Colorado Legacy Land

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DIVISION OF RECLAMATION
MINING AND SAFETY

Tony Waldron
Division of Reclamation, Mining and Safety
Colorado Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

RE: Denver Water Letter to DRMS 24 January 2018

Dear Tony:

Thank you for considering our comments on the letter from Denver Water, and the attached Arcadis letter regarding the Schwartzwalder Mine Water Treatment Estimate dated January 19, 2018.

It is unfortunate that Colorado Legacy Land (CLL) was not able to meet with Denver Water or Arcadis to provide them with information that would have clarified their incomplete understanding of the Schwartzwalder mine water treatment plant and treatment approach. Consequently, these letters are filled with erroneous assumptions about these operations that fundamentally limit the validity of their input. Despite this, Arcadis went further and relied on their opinion of "worst case" treatment requirements, rather than providing costs to implement the Orders and Permits on which CLL is basing both our operational approach and the underlying bonding approach. Consequently, the Arcadis input is irrelevant as a supporting cost estimate because it costs a treatment approach that is not consistent with the Orders and Permits that are in place at the Schwartzwalder Mine.

Without the opportunity to discuss this with Denver Water and Arcadis, there are also many mis-statements or misunderstandings about what CLL is currently committing to in the current deal with DRMS. These include:

- We have committed to providing the bonding necessary to operate the RO treatment systems to maintain the mine pool below the level specified (150' below the Steve Adit) for 20 years, not 5 years as is erroneously stated.
- We are not basing the bonding commitment on the belief that the mine pool chemistry will stabilize within 5 years such that active water treatment is no longer required.
- CLL cost calculations do not rely on the assumption of effective in situ treatment. Alexco has operated the RO treatment plant before in situ treatment began (in 2013) and effectively discharged compliant water before and during the in situ treatment system was implemented. CLL cost calculations rely on the approach that we can continue to discharge at least as much water from the mine as the mine takes in, thus maintaining the hydraulic gradient toward the mine as required by the relevant Orders and Permits.
- The reduction in sampling and monitoring costs is not related to a change in mine water treatment, but rather on implementation of the alluvial soil removal project, which reduces the area that requires groundwater monitoring and removes many sumps within the valley bottom.

Arcadis, and hence Denver Water, also misunderstand the treatment approach currently employed at the Schwartzwalder Mine. Specifically:

- Alexco operates the treatment facility with both RO systems operational, not one system on standby as stated by Arcadis.

- The IX system was necessary to be used as a polishing plant during commissioning of the RO systems, but is no longer necessary to be used. It is truly a redundant system that even if RO permeate is flowed through it, it does not load the resins at a rate that requires resin change out and recycling.
- The RO systems have a combined design flow of 200 gpm, not 100 gpm as Arcadis incorrectly states.

Arcadis justifies their approach with personal preferences and professional judgement regarding what they imagine is a "worst case" requirement, rather than designing the system to be responsive to the regulatory requirements. They do this based on a limited and recent increase in certain constituents that is best understood as a combined effect of dewatering shallow groundwater and short circuiting RO brines back to the water treatment plant intake. By choosing to present graphs of the last 2 years only, rather than since 2013 when the in situ treatment and RO systems became operational, it skews the understanding of the mine pool chemistry. They also do this without the benefit of understanding a short term treatment approach that limited in situ treatment during 2017 to a minimal approach to enhance the dewatering rate and limit fouling of the membranes. It is not proper to design a bonding program based on a 6 month "trend" that is based on an operational decision (of which they were not aware). Contrary to their statements, the mine water chemistry is going exactly according to the CLL plan and is compliant now with the Orders and Permits that apply the Schwartzwalder Mine.

Arcadis also presents a cost estimate that is based on an improper approach to the Schwartzwalder Mine management. Alexco now has 5 years of direct operational experience at the site, and has presented a cost estimate that is informed by actual experience, rather than speculation and worst case personal assumptions as presented by Arcadis. Instances of this improper approach that are relevant to the cost estimate include:

- There is not enough water being captured by the mine to operate the treatment plant year-round at its design capacity (200 gpm) or at its normal operating rate (160 gpm). Arcadis suggests operating the plant at full capacity year-round is appropriate for the bonding estimate, however, *there is simply not water available to treat at their suggested year-round rate.*
- They are inconsistent in their statements about the RO plant capacity. For clarity, the plant has a 200 gpm capacity, and normal and efficient operations are design to run near this capacity. It makes no sense to run the plant at less than half the flow rate for the full year and pay all the costs associated with plant operation (such as operators or power) when 6 month or less is sufficient to treat the annual water budget.
- Arcadis suggests disposal of IX media rather that beneficial reuse of the uranium resins which is more cost effective, and sustainable. While the plant does not require the operation of the IX system, if it is used at all, it is clearly an environmental best practice to create an economic use of the uranium that is recovered rather than landfill it as a waste, as we know Arcadis recommends to their other clients.
- Alexco believes that a 6 month operational period and a 6 month "rest" period is the best way to perform both RO active water treatment and in situ treatment, and will not result in the leaching of constituents as suggested by Arcadis. The leaching process due to water fluctuation described by Arcadis is commonly observed in mines that are not biochemically reducing as has been created at Schwartzwalder. Alexco has designed the treatment process to be implemented both during the active operation periods (focused especially on barium use to precipitate radon with limited organic carbon addition), followed by a more extensive organic carbon addition during the end of the active treatment period and at the start of the rest period, such that the organic materials are consumed prior to the next active water treatment period. This is best both for the

RO membranes (to avoid fouling) as well as best for the in situ treatment (by giving the mine a passive period amenable for the microbial processes).

The Arcadis work on which Denver Water relies is clearly limited both by the incomplete knowledge of the site, the operational history, and the reliance on personal preference and professional judgement regarding a "worst case" approach that is not relevant to a bonding calculation. We ask DRMS to consider this input on this basis and rely instead on the actual operating costs that we have developed over the last 5 years of direct site involvement.

Sincerely,

COLORADO LEGACY LAND

Jim Harrington
Managing Director
303.808.9101

cc: Ken Mushinski – Cotter Corporation
Paul Newman – Colorado Legacy Land
Eric Williams – Colorado Legacy Land