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Project No.: 95001-43-06
Powertech Reference No.: 06310
Your Reference: 317118

Petro Barrier Systems
579 Bay Street
Victoria, BC
V8T 1P5

Attention: Iain Muir

Dear Mr. Muir:

Re: Results of Analysis: PetroBarrier - PCB Removal Verification

INTRODUCTION

We were asked to determine the effectiveness of a supplied Petro Barrier column in removing PCBs (Arochlors 1242 and 1260) and insulating oil (Voltesso 35) from water. As an additional test, we were asked to add insulating oil to the top of the column, note any visible changes and time how long it takes before the column becomes plugged and impermeable to water.

METHODOLOGY

Insulating Oil Removal

Six pre-cleaned amber glass bottles were filled with 900 mL of deionized water. A known amount of insulating oil (Voltesso 35) was added to each and shaken overnight to mix well. A seventh bottle was filled with 900 mL of deionized water only and also shaken to act as a method blank.

The Petro Barrier column was pre-wet with water. Then, four of the oil-spiked samples plus the blank were passed through the Petro Barrier column and each was collected in a new, pre-cleaned 1 L amber glass bottle. The spiked water passed freely through the column. The sample bottle was rinsed onto the column three times with a small amount of deionized water and the column was allowed to completely drain for 5 minutes before the next sample was put through. Two of the oil-spiked samples acted as controls and were not put through the column.

All seven samples were then extracted and analyzed for Extractable Petroleum Hydrocarbons using the method described in the attached analytical report.

PCB Removal

A PCB spiking solution was prepared for each of the two Arochlors by adding a known amount by weight to Voltesso 35 insulating oil. Six pre-cleaned amber glass bottles were filled with 900 mL of deionized water. A known amount of spiking solution was added to each and shaken overnight to mix well. A seventh bottle was filled with 900 mL of deionized water only and also shaken to act as a method blank.

The Petro Barrier column was pre-wet with water. Then, four of the PCB-spiked samples plus the blank were passed through the column and each was collected in a new, pre-cleaned 1 L amber glass bottle. The spiked water passed freely through the column. The sample bottle was rinsed onto the column three times with a small amount of deionized water and the column was allowed to completely drain for 5 minutes before the next sample was put through. Two of the PCB-spiked samples acted as controls and were not put through the column.

All seven samples were then extracted and analyzed for PCB using the method described in the attached analytical report.

Effect of Large Quantity of Oil on Petro Barrier Column

The column was pre-wetted with water and 50 mL of insulating oil was added to the top. No visual changes were noted. Water added to the top passed through the column.

An additional 40 mL of oil was then added (90 mL total) and visual changes were immediately noted. The column granules became darker and appeared to be clumping together as shown in the photograph. Two hundred and fifty milliliters (250 mL) of water were then immediately added to the top of the column and no water passed through. The column was rechecked after sitting for 18 hours with the water on top and it remained impermeable to the water.



Petro Barrier column after being plugged by the addition of oil. 250 mL of water on top.

DISCUSSION

The Petro Barrier column appeared effective in removing both the insulating oil (Voltesso 35) and the PCB at the levels tested.

Insulating Oil Removal - The initial concentration of the insulating oil in water was an average of 58.4 mg/L. After passing through the Petro Barrier the concentration dropped to an average of 1.6 mg/L or an average rate of removal of 97%.

PCB /Removal - The initial concentrations of Arochlor 1260 were 0.13 mg/L and 0.179 mg/L. After passing through the column these were reduced to 0.0011 mg/L and 0.0003 mg/L respectively, a average removal rate of 99.4 %

The initial concentrations of Arochlor 1242 were 0.135 mg/L and 0.222 mg/L. After passing through the column these were both reduced to less than the method detection limit of 0.0002 mg/L, resulting in an effective removal rate of 100 %

Plugging Effect of Oil – It appears that the addition of a large quantity of oil causes the Petro Barrier to very quickly plug and become impermeable to water. This effect lasts for at least 18 hours.

Prepared By : _____

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