Operations Management Services

2015-2016 Annual Operations Report

Traverse City Regional Wastewater Treatment Plant

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Introduction

CH2M is pleased to present the City of Traverse City (the City) with this annual report as an overview of activities related to the Traverse City Regional Wastewater Treatment Plant (TCRWWTP) during the 2015-2016 contract year. CH2M has been operating and maintaining the WWTP and seven lift stations (increased to eight year-round lift stations) since 1990. During this time, we have stewarded the facility through various upgrades, the last of which took place in 2004, when the facility was converted to a Membrane Bioreactor (MBR) facility. (CH2M's family of engineers was selected to design, and build this upgrade.) This project allowed the City to increase plant capacities while staying within the current foot print of the WWTP, and offered a high-quality effluent that was desired by the public. In 2016, the City extended our partnership to 2022. In the coming years, we will continue working together on membrane replacement, asset management, and the presence of comma shaped Gram positive bacteria.

We look forward to the opportunity to serve the community where we live and work.

Plant Performance

The TCRWWTP operates under a National Pollutant Discharge Elimination System (NPDES) permit that is issued by the Michigan Department of Environmental Quality (MDEQ). The NPDES permit contains limits (requirements) for certain parameters within the plant effluent to protect the receiving waters.

Carbonaceous Biochemical Oxygen Demand (CBOD) and Total Suspended Solids (TSS) Plant Percent Removals and Effluent Concentrations

The plant is required to remove, at a minimum, 85 percent of the Influent CBOD and TSS. Exhibit 1 illustrates the plant percent removals for 2015-2016. Exhibit 2, contains NPDES permit effluent concentration (milligrams per liter [mg/L]) limits compared to the actual average effluent concentrations for 2015-2016.

Exhibit 1
2015-2016 TCRWWTP Percent Removals vs NPDES Permit Requirement

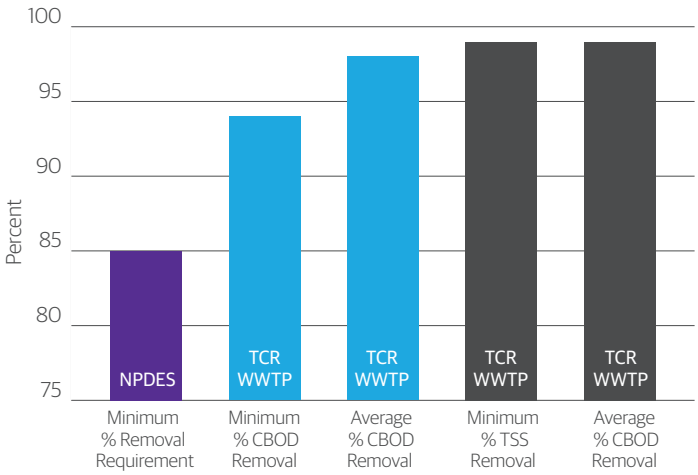


Exhibit 2
2015-2016 Plant Effluent Average CBOD and TSS Concentrations vs NPDES Permit Average Concentration Requirements

	CBOD (mg/L)	**TSS** (mg/L)
NPDES Permit Average Concentration Requirement	25	30
Plant Effluent Average Concentration	<2.19	<1.00

Total Phosphorus and Ammonia Nitrogen Concentrations

Total Phosphorus and Ammonia Nitrogen are nutrients that aid in the growth of organisms and plant life, however, if these nutrients are present in the plant effluent in too great of concentrations, it could lead to algae blooms, plant over growth, and decreased dissolved oxygen concentrations in the receiving waters. Exhibits 3 and 4 illustrate 2015-2016 effluent average concentrations of Ammonia Nitrogen and Total Phosphorus as they compare to the plant's NPDES limits.

Exhibit 3

2015-2016 NPDES Permit Average Concentration Requirement vs Plant Effluent Average Ammonia Nitrogen Concentration

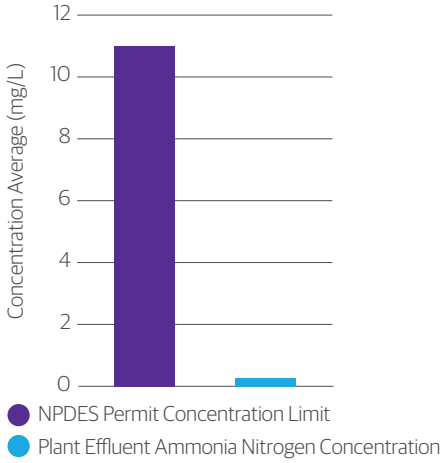
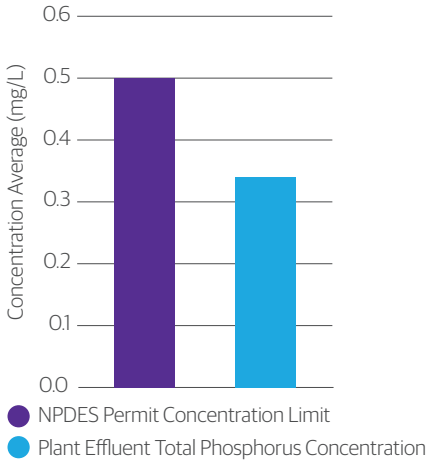


Exhibit 4

2015-2016 NPDES Permit Average Concentration Requirement vs Plant Effluent Average Total Phosphorus Concentration



Plant Performance

Dissolved Oxygen
(mg/L), and pH (S.U)

An adequate Dissolved Oxygen concentration and pH level is essential to maintaining the quality of a body of water. For this reason, the MDEQ included a minimum Dissolved Oxygen concentration (mg/L), and pH limits in the plant's NPDES permit. Exhibit 5 compares the NPDES permit plant effluent minimum Dissolved Oxygen requirement with the plant effluent minimum Dissolved Oxygen concentration in 2015-2016. Exhibit 6 compares the NPDES permit plant effluent pH limits with the maximum and minimum pH values for the plant's effluent in 2015-2016.

