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15 August 2016

Nunavut Water Board
PO Box 119
Gjoa Haven, Nunavut X0B 1J0
Attention: Karén Kharatyan, Technical Advisor

Subject: REMEDIATION – BAF 3

Reference: 1) Nunavut Water Board License #3BC-BAF0919

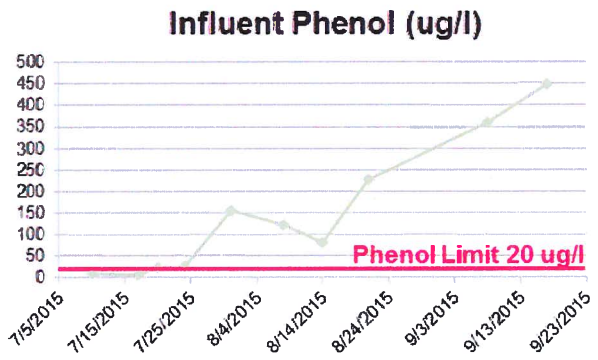
Dear Mr. Kharatyan:

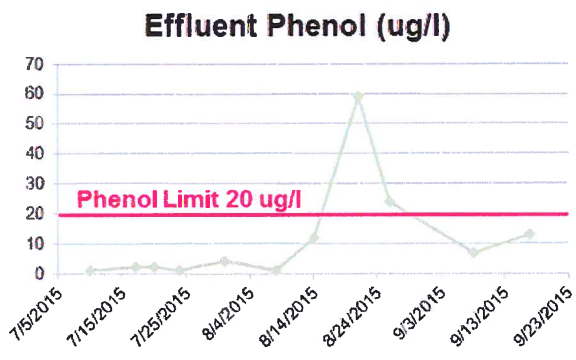
This correspondence has been prepared at the request of INAC Water Resources Officer, Andrew Keim following discussions conducted in late June 2016 and during the recent site inspection completed by INAC at BAF-3 on 19Jul16. Raytheon Canada Limited (RCL) is in the second year of performing environmental remediation of the Jet A1 fuel release identified on 19Mar2015.

Late in the 2015 field season RCL identified increasing concentrations of phenols in the water coming into the water treatment system (influent) that had been installed on-site to aid in the remediation efforts. The phenol concentrations in the treatment system influent water over the summer increased from <10 to 448 parts per billion (ppb). The increase was not expected based on samples collected from the original release. Additional testing of groundwater collected from a recovery trench and nearby monitoring wells identified phenol concentrations as high as 581 ppb. Based on samples collected from the original release that had very low phenol concentrations, these data indicated that the phenols were affiliated with groundwater on the site.

Staff on-site monitored the water treatment system and made adjustments to the treatment when the phenol concentrations in the influent water increased. Samples were taken and sent to the lab from the influent, mid-treatment, and on the water being discharged. These samples were prepared, shipped to the accredited laboratory in Ottawa, and the results received two to three weeks later, due to weather and laboratory delays. Due in large part to the long delay time for the laboratory samples, there were two discharges of water that exceeded the licence criteria measured at 59 ppb and 24 ppb.

The analytical results for phenols in the influent water and the effluent water from the water treatment system are shown in the following two graphs.





In response to experience gained during the 2015 field season, several modifications were made to the water treatment processes to enhance phenol treatment down to the 20 ppb limit cited in Nunavut Water Board License 3BC-BAF0910. The modifications enacted for 2016 included:

- An increase in temperature at which the influent water passes through the air stripper in order to increase the volatilization of phenols
- A cooling loop that reduces the temperature of water exiting the air stripper to a point where filtration by activated carbon is most efficient;
- A hydrogen peroxide oxidation step to enhance phenol removal;
- A UV light system to increase the oxidation potential of the hydrogen peroxide; and
- Equipment for two different phenol field analytical analysis tests, one with the ability to sample concentrations in the range from 0.1 to 5 parts per million (ppm) and the other for concentrations from 0.002 to 0.2 ppm.

For 2016, we have been collecting weekly analytical samples for the treated water effluent from the system, and have not identified phenol at concentrations above the license limits. If phenol concentrations in our effluent (which are consistently lower than our influent concentrations) begin to exceed 0.020 ppm, we will be required to determine whether it would be preferable to stop groundwater depression in the area of the release and risk horizontal mobilization of Jet A1 away from the impacted area or to maintain groundwater depression to contain any remaining fuel while possibly discharging partially treated phenol concentrations to the environment. We believe that if faced with a choice, off site migration of the Jet A1 fuel presents a greater environmental risk than the release of a limited quantify of phenols that already exist within the groundwater on site.

RCL is striving to take all reasonable precautions to maintain compliance with our water license, and appreciates having had the opportunity to discuss our processes with representatives from INAC and the NWB. As time progresses through the 2016 field season, we believe that the ability to continually pump and treat groundwater from the spill area is a critical step towards successful recovery of any remaining Jet A1 Non Aqueous Phase Liquids.

RCL appreciates the requirements of our license, and hopes we can continue to have candid discussions as our work progresses. We will carefully monitor conditions as the summer progresses and keep your agency informed of results and data trends as they become available.

As per the attached letter, RCL received the interpretation of NWB Water Licence 3BC-BAF0919, Part D, Item 13 as meaning that direct discharge of treated water is acceptable.

Thank you for your guidance, and please do not hesitate to contact me at any time should you have any questions.

Sincerely,

Don Beattie
Environmental Officer
RAYTHEON CANADA LIMITED

cc: Andrew Keim, INAC
Scott Charland, NWSO
Doug Beaton, RCL
William Wyman, RCL
Robert Luhrs, Raytheon Corp.