

RESPONSIVENESS SUMMARY

Michigan's Adventure Amusement Groundwater Discharge Permit GW1010335

The draft Groundwater Discharge Permit for the Michigan's Adventure Amusements was public noticed on August 5, 2015. Public comment on the draft permit was received through September 3, 2015. In addition, a Public Hearing that included a Department of Environmental Quality (DEQ) presentation on the draft permit and a question and answer period, was held on November 4, 2015, at Muskegon Community College, Muskegon, Michigan.

The hearing was attended by 34 people that included residents, environmental groups, local and state government representatives, and students. Staff of the DEQ responded to many questions during the open session. Many more comments were received during the Public Hearing portion of the session. In addition, written comments were received during the extended public comment period which ended November 12, 2015.

A Groundwater Discharge permit may be contested within 60 days of issuance by filing a petition for Contested Case Hearing with the Michigan Administrative Hearing System within the Department of Licensing and Regulatory Affairs, c/o the Michigan Department of Environmental Quality. A petition may be obtained from the Internet at <http://www.deq.state.mi.us/documents/deq-oah-eqp0201.dot>.

Summary of Comments Received on the Draft Groundwater Discharge Permit

The following is a summary of comments received during the public notice period and from the public hearing. In preparing this summary, actual comment language was abbreviated, paraphrased, and/or edited for clarity. Following each comment is a response from the DEQ, Water Resources Division.

Ground Water Concerns

- 1. Comment: The DEQ should require Michigan's Adventure to hook up to the county sewer line that runs adjacent to the property on Riley Road or the Trunk sewer that runs down the bike path adjacent to the wastewater lagoons.**

Response: The legal requirement for a person to hook up to an available public sanitary sewer system is set forth in the Public Health Code, 1978 Act 368, as amended. Specifically, Section 333.12753 requires that structures in which sanitary sewerage originates must be connected to an available public sanitary sewer if required by the city, village or township in which the sewage originates. An available public sanitary sewer is defined in Section 333.12751 as "a public sanitary sewer system located in a right of way, easement, highway, street, or public way which crosses, adjoins, or abuts upon the property and passing not

more than 200 feet at the nearest point from a structure in which sanitary sewage originates.” The structures at Michigan’s Adventure that generate sanitary sewage are farther from the county sanitary sewer than 200 feet which means that Michigan’s Adventure is not required to connect to the system under the Public Health Code. In addition, the Michigan Court of Appeals ruled in favor of Michigan’s Adventure in a lawsuit between Michigan’s Adventure and Dalton Township, holding that Michigan’s Adventure was not required to connect to the county sewer system. Therefore, the DEQ has no authority to mandate the connection to the sewer system.

- 2. Comment: Michigan’s Adventures storm water runoff from its parking lots is adversely affecting Duck Creek by increasing the thermal load on the river.**

Response: The storm water runoff from Michigan’s Adventure’s parking lots is collected in a storm water basin separate from the wastewater treatment system. The basin has an outfall that discharges to Duck Creek. This storm water discharge to Duck Creek is not a groundwater discharge and hence is not part of the groundwater discharge permit. The parking lot storm water discharge is also not a regulated industrial storm water discharge.

- 3. Comment: What is the age and condition of the liners currently being used by Michigan’s Adventure?**

Response: The lagoon liners were constructed in 2000 and consist of a clay base with a PVC liner. Visual inspections by DEQ staff have not shown deterioration of the liners.

- 4. Comment: Michigan’s Adventure should have leak detection devices in place to monitor the integrity of the lagoon liners.**

Response: Rule 323.2237 requires that treatment or storage lagoons consist of a composite liner with a base and a flexible membrane liner. Leak detection devices are not a requirement under Rule 323.2237.

- 5. Comment: Michigan’s Adventure should take wastewater samples prior to discharging.**

Response: As part of the permit application review process, the DEQ required Michigan’s Adventure to collect four separate samples of the wastewater from the lagoons during the period of May 11 through May 26, 2015. The sample results are attached to this Responsiveness Summary.