Exhibit 5
2015-2016 NPDES Permit Plant Effluent Dissolved Oxygen Requirement vs Plant Effluent Minimum Dissolved Oxygen Concentration

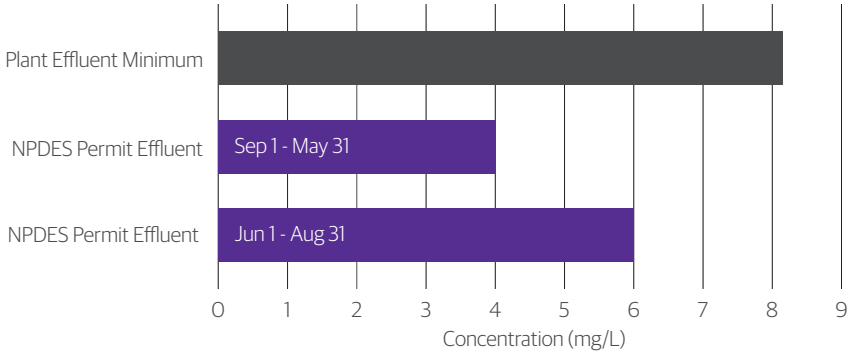
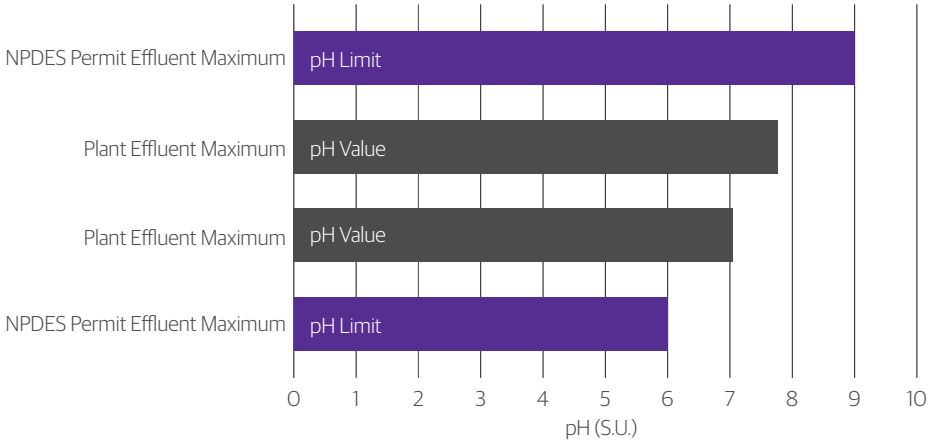


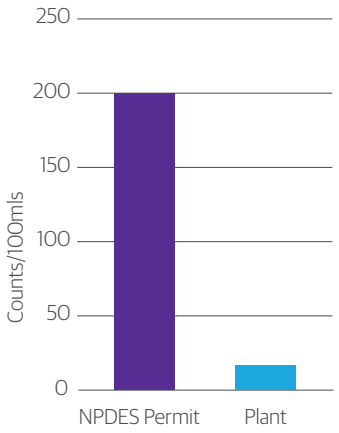
Exhibit 6
2015-2016 NPDES Permit Plant Effluent pH Requirement vs Plant Effluent Minimum/Maximum pH Values



Fecal Coliform
(Counts/100mls)

To protect the City's water ways and ultimately the public from harmful pathogens that are present in wastewater, the MDEQ requires disinfection of WWTP effluent. Disinfection destroys or deactivates pathogenic microorganisms resulting in the termination of their growth and reproduction. The plant's NPDES permit limits the monthly geomean of fecal Coliform to 200 counts (cts)/100mls. Exhibit 7 compares the NPDES permit plant effluent requirement with the plant effluent maximum 7-day geomean for 2015-2016.

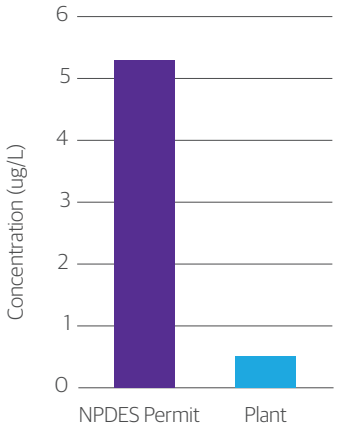
Exhibit 7
2015-2016 NPDES Permit Plant Effluent Fecal Coliform Requirement vs Plant Effluent Maximum Fecal Coliform 7-Day Geomean (counts/100mls)



Total Silver
(micrograms/Liter, ug/L)

Silver, among other uses, is a byproduct of traditional photography found in photo fixer. While the effects of silver in the environment vary greatly based on the form of silver, it can be toxic to both plants and animals. In order to protect the aquatic life in the receiving stream, the Boardman River, the NPDES permit limits the amount of silver allowed in the plant effluent to an average concentration of 5.3 ug/L. Exhibit 8 compares the NPDES plant effluent limit and the average plant effluent concentration for 2015-2016.

Exhibit 8
2015-2016 Plant Effluent Average Silver Concentration vs NPDES Permit Plant Effluent Silver Concentration Requirement



National Pollution Discharge Elimination System Permit Reporting 2015-2016

In accordance with the NPDES Permit for the TCRWWTP, CH2M completed and submitted the following reports/plans to the MDEQ:

- We submitted a non-exposure storm water exemption form in January 2016. To evaluate whether or not the facility met the requirements of the non-exposure stormwater exemption Jacob Riley, the regional DEQ regulator, toured the facility. He found the facility met the requirements for stormwater exemption and made the recommendation to the MDEQ permitting department to modify the facility's NPDES permit to exclude stormwater requirements. This will decrease the City's annual permitting fee.
- Facility Monitoring Plan Submitted (New Plan has to be submitted with each new permit)
- Monthly Discharge Monitoring Reports
- Annual Residual Management Report
- Annual Stormwater Pollution Prevention Report
- Annual Federal Industrial Pretreatment Program (IPP) Report
- IPP Local Limits Evaluation
- Submitted results of additional monitoring requirements

IPP Overview

(For compliance purposes the IPP "year" is based on the calendar year from January 1- December 31)

Below is the definition, the DEQ offers on their website, for **significant industrial users** (SIU):

An **industrial user** (IU) will be classified as an SIU if it meets any of the following:

(A) Is subject to categorical pretreatment standards under 40 CFR 403.6 and 40 CFR chapter I, subchapter N;

(B) Discharges an average of 25,000 gallons per day (gpd) or more of process wastewater to the Publically Owned Treatment Works (POTW) (excluding sanitary, noncontact cooling, and boiler blowdown wastewater);

(C) contributes a process waste stream that makes up 5 percent or more of the average dry-weather hydraulic or organic capacity of the POTW treatment plant;

(D) Is designated as such by the POTW on the basis that the IU has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

A **categorical industrial user** (CIU) is an SIU [see (A) above], but an SIU is not always a CIU. Categorical users have specific limits and requirements that are determined by the Federal government. States and local governments can develop requirements that are more restrictive, but not less restrictive.

