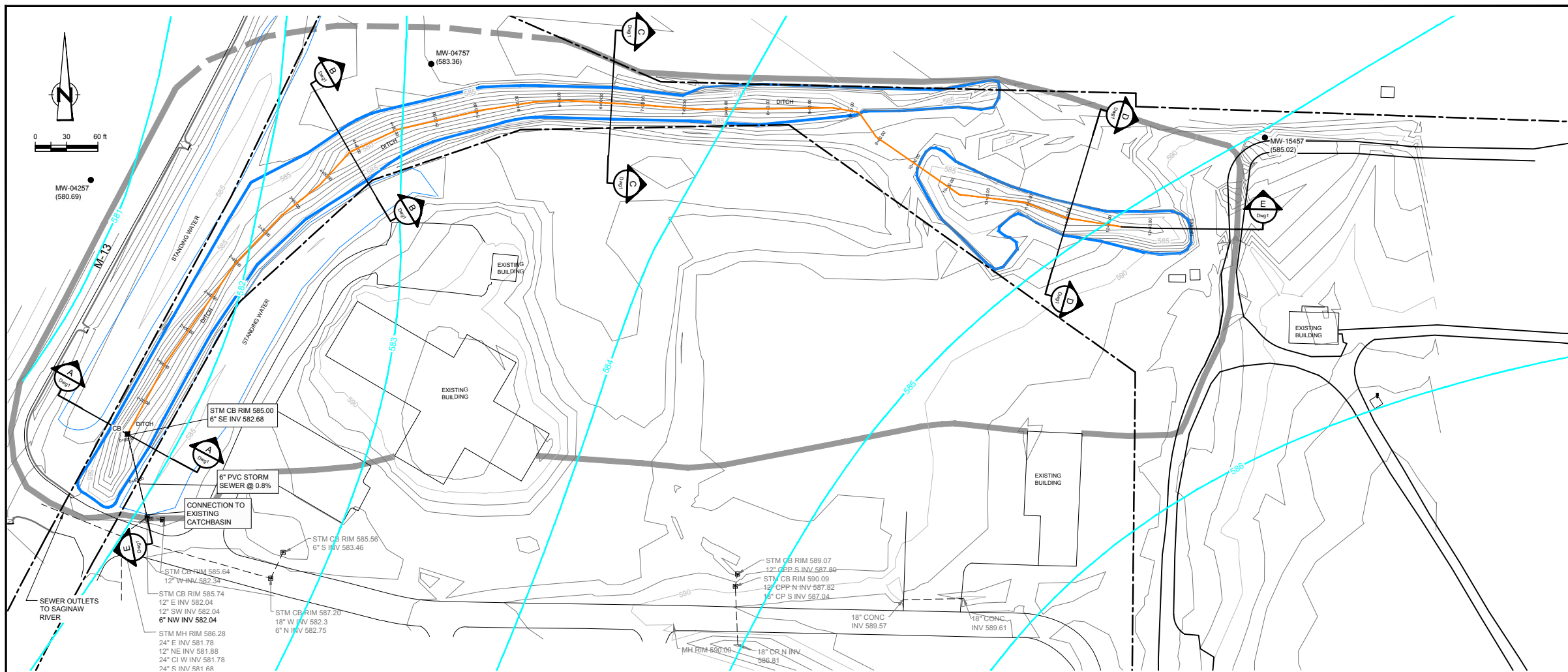
SCALE VERIFICATION
 THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

RACER TRUST
 SAGINAW NODULAR INDUSTRIAL LAND
 SAGINAW, MICHIGAN
 NORTH DITCH WATER DEPTH
 AND SEDIMENT THICKNESS



Source Reference:
 MICHIGAN STATE PLANE SOUTH, NAD 83 USING INTERNATIONAL FEET, NGVD 88
 AERIAL PHOTO BY USGS, DATED MARCH 2010.

Project Manager: M.T.	Reviewed By: B.P.	Date: NOVEMBER 2013
Scale: 1" = 50'	Project N ^o : 58502-T02	Report N ^o : MEMO005
		Drawing N ^o : figure 4



NO	Revision	Date	Initial

- LEGEND**
- EXISTING GROUND CONTOUR
 - DITCH
 - PROPERTY BOUNDARY
 - APPROXIMATE CATCHMENT BOUNDARY
 - EXISTING STORM SEWER
 - CENTER LINE OF PROPOSED SWALE
 - PROPOSED CATCHBASIN
 - EXISTING CATCHBASIN
 - MONITORING WELL LOCATION
 - GROUNDWATER ELEVATION - NOVEMBER 2013
 - UPPER WATER BEARING ZONE GROUNDWATER CONTOUR - FT. AMSL (NAVD 88) - NOVEMBER 2013

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

Approved

DRAWING STATUS

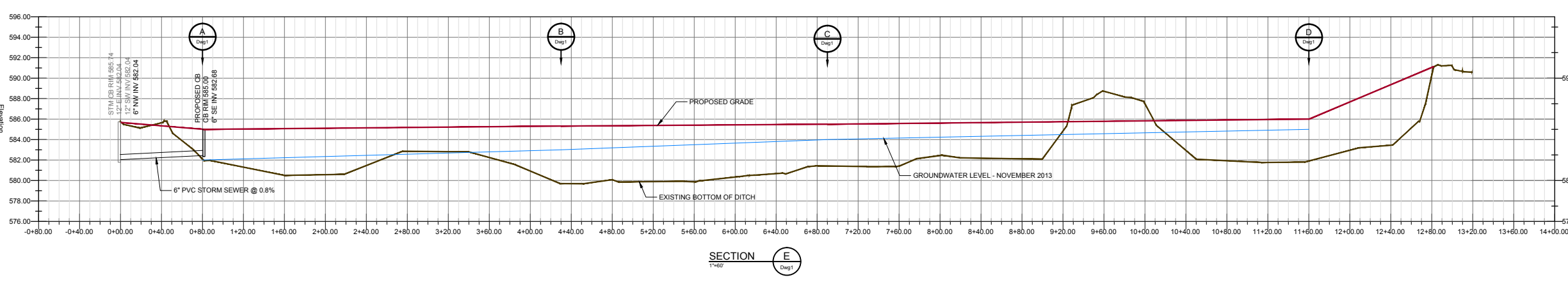
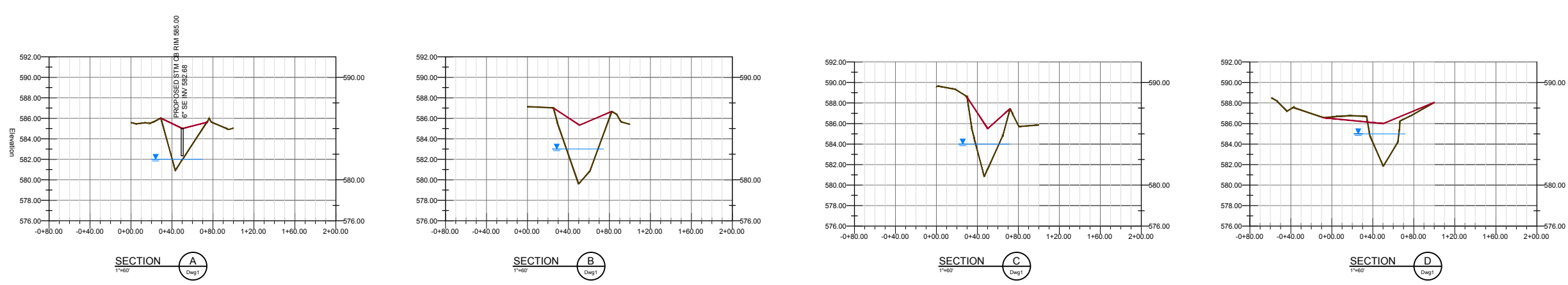
Status	Date	Initial