The four samples were analyzed for constituents commonly found in sanitary waste including sodium, chloride, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total inorganic nitrogen (TIN), and total phosphorus. The fourth sample, collected on May 26, 2015 was taken after Michigan’s Adventure stopped discharging for the year and shortly after the park opened for the Memorial Day

weekend. The fourth sample was therefore, not representative of the 2015 discharge. Effluent sodium concentrations for the three remaining samples ranged between 34 mg/l and 39 mg/l, and chloride concentrations ranged between 57 mg/l and 64 mg/l. These concentrations are well below the Part 22 discharge standards and the Part 201 Residential Drinking Water criteria for these constituents (230 mg/l for sodium and 250 mg/l for chloride). Effluent TIN concentrations as ammonia ranged between 4.8 mg/l and 6.4 mg/l, which are below the Part 201 Residential Drinking Water criteria of 10 mg/l. Effluent total phosphorus concentrations ranged between 4.7 and 5.3 mg/l. Rule 2222(2) sets the discharge standard for total phosphorus at 5.0 mg/l unless a surface water body is within 1,000 feet of the discharge, which requires a lower phosphorus limit. This rule also allows the DEQ to approve alternate phosphorus concentrations if a surface water body is not less than 1,000 feet downgradient of the discharge. Given the distance to the nearest surface water body (approximately 1,700 feet), and the amount of dilution expected within the aquifer receiving the discharge, the reported total phosphorus concentrations are not likely to become injurious to nearby surface waters.

Michigan's Adventure discharges their wastewater during an approximate two month period in early spring, prior to the park opening for the year. The wastewater receives treatment via biological activity and aeration while it is retained in the lagoons prior to discharge the following year. The results of the wastewater samples collected during this discharge event in May, 2015 demonstrate that the wastewater receives significant treatment prior to discharge. Although the characteristics of the discharge are not expected to change significantly from year-to-year due to the lengthy holding time in the lagoons prior to discharge, the DEQ has added sampling requirements to the permit. Michigan's Adventure will be required to sample the discharge once per week during discharge and analyze the samples for the same substances as the May, 2015 samples.

6. Comment: Stricter monitoring of the site is needed. Monitoring wells, a hydrogeological review, and a groundwater study are needed.

Response: The DEQ has reviewed available hydrogeologic information for the Michigan's Adventure site. Based on nearby water well records, the discharge from the treatment lagoons is to an aquifer used as a local water supply. The well logs show the area surrounding the discharge is underlain by at least 126 feet of sand and gravel with intermittent and discontinuous clay layers. Groundwater was encountered between 3.0 and 47 feet below ground surface during drilling. According to these data, the regional groundwater flow direction is expected to be to the west and southwest.

Under the Part 22 Rules, dischargers are required to meet isolation distances from water supply wells. The largest dischargers are required to discharge a minimum of 300 feet from a domestic supply well. According to the available water well logs, the nearest domestic water supply wells are located more than 1,800 feet south of the discharge along Riley Thompson Road. The nearest domestic wells to the north and west are greater than 2,700 feet from the discharge and the nearest wells to the east are greater than 3,500 feet from the discharge.

Given the volume of the aquifer receiving the discharge, the distance to the nearest water supply wells, the concentrations of constituents of concern in the discharge, and the volume of the discharge, the discharge from the treatment lagoons is not expected to impact groundwater above any applicable criteria.

7. Comment: Michigan's Adventure needs to request a Rule 2218 groundwater discharge permit instead of the Rule 2210(y) exemption.

Response: Rule 2210(y) provides that a site specific exemption may be issued to a discharger if that discharge has been determined by the DEQ to have an insignificant potential to be injurious based on volume and constituents. For the reasons noted in responses 5 and 6, above, the DEQ has determined that the discharge of sanitary wastewater from the Michigan's Adventure wastewater treatment system meets the requirements for authorization under Rule 2210(y).

8. Comment: Michigan's Adventure did not list all adjacent property owners in their application. At least two property owners were omitted from the list.

Response: The DEQ has reviewed the list provided by Michigan's Adventure and is satisfied that Michigan's Adventure used due diligence in supplying the names of adjacent property owners. While a list of property owners is requested in the application, in accordance with Part 31 and the administrative rules, a complete and accurate list of adjacent property owners is not required in order for the DEQ to issue a permit. Both the permit and the public hearing were properly placed on public notice in accordance with Part 31 and the administrative rules. Sufficient notice was provided to allow all interested parties to comment on the draft permit and attend the hearing.