SIUs are required to have discharge permits to operate on the system. Within those permits, they are required to perform self-monitoring tests on their discharges and report those results to CH2M at least twice per year. We also perform our own testing once per year. We inspect the SIUs twice per year; once on short notice (less than 24 hours) and once for a longer visit (1 to 2 week notice).

Light Industrial User (LIU) is a classification we use in Traverse City to monitor industries on the sewer system that discharge process water, but do not qualify as an SIU. They are not required to have a discharge permit and are not subject to mandatory testing. They are inspected at least once every two years, have a Slug Control Plan and an IPP Inspection Manhole.

IPP Overview

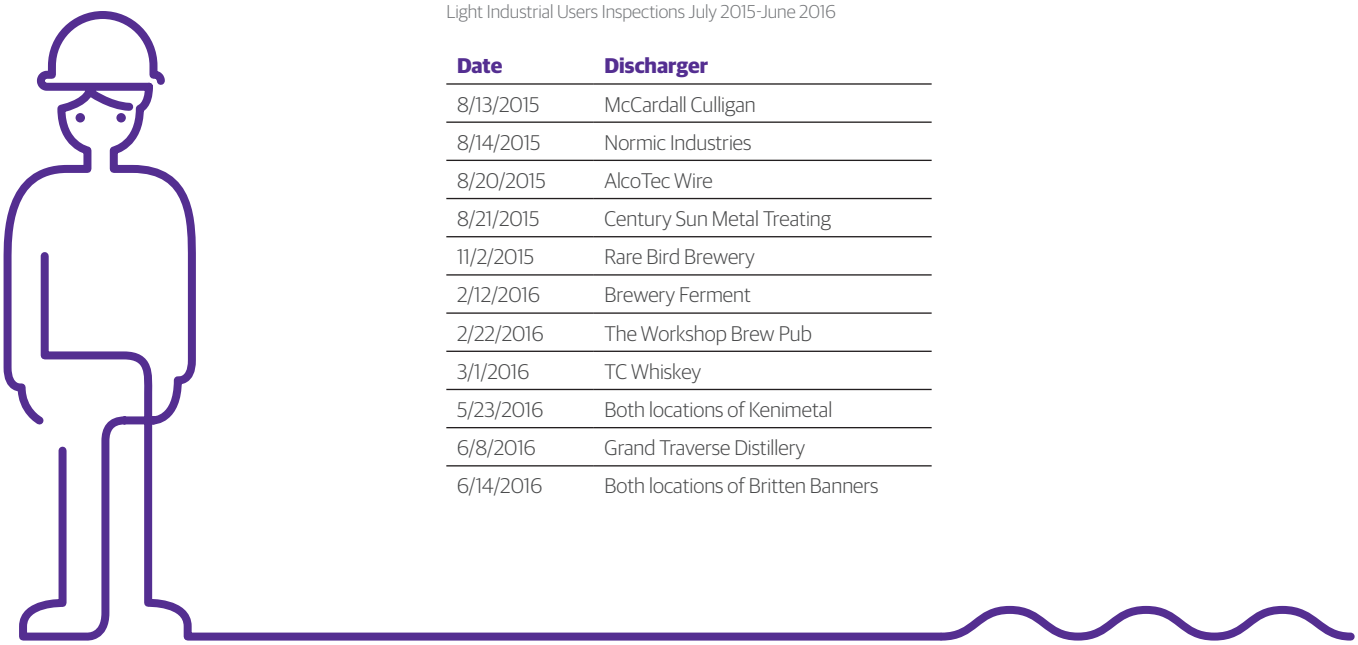
Traverse City has one CIU, three SIUs and 23 LIUs discharging to the sanitary sewer. CRM is considered a Categorical User because of the metal finishing process that occurs at their site. The three SIUs are: Munson Medical Center, Munson Support Services, and Hillshire Food. Exhibit 9 is a summary of the inspections performed at the SIUs and CIU locations. Exhibit 10 is a summary of LIU locations inspected in the last year.

Exhibit 9
SIUs and CIU Inspections July 2015-August 2016 (Grouped by User)

Date	Discharger
11/18/2015	Munson Support Services
8/5/2016	Short-notice inspection of Munson Support Services
12/1/2015	CRM, Inc. (CIU)
3/18/2016	Short Notice inspection of CRM, Inc.
12/9/2015	Hillshire Foods
8/10/2016	Short-notice inspection of Hillshire Foods.
12/21/2015	Munson Medical Center
9/1/2016	Short-notice inspection on Munson Medical Center

Exhibit 10
Light Industrial Users Inspections July 2015-June 2016

Date	Discharger
8/13/2015	McCardall Culligan
8/14/2015	Normic Industries
8/20/2015	AlcoTec Wire
8/21/2015	Century Sun Metal Treating
11/2/2015	Rare Bird Brewery
2/12/2016	Brewery Ferment
2/22/2016	The Workshop Brew Pub
3/1/2016	TC Whiskey
5/23/2016	Both locations of Kenimetal
6/8/2016	Grand Traverse Distillery
6/14/2016	Both locations of Britten Banners



In addition to inspecting the CIU, SIUs, and LIUs, CH2M conducted in-field inspections and responded to discharge issues, these activities are summarized in Exhibit 11.

Exhibit 11
IPP Items Responded to July 2015-June 2016

Date	Item
7/27/2015	Responded to Coast Guard Lift Station after an accidental release of fire suppression foam
7/28/2015	Met PCS at the Coast Guard Lift Station for cleaning
7/28/2015	Inspected AlcoTec's Inspection Manhole (IMH)
9/25/2015	Met with a contractor for Bay Breads near Chum's Corner and inspected the IMH
10/6/2015	Inspected the alley near Bistro Fou Fou and inspected the IMH for the Franklin
10/29/2015	Inspected Bistro Fou Fou after a grease plug
11/4/2015	Inspected The Parlor to determined they don't need to be an LIU
12/30/2015	Inspected Copper Falls after a grease plug
2/5/2016	Inspected AlcoTec's IMH
2/5/2016	Stopped by SMI Aerospace after being contacted about a possible Categorical Process to be installed
2/23/2016	Visited Jet's Pizza in Beitner Square to ask about the grease trap cleaning
4/27/2016	Stopped by Natural Gas Compression Systems, asked to see their IMH and Oil Water Separator (OWS) cleaning records
4/27/2016	Stopped at SMI Aerospace
4/27/2016	Inspected AlcoTec's IMH

