To: Deschambault, Lynda[Deschambault.Lynda@epa.gov]; anthony.brown@bp.com[anthony.brown@bp.com]
Cc: gr@burlesonconsulting.com[gr@burlesonconsulting.com]
From: Mike Johnson
Sent: Fri 4/7/2017 7:00:19 PM
Subject: FW: Leviathan Mine Aspen Seep Bioreactor update
removed.txt
170406_Aspen_Eff line.jpg
170320_compliance Results.pdf

Lynda,

I have answered your questions below in red. We are working on daily reports from yesterday and today.

Thanks,

Mike Johnson, PE

Senior Engineer

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From: Deschambault, Lynda [mailto:Deschambault.Lynda@epa.gov]
Sent: Thursday, April 6, 2017 4:03 PM
To: Brown, Anthony R (RM)
Cc: Mike Johnson; Greg Reller; Cohen, Adam; Wirtschafter, Joshua; Helmlinger, Andrew; Cory Koger; Chang, Kay SPK; tavassoli, lily; Doug Carey; Black, Ned; Serda, Sophia; Yogi, David
Subject: FW: Leviathan Mine Aspen Seep Bioreactor update

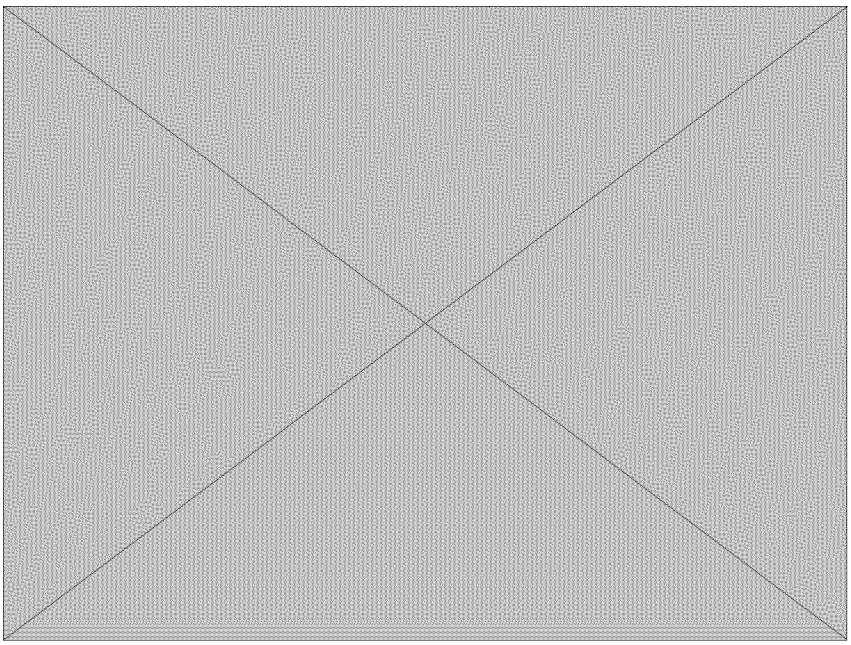
Hello Tony,

Per our exchanged voice mail conversations today--- EPA would appreciate an update on how today's site visit to the Aspen Bioreactor went, and get your quick feedback on the following few questions.