9. Maps contained in the application are not clearly marked as to which is map 1 and map 2, the maps have been copied so the scale is no longer accurate. The maps did not indicate the discharge to Duck Creek. The water usage diagram is missing the required daily average flow rates at influent, intake and discharge points and daily flow rates between treatment units.

Response: Maps were reviewed by DEQ staff and between the two maps provided in the application (attached) it was determined that the application requirements were met. The Michigan's Adventure permit application includes a

topographic map that outlines their property with township and county names clearly marked at the top and a north south arrow, offsite surface water and streams. A second map (identified as Site Map 1&2) provides a map of the treatment system, including onsite wells and distances to property lines and surface water. The two maps together provide all the information requested in Section 10 of the groundwater discharge permit application. As noted in Item 2, above, the storm water discharge to Duck Creek is not a groundwater discharge.

The water usage diagram contains sufficient information, in conjunction with the requested daily and annual flows in the application, for the DEQ to determine appropriate limits for flow in the permit.

10. The site is unsuitable for rapid infiltration. There is a high water table and insufficient information on soil permeability.

Response: A Discharge Management Plan (DMP) is required under the terms of the permit. The DMP must comply with the provisions of Rules 323.2233 – 2236. Under these rules, an appropriate hydraulic loading or application rate to the rapid infiltration beds must be developed based on the on-site soil characteristics.

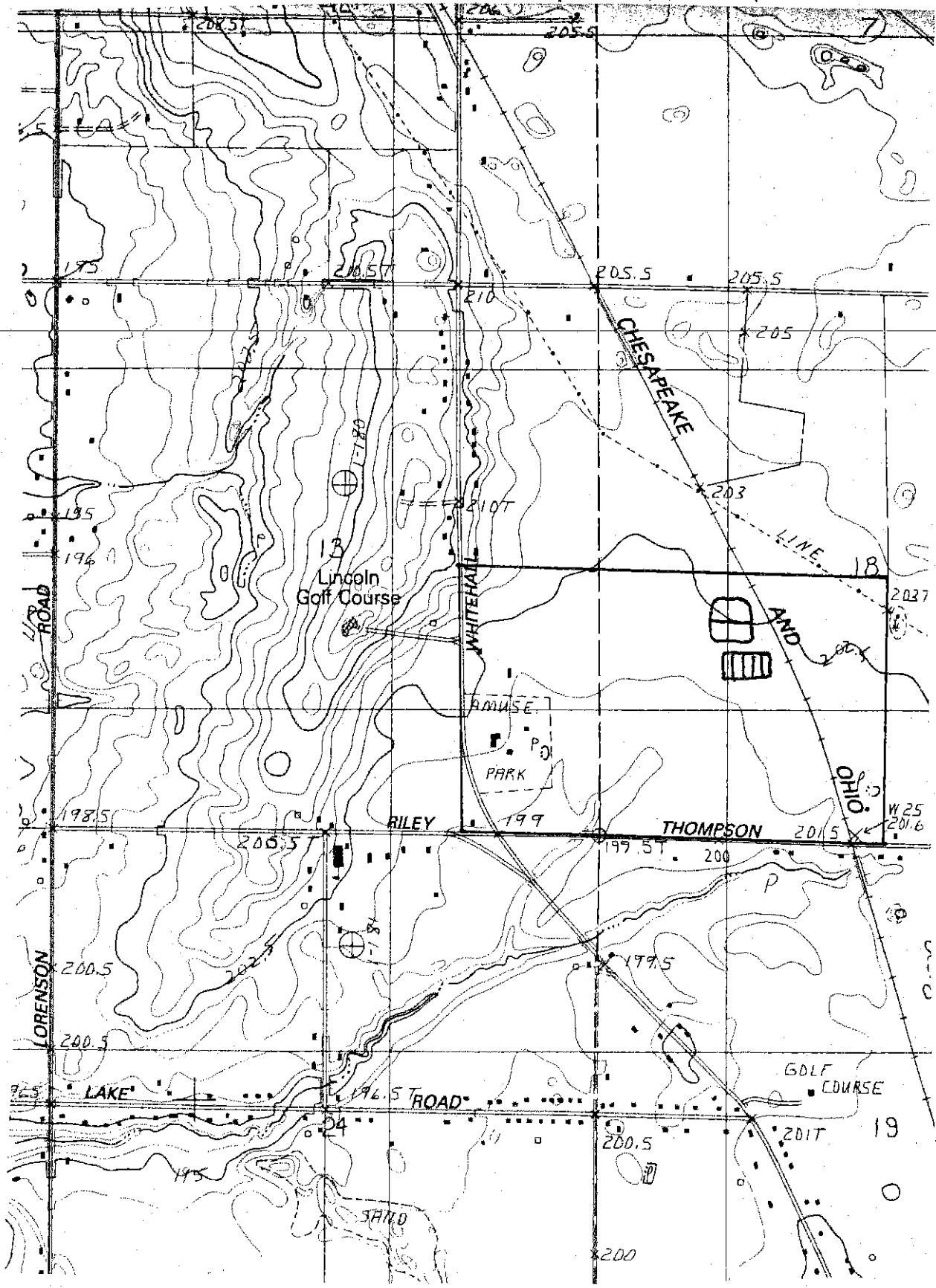
11. There have been complaints alleging discharges of sewage from the storm water ponds and into nearby woods.