IPP Overview

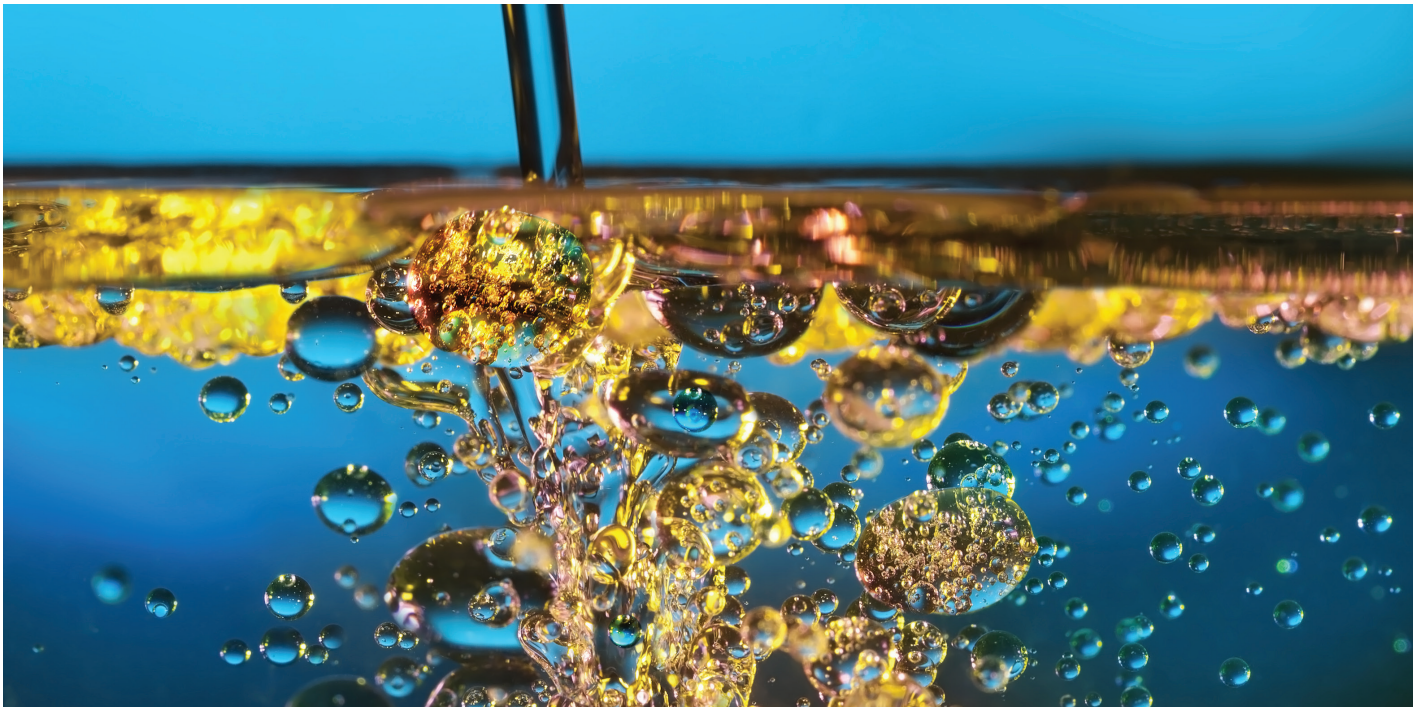
When an industry fails to comply with Traverse City's Sewer Use Ordinance (SUO), that business is sent a Notice of Violation. Exhibit 12 is a summary of the Notices of Violation sent through August 2016.

Exhibit 12
Notices of Violation Through August 2016

Date	User	Classification	Violation	Compliance Status
8/14/2015	Coast Guard Air Station	User	Interfering with the Collection System	In compliance
9/10/2015	AlcoTec Wire	LIU	High oil discharge	Oil went away for a while
2/18/2016	AlcoTec Wire	LIU	High oil discharge	Now subject to monthly reporting of oil water separator maintenance
3/14/2016	AlcoTec Wire	LIU	Missing a response deadline	Dismissed
12/30/2015	Munson Medical Center	SIU	High BOD Outfall-003	Follow up testing showed a return to compliance
2/1/2016	Munson Medical Center	SIU	Failure to resample high results in a timely manner Outfall-001 May 2015	Reporting violation
2/1/2016	Munson Medical Center	SIU	Failure to resample high results in a timely manner Outfall-001 July 2015	Reporting violation
2/1/2016	Munson Medical Center	SIU	Low pH November 2013	Follow up testing showed a return to compliance
7/18/2016	Munson Medical Center	SIU	pH too low at Outfall-003 for reporting period December 2015 - May 2016	Tests showed a return to compliance
7/18/2016	Munson Medical Center	SIU	TSS too high at Outfall-003 for reporting period December 2015 - May 2016	Tests showed a return to compliance
7/18/2016	Munson Medical Center	SIU	Failing to report a permit violation within 24 hours	Reporting violation
8/27/2016	Munson Medical Center	SIU	pH too low at Outfall-003 in Control Authority Sampling	Resample in progress
8/27/2016	Munson Medical Center	SIU	TSS too high at Outfall-003 in Control Authority Sampling	Resample in progress
1/4/2016	Copper Falls	Restaurant	High grease discharge	Follow up testing showed a return to compliance
1/11/2016	CRM Inc	SIU	Missing BOD data in Fall 2015 SMR Outfall -002	Retested
1/11/2016	CRM Inc	SIU	Missing Total Kjeldahl Nitrogen (TKN) aata in Fall 2015 Self Monitoring Report (SMR) Outfall-002	Retested
2/8/2016	CRM Inc	SIU	Missing BOD data in Fall 2014 SMR Outfall -002	Old violation - Make up in November
2/8/2016	CRM Inc	SIU	Missing TKN data in Fall 2014 SMR Outfall-002	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	BOD at Outfall-001 was measured at 360 mg/L on September 30, 2014. (285 mg/L Limit)	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	BOD at Outfall-001 was measured at 456 mg/L on November 26, 2014. (285 mg/L Limit)	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	TKN was not tested at Outfall-001 for the December 2013 – May 2014 reporting period	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	TKN was not tested at Outfall-001 for the December 2014 to May 2015 reporting period	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	Average daily flow from Outfall-001 was not included for the December 2013 to May 2014 reporting period	Old violation - Make up in November

