

December 20, 2017

Ms Tracy Braun, M.Sc.
Manitoba Sustainable Development
Environmental Approvals Branch
123 Main Street, Suite 160
Winnipeg, Manitoba
R3C 1A5

Dear Ms. Braun:

File:5679.00

Regarding: Barkman Concrete - Washout Water Action Plan

The Environment Act License (Number 3086) granted to Barkman Concrete outlined requirements for the characterization of the washout water and the possibility of an action plan based on the sampling results. The testing has determined that there are exceedances and that the implementation of controls and remedial measured did not reduce all of the exceedance to the required levels.

Based on these results Barkman's herewith submits a proposal for an action plan that includes a new treatment process. Part of this proposal includes a request for a change in Barkman' Environmental License that would move the factory washout water discharge location from the City of Steinbach Storm Sewer System to the City of Steinbach Waste Water Sewer System.

This package includes an Notice of Alteration Form, the required fee, a discussion on testing and data analysis, an explanation of the proposed treatment procedure and the expected outcomes, a discussion of the proposed testing plan based on the suggested changes and a letter from the City of Steinbach.

If you have any questions or require further information, please feel free to contact me.


Best Regards



Garry Funk
Research and Development Manager
Barkman Concrete
gkf@barkmanconcrete.com

Notice of Alteration Form



Client File No. : 5679.00		Environment Act Licence No. : 3086	
Legal name of the Licencee: Barkman Concrete Ltd.			
Name of the development:			
Category and Type of development per Classes of Development Regulation: Manufacturing Concrete batch plants			
Licencee Contact Person: Garry Funk			
Mailing address of the Licencee: 152 Brandt Street			
City: Steinbach		Province: Manitoba	Postal Code: R5G 0R2
Phone Number: (204) 326-3445 Fax: (204) 326-5915 Email: gkf@barkmanconcrete.com			
Name of proponent contact person for purposes of the environmental assessment (e.g. consultant): Same as above			
Phone:		Mailing address:	
Fax:			
Email address:			
Short Description of Alteration (max 90 characters): Requesting an alteration in the License for washout water discharge location			
Alteration fee attached: Yes: <input checked="" type="checkbox"/> No: <input type="checkbox"/>			
If No, please explain:			
Date: 2017-12-20		Signature: 	
		Printed name: Garry Funk	
<p>A complete Notice of Alteration (NoA) consists of the following components:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Cover letter <input checked="" type="checkbox"/> Notice of Alteration Form <input checked="" type="checkbox"/> 4 hard copies and 1 electronic copy of the NOA detailed report (see "Information Bulletin - Alteration to Developments with Environment Act Licences") <input checked="" type="checkbox"/> \$500 Application fee, if applicable (Cheque, payable to the Minister of Finance) 		<p>Submit the complete NOA to:</p> <p>Director Environmental Approvals Branch Manitoba Sustainable Development Box 80, Suite 160, 123 Main Street Winnipeg, Manitoba R3C 1A5</p> <p>For more information:</p> <p>Phone: (204) 945-8321 Fax: (204) 945-5229 http://www.gov.mb.ca/sd/eal</p>	
<p>Note: Per Section 14(3) of the Environment Act, Major Notices of Alteration must be filed through submission of an Environment Act Proposal Form (see "Information Bulletin – Environment Act Proposal Report Guidelines")</p>			



Proposed Action Plan for the Management of Washout Water relating to the *Environment Act* License #3086

The following report sets out both the rationale for the request to change the discharge location of the plant washout water in *Environment Act* License #3086, from the City of Steinbach storm sewer system to the City of Steinbach waste water sewer system, and changes in the treatment process that would be required. This includes a discussion on the development of this action plan and the steps that led us in this direction, the actions on the part of Barkman Concrete necessary to implement this proposal and the testing regimen that would follow.

As to the effects of the proposed change it is our belief that the change in discharge location along with increased treatment would reduce Barkman's manufacturing facility's impact on the environment significantly. The quality of the treated water would be improved and discharge into the waste sewer system allows for further treatment and dilution.