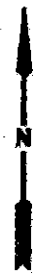
Response: Staff of the DEQ has investigated complaints concerning Michigan's Adventure. One complaint was from a parking booth attendant who stated the ponds next to the booths would overflow and then be lowered by the next day. The ponds next to the parking booths are unregulated storm water ponds. The sanitary sewer lagoons are not visible from the parking booths. Other complaints were that Michigan's Adventure would pump the sewage into nearby woods. The location of this discharge was not given. No evidence of this activity has been observed during inspection of the facility. No odors from the sanitary sewer system have been observed during inspections of the facility.

↑ Muskegon Co.

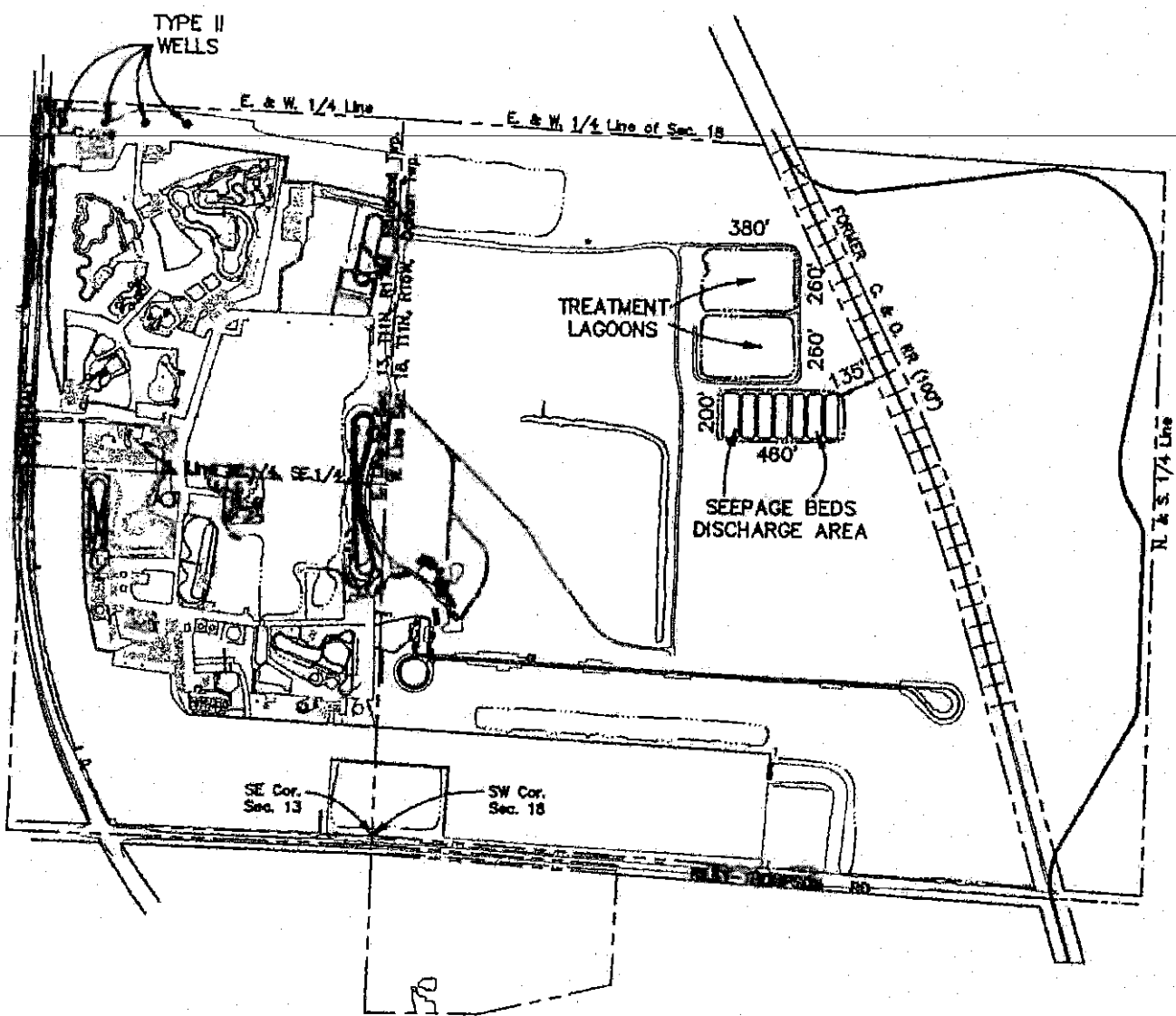
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← Fruitland Twp | Dalton Twp →