Exhibit 12 (continued)
Notices of Violation Through August 2016

Date	User	Classification	Violation	Compliance Status
2/19/2016	Munson Support Services	SIU	Average daily flow from Outfall-001 was not included for the June 2014 to November 2014 reporting period	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	Average daily flow from Outfall-001 was not included for the December 2014 to May 2015 reporting period	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	Maximum daily flow from Outfall-001 was not included for the December 2013 to May 2014 reporting period	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	Maximum daily flow from Outfall-001 was not included for the June 2014 to November 2014 reporting period	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	Maximum daily flow from Outfall-001 was not included for the December 2014 to May 2015 reporting period	Old violation - Make up in November
2/19/2016	Munson Support Services	SIU	Maximum daily flow from Outfall-001 was not included for the June 2015 to November 2015 reporting period	Old violation - Make up in November
3/14/2016	Beitner Square	Restaurant	High Grease Discharge	Under orders to eliminate high grease



IPP Overview

Township BOD Loadings

As part of CH2M's contractual obligation to the City, we operate and maintain eight automatic flow proportioned samplers strategically placed throughout the collection system in order to obtain representative samples from each of the following townships: Garfield, East Bay, Acme, Elmwood, and Peninsula. We collect three samples a week, and each sample is analyzed to determine its BOD concentration. These concentrations are used to calculate a monthly average BOD concentration. The average monthly BOD concentration for each township and monthly township flow values (provided by the County) are used to calculate the BOD loadings from each of the fore mentioned townships, the City, and Blair Township. (Exhibits 13 and 14 summarize the 2015-2016 BOD loadings vs owned capacities.)

Exhibit 13
Owned Capacity vs Maximum Monthly Average Loadings 2015-2016

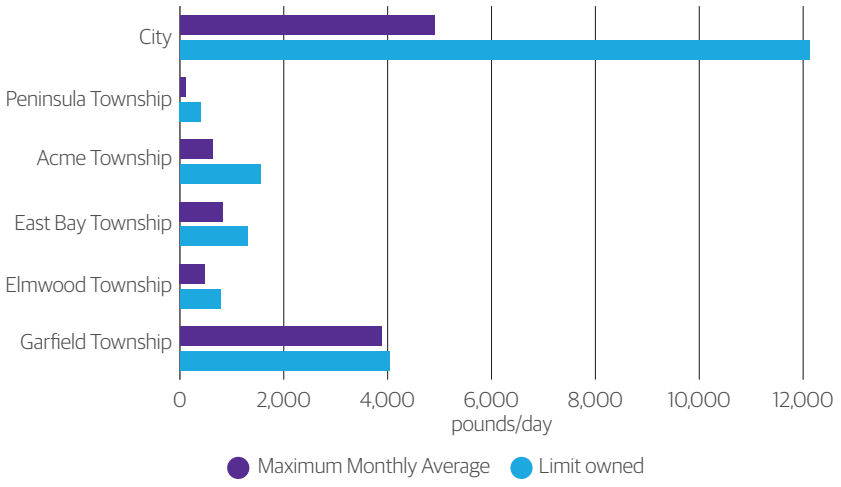


Exhibit 14
Township and City Loadings 2015-2016

BOD loadings in pounds per day

	Owned Capacity	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-15	Mar-16	Apr-16	May-16	Jun-16	Maximum Monthly Average
Blair Township	404	60	59	45	39	35	32	38	34	42	32	37	43	41
Garfield Township	3,624	2,784	2,973	3,853	3,258	2,880	3,230	3,188	3,153	3,408	3,119	2,418	3,017	3,107
Elmwood Township	780	383	380	414	355	348	418	381	385	382	401	349	371	381
East Bay Township	1,309	536	592	1,065	1,337	317	785	676	599	724	732	342	332	670
Acme Township	1,557	431	507	431	344	274	273	291	353	322	346	401	527	375
Peninsula Township	406	77	72	82	78	77	87	86	74	65	77	74	151	83
Septage	0	49	17	11	94	99	7	4	4	11	7	7	17	27
City	12,120	5,752	5,244	3,203	3,845	5,129	4,159	3,721	3,598	3,082	3,105	4,523	3,891	4,105
Total		**10,071**	**9,844**	**9,104**	**9,350**	**9,158**	**8,991**	**8,385**	**8,201**	**8,035**	**7,820**	**8,150**	**8,349**	**8,788**

*We have no BOD data for Blair Township. Loadings are calculated using plant influent BOD as a surrogate for Blair Township BOD concentration.

Operations and Maintenance Highlights

As part of the CH2M culture, we are always looking for opportunities to improve our performance by reducing compliance vulnerabilities, reducing operational costs, reducing the facilities carbon footprint, achieving operational excellence, acquiring and maintaining a highly qualified staff, and demonstrating a high standard of safety. Itemized below are this year's accomplishments:

As part of the CH2M culture, we are always looking for **opportunities to improve our performance.**

Data Acquisition for Membrane Trains

We purchased and installed a new data collection program from GE called "Insight". This program will improve our ability to track and interpret data pertaining to the membrane process. It will also more readily provide useable historical data.

GE's Installation of 500Ds Cassettes in Train 1

CH2M noticed that the newly installed 500Ds membrane cassettes in Train 1 were not performing as they should. GE and CH2M found the cause to be improper installation of the cassettes leading to an elevation difference between the 8M and 16M cassettes. We worked together to correct the elevation difference, and performed consecutive recovery cleans on the membranes in Train 1. After the fore mentioned corrective action were completed, GE came to the facility and conducted performance testing on Train 1. The results of this performance testing were:

- Train 1 was able to operate at design peak flow (17 mgd/8 cassettes=2.125 mgd, net basis) for one hour without faulting due to high transmembrane pressure. (This flow test was conducted during a comma shaped Gram positive bacteria outbreak.)
- The temperature corrected permeability of the 16M cassettes in Train 1 was found to be 86 percent of the permeability of the 8M cassettes in Train 1. The transmembrane difference between the 16M and 8M cassettes was 0.2 psi.

GE agreed to compensate the City for their incorrect installation of Train 1's 500Ds cassettes. They credited the City with $16,666 towards the City's 2015 purchase of three new trains of membranes. GE also addressed the installation error so that it would not carry forward to subsequent cassette installations.