REVITALIZING AUTO COMMUNITIES ENVIRONMENTAL RESPONSE (RACER)
SAGINAW, MICHIGAN
NORTH DITCH PLAN AND PROFILE
RECOMMENDED ALTERNATIVE 1

CRA CONESTOGA-ROVERS & ASSOCIATES

Source Reference: 58502-00(C3D-MEMO005)GN-WA002

Project Manager: M.TOMKA	Reviewed By: J.PARDYS	Date: FEBRUARY 2013
Scale: HORZ 1"=60' VERT 1"=6' (10X VERT EX)	Project N°: 58502-T02	Report N°: MEMO005
		Dwg N°: Dwg1



**ANALYTICAL RESULTS SUMMARY - SEDIMENT/MATERIAL BENEATH SEDIMENT
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI**

Sample Location:	H5	H5	H7	H7A	H7A	H7B
Sample ID:	S00016	S00017	S00020	B-7-0531	B-7-0532Q	B-7-0530
Sample Date:	11/19/1998	11/19/1998	11/19/1998	1/19/2005	1/19/2005	1/19/2005
Sample Depth:		DUP		(0-0.5) ft BGS	DUP (0-0.5) ft BGS	(0-0.5) ft BGS
matrix_code	SE	SE	SE	SE	SE	SE

Parameters:	Units	Statewide Default Background Levels	Res/Non_Res/GW Prot_GW SW Interface Prot					
Metals								
Aluminum	mg/kg		-					
Antimony	mg/kg		94					
Arsenic	mg/kg	5.8	4.6					
Barium	mg/kg		-					
Beryllium	mg/kg		-					
Cadmium	mg/kg		-					
Calcium	mg/kg		-					
Chromium	mg/kg	18	3.3					
Cobalt	mg/kg	6.8	2					
Copper	mg/kg		-					
Iron	mg/kg		-					
Lead	mg/kg		-					
Magnesium	mg/kg		-					
Manganese	mg/kg		-					
Mercury	mg/kg	0.13	0.05					
Nickel	mg/kg		-					
Potassium	mg/kg		-					
Selenium	mg/kg	0.41	0.4					
Silver	mg/kg	1.0	0.1					
Sodium	mg/kg		-					
Thallium	mg/kg		4.2					
Vanadium	mg/kg		190					
Zinc	mg/kg		-					
Metals - SEM								
Cadmium	mg/kg		-					
Copper	mg/kg		-					
Lead	mg/kg		-					
Mercury	mg/kg		0.05					
Nickel	mg/kg		-					
Zinc	mg/kg		-					
SEM/AVS	none		-					
Polychlorinated Biphenyls								
Aroclor-1016 (PCB-1016)	ug/kg		-	0.3 UJ	0.2 U	0.2 UJ	0.50 U	0.10 U
Aroclor-1221 (PCB-1221)	ug/kg		-	0.3 UJ	0.2 U	0.2 UJ	1.0 U	0.20 U
Aroclor-1232 (PCB-1232)	ug/kg		-	0.3 UJ	0.2 U	0.2 UJ	0.50 U	0.10 U
Aroclor-1242 (PCB-1242)	ug/kg		-	0.6 J	0.3	0.7 J	0.50 U	0.60
Aroclor-1248 (PCB-1248)	ug/kg		-	0.3 UJ	0.2 U	0.2 UJ	1.1	0.67
Aroclor-1254 (PCB-1254)	ug/kg		-	0.3 UJ	0.2 U	0.9 J	0.99	0.73
Aroclor-1260 (PCB-1260)	ug/kg		-	0.3 UJ	0.2 U	1.2 J	1.3	1.4
Aroclor-1262 (PCB-1262)	ug/kg		-					
Aroclor-1268 (PCB-1268)	ug/kg		-					
Total PCBs (ND = 0)	ug/kg		-	0.6 J	0.3	2.8 J	3.39	2.8
Total PCBs At 1% OC	ug/kg		-					2.51
General Chemistry								
Ammonia	mg/kg		-					
Cyanide (total)	mg/kg		0.1					
Nitrate (as N)	mg/kg		-					
pH, lab	s.u.		-					
Sulfide	mg/kg		-					
Total organic carbon (TOC)	mg/kg		-					
Total organic carbon (TOC)	%		-					
Selenium			-					
Aluminum			-					

AVS/SEM Expressed in umol/g		
		Molecular Weight
cadmium	umol/gram	112.40
copper	umol/gram	63.54
lead	umol/gram	207.20
mercury	umol/gram	200.59
nickel	umol/gram	58.70
zinc	umol/gram	65.37
total SEM	umol/gram	
Sulfide	umol/gram	33.48
Estimated from AVS/SEM ratio		
Carbon normalized SEM criteria is 130		
Conclusion		

Notes:
 J - Estimated concentration.
 U - Not present at or above the associated value.

**ANALYTICAL RESULTS SUMMARY - SEDIMENT/MATERIAL BENEATH SEDIMENT
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI**