SCALE: 1" = 600'



SITE MAP 1 & 2

MICHIGAN ADVENTURE
T11N, R16W, SECTION 18, DALTON TWP,
MUSKEGON COUNTY



phone 231.773.5998
 toll-free 800.733.5998
 fax 231.773.6537

Trace Analytical Laboratories, Inc.
 2241 Black Creek Road
 Muskegon, MI 49444-2673
 info@trace-labs.com
 www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: T15E102
 Client Project ID: Lagoon Sampling 1 of 4

Trace ID: T15E102-01 Date Collected: 05/11/15 11:00 Matrix: Wastewater
 Sample ID: Lagoon Discharge Grabs Date Received: 05/11/15 12:31

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED	BY	ANALYZED	BY	NOTES	MCL
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METALS, TOTAL

Analysis Method: EPA 200.7 Rev. 4.4
 Batch: T054053

Phosphorus	4.7 mg/L	0.060	1	05/14/15	nws	05/15/15	dtm		
Sodium	34 mg/L	1.0	1	05/14/15	nws	05/15/15	dtm		

WET CHEMISTRY

Analysis Method: EPA 300.0 Rev. 2.1
 Batch: T053970

Nitrate as N	<0.18 mg/L	0.18	5	05/11/15	kj	05/11/15	kj		
Nitrite as N	<0.14 mg/L	0.14	5	05/11/15	kj	05/11/15	kj		

Analysis Method: EPA 350.1 Rev. 2.0
 Batch: T054020

Ammonia as N	6.4 mg/L	0.060	5	06/13/15	as	05/13/15	as		
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Analysis Method: SM 4500-Cl D-97
 Batch: T054108

Chloride	60 mg/L	10	1	05/18/15	as	05/18/15	as	N	
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Analysis Method: SM 4500-Cl G-11
 Batch: T053982

Chlorine Residual	<0.030 mg/L	0.030	1	05/11/15	kj	05/11/15	kj	N	
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Analysis Method: SM 4500-H+ B-00
 Batch: T053886

pH	8.35 pH Units		1	05/11/15	twb	05/11/15	twb	SITE	
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Analysis Method: SM 5210 B-01
 Batch: T053974

Biochemical Oxygen Demand 5-day	36 mg/L	2.0	1	05/11/15	kj	05/16/15	kj/eb		
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phone 231.773.5998
 toll-free 800.733.5998
 fax 231.773.6537

Trace Analytical Laboratories, Inc.
 2241 Black Creek Road
 Muskegon, MI 49444-2673
 info@trace-labs.com
 www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: T15E102
 Client Project ID: Lagoon Sampling 1 of 4

Trace ID: T15E102-01 Date Collected: 05/11/15 11:00 Matrix: Wastewater
 Sample ID: Lagoon Discharge Grabs Date Received: 05/11/15 12:31