Optimization of the Membrane System Back-pulse Program

CH2M found that the new membranes are able to maintain optimum permeability with the use of periodic back pulsing. The original back pulse programming, GE installed in 2004, allowed you to operate in relax mode or back pulse mode 100 percent of the time, and changing from back pulse mode to relax mode had to be done manually. Back pulsing 100 percent of the time would require retreating much more back pulsed permeate, and increase electrical use while not offering a justifiable benefit. However, CH2M programmers were able to make changes to the back pulse program that optimized the use of the back pulse mode. This programming allowed the membranes to automatically back pulse when Trans-Membrane Pressures (TMPs) dropped below a certain value. Back pulsing is now automatic and only occurs when it is necessary.

Operations and Maintenance Highlights

South Aeration Basin Cleaning

We cleaned the south aeration basin, and made some minor repairs to the aeration grid. The cleaning of the basin and its ceramic aerating diffusers optimizes air transfer throughout the basin and reduces electrical cost related to aerating the basin.

South aeration basin cleaning.

Polymer Optimization

To confirm we are using the most effective polymer both economically, and operationally in our thickening processes, we performed bench testing of different polymers and compared the results to the results we get with the polymers we are currently using to thicken our digested and waste activated sludges. The testing showed that we are using the best polymer Polydyne, our current vendor, has to offer for thickening the digested sludge through the Sieve Drum Concentrator. The results of the bench testing performed on the waste activated sludge suggested that there were three polymers that may offer a better result than the current polymer being used to thicken waste activated sludge over the Gravity Belt Concentrator. We field tested these three polymers and found the polymer we are currently using, NE 864 polymer, works better than any other product Polydyne offers. (The polymers were rated by cost, amount needed to thicken sludge, and the quality of the resulting sludge.)

Ferric Chloride Pricing

CH2M rebid Ferric Chloride in 2015-2016 contract year for the 2016-2017 contract year. (Results are located in Exhibit 15) We negotiated with PVS to reduced their price from $469/dry ton to $457/dry ton, saving a minimum of $2,500 in 2016-2017.

Exhibit 15
Traverse City Ferric Chloride Bids

Bidder	Bid Response
PVS	$457 per dry ton (was $469 per dry ton)
Univar	Not competitive
Kemira	$522.54- per dry ton
Webb	No bid

Carbon Canister Replacement

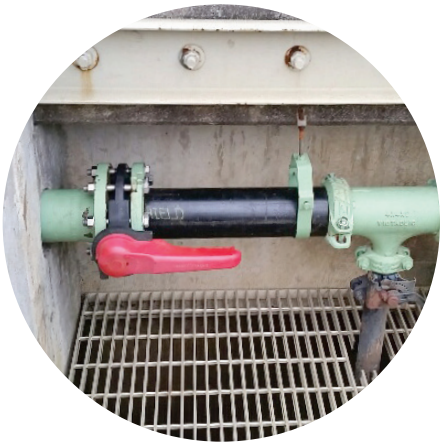
We installed new carbon canisters in the Phoenix order control building. Prior to replacing the canisters the system's manometer was reading 13.5 inches. After replacing the canisters the system's manometer reads 7.5 inches, which is where it should be when the air flow is unobstructed. The Hydrogen Sulfide (H2S) monitor is currently showing little to no breakthrough H2S in the Phoenix discharge. (Canisters need replacing every 2 to 2.5 years depending on manometer readings.)

Facility Maintenance

- Repaired Return Activate Sludge pump #3
- Replaced the seals on the stop logs for the return activated sludge channel
- Replaced Supervisory Control and Data Acquisition (SCADA) server #2
- Installed a new turbidity meter for trains 1 and 2, and new sensors were installed for both trains
- Michigan Switch Gear repaired and installed the breaker for Aeration Blower #2
- ABI repaired the back pulse line.
- Windemuller completed the validation, and calibration of the pressure sensors, and flow meters on each membrane train
- Installed a new level transducer in membrane train #3
- Installed new pressure transmitters for membrane trains #3 and #6
- Replaced the coupler and bearings on the primary drive for 3 and 4 north primary tanks
- Replaced the belt on the Gravity Belt Concentrator
- Installed a new Pressure Relief Valve on Digester #3 and #4
- Replaced the upper bearing on screw pump #3
- Replaced the failed Maxon valve on boiler #1
- Installed containment structures around the US Filter Polymer Units
- The doors to the maintenance shop and the aeration basin were replaced
- Installed an isolation valve on the air distribution line for the membrane train distribution channel

Containment structures around US Filter Polymer.

Shop door replacement.



New isolation valve.

Operations and Maintenance Highlights

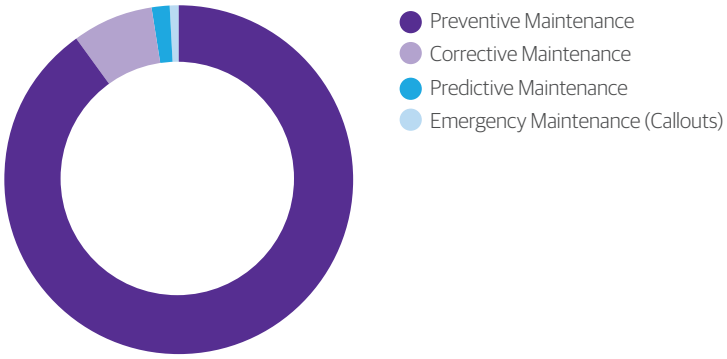
Lift Station Maintenance

- Front Street Lift Station's electrical conduit was repaired
- Identified an issue with the Front Street generator while performing a routine preventive maintenance work order. We called Cummings Bridgeway to help identify the source of the issue. It turned out that the voltage regulator was faulty. Cummings Bridgeway repaired the voltage regulator, and we installed a new generator battery.
- Replaced the motor leads for Front Street's Pump #4
- The PID loop controlling Front Street's lead pump speed froze in the ladder logic of the PLC. The logic was reprogramed and the PID loop is currently working. The Front Street PLC upgrade was moved up in the capital improvement program to 2016-2017
- Installed a new motor starter and heater for pump #1 at the TBA lift station
- Replaced pump #2 at the Clinch Park Lift Station. The pump that was in operation was repaired and stored in inventory
- The phase monitor in the control cabinet at the Coast Guard Lift Station was replaced, and rewired to call out when there is a loss of phase at the lift station
- Rebuilt pump #2 at the Coast Guard Lift Station
- Replaced pump #1 at the Coast Guard Lift Station
- Replaced the sensophone in the Coast Guard Lift Station
- Repaired the volute for Woodmere Lift Station's pump #1

Maintenance Work Orders

CH2M performed 2,562 work orders in 2015-2016. More than 90 percent of the work orders were for preventive maintenance activities, or work that helps prolong the life of the City's assets. Exhibit 20 highlights our maintenance work orders for 2015-2016.

