March 14, 2023

Technical Review Team
State of Oregon Department of Geology and Mineral Industries
229 Broadalbin St. SW
Albany, OR 97321

RE: CALICO RESOURCES CONSOLIDATED PERMIT APPLICATION FOR CHEMICAL PROCESS MINE

Dear Friends:

Thank you for the opportunity to comment on the Calico Resources' ("Paramount") Grassy Mountain gold mine.

We are the professor and two members of Willamette Law's Advanced Environmental and Natural Resources Practice class. This semester we have reviewed and researched Paramount's Grassy Mountain gold mine proposal. We have been studying geothermal energy resources and groundwater quality issues in eastern Oregon as well as the proposed mine. We plan to visit Malheur County and the area surrounding Grassy Mountain, including Lake Owyhee and Owyhee River, in the near future.

We appreciate the work of Technical Review Team (TRT) to secure a complete Consolidated Permit Application to enable federal and state agencies and the interested public to thoroughly evaluate Paramount's proposed mine. While the TRT requested a substantial amount of additional information from Paramount in an attempt to secure a complete application, the application still falls short in one major respect. It does not adequately provide the analysis of mining, milling, tailings storage and disposal, and reclamation alternatives required under Oregon law.

We hope DOGAMI and the TRT will require that Paramount analyze a full range of alternatives before DOGAMI deems the CPA complete.

We view this as an opportunity for DOGAMI to implement and exemplify the standards necessary to ensure that future chemical-process gold mining operations in Oregon are safe for Oregon's workers, communities, and environment. Our comments below identify important alternatives not analyzed in sufficient detail or at all by Paramount's CPA.

<u>Alternatives Analysis</u>

Under ORS 517.971, DOGAMI shall not begin deliberating on whether to issue a permit until the Department receives a completed consolidated application that includes "all information required by the permitting agenc[y] to determine whether to issue or deny" a mining permit.

Under DOGAMI regulations, a consolidated permit application must include an alternatives analysis that identifies and analyzes the environmental impacts of the proposed operation and

"alternatives to avoid or minimize adverse impacts and/or enhance the quality of the human and natural environment." OAR 632-037-0045; OAR 632-037-0075(1). The applicant's analysis must include, but is not limited to, "alternative designs (including chemical processes), operations and scheduling for mine facilities and operations, . . . [a]lternative water supply[,] . . . [a]nd alternative reclamation procedures." OAR 632-037-0075(2). Furthermore, the analysis must include "sufficient detail in the description of each alternative so that affected agencies and the public may evaluate the comparative merits of each alternative." OAR 632-037-0075(3).

If the permit application fails to include the requisite information, DOGAMI must notify the applicant of the additional information that is required and hold an additional public hearing if the additional information is significant to the issuance or denial of a permit. ORS 517.977(1)(b), (2).

Paramount only analyzed its proposed underground mine and two open pit alternatives as alternative mining and processing designs.

Paramount's proposed action is to develop an underground mine where ore is transported to the surface and milled with CIL cyanide processing. Roughly 2 Mst of tailings will be treated with lime and pumped as a slurry into an adjacent storage facility, and .027 Mst of waste rock will be temporarily stored nearby and used to refill the mine access portal. These activities are planned to disturb a total surface area of 319.6 acres.

Under Alternative 1A, Paramount would operate a 74.1 acre open pit mine that also uses CIL cyanide processing to mill 22.5 Mst of ore before treating tailings with lime and pumping it as a slurry to an adjacent facility. The remaining 57.4 Mst of rock would be permanently stored in a nearby waste rock storage facility. This alternative would disturb a total surface area of 716.6 acres.

Under Alternative 1B, Paramount would operate a 97.1 acre open pit mine and process 108.6 Mst of lower grade ore using a cyanide heap leach pad. The remaining 53.3 Mst of waste would be permanently stored in a synthetically lined waste rock storage facility. This alternative would disturb a total surface area of 674.6 acres.

Neither of the open pit alternatives included in the CPA are described in sufficient detail to fully understand what portion of the deposit would be mined, how much ore would be high-grade and how much low-grade ore, the process and safeguards to be employed and the expected impacts of each alternative on critical factors such as groundwater quality, contaminated mine drainage, wildlife and worker safety.

Paramount seemingly constructed two straw man open pit alternatives to assure that its underground proposal would be deemed superior.

What Paramount failed to include among its design alternatives was Paramount's actual two phase plan. Paramount clearly intends to first mine the high-grade ore underground and then mine lower-grade ore in an open pit scenario. In a 2021 video (1:28), Paramount's CEO stated that Paramount hopes, "as the mine gets into production and proves to be successful, . . .

[Oregon] will be more receptive to the concept of expanding into an open-pit mine down the road." Furthermore, Paramount's upper estimate of the mine's value for investment purposes clearly includes both the high-grade and low-grade ore. Although at first glance Alternative 1B appears to address this two-phased scenario, Alternative 1B in fact proposes to develop the low-grade ore only. DOGAMI should therefore deem the application incomplete and require Paramount to provide additional information that fully analyzes a two-phased alternative, including whether it proposes cyanide heap leaching of the lower grade ore in the second phase.