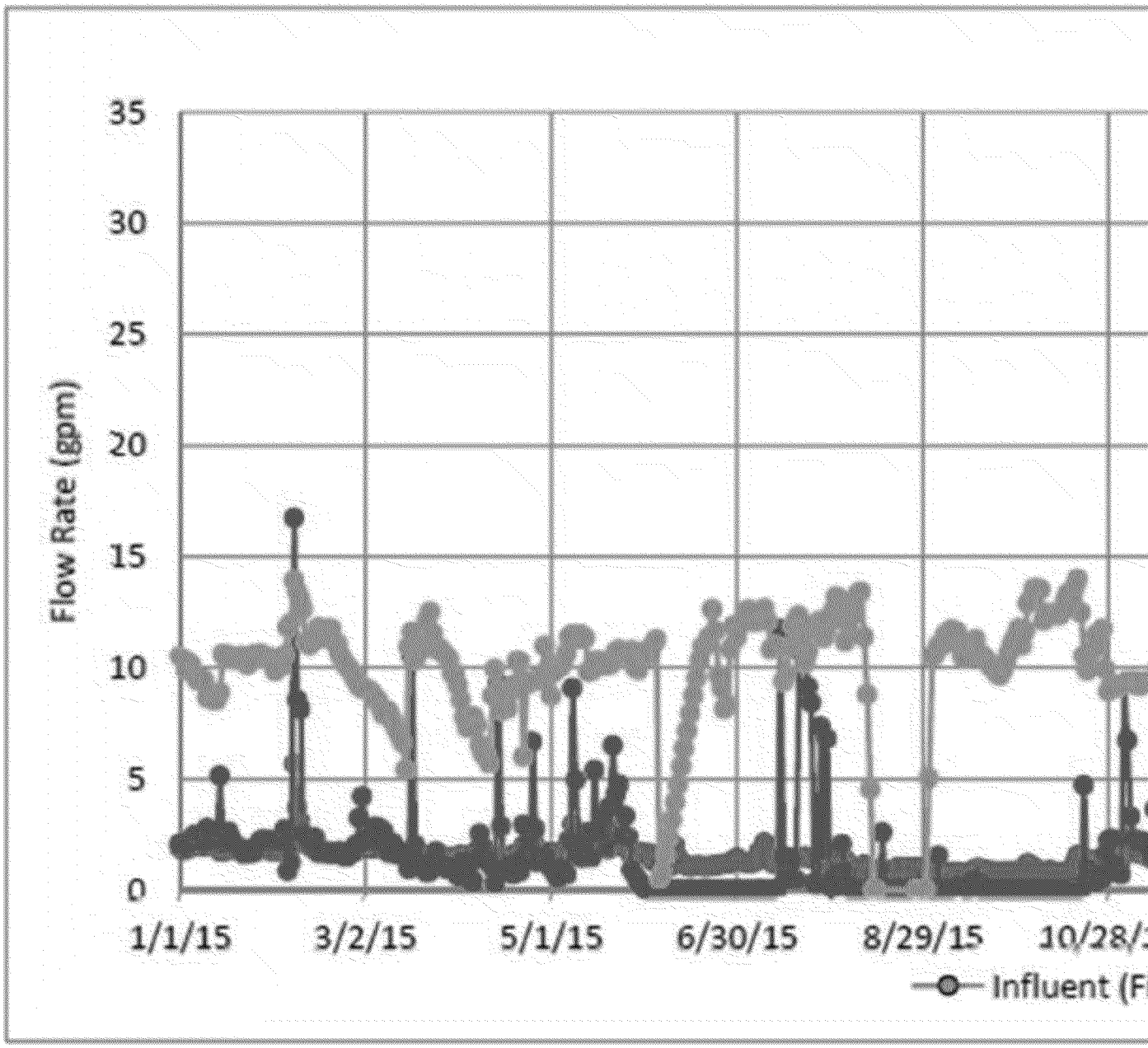
Please get back to me with you responses today if possible. EPA assessing the appropriate response to notify stakeholders of the possibility for release of partially treated water from ASBR

(similar to the notification sent about the Upper Ponds).

1) **Flow Rates**: Could you please provide some additional updates on charts and figures regarding flow, freeboard etc? For instance this one:



Please see the chart below which illustrates the recent influent flow rate (field measurements) and effluent flow rate data from the Aspen Seep Bioreactor (ASB) Treatment System. We have not received the downloaded influent flow rate data since 12/31/16; however, our approximately monthly field measurements are shown on the chart. In addition, the influent flow rate was manually measured at approximately 25 gpm during the 4/6/17 field visit. As we have had to temporarily remove the 1" effluent flow meter, we will not have effluent flow rate data until it (or a larger 2" flowmeter) can be re-installed. During the 4/6/17 visit, the debris at the launder was removed, and the Pond 4 water elevation was lowered through the use of a siphon. The 1" section of discharge piping and the 1" flowmeter was replaced with 2" flexible piping. The new 2" piping was flowing at approximately 100 gpm while the Pond 4 elevation was lowering (see attached photo). At the time that the maintenance crew left the site, the effluent flow rate had still not yet reached equilibrium.



In addition, here are some before and after photos from the 4/6/17 site visit. As you can see, we gained approximately 2 “stairs” of freeboard which provides approximately 100,000 gallons of storage in Pond 4. As a result of the maintenance activities on 4/6/17, we believe there is adequate capacity to get through the forecasted storm this weekend.

Figure 1: Pond 4 Launder at 0900 on 4/6/17

Figure 2: Pond 4 Launder at 1545 on 4/6/17

2) **Bioreactor Residence time at the higher flows:** Please provide an assessment of the flow rates with respect to residence time, and identify what is necessary for treatment to occur. If ARC finds that the residence time is becoming too short, please provide a plan to address this and identify any necessary changes. If influent flows

become too high--- sufficient treatment may not occur and effluent concentrations could exceed discharge requirements. Please ensure that ARC take discharge samples using rush turnaround time, and present to EPA as soon as available. i.e. within 5 days.