Exhibit 16
Maintenance Work Orders Completed 2015-2016



Safety

CH2M had one loss time injury requiring treatment in 2015-2016. A total of two work days were missed as a result of this injury. Before this incident we had 926 days without a loss time injury, or an injury requiring treatment, and since this incident we have gone 360 days without a loss time injury, or an injury requiring treatment.

Target Zero. It's Personal.

Community Involvement Summary

Exhibits 17 and 18 summarize our community involvement in 2015-2016. We are always looking for ways to get involved in bettering our community. If there are opportunities in the future where we can help, please let us know if you know of opportunities we could consider.

Exhibit 17
TCRWWTP Tours 2015-2016

Group/Organization	Date
Au Sable Institute	July 2015
NMC Fresh Water Studies Tour	October 2015
West Middle School (150 Students)	May 2016
Grand Traverse Academy (100 Students)	May 2016
Norte Youth Biking	June 2016

Exhibit 18
CH2M Local Donations 2015-2016

Group/Organization	Amount
Watershed Center	$1,000
Inland Seas	$1,000
Down Syndrome of NW MI	$500
Michigan Municipal League	$1,000

We are always looking for ways to get involved in the community.

Facility Upgrades in 2015-2016

In 2015-2016, we replaced four membrane train effluent gates, two aeration basin gates, and four trains of 500C membranes with 500Ds membranes.

Traverse City membrane replacement team.

New gate being moved in place.

New gate in place.

Fiscal Summary

We strive to provide the best quality of service we can day in and day out. We understand that the City has fiscal demands and is focused on minimizing the financial impact operating the wastewater treatment plant and the related lift stations. We are happy to report that this year we were able to rebate $10,000 to the City of Traverse City, all while improving the facilities buildings and grounds, optimizing the facility's operation, reducing vulnerabilities, and increasing critical spare parts in conjunction with our emergency response plan.

Direct Cost Summary

Direct costs are expenses incurred in the operation and maintenance of the wastewater facility and related lift stations. They include repair items and non-repair items. Exhibit 19 is a summary of the total repairs and non-repairs expenses in 2015-2016.

The expense types that comprise the direct cost, the budgeted amounts for each expense type, and the actual cost incurred in 2015-2016 are including in Exhibit 24. Repair expenses are charged to the client plant and equipment expense type. Per our 2012 Agreement, we budgeted $115,000 for this expense, the recently approved amendment No. 4 to our 2012 Agreement increased the repairs budget included in our contract to $125,000. As shown Exhibit 24, the repair expenses in 2015-2016 exceed the budgeted amount by $36,914.57. We purchased replacement Carbon Canisters for the odor control system last year that amounted to $19,530, accounting for a majority of this additional expense.

Exhibit 19
Direct Cost Summary

	Total Budgeted Direct Cost	Total Actuals Direct Cost	Rebate/ Invoice
Non-Repairs	$1,949,156.00	$1,888,255.54	$36,540.28
Repairs	$115,000.00	$151,914.57	($36,914.57)

We strive to provide the **best quality of service** we can day in and day out.

CH2M strives to cultivate an empowered, educated, efficient staff that will result in less employees needed to deliver excellent results. Last year, we added new staff members, and some staff members changed roles. To properly position them to optimally perform their job duties, we invested in their training and education. We budgeted $16,481 and exceeded that amount by $17,370. However, because of this investment we have a very efficient staff, which lowered labor expenses and saved roughly $24,000 in labor for an overall savings of roughly $6,630.

Exhibit 20
Direct Cost Itemized

Traverse City Regional Wastewater Treatment Plant Financial Overview 2015-2016

Expense Type	Budgeted Costs	Actual Costs	Difference	Comments
Chemicals	$200,710.00	$193,640.21	$7,069.79	
Client Plant and Equipment (Repairs Invoice)	$115,000.00	$151,914.57	$36,914.57	Please refer to Exhibit 26
Education/Employee Expenses	$16,481.00	$33,851.20	$17,370.20	Training for new staff, and existing staff with new positions
Electricity	$484,800.00	$421,745.67	$63,054.33	
Insurance	$34,827.00	$34,509.16	$317.84	
Labor	$845,686.00	$821,660.71	$24,025.29	
Operating Expenses	$114,395.00	$135,745.09	$21,350.09	Utility main, and auxiliary power breakers cleaning and inspections in membrane control room, UV lamps, rental of an 8 inch bypass pump, membrane equipment calibrations (will be annually moving forward), and new office furniture for operators office (all 1970s furniture is now replaced)
Outside Services	$26,000.00	$25,828.39	$171.61	
Solids Handling	$168,340.00	$152,188.56	$16,151.44	
Supplies	$11,000.00	$13,435.57	$2,435.57	
Telecommunications	$10,200.00	$11,008.54	$808.54	
Travel Costs	$22,167.00	$28,154.45	$5,987.45	
Utilities-Operations	$14,550.00	$16,487.99	$1,937.99	
Grand Total	**$2,064,156.00**	**$2,040,170.11**	**$23,985.89**	

Fiscal Summary

Base Fee/Direct Cost Overview

The City pays, to CH2M, a fraction of our base fee every month. Our base fee is the direct cost incurred in operating and maintaining the facility and its related lift stations plus our margin. Our margin was 16.5% of the base fee. The table below is a summary of our 2015-2016 reconciliation. As stated above, this year the City received a rebate from CH2M amounting to $10,515.32.