1. Background on Testing and Data Analysis

After a one year period of monitoring the wash out water from the Barkman Concrete facility in Steinbach, following a plan prepared for us by AECOM and with further direction from an interim report from AECOM, we have come to a more complete understanding of the effects of our processes on the washout water and the quality of our washout water referenced against three sets of guidelines. In proceeding with the plan we began this process with an extensive period of testing the washout water for potential materials identified in plant processes the results of which were referenced to the following three sets of guidelines:

1. Canadian Council of Ministers of the Environment (CCME), *Water Quality Guidelines for the Protection of Freshwater Aquatic Life*, 2011.
2. Ontario Ministry of the Environment (MOE), *Soil, Ground Water and Sediment Standards for the Use Under Part XV.1 of the Environmental Protection Act*, April 12, 2011.
3. City of Winnipeg, *Sewer By-Law No. 92/2010*.

The AECOM interim report pointed out materials that exceeded one or more of the referenced guideline parameters. The test data combined with the interim report helped establish patterns that provided guidance for further investigation into the potential sources that may have contributed to these exceedances. The intent of this further investigation, based on the Interim report along with the further test results, was to determine the feasibility of controlling the contaminant sources through careful management at the point where the identified materials are used. The results of this investigation indicated that in some cases there were direct factory process to exceedance correlations through which we could identify the contaminant source. With some of the exceedances though, the connection to what the causes

could be were not clearly traceable. As testing proceeded we continued to research potential sources, but in a few cases found this, especially with the trace results of some VOC's, to be very challenging. There are still some results from the testing that we have not been able to trace back to a source. It was suggested by some of the individuals we consulted that some of these trace results may have historical origins not related to any materials used today.

As the testing neared completion some exceedance patterns became apparent, and even with our efforts to control source contamination, recognized that we could not affect all the parameters that did not meet the guidelines cited with careful plant management. What followed from this was a period centered on investigating methodologies that might be used in our manufacturing environment that could either filter, treat or amend plant process water to eliminate the exceedances. The results of the research, along with the limited water treatment options available specifically for our industry in North America and the intensive nature of the available options, spurred us to consider other alternatives.

This led to the consideration of discharging our wash out water into the City of Steinbach wastewater sewer system. The City of Steinbach Sewer Utility Policy includes requirements on what can be discharged into the Wastewater Sewer which allowed us to compare our test results to their expectation. Included in the requirements were two parameters that we had not tested for, Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). Therefore we initiated further testing to determine what could be considered the normative range for BOD and TSS levels in our wash out water.

Once we had sufficient test data to fairly characterize the wash out water for comparison with the City of Steinbach requirements, we contacted the City of Steinbach and met with Mike Heppner, Waterworks Department Head and Phil Kalyta, City Engineer for the City of Steinbach. We introduced our consideration of discharging our washout water into the waste water system and presented the test data and our plans to amend the wash out water where it did not meet the City of Steinbach wastewater discharge requirements. They gave us some additional insight on methodologies presently being used by other companies in Steinbach that might be of use to us. After reviewing the data and listening to our plans to bring the washout water into compliance with the City of Steinbach Wastewater Sewer discharge requirements, they stated that, given effective treatment, they would not have any problems accepting this discharge into their waste water system.

Based on this information Barkman's researched possible treatment options comparing anticipated outcomes to City of Steinbach waste water sewer system expectations. The results of this work led to a meeting with the relevant parties from the City of Steinbach and local Department of Sustainability officials and Barkman Concrete to ensure that all necessary considerations were being taken into account allowing the City could move forward with support for Barkman's proposal.

2. Proposed Treatment Procedure for Factory Process (Washout Water) Water

Our facility presently has two waste process water collection locations. Both of these locations are comprised of a system of three settling pits. At the end of the series of pits is a pump out chamber from where the process water is presently pumped to a drain system that moves it into the City of Steinbach Storm Sewer system. In the proposed plan, the process water would be pumped from these pump out chambers to a central location and combined to be further treated by a single processing unit.

At this final treatment stage the waste process water is collected in a large tank that maintains a surcharge of treated water, the volume of this surcharge is based on the expected average daily volume of process water. The storage tank is sized to hold our calculated largest days process water output plus the surcharge. The settling pits and pump out chambers act as the reservoir for the system if for some reason the daily process water exceeds the tank capacity. Our understanding is that the present design capacity will not be challenged as we will be able to perform a number of water processing cycles of per day.

With the surcharge in the processing tank being equal to the expected daily production of waste water, the first step in the treatment process is through dilution. As process water is pumped into the tank it is blended with treated water thereby lowering the pH as well as reducing the concentration of any materials still suspended in the process water. This tank is connected to a proprietary pH control system designed and manufactured specifically for treating concrete waste water by the company Fortrans in North Carolina. When the level in the tank reaches a specified volume, the inflow of process water will be stopped and the mixture of new process water and the treated surcharge will be drawn out of the tank and cycled through the treatment process until the pH level meets the required target. The pH level will be measured in the tank through an electronic monitoring system.

