

**Calico Technical Review Team
Salem, Oregon – and by phone
February 5, 2018
Meeting Summary**

Attendance:

- Randy Jones, DOGAMI
- Karen Colvin, DOGAMI
- Bob Brinkmann, DOGAMI
- Larry Knudsen, DEQ
- Jim Billings, DEQ
- Doug Welch, DEQ
- John Dadoly, DEQ
- Ken Lucas, DEQ
- Bill Mason, DEQ
- Matt Diederich, SHPO
- Phil Marcy, WRD
- Phil Milburn, ODFW
- Tom Segal, ODFW
- Nancy Wolverson, Calico/Paramount
- Rich DeLong, EM Strategies
- Adam Bonin, Cardno
- Chris Lewis, TetraTech
- Kelly Fuller, Western Watersheds Project
- Larry Meyer, Argus Observer
- Matt Vaughn
- Janet Gillaspie, Environmental Strategies

The group introduced themselves. Randy Jones, DOGAMI, chaired the meeting.

Review of Agenda and Additional Items to Add

Jones asked the group for additional items to add to the agenda; no items were added.

TRT Vice-Chair Election

Randy Jones said he served as the vice chair of the TRT when Gary Lynch, DOGAMI, was the project lead. Since Jones has moved over to DOGAMI and given the number of permits under DEQ's control, it is logical for DEQ to serve as the vice chair, and Larry Knudsen is currently the lead for DEQ. Jones asked for feedback from the TRT on appointing Knudsen as the TRT vice chair.

Jones asked for unanimous consent and hearing no objections, Knudsen will serve as the TRT vice chair.

Status of Pending Calico Baseline Data Review Topics

Jones reminded the TRT that the baseline data methodologies were approved by the TRT on 12/7/17 for all topics except wetlands and noise.

On noise, Calico is working on a response to the DOGAMI contractor issues. On wetlands, DeLong indicated that a response would be filed in the next few weeks.

Calico Submittal of Baseline Data Reports to DOGAMI and TRT Review Process

Jones reported that the baseline data reports for these baseline data methodologies have been received:

- Visual resources
- Grazing
- Recreation
- Air Quality
- Land use
- Transportation
- Vegetation
- Aquatic resources
- Geochemistry

The TRT has 3 weeks for review of the baseline data. Jones indicated that the TRT is currently working on the baseline data reviews.

This is a rolling set of 3-week review periods, said Jones. The review to ensure the data is consistent with the accepted methodologies is important, he said.

Jones asked the TRT to ensure they have blocked adequate time to review the reports when they are received. Contact the DOGAMI project staff or Janet Gillaspie if TRT members have questions or need additional information.

The TRT should expect additional, more frequent meetings as the Consolidated Application is received.

Nancy Wolverson added that the older versions of the reports have generally been reviewed by TRT members. She continued by explaining that the reports have the same headings and format as the earlier reports. The first portion of each report describes how this report is different than the earlier report. Where data from earlier reports is used, that is included as an appendix, she said.

DeLong indicated that there will be several additional reports this week, including socioeconomics and environmental justice.

Jones reported that the final geochemistry report has been submitted – a large, detailed report written by SRK. It will be initially reviewed by the TRT

Geochemistry Subcommittee and then will be evaluated by a full discussion of the TRT members.

Jones reminded the TRT that meetings are scheduled for the first Monday of each month; the next meeting is March 5, 2018.

Calico TRT Tailings Facility Design Subcommittee – Key Recommendations

The Tailings Facility Design Subcommittee met in January to review the conceptual design and technical review report and develop a recommendation to the full TRT. A technical review was completed by Tetra Tech, under contract to Cardno. The technical review memo and inventory of issues were distributed prior to the meeting.

An inventory of topics for additional consideration in the conceptual design has been developed for review and improvement by TRT members.

Jones asked members of the Tailings Facility Subcommittee to offer any additional thoughts or suggestions; none were received.

Technical Review of Calico Grassy Mountain Conceptual Tailings Storage Facility Design

Adam Bonin with Cardno introduced Chris Lewis with Tetra Tech, an expert in tailings facility design.

Lewis used a *PowerPoint* presentation to review the technical memo. A copy of the presentation is available from the DOGAMI office.

In his review, Lewis described:

- Background technical information
- Regulatory framework
- Long term accepted standards of practice for slurry impoundment facilities across industries including metal mining and coal extraction
- Long term environmental productively issues, along and reclamation and closure issues

Tetra Tech concluded:

- The basics of the design meets the Oregon regulatory structure
- Composite liner and leachate collection system conforms to standards of practice in the industry
- Closure practices were not detailed and additional information is needed
- A leak detection system is not included between the first and second liner system

DeLong asked if a leak detection system was required by the Oregon regulations; Lewis indicated no, but there has been additional discussion.

Larry Knudsen, DEQ, added that the guidelines do not require leak detection, but the beginning of the rules (see OAR 340-043-000 – Purpose and Policies) would require leak detection. This is not a guideline, but a requirement. Knudsen concluded that leak detection would be required for the tailings impoundment facility.

