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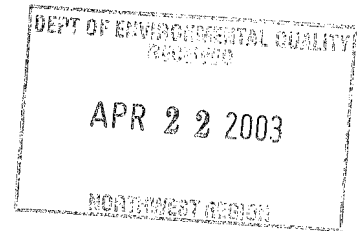
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April 14, 2003

File

WQ 5.0.1

Elliot Zais, PHD, P.E.
Senior Environmental Engineer
DEQ, Northwest Region
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987



Subject: Possible Mercury Release to the Columbia Slough on April 9, 2003,
NPDES Permit No. 101617

Dear Elliot:

This letter report has been prepared to meet the reporting requirements found in Section D.6 of the NPDES General Conditions.

The Water Bureau has an agreement with Carollo Engineers to supply them un-chlorinated groundwater for purposes of validating the performance of UV reactors. Although Carollo Engineers has responsibility for operation of the temporary UV Validation Facility at the Ground Water Pump Station, the disposal of the test water is being done under the Bureau's existing NPDES permit. At 0820 on Wednesday April 9, 2003 while a test run was being conducted, Carollo Engineers personnel noticed water leaking out the sides of the reactor they were testing. They called the Water Control Center to shutdown the wells supplying water to the facility and closed the valves to the reactor. After flow to the reactor subsided and the power was shut off, the reactor was drained and opened up for inspection. It was discovered that a UV lamp and a quartz sleeve inside the reactor were broken. Carollo Engineers called Water Bureau Engineering and apprised Dave Peters, the project manager, of the situation. Dave then relayed the information to Water Bureau Operations and Emergency Management personnel and they subsequently notified OERS, DEQ, BES, and the Multnomah County Drainage District.

At approximately 0915, Carollo Engineers collected a grab sample from an upstream location of the discharge point within the Columbia Slough. A sample was also collected downstream of the discharge point about 0926. These samples were stored in a refrigerator on site and were subsequently sent to a certified lab. The results of those analyses were not available for this report.

Water began flowing through the reactor at about 0743 at a rate of 8 MGD. The flow rate was increased to 41 MGD from 0815 to 0817. The reactor was observed to be leaking about three minutes later. Carollo immediately began closing the valves controlling flow to the reactor and flow was completely stopped at 0822. At that point, the reactor vessel and its associated piping were isolated from the rest of the system. Flow continued to the Slough until 0847 when the last well was shutdown. Well 12 was turned on at 1036 for the purpose of refilling the tank, but was

shutdown at 1146 when it was discovered that the flow was going to the Slough instead. There were no further discharges to the Columbia Slough that day.


Exactly when the lamp broke will never be known for sure. It most likely occurred sometime during or after the flow change. According to Carollo Engineers, broken lamps in these units are a very uncommon occurrence. One UV lamp contains approximately two grams of elemental mercury. Since the lamps had not been turned on, the mercury was in liquid form. An estimated one gram of mercury was found and removed from the lamp end boxes Wednesday morning. On Thursday April 10, 2003, the reactor unit was inspected further as was the associated downstream piping. More mercury was found in the bottom of the reactor and in the piping and was immediately cleaned up. Carollo Engineers estimate that it was an amount comparable to that found on Wednesday.

At this point, it appears that the vast majority of the mercury from the lamp has been recovered. Unfortunately, the mercury became mixed with material from the spill kits and it is not possible to separate it out and weigh it. Thus, it cannot be verified that all the mercury has been recovered and we must conservatively assume that some small fraction of the mercury might have been released to the Slough.

Carollo Engineers and Calgon have not been able to pinpoint the exact cause for the lamp failure, but have initiated some operational changes to mitigate some of the possible causes. One of these changes is to start the testing procedure by slowly ramping up the flow to the desired test rate without the lamps installed. Then flow will be slowly shut down, the reactor drained, and the quartz sleeves inspected. If the sleeves and everything else passed inspection, then the lamps will be installed and the test started again. UV Testing resumed last Friday morning, April 11, 2003, but was terminated after the inspection revealed two broken quartz sleeves. The UV lamps had not yet been installed. Carollo Engineers and Calgon are in the process of determining the cause of the broken sleeves. Carollo has indicated they do not anticipate any further testing with lamps in place until sometime in June.

If you have any questions or desire additional information, please call me at (503) 823-7598.

Sincerely,



Curt Ireland, P.E.
Water Quality Engineer

cc: Mark Knudson (via e-mail)
Mort Anoushirivani, Administrator (via e-mail)
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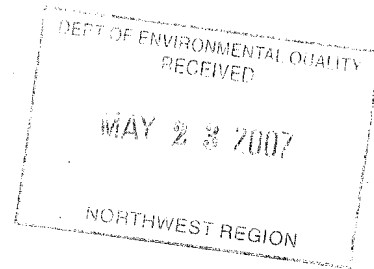


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May 17, 2007

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WQ 5.0.1

MULT. CO.

Subject: Possible Mercury Release to the Columbia Slough on May 11, 2007,
NPDES Permit No. 101617

Dear Elliot:

This letter report has been prepared to meet the reporting requirements found in Section D.6 of the NPDES Permit General Conditions.