The Fortrans process uses an injection manifold that injects gas, in this case carbon dioxide, into the water without any moving parts or small nozzles eliminating the possibility of buildup and reduced performance. Increased water volumes or the need to reduce processing time is handled by increasing the number of these injectors active in the process. The primary purpose of this process is to bring the pH to acceptable discharge level. An additional benefit of the use of CO₂ to control the pH is that the carbonic acid produced by the injected carbon dioxide will react with the calcium hydroxide, a byproduct of cement hydration, to produce calcium carbonate, which settles out of the water. This should result in a further reduction of the TSS. The static stages between processing also allows other materials to settle out of the process water. The holding tank is of a hopper bottom style that facilitates the removal of the accumulated material.

When the process water in the tank meets the required parameters, the volume of water greater than the calculated surcharge would be pumped into the City of Steinbach Waste Water Sewer system. At implementation of the system, testing would be performed on trial processing runs to ensure targets are being met before any water is released into the waste water sewer system. Ongoing testing, to ensure the requirements of the Steinbach Sewer Utility Policy are met, will be set by the City and submitted as required, this will be reviewed at the end of one year of testing. If any single test shows significant deviation from the required parameters remedial action will be taken.

The testing done to date also indicated that there were episodic occurrences of trace amounts of oil in the process water. In completing an exhaustive audit Barkman's discovered the cause primarily to be maintenance processes where oil could enter the process water stream and that has been mitigated through increased procedural controls. As an additional measure we have placed floating filter socks to capture oil and grease in the earliest effective point upstream. These socks would also be placed in the holding tank in the proposed treatment system.

To ensure that this system operates as designed, Standard Operating Procedures will be developed for the maintenance of every aspect of the system and become a part of the scheduled Preventative Maintenance program presently in place at Barkman Concrete.

Barkman's also proposes that after one year of operation and testing the performance of the system will be assessed by the parties involved. The reliability of system and any other considerations that are deemed important will also be assessed at this time as well. Ongoing testing requirements may be re-considered based on the outcome of this assessment.

One of the requirements listed by the City of Steinbach, Hexavalent Chromium, at one of the sample locations, exceeded the limits on a number of occasions. Our best understanding of the treatment process is that the production of Calcium Carbonate as described above will significantly reduce the levels of Hexavalent Chromium as the source of both the Hexavalent Chromium and the Calcium Hydroxide is the cement powder itself. Primarily though, the Hexavalent Chromium levels will be reduced through dilution with the process water from the second source which had levels much below the stated limits. The effectiveness of this dilution is expected to be significant as the water from the source without exceedances in Hexavalent Chromium constitutes the much larger quantity of the water to be processed. Additional dilution can be used if there continue to be exceedances and the possibility of decommissioning the process that is a significant contributor is also being considered.

3. Proposed Testing Plan per City of Steinbach Requirements

The original testing plan, based on the present discharge location, was designed to compare known and potential materials included in the process of concrete products manufacture to the

following environmental quality guidelines that could have jurisdiction over the discharge environment or provide relative comparative parameters.

1. Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Freshwater Aquatic Life, 2011
2. Ontario Ministry of the Environment, Soil, Ground water and Sediment Standards for Use under Part XV.1 of the *Environmental Protection Act*, April 15, 2011
3. City of Winnipeg, Sewer By-Law No. 92/2010

The proposed discharge location of the City of Steinbach (CoS) waste water sewer system, based on the rationale given has specific requirements for water quality entering their waste water sewer system. This necessitated changes to the testing plan and AECOM in an interim report had also suggested some changes. Given the proposed discharge location, it is suggested that further analysis be based on the most relevant documents to this location and include:

1. City of Steinbach Sewer Utility Policy
2. City of Winnipeg Sewer By-Law No. 92/2010

Based on these documents and consultation with ALS laboratory Winnipeg the following tests are proposed for monitoring the acceptability of the washout water to meet the specific City of Steinbach requirements in PART 4 – Control of Discharge to Sewers:

- Chromium +6
- Total Metals by ICP-MS
- Anions by IC
- Oil & Grease – Gravimetric
- pH
- Biochemical Oxygen Demand (BOD)
- BTEX plus F1-F4
- Free Cyanide in water by CFA
- Cyanide, Total
- Mercury Total
- Total Sulphide Calculated as H₂S
- Total Suspended Solids
- Sulphide (as S)

The list above also includes testing for materials that are not regulated by the City of Steinbach Waste Water discharge policy but were detected in the initial testing and will be monitored to further understand and track the effectiveness of the treatment system.