Since the ASB Treatment System is normally operated in recirculation mode, the ARD influent bypasses the two bioreactor cells; therefore, the residence time of the bioreactor cells is controlled by the recirculation flow rate and remains within the design parameters. The current residence time for Ponds 3 and 4 combined is estimated between 3 and 3.5 days. The primary purpose of Ponds 3 and 4 are to provide settling of solids, and we are currently observing clear effluent (See attached photo). At this time, we do not believe that changes to the pond residence time are warranted or feasible.

Results were received 4/5/17 for the 3/20/17 sampling event; the results indicated that all discharge standards were met with the exception of dissolved iron (7.9 mg/L). The results will be documented in the upcoming monthly report; however, a table illustrating the results has also been attached to this email. Following the 3/20/17 site visit and sampling event, AR has continued to adjust the sodium hydroxide dosing rates based upon the effluent flow rate data, which we believe has successfully kept the pH within the discharge standard range. Our evaluation of past data from the ASB Treatment System has indicated that discharge standards for iron and other metals may be exceeded under high flow conditions that exceed the design capacity of the system during the Limited Access Season.

The 4/6/17 visit required staff to walk most of the distance between Leviathan Mine Road and the Aspen Seep Bioreactor, thus limiting the amount of supplies and equipment that could be transported to and from the ASB. We plan to conduct the April sampling event as soon as snow removal and road maintenance is completed between the junction of Leviathan Mine Road and the Aspen Seep Bioreactor, thus providing for safe access for the sampling and O&M crew. We will request rush turnaround for the laboratory analytical results and will provide a copy of the results to EPA within 5 days of receiving the results.

3) **Bacterial Health:** . Please provide us with an assessment of the bacterial health impacts and whether the increased flows are a threat to the short and long term utility of the bioreactor. As you know,t The bioreactor functions by creating an environment (pH, carbon, other nutrients, temperature) conducive to a thriving population of sulfate reducing bacteria. If the increasing influent rate causes significant changes to any of these environmental factors, the bacteria can be disrupted and associated treatment

capacity may be reduced reduced. In the extreme, this could result in long term (possibly permanent) damage to the bioreactor and impair its effectiveness. Please let us know what plans are in place to protect the function of the bioreactor.

As previously stated, the flow through the bioreactor cells is provided by the recirculation system, with the exception of direct precipitation and runon. The recirculation flow rate is set by the system operators; therefore, larger flows of acidic influent do not directly enter the bioreactor cells. While there is a slight increase in flow due to snowmelt runon entering the bioreactor cells and pretreatment pond, we believe we are providing an ample carbon source (ethanol) for the current flow through the bioreactor cells. During the 3/20/17 site visit, the laboratory analytical results indicate sulfate concentration reductions of approximately 50 percent between the influent and effluent. In addition, the April sampling event will be an enhanced sampling event which will measure both ethanol and sulfide in the effluent which will help to verify the ethanol dose rate. The flow from the biocells to Pond 3 is Black which is a good indication of sulfate to sulfide conversion.

4) **Potential contingencies:** Please let us know what other contingencies ARC will consider and the pros/cons of each. Contingencies may include increasing the feed rates for NaOH, nutrients, and ethanol; and bypassing part of the influent flow to ASBR Pond 3. However, controlling the chemical feed rates will provide limited control in that the activity of the bacteria does have limits. And Bypassing would result in discharging a blend of ASBR effluent with untreated Aspen Seep water—ie discharge of partially treated water.

The primary contingency available is the adjustment of sodium hydroxide dosing. As soon as safe access is obtained following snow removal and road maintenance activities, O&M personnel will closely monitor flow rates daily and adjust the sodium hydroxide dosing rate as necessary to maintain pH within discharge criteria. Recirculation flow rate and ethanol dosing will also be adjusted as necessary. In addition, geochemical modeling will be conducted to determine the optimum pH setpoint. A higher pH will be needed if more of the influent metals are metal hydroxides rather than metal sulfides as the hydroxides have higher solubility at the normal pH levels.

5) **Erosion:** Please let us know if there is an engineered way of controlling excessive fluid flowing into and out of Pond 4 . If there is the potential for fluid flowing directly over the Pond 4 berm, there would likely be erosion between Pond 4 and the I/O pond. If

erosion in that area continued unabated, it is reasonable to assume that some head cutting would occur in the direction of Pond 4 itself. Please assess the severity of head cutting, and whether or not the structural integrity of the ASB Pond 4 could be threatened.

The modification of the Pond 4 discharge that was completed on 4/6/17 increased the effluent flow from 25 gpm to over 100 gpm. Once the pond level drops, this flow will reduce to match the influent flow plus precipitation and runon. The modification increased the flow enough that we do not anticipate the potential for a pond overflow. Again, as we gain regular access to the Aspen Seep Bioreactor we would be able to reinstall the effluent flow meter and gain more remote monitoring capabilities.