Exhibit 21
Base Fee/Direct Cost Overview

O&M Base Fee	$2,454,163.00	Direct Cost plus margin
Repairs Invoice	-$36,914.57	Repairs limit of $115,000 per contract the City is responsible for any expenses over this amount. (Article 2.21 of 2012 Agreement, refer to exhibit 23 above)
Direct Cost Rebate	$36,540.28	(Total budgeted non- repairs direct cost - Total actual non-repairs direct cost)*.60-(per contract article 4.2 of 2012 Agreement, refer to exhibit 23 above)
Electric Credit	$10,515.32	Electrical credit to the City because fuel power cost adjustment decreased in 2015-2016
Total Reconciliation:	**$10,141.03**	**Rebated to the City**
Total Fee Paid:	**$2,444,021.97**	

Repair Expenses Over $2,000

For repair expenses equal to or greater than $2,000, CH2M obtains multiple bids and unless there are extenuating circumstances we choose the low bid. Prior to Amendment No. 4 of our 2012 Agreement, CH2M needed the City Commission's approval for repair expenses in excess of $7,000. Repair Expenses for 2015-2016 equal to or greater than $2,000 are itemized in Exhibit 22.

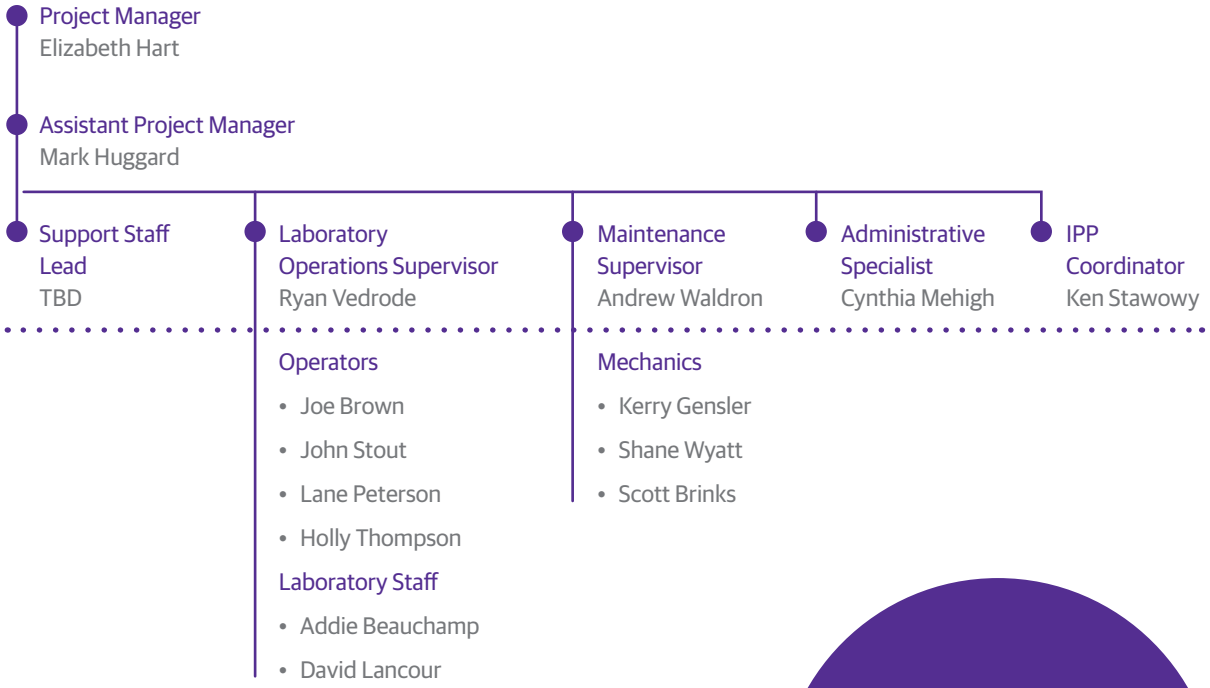
Exhibit 22
Repair Expenses Over $2,000

Vendor	Equipment or Repair	Cost
Kennedy Industries	New volute for pump #1 at Woodmere Lift Station	$3,372.80
Hydrodynamics Inc.	Repaired rotating assembly for return activated sludge pump	$3,832.95
Hurst Mechanical	Replacement ventilation fan for membrane building basement	$3,975.07
Hurst Mechanical	Membrane building HVAC repair	$3,975.07
Whipps, Inc	Replacement drive nuts and bearings for membrane gate assemblies	$2,678.00
Windemueller Electric	Repair of CWAS pump control circuit	$2,354.00
Michigan Switchgear	New trip unit for GE breaker on aeration blower #2	$3,500.00
Continental Carbon Group	Replacement carbon canisters for the Phoenix odor control building (purchase made with prior approval)	$19,530.00
ABI Mechanical	Repaired back pulse line in membrane building	$3,450.00
Hach Company	Turbidity meter replacement for trains #1 and #2, and new probes for each train	$3,800.72
Endress Hauser, Inc.	New level transducer for train #3	$2,046.57
One Stop Resource, Inc.	Spare processing card for the Digester 5 control panel and the main control panels in the membrane control room	$2,300.00
Topline Electric LLC	Installed new pressure transmitters on membrane trains #3 and #6	$3,712.44
Lakeside Doors	Replace door and frame to the aeration room and maintenance shop	$3,100.00
Kerr Pump & Supply	Replaced west booster pump in boiler room	$2,088.00
Hydrodynamics Inc.	New pump for Clinch Park	$4,675.05
Standard Electric (Graham Motors)	Rebuild pump for Coast Guard Lift Station	$2,119.12
Northern A-1 Services	Televised to grit chambers	$3,706.99
AIS	8 inch pump rental for primary bypass for televising	$4,181.07
Whipps, Inc	Seals for return activated sludge channel stop logs	$2,420.00

CH2M TCRWWTP Staff Overview

Twelve CH2M employees operate the TCRWWTP 24 hours day, 7 days a week. CH2M also has 5 other staff members supporting the Traverse City based staff Exhibit 23 highlights our team.

Exhibit 23
TCRWWTP Organizational Chart



24 hours day,
7 days a week

Summary

Whether we are partnering to provide services to a village, a city, a county, or a company, we know our partnerships are built on trust. We are proud and protective of our strong corporate standing, and we are vigilant in maintaining our reputation. The Traverse City project is a shining example of where working together, we have developed and maintained a trusting relationship built on open, honest communications and a dedication to doing the right thing.

Facilities run by CH2M treat more than 1 billion gallons of wastewater and water each day. Our culture uniquely links our personal investment with our job performance and satisfaction, and ensures our commitment to outperform for you.

It is our goal to exceed your expectations. CH2M and the City of Traverse City have worked to create a partnership where we reduce risk, exceed performance expectations, and apply our institutional knowledge gained while working with the city for more than 25 years.

We appreciate the opportunity to serve Traverse City and its citizens.
We look forward to our continued partnership for many years to come.

www.ch2m.com
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