



## **Site Remediation of Nottingham Island**

**July 1, 2016**

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The following document was prepared at PWGSC request following the inspection carried out by the Nunvaut Water Board on site on June 22, 2016. The information presented below answers the interrogations raised by the inspector by comparing what was written in Biogenie's technical proposal in 2014 and what has actually been done on site.

### **WATER TREATMENT UNIT**

#### **Extract from our technical proposal**

##### **Treatment of Barrel and Tank Wash Water**

Wash water will be generated during barrel clean-up, pipe and tank cleaning, and collection during excavation. A two lagoon system (or tank) in conjunction with the Water Treatment Unit (WTU) will be used to treat barrel wash water. The lagoons will be constructed adjacent to the Material Processing Area (MPA) where barrel processing takes place. Wash water will be pumped into the first lagoon and allowed to stand to promote settling of sediment and metals. Absorbent booms will be deployed to absorb any oil or grease. Taking care not to disturb the settled sediments, the water will be pumped into the second lagoon. From the second lagoon, water will be circulated through the WTU. The WTU is designed so that different filtration media (like activated carbon, organo-clays and ion exchange resins) can be used in the filtration units to capture contaminant compound of different natures. The filtration components can be arranged in various configurations to adapt the flow rates and the treatment to a specific contaminant. It is anticipated that, from the soil contamination profiles detailed in the characterization data, the water treatment unit proposed will meet the requirements of this site. Used filter media will be containerized in a BWI bulk bag. Wash water will be circulated until sample results indicate that the water complies with discharge criteria. Treated water will be discharged with DR approval at a location of least 31 m from all water courses. Refer to Appendix C for a schematic of the WTU.

### **Actual setup of the barrel washing area and WTU**

The MPA is constructed with 2 tanks instead of 2 lagoons. The water is treated as described above. The media inside the filtering containers used to treat the water is activated carbon since the contaminant is petroleum hydrocarbons. The WTU unit is setup with 4 containers holding the activated carbon where the contaminated water circulates through. It is anticipated that approximately 2,500 to 3,000 L of contaminated wash water will be produced by our barrel cleaning operations. The WTU was designed to treat 30 GPM (136 litre per minute or 8,160 L per hour) when running at its full capacity. Our operation procedure allows us to treat water at a slower pace, since the volume of water produced is small. Furthermore, the water is circulated through the WTU several times to help reduce the contamination level.

The activated carbon inside the filtering containers will be changed once during the treatment of the water if necessary. Typically, the activated carbon inside a WTU with 4 filtering containers can be used to treat 50,000 L of contaminated water before needing replacement. With the small volume of water produced at Nottingham Island, we do not anticipate having any problems with the treatment of the washwater. There is presently enough activated carbon on site for 2 full carbon replacements.

In the event that the water results are negative after the treatment and there is no time left to continue the treatment, the water will be containerized and brought back south to be sent at a licenced treatment/disposal facility. Containers were planned for this eventuality and are present on site.

## **CAMP SEWAGE LAGOON**

### **Extract from our technical proposal**

#### **CAMP WASTEWATER MANAGEMENT**

Biogenie's wastewater system will be comprised of two sets of sewage lagoons. This system has been successfully used on previous projects such as CAM-F, CAM-5, Bear Island and FOX-3.

All sewage and wastewater generated from the operation of the camp are to be pumped to one of two temporary and independently operated sewage lagoons. The site will possess two lagoons with a total capacity of 273 m<sup>3</sup> based on the estimated monthly water use. Only one lagoon will be in use at any given time for a duration of one month, then sewage will be pumped into the second lagoon to allow for the sewage in the first lagoon to settle. The lagoons will be located a minimum of 100 m from the camp and a minimum of 100 m from drainage paths. Refer to Appendix E for our proposed sewage lagoon locations, although the locations may be changed after the initial site visit and subject to DR approval.

The lagoons will take approximately 6 hours to construct. An excavator will be used to dig the lagoon basins as they are below grade and will use the excavated material to construct the 0.5 m berm around the lagoons. All construction activities on the sewage lagoons will be carried out avoiding sedimentation of any surrounding water bodies. There will be no hazardous substances affiliated with the sewage disposal facility.

Prior to entering the lagoons, sewage and wastewater will initially be drained to a sewage transfer tank adjacent to the camp. A mulcher pump will be installed in this tank, with the ability to grind any solids in the wastewater, creating slurry, which will then be pumped to the lagoons. The lagoons will rely on natural processes of bacteria and algae to reduce organic matter to acceptable levels, while allowing an appropriate amount of time for the solids to settle out as sludge. The settling section allows for the physical removal of solids and grease from the incoming wastewater. Heavy organic matter is settled out in the lagoons, with the lighter grease forming a scum layer on the water surface. The lagoons will be operated in parallel configuration to reduce excessive Biological Oxygen Demand (BOD) and fecal coliform and to avoid the use of chemicals

such as calcium hypochlorite as a treatment method. Detention time will also be maximized to again reduce excessive BOD and fecal coliform. Security measures will include a sign clearly identifying the sewage lagoons. This area will also be explained and identified during the WOS as a restricted area. The constructed berms will be high enough to prevent any accidental intrusion in the lagoons. Confirmed location of the lagoons will be identified and submitted to the DR following the pre-mobilization site visit in 2014.

The lagoons will be monitored daily to check the fluid level and to prevent inadvertent seepage of effluent through the lagoon berms. If the lagoons leak or inadvertent seepage occurs, discharge of effluent in the lagoon will be stopped and switched to the other lagoon. If necessary, a temporary lagoon can be constructed.

Lastly, the mulcher pump installed in the sludge tank will enable considerable accumulation of sludge in the tank. This should lead to a minimal sludge accumulation in the lagoon which can then be disposed of off-site.

### **Discharge Locations**

Prior to discharging from the lagoons, samples will be collected and analyzed in an approved laboratory (in Ottawa or Montreal) for the parameters set out in the Water License. Wastewater treatment targets defined for this project will be determined by the Nunavut Water Board. Likewise, discharge of effluent will be done in compliance with Section 36(3) of the Fisheries Act. Wastes which meet the criteria set forth by the Nunavut Water Board will be discharged at one of two points dependent on which lagoon is being discharged. These discharge points are located 100 m from any drainage course or fish-bearing body of water. During the pre-mobilization site visit, possible discharge locations will be identified. Once on site, the sampling stations and discharge point shall be surveyed and the coordinates will be provided to the DR.

### **Estimated Water Discharge**

It is estimated that over the course of a month, the camp will generate 59 m<sup>3</sup> of wastewater based on the daily water consumption of 2100 L. Sewage lagoons will be discharged monthly after appropriate testing and settling takes place.

### **Actual setup of the camp wastewater management**

Only one camp sewage lagoon was constructed since the camp holds only 30 people. The volume of wastewater produced is approximately 2 m<sup>3</sup> to 3 m<sup>3</sup> per day. The mulcher pump installed in the sludge tank enables considerable accumulation of sludge in the tank and only water with minimal sludge is pumped in the lagoon. The lagoon has not been sampled nor emptied yet, based on the small volume produced.

In prediction of site closing, the sewage lagoon will be sampled during the week of July 4, 2016 to verify the level of contamination. If the results are negative, we will have enough time to treat the water, either by the addition of the appropriate chemical products (calcium hypochlorite, flocculating agent such as lime, etc.) or by using our WTU, equipped with the right media for the identified contaminants.