CIL non-cyanide processing alternative

OAR 632-037-0075 requires applicants to analyze chemical processing alternatives. OAR 632-037-0118(1) requires chemical process mining "to be undertaken in a manner that minimizes environmental damage through the best available, practicable, and necessary technology to ensure compliance with [the] environmental standards [listed in ORS 517.956 and 517.953]." ORS 517.956 also declares zero-wildlife mortality as an objective. ORS 517.953 charges DOGAMI with protecting "the environmental, scenic, recreational, social, archaeological and historic resources of this state from unacceptable adverse impacts that may result from mining operations" when permitting mining.

The only alternative processing that Paramount analyzed in addition to milling was cyanide heap leach ore processing. Paramount must also analyze CIL non-cyanide processing because Thiosulfate is a safe, feasible, and practicable alternative to Sodium cyanide that is extremely toxic and dangerous to the environment in low concentrations.

Starting in 2014, Barrick Gold Corporation has used CIL non-cyanide processing at the Barricks Gold Site in Nevada. Although non-cyanide processing might be more expensive than cyanide processing, DOGAMI's TRT should at least determine if other technology to process the ore is available, practical, and necessary to fulfill the environmental standards because of cyanide's extreme toxicity and the over $300 million that Paramount expects to profit from operating the mine.

Cyanide is a highly toxic chemical that can result in significant environmental impacts and health risks if released into the environment. Despite its relatively short half-life, its derivatives are similarly harmful. Paramount proposes to deliver cyanide solution to the Grassy Mountain site in 6,400-gallon loads. Once on site, it will be used to recover ore before being detoxed and pumped in a slurry to the TSF. The supernatant solution would return to the mill for reuse. At any point during this cycle, the toxic chemical could be mishandled and released into the environment. Furthermore, the heap leaching method described in Alternative 1B is concerning for migratory birds, bats, and freshwater biota that are the most cyanide-sensitive aquatic organisms. Not to mention that in 2004, heap leach ore processing was banned in Nevada after a leak of "245,000 gallons of cyanide-laden waste," was caused by Newmont, the predecessor to Paramount at Grassy Mountain.

Also, the sulfide- and cyanide-rich tailings slurry would be detoxified with high quantities of lime before going to the TSF, which would violate groundwater quality standards if released. Under Oregon chemical process mining regulations, Paramount must treat the tailings to reach a

specific neutralization potential ratio (NPR) and net neutralization potential (NNP) that, in this case, would result in extremely alkaline (pH 12) leachate. Not only would this violate groundwater quality standards, but it would corrode rock and mobilize harmful elements like arsenic, selenium, sulfate, and other solids.

On the other hand, Thiosulfate in CIL non-cyanide processing poses fewer risks to the environment. Its toxicity is much lower, and Paramount would not risk violating groundwater quality standards because the leachate would not need to be treated with the same amount of lime required to bring cyanide leachate into compliance. DOGAMI should therefore require Paramount to analyze all four mine design alternatives under CIL non-cyanide processing because Thiosulfate treatment is a proven method that "minimizes environmental damage through the best available, practicable, and necessary technology [that] ensure[s] compliance with environmental standards." OAR 632-037-0118(1).

Dewatering tailings alternative

The CPA should analyze filtered and paste tailings options to reduce the risk of acid mine drainage. In its CPA, Paramount provided that mechanically dewatering tailings would be "detrimental to the Project's economic feasibility," with little to no other analysis on the dewatering alternative. *Alternatives Assessment Report*, Pg. 27. Given that (1) the conventional tailings slurry is likely to put more pressure on the dam and more risk to the environment, (2) Paramount is expected to make a large profit just from the high-grade ore and (3) Paramount has stated its intention to expand the project's life and acreage, it is necessary for the CPA to effectively analyze the possibility of filtered and paste tailings to reduce the risk of contaminated mine drainage and extend the capacity of the tailings storage facility.

Reclamation alternative

ORS 632-037-0075(2) requires consolidated permit applicants to analyze alternative reclamation procedures. Although Paramount did analyze alternatives for reclamation, it appears that it only analyzed the differences in reclamation for each mine design alternative instead of analyzing alternative reclamation procedures for the proposed action. Not only should Paramount analyze alternative reclamation procedures for each alternative, but it should also analyze alternative reclamation procedures specifically for its proposed action.

The proposed post-closure land uses for the area are livestock grazing or range land, wildlife habitat, and recreational land. Given that Paramount is a Canadian-based corporation operating through its Nevada-based subsidiary to extract Oregon resources, both Paramount and DOGAMI should consider alternatives that do not just remove facilities and infrastructure, but also make the area better for Oregon wildlife and recreation than it was before Paramount began their mining exploration. We ask DOGAMI to require Paramount to return Grassy Mountain to conditions more suitable for wildlife and recreation by enforcing measurable standards as a condition of reclamation.

Relationship to BLM Alternatives Analysis in the EIS for Paramount's Proposed Operating Plan

The alternatives information we have requested is necessary for DOGAMI to draft the Environmental Evaluation and Socio-economic Analysis, other state agencies to determine whether to grant other state permits, and the Bureau of Land Management to draft its Environmental Impact Statement. It might also be wise to wait the completion of the EIS before proceeding to draft various state permits.

We hope that DOGAMI will assure that the CPA provides all the information necessary to fully inform decision makers and the public about the full range of alternatives to Paramount's proposal to build the first chemical process gold mine in Oregon.

Sincerely,

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Aidan Z. Harris, *Student*
Benjamin F. Deford, *Student*