Jones said that leak detection in the basin liner and overall protection of the environment was discussed at the Tailings Facility Design Subcommittee meeting.

Lewis continued that leak detection between liners is not common in the mining industry. For many mines, the leachate collection system is considered adequately robust to protect the environment.

Jones continued by discussing the leak detection issues and issues such as timing, response, fate, and transport. There are many questions related to leak detection, both short term (life of mine) and long term (up to 100 years and beyond). These are all issues to be tackled by the Tailings Facility Design Subcommittee and the TRT.

Lewis indicated there are technical issues related to incorporating leak detection systems, but the tailings design experts can tackle those issues in continuing to design the system.

Additional review of the Water Resources Department (WRD) Division 20 'low hazard' ranking should be further explored, especially the impacts of failure. In general, the TetraTech review concluded:

- The proposed conceptual design is reasonably anticipated to meet the minimum requirements of Oregon DEQ's chemical mining rules, including liner specifications.
- Additional information on facility closure will be needed to determine if closure activities are consistent with Oregon regulations
- The WRD Dam Safety hazard potential classification for the impoundment should be carefully examined
- The resiliency of the design and the reliance on pumping for the supernatant pool and underdrain reclaim pond should be examined
- Additional geotechnical information is needed
- Less rigid and more crack resistant backfill should be examined for pipe transitions and connections.
- Additional criteria for evaluating the liner, in addition to the DEQ standard related to hydraulic conductivity, should be considered

This inventory is focused on engineering issues, not cyanide or other environmental issues, said Lewis.

Jones reported that the additional geotechnical investigation has been collected at the site, and Calico is still reviewing that data. A complete, final report will be provided to the TRT.

Jones continued to describe the overall tailings facility design and the tailings facility construction process. He recalled a comment by Golder, that the facility should be considered a ringed structure with beaches of tailings material being built over time.

He recalled that the DEQ standards, in Division 43, are based on standard practices of the mid-1980s, and newer technology should be considered to meet with 'best, available practicable and necessary technology' (see OAR 632-037-0188).

DeLong added that the tailings facility is not full of water, it is designed to contain the solids with a small amount of water that are recycled through the mill processing. The Oregon Water Resources Department dam safety regulations are focused on retaining water AND the dam height.

Jones added that the tailings cyanide concentrations and tailings material chemistry are also unknown areas. Metals leaching from the tailings needs to be evaluated, along with the potential for acid leaching.

Matt Diederich with SHPO asked about the DEQ standards for 36 inches of clay – on top of the ground or dug out of the ground, he questioned; cultural resources might be exposed if it is dug out on site. DeLong answered that the geotechnical investigations are still ongoing, but in general, it would be both earthwork to smooth the topography with some material removal, and then native material must be augmented. Lewis added that the conceptual design does not use a 36-inch liner, but a geomembrane improved version.

Jim Billings with DEQ added that there will be standing leachate in the tailings facility – standing water for most of the 10-year life of the mine. The leak detection system appears to not be fully understood, he said. The Resource Conservation and Recovery Act (RCRA) subtitle C and D regulations for leachate detection and collection are applicable. DEQ is thinking along RCRA Subtitle C plan, rather than a Subtitle D plan.

Janet Gillaspie, Environmental Strategies, suggested that DOGAMI send a letter back to Calico regarding the conceptual standards, requesting additional information, and requesting a revised conceptual design prior to submittal of the consolidated application. She highlighted that the cultural resources issues should be added to the inventory.

Bob Brinkmann with DOGAMI stressed that knowing the chemical composition of the tailings is critical. There are many DEQ regulations that need to be addressed, he said.

Larry Knudsen with DEQ added that when the regulations were written in 1992, the issue was would Oregon allow chemical process mining - and the answer was 'yes', but in the Oregon method. Generally, overall policy statements are set, and then specific regulatory requirements are followed by guidelines. Knowing what is done in other states or best-in-class industry wide or RCRA standards is useful, but applying our Oregon specific information is needed, he said.

The sooner the TRT has an understanding of the tailings facility design is important, he said. The baseline data collection is informing the process, but the TRT needs to consider the additional information necessary to support the permits. This additional information is important to inform the Consolidated Application, he concluded.

Jones asked the Oregon Department of Fish and Wildlife (ODFW) about the fish and wildlife issues that need to be addressed. Phil Milburn from ODFW indicated that slurry water as 'wastewater' must be covered or be maintained to not be a threat to wildlife. The rules are straight-forward, he said.

Jones thanked Chris Lewis for his work for the TRT. Jones asked if there was consensus for requesting a revised, conceptual tailings facility design concept for review from the TRT.

The TRT took a break.

Chemistry of Cyanide

Dr. Adam Bonin with Cardno gave a *PowerPoint* presentation on the chemistry of cyanide. A copy of the presentation is available from the DOGAMI office.