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED BY	ANALYZED BY	NOTES	MCL
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WET CHEMISTRY

Analysis Method: Calculation
Batch: [CALC]

Total Inorganic Nitrogen	6.4 mg/L	0.050	5	05/13/15	05/13/15	kj	N
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Analysis Method: SM 4500-O G-01
Batch: T053989

Dissolved Oxygen	7.1 mg/L		1	05/12/15	05/12/15	kj	N
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 www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: T15E165
 Client Project ID: Lagoon Sampling 2 of 4

Trace ID: T15E165-01 Date Collected: 05/15/15 08:00 Matrix: Aqueous
 Sample ID: Lagoon Grabs Date Received: 05/15/15 08:00 Field pH = 8.77

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED	BY	ANALYZED	BY	NOTES	MCL
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METALS, TOTAL

Analysis Method: EPA 200.7 Rev. 4.4
 Batch: T054163

Phosphorus	5.2 mg/L	0.050	1	05/20/15	nws	05/21/15	dtm		
Sodium	38 mg/L	1.0	1	05/20/15	nws	05/21/15	dtm		

WET CHEMISTRY

Analysis Method: EPA 300.0 Rev. 2.1
 Batch: T054102

Nitrate as N	<0.18 mg/L	0.18	5	05/15/15	kj	05/15/15	kj		
Nitrite as N	<0.14 mg/L	0.14	5	05/15/15	kj	05/15/15	kj		

Analysis Method: EPA 350.1 Rev. 2.0
 Batch: T054139

Ammonia as N	4.8 mg/L	0.050	5	05/19/15	as	05/19/15	as		
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Analysis Method: SM 4500-Cl D-97
 Batch: T054198

Chloride	57 mg/L	10	1	05/21/15	as	05/21/15	as	N	
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Analysis Method: SM 4500-Cl G-11
 Batch: T054091

Chlorine Residual	<0.030 mg/L	0.030	1	05/15/15	kj	05/15/15	as	N	
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Analysis Method: SM 4500-H+ B-00
 Batch: T053886

pH	8.77 pH Units		1	05/15/15	twb	05/15/15	twb	SITE	
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Analysis Method: SM 5210 B-01
 Batch: T054084

Biochemical Oxygen Demand 5-day	57 mg/L	2.0	1	05/15/15	as	05/20/15	as/kj		
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 Muskegon, MI 49444-2673
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 www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: T15E165
 Client Project ID: Lagoon Sampling 2 of 4

Trace ID: T15E165-01 Date Collected: 05/15/15 08:00 Matrix: Aqueous
 Sample ID: Lagoon Grabs Date Received: 05/15/15 08:00 Field pH = 8.77

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED BY	ANALYZED BY	NOTES	MCL
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WET CHEMISTRY

Analysis Method: Calculation
Batch: [CALC]

Total Inorganic Nitrogen	4.8 mg/L	0.050	5	05/19/15	05/19/15	kj	N
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Analysis Method: SM 4500-O G-01
Batch: T054088

Dissolved Oxygen	7.6 mg/L		1	05/15/15	05/15/15	kj	N
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ANALYTICAL RESULTS

Trace Project ID: T15E208
 Client Project ID: Lagoon Sampling 3 of 4

Trace ID: T15E208-01 Date Collected: 05/20/15 08:30 Matrix: Aqueous
 Sample ID: Lagoon Grabs Date Received: 05/20/15 08:30 Field pH = 7.74

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED	BY	ANALYZED	BY	NOTES	MCL
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METALS, TOTAL

Analysis Method: EPA 200.7 Rev. 4.4
 Batch: T054188

Phosphorus	5.3 mg/L	0.050	1	06/21/15	nws	05/21/15	dtm		
Sodium	39 mg/L	1.0	1	05/21/15	nws	06/21/15	dtm		

WET CHEMISTRY

Analysis Method: EPA 300.0 Rev. 2.1
 Batch: T054196

Nitrate as N	<0.10 mg/L	0.10	1	05/21/15	kj	05/21/15	kj		
Nitrite as N	<0.10 mg/L	0.10	1	05/21/15	kj	05/21/15	kj		