Sample Location:	SED-317-13	SO-318-13	SED-319-13	SO-320-13
Sample ID:	S-58502-071713-SSH-317	S-58502-071713-SSH-318	S-58502-071713-SSH-319	S-58502-071713-SSH-320
Sample Date:	7/17/2013	7/17/2013	7/17/2013	7/17/2013
Sample Depth:	(0-1.5) ft BGS	(1.5-2.5) ft BGS	(0-5) ft BGS	(5-6) ft BGS
matrix_code	SE	SO	SE	SO
Parameters:	Units	Statewide Default Background Levels	Res/Non_Res/GW Prot	SW Interface Prot
Metals				
Aluminum	mg/kg	-	2400	6100
Antimony	mg/kg	94	0.12 J	0.41 J
Arsenic	mg/kg	5.8	4.6	5.2
Barium	mg/kg	-	14	44
Beryllium	mg/kg	-	0.13 J	0.31
Cadmium	mg/kg	-	0.046 J	0.43
Calcium	mg/kg	-	14000 J	29000 J
Chromium	mg/kg	18	3.3	8.9
Cobalt	mg/kg	6.8	2	1.4
Copper	mg/kg	-	7.8	26
Iron	mg/kg	-	6500	16000
Lead	mg/kg	-	6.4 J	52 J
Magnesium	mg/kg	-	3800	7300
Manganese	mg/kg	-	110	380
Mercury	mg/kg	0.13	0.05	0.056 U
Nickel	mg/kg	-	6.5	17
Potassium	mg/kg	-	310 J	820
Selenium	mg/kg	0.41	0.4	0.47
Silver	mg/kg	1.0	0.1	0.021 J
Sodium	mg/kg	-	88 J	200
Thallium	mg/kg	-	4.2	0.057 J
Vanadium	mg/kg	-	190	6.4
Zinc	mg/kg	-	60	730
Metals - SEM				
Cadmium	mg/kg	-	0.075 J	1.3
Copper	mg/kg	-	7.3	49
Lead	mg/kg	-	6.8	160
Mercury	mg/kg	0.05	0.017 U	0.040 U
Nickel	mg/kg	-	5.0	21
Zinc	mg/kg	-	75	2600
SEM/AVS	none	-	0.87	1.4
Polychlorinated Biphenyls				
Aroclor-1016 (PCB-1016)	ug/kg	-	0.35 U	0.5 U
Aroclor-1221 (PCB-1221)	ug/kg	-	0.35 U	0.5 U
Aroclor-1232 (PCB-1232)	ug/kg	-	0.35 U	0.5 U
Aroclor-1242 (PCB-1242)	ug/kg	-	0.11 J	0.039 J
Aroclor-1248 (PCB-1248)	ug/kg	-	0.35 U	0.5 U
Aroclor-1254 (PCB-1254)	ug/kg	-	0.35 U	0.5 U
Aroclor-1260 (PCB-1260)	ug/kg	-	0.35 U	0.5 U
Aroclor-1262 (PCB-1262)	ug/kg	-	0.35 U	0.5 U
Aroclor-1268 (PCB-1268)	ug/kg	-	0.35 U	0.5 U
Total PCBs (ND = 0)	ug/kg	-	0.11	0.039
Total PCBs At 1% OC	ug/kg	-	0.04	0.02
General Chemistry				
Ammonia	mg/kg	-	26 J	120
Cyanide (total)	mg/kg	0.1	0.14 J	0.53 J
Nitrate (as N)	mg/kg	-	340 U	480 U
pH, lab	s.u.	-	7.29 J	7.23 J
Sulfide	mg/kg	-	51	-
Total organic carbon (TOC)	mg/kg	-	28000	26000
Total organic carbon (TOC)	%	-	0.03	0.03
Selenium	mg/kg	-	0.47	0.98
Aluminum	mg/kg	-	2400	6100
AVS/SEM Expressed in umol/g				
			Molecular Weight	
cadmium	umol/gram		112.40	0.00
copper	umol/gram		63.54	0.11
lead	umol/gram		207.20	0.03
mercury	umol/gram		200.59	0.00
nickel	umol/gram		58.70	0.09
zinc	umol/gram		65.37	1.15
total SEM	umol/gram			1.38
Sulfide	umol/gram		33.48	1.52
			Estimated from AVS/SEM ratio	
				1.59
			Carbon normalized SEM criteria is 130	
				-5.09
			Conclusion	
				Not Toxic

Notes:
J - Estimated concentration.
U - Not present at or above the associated value.

**ANALYTICAL RESULTS SUMMARY - SEDIMENT/MATERIAL BENEATH SEDIMENT
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI**

Sample Location: SED-321-13 SO-322-13 SED-323-13 SED-324-13 SO-325-13
 Sample ID: S-58502-071713-SSH-321 S-58502-071713-SSH-322 S-58502-071713-SSH-323 S-58502-071713-SSH-324 S-58502-071713-SSH-325
 Sample Date: 7/17/2013 7/17/2013 7/17/2013 7/17/2013 7/17/2013
 Sample Depth: (0-4) ft BGS (4-5) ft BGS (0-1.5) ft BGS DUP (0-1.5) ft BGS (1.5-2.5) ft BGS
 matrix_code SE SO SE SE SO

Parameters:	Units	Statewide Default Background Levels	Res/Non_Res/GW Prot_SW Interface Prot	SED-321-13	SO-322-13	SED-323-13	SED-324-13	SO-325-13
Metals								
Aluminum	mg/kg	-	-	14000	2800	3200	2900	4900
Antimony	mg/kg	94	0.78 J	0.78 J	0.59 J	0.12 J	0.065 J	0.040 J
Arsenic	mg/kg	5.8	4.6	8.0	2.6	2.2	1.8	2.5
Barium	mg/kg	-	-	79	17	17	16	34
Beryllium	mg/kg	-	-	0.74	0.25	0.16 J	0.15 J	0.22
Cadmium	mg/kg	-	-	1.4	0.61	0.18	0.14	0.087
Calcium	mg/kg	-	-	61000 J	7100 J	43000 J	41000 J	65000 J
Chromium	mg/kg	18	3.3	43	13	11	14	13
Cobalt	mg/kg	6.8	2	7.7	1.4	2.1	1.8	4.1
Copper	mg/kg	-	-	52	18	9.2	6.5	9.3
Iron	mg/kg	-	-	35000	8300	7500	6300	8300
Lead	mg/kg	-	-	150 J	100 J	16 J	9.5 J	4.5 J
Magnesium	mg/kg	-	-	16000	1700	14000	13000	20000
Manganese	mg/kg	-	-	1400	450	300	310	250
Mercury	mg/kg	0.13	0.05	0.092 J	0.053	0.018 J	0.052 U	0.041 U
Nickel	mg/kg	-	-	28	6.8	6.6	5.7	12
Potassium	mg/kg	-	-	2100	210 J	610	520	1100
Selenium	mg/kg	0.41	0.4	2.0	0.77	0.51	0.51	0.68
Silver	mg/kg	1.0	0.1	0.40 J	0.24	0.042 J	0.031 J	0.025 J
Sodium	mg/kg	-	-	400	130	130	130	150
Thallium	mg/kg	-	-	4.2	0.23 J	0.11 J	0.050 J	0.094 J
Vanadium	mg/kg	-	-	190	24	4.8	8.0	7.8
Zinc	mg/kg	-	-	2900	3300	150	140	49
Metals - SEM								
Cadmium	mg/kg	-	-	1.3	-	0.078 J	0.10 J	-
Copper	mg/kg	-	-	47	-	4.8	6.1	-
Lead	mg/kg	-	-	130	-	7.3	8.9	-
Mercury	mg/kg	-	0.05	0.0047 J	-	0.016 U	0.017 U	-
Nickel	mg/kg	-	-	20	-	3.4	4.0	-
Zinc	mg/kg	-	-	2400	-	110	130	-
SEM/AVS	none	-	-	2.5	-	1.2	1.6	-
Polychlorinated Biphenyls								
Aroclor-1016 (PCB-1016)	ug/kg	-	-	0.85 U	0.34 U	0.34 U	0.36 U	0.31 U
Aroclor-1221 (PCB-1221)	ug/kg	-	-	0.85 U	0.34 U	0.34 U	0.36 U	0.31 U
Aroclor-1232 (PCB-1232)	ug/kg	-	-	0.85 U	0.34 U	0.34 U	0.36 U	0.31 U
Aroclor-1242 (PCB-1242)	ug/kg	-	-	0.85 U	0.044 J	0.34 U	0.36 U	0.31 U
Aroclor-1248 (PCB-1248)	ug/kg	-	-	0.85 U	0.34 U	0.34 U	0.36 U	0.31 U
Aroclor-1254 (PCB-1254)	ug/kg	-	-	0.85 U	0.34 U	0.34 U	0.36 U	0.31 U
Aroclor-1260 (PCB-1260)	ug/kg	-	-	0.85 U	0.34 U	0.34 U	0.36 U	0.31 U
Aroclor-1262 (PCB-1262)	ug/kg	-	-	0.85 U	0.34 U	0.34 U	0.36 U	0.31 U
Aroclor-1268 (PCB-1268)	ug/kg	-	-	0.85 U	0.34 U	0.34 U	0.36 U	0.31 U
Total PCBs (ND = 0)	ug/kg	-	-	0	0.044	0	0	0
Total PCBs At 1% OC	ug/kg	-	-	0.00	0.02	0.00	0.00	0.00
General Chemistry								
Ammonia	mg/kg	-	-	94	81	40 J	66	40 J
Cyanide (total)	mg/kg	0.1	-	2.0	1.4	0.66 U	0.70 U	0.57 U
Nitrate (as N)	mg/kg	-	-	790 U	320 U	330 U	340 U	300 U
pH, lab	s.u.	-	-	7.03 J	8.12 J	7.17 J	7.20 J	7.91 J
Sulfide	mg/kg	-	-	490	-	50	46	-
Total organic carbon (TOC)	mg/kg	-	-	96000	27000	28000	17000	23000
Total organic carbon (TOC)	%	-	-	0.10	0.03	0.03	0.02	0.02
Selenium	mg/kg	-	-	2	0.77	0.51	0.51	0.68
Aluminum	mg/kg	-	-	14000	2800	3200	2900	4900