Please get back to me with you responses today if possible.

EPA is assessing the appropriate response to notify stakeholders of the possibility for release of partially treated water from ASBR (similar to the notification sent about the Upper Ponds).

Please also provide an update on the HDS plant and Pond 4. Thanks!

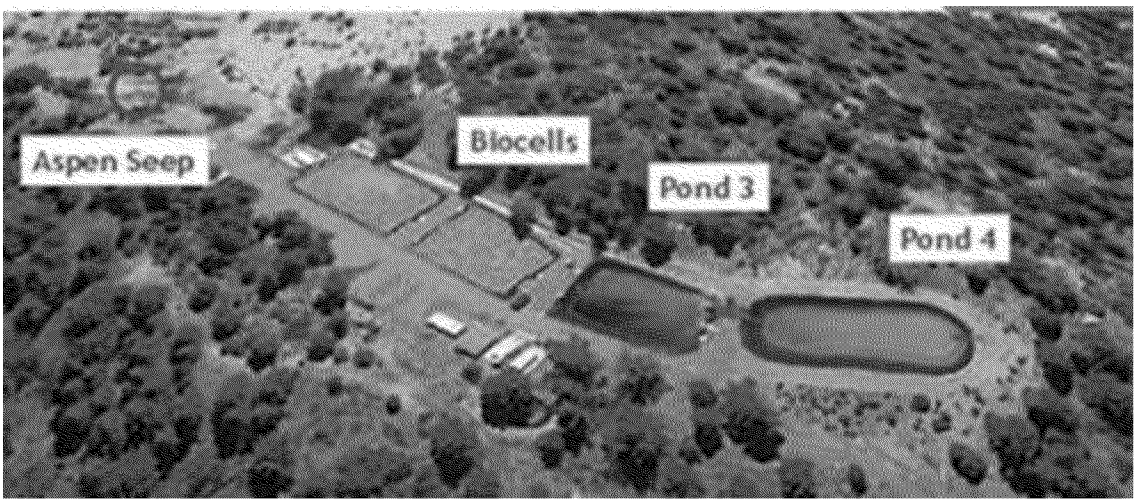
Best Regards,

Lynda Deschambault

Environmental Scientist

USEPA Region 09

(415) 947-4183



Please be advised I may have limited access to email , therefore please be patient with any communication delays.

From: Mike Johnson [mailto:mike.johnson@copperenv.com]
Sent: Wednesday, April 05, 2017 6:07 PM
To: Deschambault, Lynda <Deschambault.Lynda@epa.gov>
Cc: gr@burlesonconsulting.com; Dave McCarthy <dave.mccarthy@copperenv.com>; Cohen, Adam <Adam.Cohen@dgslaw.com>
Subject: Leviathan Mine Aspen Seep Bioreactor update

Lynda,

We wanted to give a brief update on current events at the Aspen Seep Bioreactor. We have been remotely monitoring the Aspen Seep Bioreactor and have been watching the flows increase steadily. In the last day we have seen a slight increase in the water elevation of Pond 4. This indicates that our influent flow rate is out pacing our effluent flow rate. Since a significant storm is forecasted, we are planning to attempt to access the site tomorrow to address the pond 4 water elevation and effluent flow rate. We still have roughly 75,000 gallons of storage available and

our effluent flow rate is averaging 26 gpm. As currently configured, the maximum design flow capacity of the ASB Treatment System is 27 gpm. If we can gain safe access, we will complete the following tasks to protect against a possible exceedance of Pond 4 storage capacity:

- Check for and remove any obstructions to flow at the Pond 4 effluent launder.

- Pump water from near the effluent launder of pond 4 to the aeration channel to lower Pond 4 elevation.

- Increase piping size at outlet from 1 inch piping to 2 inch near the discharge of the aeration channel, including temporary removal of the 1" in-line effluent flowmeter. This will greatly increase overall capacity of the discharge of our system and help us manage future increased expected flow rates. Once we have safe access for four-wheel drive vehicles and supplies all the way to the ASB Treatment System, we will then change the piping back to the 1" PVC and re-connect the 1" flowmeter, or permanently switch to 2"PVC and a 2" flowmeter. Although we will not be able to directly monitor the effluent flow rate while the flow meter is disconnected, we will still be monitoring the influent flow rate, so we will still have a good indication of total flow through the ASB Treatment System. These plumbing modifications will not otherwise affect our ability to control the system components.

We don't anticipate these changes to negatively impact water quality of our discharge since Pond 4 is a final settling pond. Our site access may require some snowshoeing, so we are postponing compliance samples until we complete road work scheduled next week. Taking the compliance samples at that time should still give a representative sample.

Thanks,

Mike Johnson, PE

Senior Engineer

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