



Interoffice Memorandum

December 10, 2024

From: Leigh Simmons  
To: Amy Yeldell

**Subject: Whirlwind Mine (Permit No. M-2007-044)  
TR-2**

As you requested, I reviewed the material submitted with the Whirlwind Mine TR-2 application. My focus was on aspects of the submittal concerning potential impacts to the hydrologic balance. I also reviewed documents from the currently approved permit file, and recently submitted hydrology reports.

With TR-2 Energy Fuels Resources (USA) Inc, the operator of the Whirlwind Mine, is seeking to add to the existing water treatment system.

The scope of TR-2 is rather limited: it provides details of an “add-on” water treatment system that the operator proposes to use in order to comply with the requirements of the CDPS discharge permit (CO0047562) which were made more stringent upon renewal in 2015 compared to the original 2007 permit. The original system was designed by Lyntek (details are given in Appendix H of the permit file). The proposed add-on does not replace any of the existing water treatment system, but effectively “polishes” the effluent; it has been designed by Linkan and is detailed in the proposed Appendix H2.

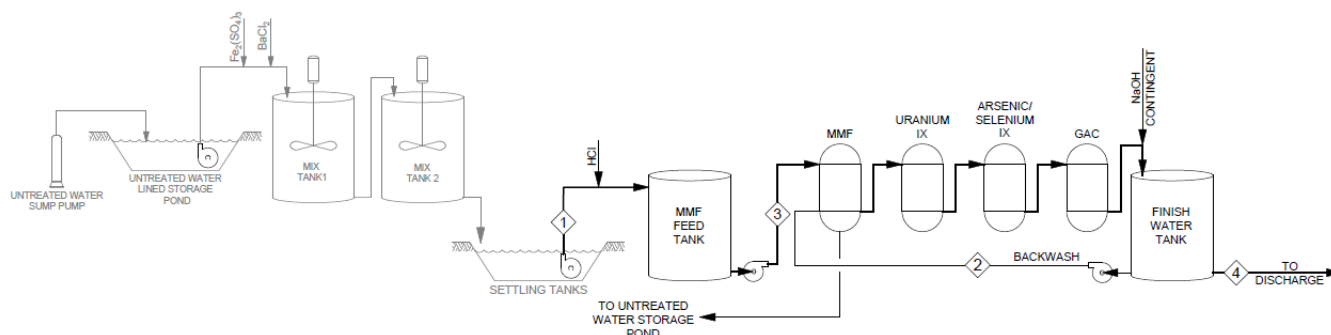
Linkan is a reputable company with an office in Golden, CO, and considerable expertise in mine water treatment. The Division has worked with Linkan in the past on several projects around the state.

The existing Water Treatment System has not been in operation since 2009, which has allowed a mine pool to accumulate. Since the operator intends to resume activity at the Whirlwind Mine, the pool must be dewatered which will require the treatment and discharge of an estimated two million gallons of mine water. While the existing system was effective in meeting the discharge standards of the 2007 CDPS permit, there are several water quality parameters which would exceed the more stringent standards of the 2015 permit: selenium, uranium and Total Suspended Solids (TSS) – these are identified as “primary constituents of concern”. Several additional water quality parameters are identified as “secondary constituents of concern”, where the parameter exceeds the discharge limit in the raw feed (i.e. mine water) but meets the standard in the treated effluent; these include arsenic, iron, lead, manganese, zinc, pH, radium 226, and radium 226+228.

The proposed add-on system is thoroughly described in the material submitted with TR-2. In summary, the system takes treated water from the existing settling/polishing tanks, and passes it in series, through



sand filters (to remove suspended solids), a strong base anion exchange resin (to remove uranium), a second ion exchange resin (to remove arsenic and selenium), and activated carbon (to remove organic compounds). The effluent is treated with sodium hydroxide, as necessary, to raise the pH prior to discharge, see Figure 1.



*Figure 1: Process flow diagram, copied from Appendix H2*

Detailed design drawings are given for the add-on system, (and aspects of the existing system), which would greatly assist a new operator in taking over responsibility for running the system in case that were to be necessary in the future. The detailed drawings show redundancy of critical parts of the system, as well as components necessary for maintenance.

The add-on system is proposed to be completely contained within two shipping containers, so bonding for reclamation is considerably simplified.

TR-2 proposes:

- No new disturbance
- No increase in sludge
- No additional water storage tanks
- No change to the outfall or discharge rate

**I have no adequacy concerns about the material submitted with TR-2.**

In addition to the TR-2 material I reviewed Exhibits C, D, G and T, and Appendices A, F, H and L of the permit file, the 2022 Groundwater Characterization Report by Western Water and Land, and several quarterly hydrologic monitoring reports.

I will not attempt to summarize the content of the material here, but I will note that I found it to be refreshingly thorough and clearly presented. I have the following comments:

- Ore and waste material has been geochemically characterized using a Synthetic Precipitation Leaching Potential (SPLP) procedure, (see Appendix A). The results support the operational plan for the future disposal of mine waste on the historic waste dump, assuming the best management practices described in Exhibits D and T are adhered to.
- The design of the ore pad and the water treatment facilities, described in Exhibit T with additional design details in Appendix J, has redundancy in terms of spill or leak containment. The capacity of critical elements of the system – in particular the untreated water storage pond

– allows for scheduled and unscheduled periods of treatment plant downtime as well as normal operations, and the surge capacity to retain ore pad run-off from the 100y/24hr storm event.

- Hydrologic monitoring and reporting requirements are adequate for the time being. If and when the mine becomes active a review of the reported monitoring data may indicate that additional monitoring is warranted.
- The 2022 Groundwater Characterization Report is a substantial document that collates historic data from a number of sources, as well as more recent data collected by the current operator. It presents a coherent conceptual model of the site, supported by the available data. The analysis presented is thorough. Conclusions are definitive where possible (for example, “no mine water is expected to exit the mine under free drainage conditions”), but acknowledge where uncertainty remains (for example, the authors found that the proposal by an earlier operator that there is not hydrologic connection between the Packrat Mine and the PR spring is not supported by sufficient evidence to be definitive). Future mining will likely provide additional information to build on this Report.