AVS/SEM Expressed in umol/g								
		Molecular Weight						
cadmium	umol/gram	112.40	0.01			0.00	0.00	
copper	umol/gram	63.54	0.74			0.08	0.10	
lead	umol/gram	207.20	0.63			0.04	0.04	
mercury	umol/gram	200.59	0.00			0.00	0.00	
nickel	umol/gram	58.70	0.34			0.06	0.07	
zinc	umol/gram	65.37	36.71			1.68	1.99	
total SEM	umol/gram		38.43			1.85	2.20	
Sulfide	umol/gram	33.48	14.64			1.49	1.37	
		Estimated from AVS/SEM ratio	15.37			1.54	1.37	
		Carbon normalized SEM criteria is 130	247.89			12.81	48.40	
		Conclusion	Uncertain, probably not toxic			Not Toxic	Not Toxic	

Notes:
 J - Estimated concentration.
 U - Not present at or above the associated value.

TABLE 1

**ANALYTICAL RESULTS SUMMARY - SEDIMENT/MATERIAL BENEATH SEDIMENT
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI**

Sample Location:	SED-326-13	SO-327-13	SED328-13			
Sample ID:	S-58502-071713-SSH-326	S-58502-071713-SSH-327	S-58502-071713-SSH-328			
Sample Date:	7/17/2013	7/17/2013	7/17/2013			
Sample Depth:	(0-2.5) ft BGS	(2.5-3.5) ft BGS	(0-3) ft BGS			
matrix_code	SE	SO	SE			
Parameters:	Units	Statewide Default Background Levels	Res/Non_Res/GW Prot_GW SW Interface Prot			
Metals						
Aluminum	mg/kg	-	-	14000	5300	8600
Antimony	mg/kg	94	-	0.48 J	0.54 J	1.3 J
Arsenic	mg/kg	5.8	4.6	6.2	6.5	17
Barium	mg/kg	-	-	83	55	110
Beryllium	mg/kg	-	-	0.74	0.40	0.90
Cadmium	mg/kg	-	-	1.1	1.2	0.83 U
Calcium	mg/kg	-	-	74000 J	23000 J	38000 J
Chromium	mg/kg	18	3.3	39	46	190
Cobalt	mg/kg	6.8	2	8.1	2.5	9.4
Copper	mg/kg	-	-	43	63	120
Iron	mg/kg	-	-	27000	23000	180000
Lead	mg/kg	-	-	94 J	71 J	65 J
Magnesium	mg/kg	-	-	22000	4600	5300
Manganese	mg/kg	-	-	1100	630	3500
Mercury	mg/kg	0.13	0.05	0.12	0.13	0.10 U
Nickel	mg/kg	-	-	27	15	100
Potassium	mg/kg	-	-	2400	390 J	480 J
Selenium	mg/kg	0.41	0.4	1.9	0.79	1.7
Silver	mg/kg	1.0	0.1	0.39 J	0.47	0.14 J
Sodium	mg/kg	-	-	360	160	300
Thallium	mg/kg	-	-	0.23 J	0.079 J	0.067 J
Vanadium	mg/kg	-	190	26	8.7	11
Zinc	mg/kg	-	-	1700	1300	1100
Metals - SEM						
Cadmium	mg/kg	-	-	1.0	-	2.6 U
Copper	mg/kg	-	-	37	-	140
Lead	mg/kg	-	-	82	-	33
Mercury	mg/kg	-	0.05	0.0096 J	-	0.026 U
Nickel	mg/kg	-	-	19	-	76
Zinc	mg/kg	-	-	1700	-	740
SEM/AVS	none	-	-	2.4	-	0.86
Polychlorinated Biphenyls						
Aroclor-1016 (PCB-1016)	ug/kg	-	-	0.73 U	1.9 U	0.7 U
Aroclor-1221 (PCB-1221)	ug/kg	-	-	0.73 U	1.9 U	0.7 U
Aroclor-1232 (PCB-1232)	ug/kg	-	-	0.73 U	1.9 U	0.7 U
Aroclor-1242 (PCB-1242)	ug/kg	-	-	0.73 U	1.9 U	0.7 U
Aroclor-1248 (PCB-1248)	ug/kg	-	-	0.73 U	0.49 J	0.7 U
Aroclor-1254 (PCB-1254)	ug/kg	-	-	0.73 U	1.9 U	0.7 U
Aroclor-1260 (PCB-1260)	ug/kg	-	-	0.73 U	0.88 J	0.7 U
Aroclor-1262 (PCB-1262)	ug/kg	-	-	0.73 U	1.9 U	0.7 U
Aroclor-1268 (PCB-1268)	ug/kg	-	-	0.73 U	1.9 U	0.7 U
Total PCBs (ND = 0)	ug/kg	-	-	0	1.37	0
Total PCBs At 1% OC	ug/kg	-	-	0.00	0.15	0.00
General Chemistry						
Ammonia	mg/kg	-	-	54	69	120
Cyanide (total)	mg/kg	0.1	-	0.32 J	0.40 J	4.5
Nitrate (as N)	mg/kg	-	-	690 U	360 U	660 U
pH, lab	s.u.	-	-	7.14 J	7.20 J	7.53 J
Sulfide	mg/kg	-	-	350	-	550
Total organic carbon (TOC)	mg/kg	-	-	57000	91000	91000
Total organic carbon (TOC)	%	-	-	0.06	0.09	0.09
Selenium		-	-	1.9	0.79	1.7
Aluminum		-	-	14000	5300	8600
AVS/SEM Expressed in umol/g						
				Molecular Weight		
cadmium	umol/gram			112.40	0.01	0.01
copper	umol/gram			63.54	0.58	2.20
lead	umol/gram			207.20	0.40	0.16
mercury	umol/gram			200.59	0.00	0.00
nickel	umol/gram			58.70	0.32	1.29
zinc	umol/gram			65.37	26.01	11.32
total SEM	umol/gram				27.32	14.99
Sulfide	umol/gram				10.45	16.43
				Estimated from AVS/SEM ratio		
					11.38	17.43
				Carbon normalized SEM criteria is 130		
					295.83	-15.81
				Conclusion		
					Uncertain, probably not toxic	Not Toxic

Notes:
 J - Estimated concentration.
 U - Not present at or above the associated value.