The Water Bureau has an agreement with Carollo Engineers to supply them native groundwater for purposes of validating the performance of UV reactors. Although Carollo Engineers has responsibility for operation of the temporary UV Validation Facility at the Ground Water Pump Station, the disposal of the test water is being done under the Bureau's existing NPDES permit. At about 0805 on Friday May 11, 2007 while a test run was being conducted, Mark Heath of Carollo Engineers heard a popping sound and then noticed water leaking out the sides of the reactor that was being testing. He immediately began closing the valve downstream of the reactor. After that valve was closed, he closed the valve upstream of the reactor. Isolation of the reactor was completed at about 0810. Mr. Heath then contacted Rich Seright to notify the Water Bureau of the incident. Mr. Seright contacted the Water Control Center to shut down the wells pumping to the tank. All wells were shut down by about 0830.

Inspection of the reactor revealed that two UV lamps had broken. Broken glass from the lamps and the quartz sleeves enclosing them was found in the de-chlorination basin downstream of the test facility. Most of this material was located near the inlet to the basin and was removed later that day. Also found in the de-chlorination basin was a piece of 2-inch diameter PVC pipe approximately 18 inches in length.

On May 14, 2007 the remaining glass fragments and associated debris was removed from the de-chlorination basin. The tank was subsequently drained to allow inspection of pump station inlet piping to determine the condition of the chlorine injection diffusers. Both diffusers were made of the same PVC material and were damaged. The upstream diffuser was broken and the piece found in the de-chlorination basin appears to be part of it. Thus, it seems highly likely that the piece of

PVC diffuser pipe caused the breakage of the UV lamps and quartz sleeves as it passed through the reactor.

Carollo Engineers collected a grab sample from the isolated section of the process piping downstream of the reactor on the afternoon of May 14, 2007. This sample was stored in a refrigerator on site and was subsequently sent to a certified lab for analysis. The results were not available for this report.

On May 15, 2007 the isolated process piping was opened up for inspection. More glass fragments and debris was found up against the downstream butterfly valve. This material was removed from the piping. Draining the process piping flushed some additional broken glass and debris in to the inlet of the de-chlorination basin. That material was also removed. All together, Carollo Engineers estimates that approximately 90-95 percent of the broken glass and debris from the UV lamps and quartz sleeves has been collected.

One UV lamp contains approximately 0.6 grams of elemental mercury. This is roughly the same amount as found in once commonly used household mercury thermometers. The total amount of mercury in the two broken lamps was about 1.2 grams. This quantity of mercury is equivalent to a volume of less than one-tenth of a milliliter. As the UV lamps in the reactor had not been turned on when the incident occurred, the mercury was still in liquid form. Examination of the remaining intact UV lamps from the reactor showed mercury deposited in fine droplets and widely dispersed on the inside of the glass along the full length of the lamp. It is assumed that the mercury in the broken lamps had been similarly deposited prior to the incident.

From inspection of the broken glass, it appears that most (if not all) of the mercury droplets were washed off the glass. Because sediment, fine debris, and iron and manganese particles were commingled with the glass, it was impossible to discern if any mercury deposits were still present in the recovered material. At this point, it appears that the mercury from the broken lamps cannot be accounted for. Given this, we must conservatively assume that some fraction of the mercury might have been released to the Columbia Slough.

The reportable quantity for mercury is one pound (454 grams). If an amount equal to or greater than that quantity were released to the environment, then we would be required to report it to the appropriate State agencies. Had the entire 1.2 grams of mercury from the broken lamps reached the Columbia Slough, this would only be 0.26 percent of the reportable quantity.

The acute freshwater water quality criteria for mercury listed in Table 20 of OAR 340 is 2.4 ug/L. Based on flow totalizer readings, Carollo Engineers estimates that a total of 30,000 gallons of water went through the reactor before it was isolated. If the entire 1.2 grams of mercury thoroughly mixed with the 30,000 gallons of water, the resultant concentration of mercury would be 10.6 ug/L. However mercury is considered insoluble in water, so it is very likely that the concentration of mercury in the water entering the Columbia Slough under worst case conditions would be far less than the acute freshwater criteria.

Since the mercury started out as widely dispersed fine droplets within the UV lamps, it is probably safe to assume that the droplets remained that size and became much more widely dispersed after the lamps were broken. This widespread dispersion of fine droplets and the insolubility of mercury serve to mitigate adverse effects to the aquatic environment. As the total amount of mercury released from the reactor was small (1.2 grams with an equivalent volume less than one-tenth of a milliliter), it appears that the risk to the environment would be minimal even if the entire amount was released to the Columbia Slough.

The chlorine injectors are going to be re-designed and replaced so that this type of incident will not occur in the future. Carollo Engineers and the Water Bureau have made a good faith effort to recover as much of the material from the broken lamps as possible. Despite our efforts, at least some portion of the mercury may have entered the Columbia Slough. Given the reasons enumerated above, we believe that any potential risk to the environment resulting from this incident is small.

If you have any questions or desire additional information, please call me at (503) 823-7598.

Sincerely,



Curt Ireland, P.E.
Water Quality Engineer

cc: Chris Wanner (via e-mail)
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Bruce McClelland, MCDD
Mark Heath, Carollo Engineers