He discussed:

- Basic cyanide chemistry
 - Triple bonded, negatively-charged ion
- Nature and common uses
 - Found in nature in
 - Bacteria, fungi, and algae
 - Spinach, bamboo shoots, almonds, lima beans, fruit pits, cassava, and tapioca
 - Cigarette smoke and vehicle exhaust,
 - Common uses include in pesticides, pharmaceuticals, steel production, and others
 - Mining contributes about 10% of the total global cyanide use
- Cyanide in Gold Mining
 - Ore is crushed and ground; free gold is gravity- separated
 - Cyanidation/leaching process uses a dilute sodium cyanide to dissolve the gold; high pH is needed to prevent hydrogen cyanide (HCN) formation

- Exposure routes include ingestion, inhalation, absorption
- Acute toxicity due to hypoxia
- EPA Maximum Contaminant Level (MCL) is 0.2 mg/l (drinking water related)
- Ecological Risk
 - Free cyanides most toxic
 - Aquatic organisms are most sensitive, especially fish
 - Birds that feed on flesh are most sensitive (raptors, due to low pH of stomach) – ingestion of water or contaminated flesh
 - Mammals sensitive to acute exposure
- Risk Reduction Strategies
 - Reduce cyanide discharge concentration to below 50 mg/l WAD
 - Mine waste treatment
 - Supernatant ponds with a capacity to dilute high influx
 - Proper Personal Protective Equipment
 - Production of hypersaline tailings slurry and supernatant
 - Salt discourages ingestion
 - Decreases HCN solubility
 - Thickening the tailings
 - Wildlife deterrents
 - Fencing, netting, mitigation sites that are more desirable offsite

Jones asked about cyanide transfer in the supernatant pool. Brinkmann asked how cyanide concentrations might naturally degrade in the tailings facility due to volatilization and other natural processes.

What are the fugitive air cyanide emissions from the tailings facility, asked Jones. Bonin responded that there is a chance of cyanide, but residual metal concentrations in the dust are likely a larger risk, both during operation and after closure. Maintaining moist conditions during and after operations is critical, said Bonin.

DeLong mentioned that the International Cyanide Management Code is a voluntary organization that sets 'cradle-to-grave' standards for the use of cyanide. Almost all the precious metal mines in the Western US are members of the International Cyanide Management Code.

Calico would like to engage the TRT members on cyanide issues and that will be most useful post Feasibility Study with specifics.

Additional presentations are needed on:

- Calico-specific information on processing and tailings composition briefings

- Transportation of cyanide – primary cyanide distributor to focus on transport from Oregon border

This issue should be coordinated with the National Environmental Policy Act (NEPA) process.

Briefing on Activities at Grassy Mountain

Nancy Wolverson from Calico provided an update on current and ongoing activities at Grassy Mountain. She indicated there are no activities on site other than the quarterly water resources monitoring.

The well drilling has been stopped for now and will be restarted in the spring. The two upgradient wells (upgradient and downgradient) need to be completed. Knudsen asked if the delay was weather related; generally, yes, said Wolverson. All Calico activities are focused on the Pre-Feasibility Study completion. There will be additional work after the Pre-Feasibility Study to complete the Consolidated Application.

Diederich asked about consultation with BLM and the Tribes and the overall NEPA process. DeLong indicated the draft Plan of Operations has been filed with BLM and BLM has provided comments. Some of the questions BLM has asked are related to completing the Pre-Feasibility Study.

Jones reported that he was meeting with the BLM later this week with a focus on coordination with the NEPA process and he was reaching out to the Burns Paiute Tribe.

Brinkmann asked about the additional drilling. Wolverson indicated that the resource holes have been drilled and 2 out of the 5 monitoring wells have been installed. All the information will be compiled into the final report for the drilling program.

Jones asked Wolverson about the results of the geochemistry investigations to be incorporated. Wolverson said the revised tailings conceptual design should be filed with the State after the Pre-Feasibility Study is completed.

Wolverson described the Pre-Feasibility Study. She indicated that Calico will issue a press release that the Pre-Feasibility Study is completed. There is then a 45-day period for Calico to complete its report. Calico will likely take the complete 45 days to finalize its report.

Jones provided a heads-up that State Agency partners should start preparing for gathering a detailed budget proposal for the 24-month period after a Consolidated Permit Application is received. State agency staff will have a few months from now to prepare those budget estimates. DOGAMI will be providing budget templates and direction to the TRT partner agencies for completing this budget estimate.

TRT members were asked if there were additional items to discuss – there were none...

TO DO Inventory

The 'to do' inventory developed during the meeting included:

- DOGAMI will craft a response to Calico on the tailings facility conceptual design
- Distribute information to the TRT on the International Cyanide Management Codes
- Forecast additional cyanide briefings for TRT discussion
- Summarize existing baseline data submittals, links to data, reviewing agencies, and deadlines and provide to TRT
- Set Calico Project Coordinating Committee (PCC) meeting in Ontario – could be late March
- Set Geochemistry Subcommittee meeting; forecast full TRT discussion

*Janet Gillaspie
Environmental Strategies
2/6/18*