In this proposal testing that was originally performed and would not be continued includes the following:

- Alkalinity
 - o Processing the water to reduce the pH to meet the City of Steinbach requirements will reduce the maximum possible Alkalinity and the City of Steinbach does not have requirements for this parameter.
- Conductivity
 - o The City of Steinbach does not require this test and all the referenced guidelines to date do not recommend restrictions on this parameter.
- Glycol and alcohol in water
 - o Results at both sample locations only picked up Acetone which was traced back to an equipment cleaning agent. Through controls and waste management the test results were brought down to trace levels during the testing period.
- Total Dissolved Solids
 - o The City of Steinbach does not require this test and the referenced guidelines to date do not recommend restrictions on this parameter.
- Total Trihalomethanes (THMs)
 - o Testing at one sample location showed trace levels and at the other location was not detected.
- Turbidity
 - o The City of Steinbach does not require this test and the referenced guidelines to date do not recommend restrictions on parameter.
- VOC plus F1 by GCMS
 - o The Interim Testing report by AECOM recommended that we remove this test and replace it with the BTEX plus F1-F4
- Sum of Xylene Isomer Concentrations
 - o The BTEX test added picks up the detection of Xylenes.

3. Summary

The original sampling period indicated that the factory washout water had exceedances based on three sets of reference guidelines given that were relevant to the present discharge location. Barkman's research into technologies for reducing these exceedances found that the processes and energies required to bring those exceedances into compliance would be beyond the capacity of the business to implement. Further research brought to the fore the possibility of releasing the wash out water into the City of Steinbach waste water sewer system. This was found to be a common approach used by many industries and the City of Steinbach had a set of

parameters characterizing the quality of the water that could be released that provided a clear design target.

The testing to that point and additional testing indicated that from the two plant washout water sources, both consistently exceeded the pH requirement of the City of Steinbach and one of the locations exceeded the Hexavalent Chromium limit of 5 mg/L on 5 of 8 tests with the highest level of the exceedances recorded being 6.83 mg/L. The plants second washout water source's highest test for Hexavalent Chromium was 0.362 mg/L. There were episodic exceedances but these were reduced through plant controls.

We then developed a plan that included a process to bring the pH into compliance and anticipated a reduction of the Hexavalent Chromium levels as well. Though for the Hexavalent Chromium the primary measure to reduce exceedances is through dilution which, in our understanding of our volumes of waste water from the two sources, should occur without any additional measures, as the larger fraction of the total washout water comes from the source with low measured amounts.

The proposal includes a change in testing requirements contingent upon the acceptance of the proposal and a change in the discharge location in *Environment Act* License #3086, and is consistent with the requirements of the City of Steinbach for discharge into the waste water sewer system. The City of Steinbach has been consulted through this process and has indicated that as planned the proposal including the proposed testing meets with their requirements.

Respectfully Prepared and Submitted by

Garry Funk
Research and Development Manager
Barkman Concrete

February 8, 2017

Barkman Concrete
152 Brandt Street
Steinbach, MB
Canada, R5G 0R2

Attention: Garry Funk

Re: Barkman Concrete Waste Process Water

Dear Sir,

In the spring of 2016 the City of Steinbach received the request from Barkman Concrete to accept waste wash water coming from their concrete process plant. Over the last months we have had good discussions regarding the wastewater quality parameters required to meet the City's Control of Discharge Policy prior to the wastewater being accepted into our waste water stream. In the most recent meeting with Manitoba Sustainable Development all parties came to agreement that the treatment plans in place should be able to meet the parameter requirements of the policy.

The testing requirements of the City would include the following:

- 1) All online monitoring data to be submitted monthly. (pH)
- 2) Testing of the Control of Discharge parameters taken weekly prior to a discharge and the results submitted to Waterworks monthly.
- 3) Record any changes or adjustments made to the process to meet the policy parameters and submit them monthly.
- 4) Keep date and time records of each discharge volume and submit monthly.
- 5) A process drawing be submitted when design is complete and Waterworks to walk through with a Barkman representative to review process and sample points. This would be done before the system is put into operation.

The City will review the reports regularly and when we are comfortable that the parameters are being met a reduced testing schedule will be considered.

Sincerely,

Mike Heppner
City of Steinbach
Waterworks Department Head.