TABLE 2

**ANALYTICAL RESULTS SUMMARY - SURFACE WATER DATA
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI**

Sample Location:			H6	MD-312-13	MD-314-13	MD-316-13	
Sample ID:			W00013	W-58502-071713-SSH-312	W-58502-071713-SSH-314	W-58502-071713-SSH-316	
Sample Date:			11/18/1998	7/17/2013	7/17/2013	7/17/2013	
Sample Depth:			(0-0) ft BWS	(2.5-2.5) ft BWS	(2.5-2.5) ft BWS	(2-2) ft BWS	
matrix_code			WS	WS	WS	WS	
Parameters:	Units	Res/Non_Res/GW SW Interface	DEQ Rule 57 - Surface Water Quality Values				
Metals							
Antimony	mg/L	0.13	0.0017	0.05 U	0.00038 J	0.00045 J	0.00029 J
Arsenic	mg/L	0.01	0.01	0.005 U	0.005 U	0.005 U	0.005 U
Barium	mg/L	-	1.9	0.035	0.036 J	0.033 J	0.033 J
Beryllium	mg/L	-	0.16	0.005 U	0.001 U	0.00013 J	0.000056 J
Cadmium	mg/L	-	0.0025	0.004 U	0.00003 J	0.00012 J	0.001 U
Chromium	mg/L	0.011	0.12	0.005 U	0.005 U	0.005 U	0.005 U
Cobalt	mg/L	0.1	0.1	0.01 U	0.00018 J	0.0002 J	0.000093 J
Copper	mg/L	-	0.47	0.01 U	0.002 U	0.002 U	0.002 U
Lead	mg/L	-	0.014	0.002 U	0.0014 J	0.001 J	0.00053 J
Manganese	mg/L	-	1.3	0.093	0.16	0.14	0.14
Mercury	mg/L	0.0000013	0.0000013	0.0002 U	0.00002 U	0.0002 U	0.0002 U
Nickel	mg/L	-	2.6	0.02 U	0.02 U	0.02 U	0.02 U
Selenium	mg/L	0.005	0.005	0.005 U	0.00067 J	0.00056 J	0.00035 J
Silver	mg/L	0.0002	0.00006	0.01 U	0.000019 J	0.000018 J	0.00001 J
Thallium	mg/L	0.0037	0.0012	0.005 U	0.001 U	0.001 U	0.001 U
Vanadium	mg/L	0.012	0.027	0.01 U	0.004 U	0.004 U	0.004 U
Zinc	mg/L	-	3.3	0.018 UJ	0.02 U	0.02 U	0.02 U
Polychlorinated Biphenyls							
Aroclor-1016 (PCB-1016)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
Aroclor-1221 (PCB-1221)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
Aroclor-1232 (PCB-1232)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
Aroclor-1242 (PCB-1242)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
Aroclor-1248 (PCB-1248)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
Aroclor-1254 (PCB-1254)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
Aroclor-1260 (PCB-1260)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
Aroclor-1262 (PCB-1262)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
Aroclor-1268 (PCB-1268)	mg/L	0.0002	0.000000026	0.0002 U	0.000095 U	0.000095 U	0.000095 U
General Chemistry							
Ammonia	mg/L	-	-	-	1.4 J	2.0 U	2.0 U
Ammonia (unionized)	mg/L	0.053	0.053	-	0.01	-	-
Biochemical oxygen demand (BOD)	mg/L	-	-	-	2.0 U	2.0 U	2.0 U
Chemical oxygen demand (COD)	mg/L	-	-	-	20	20	22
Cyanide (amenable)	mg/L	-	-	-	0.010 U	0.010 U	0.010 U
Cyanide (total)	mg/L	0.0052	0.0052	-	0.010 U	0.010 U	0.010 U
Hardness, carbonate	mg/L	-	-	-	130	130	120
Hardness, magnesium	mg/L	-	-	-	44	45	46
Nitrate (as N)	mg/L	-	10	-	0.10 U	0.10 U	0.10 U
Oil and grease (HEM), polar	mg/L	-	-	-	4.7 U	4.8 UJ	4.8 U
pH, lab	s.u.	-	-	-	7.45 J	7.52 J	7.42 J
Phenolics (total)	mg/L	-	-	-	0.040 U	0.040 U	0.040 U
Total organic carbon (TOC)	mg/L	-	-	-	5.9	6.2	6.1

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

UJ - Estimated reporting limit.

BWS - Below Water surface

⁽¹⁾ The generic GSI criteria are based on the toxicity of unionized ammonia (NH₃); the criteria is 53 µg/L warm water surface water

⁽²⁾ Temperature of the water was assumed to be approximately 65 degrees F at the criteria is 53 µg/L warm water surface water

TABLE 2

**ANALYTICAL RESULTS SUMMARY - SURFACE WATER DATA
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI**

Sample Location:**Sample ID:****Sample Date:****Sample Depth:****matrix_code**

	SW-310-13 W-58502-071713-SSH-310	SW-311-13 W-58502-071713-SSH-311	SW-313-13 W-58502-071713-SSH-313	SW-315-13 W-58502-071713-SSH-315
	7/17/2013 (0-0) ft BWS	7/17/2013 (0-0) ft BWS	7/17/2013 (0-0) ft BWS	7/17/2013 (0-0) ft BWS
	WS	WS	WS	WS

Parameters:	Units	Res/Non_Res/GW SW Interface	DEQ Rule 57 - Surface Water Quality Values				
Metals							
Antimony	mg/L	0.13	0.0017	0.0005 J	0.00036 J	0.00032 J	0.00036 J
Arsenic	mg/L	0.01	0.01	0.005 U	0.005 U	0.005 U	0.005 U
Barium	mg/L	-	1.9	0.037 J	0.036 J	0.033 J	0.033 J
Beryllium	mg/L	-	0.16	0.00025 J	0.00015 J	0.00004 J	0.000096 J
Cadmium	mg/L	-	0.0025	0.00014 J	0.000029 J	0.001 U	0.001 U
Chromium	mg/L	0.011	0.12	0.005 U	0.005 U	0.005 U	0.005 U
Cobalt	mg/L	0.1	0.1	0.00029 J	0.00018 J	0.000083 J	0.00014 J
Copper	mg/L	-	0.47	0.002 U	0.002 U	0.002 U	0.002 U
Lead	mg/L	-	0.014	0.002 J	0.0015 J	0.00062 J	0.001 J
Manganese	mg/L	-	1.3	0.17	0.15	0.11	0.18
Mercury	mg/L	0.000013	0.000013	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel	mg/L	-	2.6	0.02 U	0.02 U	0.02 U	0.02 U
Selenium	mg/L	0.005	0.005	0.00083 J	0.00052 J	0.00055 J	0.00049 J
Silver	mg/L	0.0002	0.00006	0.000039 J	0.000022 J	0.000017 J	0.000012 J
Thallium	mg/L	0.0037	0.0012	0.001 U	0.001 U	0.001 U	0.001 U
Vanadium	mg/L	0.012	0.027	0.004 U	0.004 U	0.004 U	0.004 U
Zinc	mg/L	-	3.3	0.02 U	0.02 U	0.02 U	0.02 U
Polychlorinated Biphenyls							
Aroclor-1016 (PCB-1016)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
Aroclor-1221 (PCB-1221)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
Aroclor-1232 (PCB-1232)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
Aroclor-1242 (PCB-1242)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
Aroclor-1248 (PCB-1248)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
Aroclor-1254 (PCB-1254)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
Aroclor-1260 (PCB-1260)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
Aroclor-1262 (PCB-1262)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
Aroclor-1268 (PCB-1268)	mg/L	0.0002	0.00000026	0.00011 U	0.0001 U	0.0001 U	0.000097 U
General Chemistry							
Ammonia	mg/L	-	-	2.0 U	1.1 J	1.1 J	2.0 U
Ammonia (unionized)	mg/L	0.053	0.053	-	0.01	0.01	-
Biochemical oxygen demand (BOD)	mg/L	-	-	2.0 U	2.0 U	2.0 U	2.0 U
Chemical oxygen demand (COD)	mg/L	-	-	22	25	17 J	30
Cyanide (amenable)	mg/L	-	-	0.010 U	0.010 U	0.010 U	0.010 U
Cyanide (total)	mg/L	0.0052	0.0052	0.010 U	0.010 U	0.010 U	0.010 U
Hardness, carbonate	mg/L	-	-	180	180	170	170
Hardness, magnesium	mg/L	-	-	45	44	45	44
Nitrate (as N)	mg/L	-	10	0.10 U	0.10 U	0.10 U	0.10 U
Oil and grease (HEM), polar	mg/L	-	-	4.9 U	4.9 U	4.8 U	4.9 U
pH, lab	s.u.	-	-	7.43 J	7.44 J	7.44 J	7.41 J
Phenolics (total)	mg/L	-	-	0.040 U	0.040 U	0.040 U	0.040 U
Total organic carbon (TOC)	mg/L	-	-	6.0	6.1	6.0	6.4