Analysis Method: EPA 350.1 Rev. 2.0
 Batch: T054263

Ammonia as N	4.8 mg/L	0.010	1	05/27/15	as	05/28/15	as		
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Analysis Method: SM 4500-Cl D-97
 Batch: T054198

Chloride	64 mg/L	10	1	06/21/15	as	05/21/15	as	N	
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Analysis Method: SM 4500-Cl G-11
 Batch: T054177

Chlorine Residual	<0.030 mg/L	0.030	1	05/20/15	kj	05/20/15	kj	N	
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Analysis Method: SM 4500-H+ B-00
 Batch: T053866

pH	7.74 pH Units		1	05/20/15	twb	05/20/15	twb	SITE	
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Analysis Method: SM 5210 B-01
 Batch: T054181

Biochemical Oxygen Demand 5-day	50 mg/L	2.0	1	05/20/15	as	05/25/15	eb		
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 www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: T15E208
 Client Project ID: Lagoon Sampling 3 of 4

Trace ID: T15E208-01 Date Collected: 05/20/15 08:30 Matrix: Aqueous
 Sample ID: Lagoon Grabs Date Received: 05/20/15 08:30 Field pH = 7.74

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED BY	ANALYZED BY	NOTES	MCL
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WET CHEMISTRY

Analysis Method: Calculation
Batch: [CALC]

Total Inorganic Nitrogen	4.8 mg/L	0.010	1	05/27/15	05/28/15	kj	N
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Analysis Method: SM 4500-O G-01
Batch: T054178

Dissolved Oxygen	2.9 mg/L		1	05/20/15	05/20/15	as	N
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 Muskegon, MI 49444-2673
 info@trace-labs.com
 www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: T15E266
 Client Project ID: Lagoon Sampling 4 of 4

Trace ID: T15E266-01 Date Collected: 05/26/15 09:00 Matrix: Aqueous
 Sample ID: Lagoon Grabs Date Received: 05/26/15 09:00

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED BY	ANALYZED BY	NOTES	MCL
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METALS, TOTAL

Analysis Method: EPA 200.7 Rev. 4.4
Batch: T054291

Phosphorus	5.4 mg/L	0.050	1	05/28/15	nws	05/28/15	dtm
Sodium	39 mg/L	1.0	1	05/28/15	nws	05/28/15	dtm

WET CHEMISTRY

Analysis Method: EPA 300.0 Rev. 2.1
Batch: T054267

Nitrate as N	<0.18 mg/L	0.18	5	05/27/15	kj	05/27/15	kj
Nitrite as N	<0.14 mg/L	0.14	5	05/27/15	kj	05/27/15	kj

Analysis Method: EPA 350.1 Rev. 2.0
Batch: T054263

Ammonia as N	16 mg/L	0.050	5	05/27/15	as	05/28/15	as
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Analysis Method: SM 4500-Cl D-97
Batch: T054332

Chloride	64 mg/L	10	1	06/01/15	kj	06/01/15	as N
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Analysis Method: SM 4500-Cl G-11
Batch: T054251

Chlorine Residual	<0.030 mg/L	0.030	1	05/26/15	kj	05/26/15	kj N
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Analysis Method: SM 4500-H+ B-00
Batch: T054280

pH	7.48 pH Units		1	05/26/15	js	05/26/15	twb SITE
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Analysis Method: SM 5210 B-01
Batch: T054277

Biochemical Oxygen Demand 5-day	17 mg/L	2.0	1	05/27/15	as	06/01/15	as/kj
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 fax 231.773.6537

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 2241 Black Creek Road
 Muskegon, MI 49444-2673
 info@trace-labs.com
 www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: T15E266
 Client Project ID: Lagoon Sampling 4 of 4

Trace ID: T15E266-01 Date Collected: 05/26/15 09:00 Matrix: Aqueous
 Sample ID: Lagoon Grabs Date Received: 05/26/15 09:00

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED BY	ANALYZED BY	NOTES	MCL
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WET CHEMISTRY

Analysis Method: Calculation
Batch: [CALC]

Total Inorganic Nitrogen	16 mg/L	0.050	5	05/27/15	05/28/15	kj	N
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Analysis Method: SM 4500-O G-01
Batch: T054255

Dissolved Oxygen	0.80 mg/L		1	05/26/15	05/26/15	kj	N
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