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

UJ - Estimated reporting limit.

BWS - Below Water surface

⁽¹⁾ The generic GSI criteria are based on the toxicity of unionized ammonia (NH₃);
the criteria is 53 µg/L warm water surface water

⁽²⁾ Temperature of the water was assumed to be approximately 65 degrees F at
the criteria is 53 µg/L warm water surface water

TABLE 3

ANALYTICAL RESULTS SUMMARY - BANK SOIL
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI

Sample Location:	SO-290-13	SO-292-13	SO-294-13
Sample ID:	S-58502-071613-SSH-290	S-58502-071613-SSH-292	S-58502-071613-SSH-294
Sample Date:	7/16/2013	7/16/2013	7/16/2013
Sample Depth:	(0-0.5) ft BGS	(0-0.5) ft BGS	(0-0.5) ft BGS
matrix_code	SO	SO	SO

Parameters:	Units	Statewide	Direct	Res/Non_Res/G W Prot_GW SW Interface Prot (b)	SO-290-13	SO-292-13	SO-294-13
		Default Background Levels	Contact Criteria & RBSLs (a)				
Metals							
Aluminum	mg/kg		370000	-	2200	4100	890
Antimony	mg/kg		670	94	0.13 J	0.14 J	0.094 J
Arsenic	mg/kg	5.8	37	4.6	1.1	2.8	3.8
Barium	mg/kg		130000	-	14	65	6.0
Beryllium	mg/kg		1600	-	0.10 J	0.42	0.066 J
Cadmium	mg/kg		2100	-	0.11	0.065 J	0.096
Calcium	mg/kg		-	-	3600	17000	1600
Chromium	mg/kg	18		3.3	12	70 (b)	5.8
Cobalt	mg/kg	6.8	9000	2	0.82	1.3	0.89
Copper	mg/kg		73000	-	7.5	18	3.6
Iron	mg/kg		90000	-	5300	16000	6100
Lead	mg/kg		900	-	15	11	15
Magnesium	mg/kg		1000000	-	1300	1800	640
Manganese	mg/kg		90000	-	61	940	100
Mercury	mg/kg	0.13	580	0.05	0.055 U	0.058 U	0.050 U
Nickel	mg/kg		150000	-	4.9	13	2.5
Potassium	mg/kg		-	-	180 J	290 J	450 U
Selenium	mg/kg	0.41	9600	0.4	0.28 J	0.74 (b)	0.22 J
Silver	mg/kg	1.0	9000	0.1	0.013 J	0.081 J	0.019 J
Sodium	mg/kg		1000000	-	100 U	84 U	91 U
Thallium	mg/kg		130	4.2	0.14 J	0.17	0.18 U
Vanadium	mg/kg		5500	190	5.1	6.4	6.7
Zinc	mg/kg		630000	-	99	270	73
Polychlorinated Biphenyls							
Aroclor-1016 (PCB-1016) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
Aroclor-1221 (PCB-1221) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
Aroclor-1232 (PCB-1232) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
Aroclor-1242 (PCB-1242) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
Aroclor-1248 (PCB-1248) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
Aroclor-1254 (PCB-1254) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
Aroclor-1260 (PCB-1260) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
Aroclor-1262 (PCB-1262) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
Aroclor-1268 (PCB-1268) ⁽¹⁾	µg/kg		1000	-	0.35 U	0.35 U	0.33 U
General Chemistry							
Ammonia	mg/kg		-	-	48 U	49 U	50 U
Cyanide (total)	mg/kg		250	0.1	0.67 U	1.8 (b)	0.64 U
Nitrate (as N)	mg/kg		-	-	330 U	330 U	310 U
pH, lab	s.u.		-	-	7.46 J	7.07 J	8.36 J
Total organic carbon (TOC)	mg/kg		-	-	12000	12000	8200

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

⁽¹⁾ MDEQ guidance references TSCA regulations. 1000ppb PCBs is the criteria for unrestricted use

TABLE 3

ANALYTICAL RESULTS SUMMARY - BANK SOIL
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI

Sample Location:		SO-296-13		SO-298-13		SO-300-13	
Sample ID:		S-58502-071613-SSH-296		S-58502-071613-SSH-298		S-58502-071613-SSH-300	
Sample Date:		7/16/2013		7/16/2013		7/16/2013	
Sample Depth:		(0-0.5) ft BGS		(0-0.5) ft BGS		(0-0.5) ft BGS	
matrix_code		SO		SO		SO	
Parameters:	Units	Statewide Default Background Levels	Direct Contact Criteria & RBSLs (a)	Res/Non_Res/G W Prot_GW SW Interface Prot (b)			
Metals							
Aluminum	mg/kg		370000	-	3200	5100	7900
Antimony	mg/kg		670	94	0.27 J	0.49 J	0.43 J
Arsenic	mg/kg	5.8	37	4.6	5.4	4.2	6.1 (b)
Barium	mg/kg		130000	-	27	38	79
Beryllium	mg/kg		1600	-	0.22	0.28	0.64
Cadmium	mg/kg		2100	-	0.19	0.081 J	0.19 J
Calcium	mg/kg			-	15000	9200	35000
Chromium	mg/kg	18		3.3	41 (b)	34 (b)	110 (b)
Cobalt	mg/kg	6.8	9000	2	1.9	3.3	4.0
Copper	mg/kg		73000	-	15	28	54
Iron	mg/kg			-	16000	32000	61000
Lead	mg/kg		900	-	29	20	33
Magnesium	mg/kg		1000000	-	3000	2700	5600
Manganese	mg/kg		90000	-	380	580	1400
Mercury	mg/kg	0.13	580	0.05	0.049 U	0.050 U	0.047 U
Nickel	mg/kg		150000	-	13	20	57
Potassium	mg/kg			-	320 J	410 J	610
Selenium	mg/kg	0.41	9600	0.4	0.79 (b)	0.65 (b)	1.1 (b)
Silver	mg/kg	1.0	9000	0.1	0.062 J	0.049 J	0.088 J
Sodium	mg/kg		1000000	-	100 U	92 U	78 U
Thallium	mg/kg		130	4.2	0.22	0.18 U	0.16 U
Vanadium	mg/kg		5500	190	6.9	7.5	9.9
Zinc	mg/kg		630000	-	98	86	370
Polychlorinated Biphenyls							
Aroclor-1016 (PCB-1016) ⁽¹⁾	µg/kg		1000	-	0.34 U	0.33 U	0.29 U
Aroclor-1221 (PCB-1221) ⁽¹⁾	µg/kg		1000	-	0.34 U	0.33 U	0.29 U
Aroclor-1232 (PCB-1232) ⁽¹⁾	µg/kg		1000	-	0.34 U	0.33 U	0.29 U
Aroclor-1242 (PCB-1242) ⁽¹⁾	µg/kg		1000	-	0.34 U	0.16 J	0.075 J
Aroclor-1248 (PCB-1248) ⁽¹⁾	µg/kg		1000	-	0.34 U	0.33 U	0.29 U
Aroclor-1254 (PCB-1254) ⁽¹⁾	µg/kg		1000	-	0.037 J	0.17 J	0.049 J
Aroclor-1260 (PCB-1260) ⁽¹⁾	µg/kg		1000	-	0.34 U	0.026 J	0.29 U
Aroclor-1262 (PCB-1262) ⁽¹⁾	µg/kg		1000	-	0.34 U	0.33 U	0.29 U
Aroclor-1268 (PCB-1268) ⁽¹⁾	µg/kg		1000	-	0.34 U	0.33 U	0.29 U
General Chemistry							
Ammonia	mg/kg			-	80	50 U	68
Cyanide (total)	mg/kg		250	0.1	0.61 U	0.65 U	5.1 (b)
Nitrate (as N)	mg/kg			-	310 U	310 U	270 U
pH, lab	s.u.			-	8.18 J	7.97 J	8.13 J
Total organic carbon (TOC)	mg/kg			-	23000	18000	44000

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

⁽¹⁾ MDEQ guidance references TSCA regulations. 1000ppb PCBs is the criteria for unrestricted use

TABLE 3

ANALYTICAL RESULTS SUMMARY - BANK SOIL
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI

Sample Location: SO-302-13 SO-304-13 SO-306-13
Sample ID: S-58502-071613-SSH-302 S-58502-071613-SSH-304 S-58502-071613-SSH-306
Sample Date: 7/16/2013 7/16/2013 7/16/2013
Sample Depth: (0-0.5) ft BGS (0-0.5) ft BGS (0-0.5) ft BGS
matrix_code SO SO SO

Parameters:	Units	Statewide Default Background Levels	Direct Contact Criteria & RBSLs (a)	Res/Non_Res/G W Prot_GW SW Interface Prot (b)	SO-302-13 S-58502-071613-SSH-302 7/16/2013 (0-0.5) ft BGS SO	SO-304-13 S-58502-071613-SSH-304 7/16/2013 (0-0.5) ft BGS SO	SO-306-13 S-58502-071613-SSH-306 7/16/2013 (0-0.5) ft BGS SO
Metals							
Aluminum	mg/kg		370000	-	9300	4100	2900
Antimony	mg/kg		670	94	0.15 J	0.11 J	0.16 J
Arsenic	mg/kg	5.8	37	4.6	5.7 (b)	1.6	2.7
Barium	mg/kg		130000	-	59	34	19
Beryllium	mg/kg		1600	-	0.47	0.22	0.20
Cadmium	mg/kg		2100	-	0.24	0.097	0.045 J
Calcium	mg/kg			-	36000	7300	3300
Chromium	mg/kg	18		3.3	23 (b)	7.4	16
Cobalt	mg/kg	6.8	9000	2	5.8	0.88	1.1
Copper	mg/kg		73000	-	19	4.5	6.7
Iron	mg/kg		90000	-	15000	4700	9500
Lead	mg/kg		900	-	23	8.4	12
Magnesium	mg/kg		1000000	-	13000	1600	810
Manganese	mg/kg		90000	-	530	170	240
Mercury	mg/kg	0.13	580	0.05	0.035 J	0.050 U	0.043 U
Nickel	mg/kg		150000	-	18	3.1	5.2
Potassium	mg/kg			-	1700	260 J	280 J
Selenium	mg/kg	0.41	9600	0.4	0.91 (b)	0.57 (b)	0.54 (b)
Silver	mg/kg	1.0	9000	0.1	0.053 J	0.019 J	0.023 J
Sodium	mg/kg		1000000	-	87	80 U	86 U
Thallium	mg/kg		130	4.2	0.17 U	0.16 U	0.17 U
Vanadium	mg/kg		5500	190	20	4.3	4.5
Zinc	mg/kg		630000	-	110	29	35
Polychlorinated Biphenyls							
Aroclor-1016 (PCB-1016) ⁽¹⁾	µg/kg		1000	-	0.31 U	0.29 U	0.3 U
Aroclor-1221 (PCB-1221) ⁽¹⁾	µg/kg		1000	-	0.31 U	0.29 U	0.3 U
Aroclor-1232 (PCB-1232) ⁽¹⁾	µg/kg		1000	-	0.31 U	0.29 U	0.3 U
Aroclor-1242 (PCB-1242) ⁽¹⁾	µg/kg		1000	-	0.31 U	0.29 U	0.3 U
Aroclor-1248 (PCB-1248) ⁽¹⁾	µg/kg		1000	-	0.31 U	0.29 U	0.3 U
Aroclor-1254 (PCB-1254) ⁽¹⁾	µg/kg		1000	-	0.065 J	0.29 U	0.3 U
Aroclor-1260 (PCB-1260) ⁽¹⁾	µg/kg		1000	-	0.31 U	0.29 U	0.3 U
Aroclor-1262 (PCB-1262) ⁽¹⁾	µg/kg		1000	-	0.31 U	0.29 U	0.3 U
Aroclor-1268 (PCB-1268) ⁽¹⁾	µg/kg		1000	-	0.31 U	0.29 U	0.3 U
General Chemistry							
Ammonia	mg/kg			-	68	50 U	81
Cyanide (total)	mg/kg		250	0.1	0.59 U	0.53 U	0.55 U
Nitrate (as N)	mg/kg			-	290 U	280 U	280 U
pH, lab	s.u.			-	8.14 J	8.04 J	7.60 J
Total organic carbon (TOC)	mg/kg			-	27000	18000	24000

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

⁽¹⁾ MDEQ guidance references TSCA regulations. 1000ppb PCBs is the criteria for unrestricted use

TABLE 3
ANALYTICAL RESULTS SUMMARY - BANK SOIL
NORTH DITCH
RACER NODULAR INDUSTRIAL LAND (10040)
SAGINAW, MI

Sample Location: SO-307-13
Sample ID: S-58502-071613-SSH-307
Sample Date: 7/16/2013
Sample Depth: (0-0.5) ft BGS
matrix_code: SO
(Duplicate)

Parameters:	Units	Statewide	Direct	Res/Non_Res/G	
		Default Background Levels	Contact Criteria & RBSLs (a)	W Prot	GW SW Interface Prot (b)
Metals					
Aluminum	mg/kg		370000	-	2900
Antimony	mg/kg		670	94	0.072 J
Arsenic	mg/kg	5.8	37	4.6	2.1
Barium	mg/kg		130000	-	18
Beryllium	mg/kg		1600	-	0.18
Cadmium	mg/kg		2100	-	0.038 J
Calcium	mg/kg			-	2600
Chromium	mg/kg	18		3.3	10
Cobalt	mg/kg	6.8	9000	2	0.95
Copper	mg/kg		73000	-	5.0
Iron	mg/kg			-	7200
Lead	mg/kg		900	-	11
Magnesium	mg/kg		1000000	-	870
Manganese	mg/kg		90000	-	160
Mercury	mg/kg	0.13	580	0.05	0.043 U
Nickel	mg/kg		150000	-	3.3
Potassium	mg/kg			-	260 J
Selenium	mg/kg	0.41	9600	0.4	0.53 (b)
Silver	mg/kg	1.0	9000	0.1	0.027 J
Sodium	mg/kg		1000000	-	82 U
Thallium	mg/kg		130	4.2	0.16 U
Vanadium	mg/kg		5500	190	4.3
Zinc	mg/kg		630000	-	34
Polychlorinated Biphenyls					
Aroclor-1016 (PCB-1016) ⁽¹⁾	µg/kg		1000	-	0.3 U
Aroclor-1221 (PCB-1221) ⁽¹⁾	µg/kg		1000	-	0.3 U
Aroclor-1232 (PCB-1232) ⁽¹⁾	µg/kg		1000	-	0.3 U
Aroclor-1242 (PCB-1242) ⁽¹⁾	µg/kg		1000	-	0.3 U
Aroclor-1248 (PCB-1248) ⁽¹⁾	µg/kg		1000	-	0.3 U
Aroclor-1254 (PCB-1254) ⁽¹⁾	µg/kg		1000	-	0.3 U
Aroclor-1260 (PCB-1260) ⁽¹⁾	µg/kg		1000	-	0.3 U
Aroclor-1262 (PCB-1262) ⁽¹⁾	µg/kg		1000	-	0.3 U
Aroclor-1268 (PCB-1268) ⁽¹⁾	µg/kg		1000	-	0.3 U
General Chemistry					
Ammonia	mg/kg			-	49 U
Cyanide (total)	mg/kg		250	0.1	0.54 U
Nitrate (as N)	mg/kg			-	280 U
pH, lab	s.u.			-	7.53 J
Total organic carbon (TOC)	mg/kg			-	21000

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

⁽¹⁾ MDEQ guidance references TSCA regulations. 1000ppb PCBs is the criteria for unrestricted use

TABLE 4

**NORTH DITCH SITE STABILIZATION ALTERNATIVES
SAGINAW NODULAR INDUSTRIAL LAND
SAGINAW, MICHIGAN**

<i>Criteria</i>	<i>Alternative 1 - Install New Catchbasin Along the North Ditch - Hook into Tri-Cap outfall - Cover Sediments</i>
Protect Human Health and the Environment	Stormwater ponding will be prevented by directing runoff to a catchbasin. By preventing the ponding of stormwater, the potential exposure of avian and mammalian populations by consumption will be significantly reduced. Furthermore, covering the sediments will prevent potential suspension and migration of impacted sediments to potential downstream receptors.
Attain Media Cleanup Standards	The results of the risk assessments identified that there is no unacceptable risk to humans and the risk of adverse ecological effects is low to negligible but alternative will eliminate low to adverse ecological risk.
Controlling the Source of Release	Contaminants of concern include PCBs which have an affinity for solids as evidenced by the lack of PCBs found in the Ditch water. In addition, the following parameters were detected above GSI protection criteria: arsenic, cobalt, chromium, selenium, and cyanide. Through the installation of a geo-fabric and a clean layer of soil, the source is being immobilized.
Comply with Applicable Waste Management Standards	No waste management is required by this corrective measure.
Long-term Reliability and Effectiveness	This is a reliable and effective mechanism to restrict avian/mammalian exposures and prevent the migration of sediments.
Reduction in the Toxicity, Mobility, and Volume of Waste	This option reduces potential exposures on-Site and prevents the mobility of hazardous constituents; however, this option does not reduce the toxicity or the volume of waste.
Short-term Effectiveness	This is a reliable mechanism which can be implemented in a relatively short period of time to prevent migration of hazardous constituents and reduce potential exposures.
Implementability	This option would be easily implemented from a construction stand point using standard engineering practices, however, permits, approvals and agreements from various parties will be required to complete the work.
Community Acceptance	This option would reduce ponding and improve the aesthetics of the North Ditch. Community acceptance is likely, especially adjacent property owners because of the improvement of stormwater drainage.
State Acceptance (MDEQ)	MDEQ acceptance is anticipated. Discussions to follow.
Sustainability	This option requires short term construction. Following construction, additional resource consumption is not required.
Cost	Costs are on the order of \$200,000, assuming there is available capacity in the existing network and concurrence is obtained from the following parties: County Drain Commission, Michigan Department of Environmental Quality (NPDES), neighbor (easement to discharge water into existing storm system and access for completing work), US Army Corp of Engineers and USEPA

TABLE 5

NORTH DITCH SITE STABILIZATION ALTERNATIVES
 SAGINAW NODULAR INDUSTRIAL LAND
 SAGINAW, MICHIGAN

<i>Criteria</i>	<i>Alternative 2 - Excavate Sediment from North Ditch, backfill with clean material, and regrade ditch to drain to new catchbasin that will tie into Tri-Cap outfall (manhole)</i>
Protect Human Health and the Environment	Removal of the hazardous constituents would eliminate potential exposure of avian and mammalian populations at the North Ditch.
Attain Media Cleanup Standards	All media above cleanup standards would be removed and disposed of off-Site.
Controlling the Source of Release	By removing the sediments the source of any contaminants in the sediment will be eliminated.
Comply with Applicable Waste Management Standards	All excavated materials would be disposed of at a local disposal facility which is permitted to receive the materials.
Long-term Reliability and Effectiveness	All media above cleanup standards would be removed and disposed of off-Site.
Reduction in the Toxicity, Mobility, and Volume of Waste	All media above cleanup standards would be removed and disposed of off-Site.
Short-term Effectiveness	This alternative could be completed in a short time frame and all media above cleanup standards would be removed and disposed of off-Site.
Implementability	This option would be easily implemented from a construction stand point using standard engineering practices, however, permits, approvals and agreements from various parties will be required to complete the work.
Community Acceptance	This option would reduce ponding and improve the aesthetics of the North Ditch, while removing the hazardous constituents. Community acceptance is expected, especially adjacent property owners.
State Acceptance (MDEQ)	MDEQ acceptance is anticipated. Discussions to follow.
Sustainability	This option requires extensive excavation and transportation of excavated materials; however, following construction no additional resource consumption is anticipated.
Cost	Costs are on the order of \$1,000,000, assuming there is available capacity in the existing network and concurrence is obtained from the following parties: County Drain Commission, Michigan Department of Environmental Quality (NPDES), neighbor (easement to discharge water into existing storm system and access for completing work), US Army Corp of Engineers and USEPA