



September 30, 2024

Mr. Dayne Doucet
Consolidated Mining Permit Lead
Oregon Department of Geology and Mineral Industries
Mineral Land Regulation & Reclamation
229 Broadalbin St SW
Albany, Oregon 97321

RE: Use of Thiosulfate as an Alternative to Cyanidation at Grassy Mountain Mine

Dear Mr. Doucet:

Calico has reviewed the USFWS public comment letter dated September 19, 2024 related to the Environmental Evaluation conducted by Stantec for DOGAMI. One of the concerns continues to persist: Using thiosulfate leach as an alternative to cyanidation for gold recovery. Calico has gathered additional information on the use of thiosulfate and would like to make it part of the record in hopes of reaching a final resolution on this issue.

On March 13, 2023, DOGAMI received a letter from Willamette University College of Law's Advanced Environmental and Natural Resources Practice class which requested the evaluation of the use of a thiosulfate process as an alternative to the proposed cyanidation process. Calico reviewed this letter and provided available information on the thiosulfate process to DOGAMI to share with the Technical Review Team (TRT) in support of addressing this issue. However, as the question of the applicability of thiosulfate persists, we would like to provide new additional information that we have available.

Ausenco, one of the largest and most respected engineering and process development firms in the mining industry, prepared the Feasibility Study for the Grassy Mountain Mine (GMM) project. As such, Ausenco and its metallurgical team had advised and defined the best feasible, practical, and available technology and the most secure and proven, environmentally safe alternative to extract the gold from the Grassy Mountain deposit. Ausenco also has rare expertise in the thiosulfate leach process as they designed and aided in construction of the only commercial thiosulfate leach process we know of in the mining industry: the Copper-catalysed Calcium Thiosulphate System (CaTS) at the Goldstrike Mine in Nevada, operated by Barrick Gold.

Calico asked for Ausenco's input on the potential for using thiosulfate at GMM. Calico can share the following information provided by Ausenco regarding thiosulfate leaching:

Ausenco are not aware of ANY commercial gold plants in the Western world using thiosulfate. Copper catalysed Calcium Thiosulphate System (CaTS) was selected at Barrick Goldstrike for treating a double refractory, preg-robbing carbonaceous ore that was not amenable to recovery by conventional cyanidation (Preg-robbing is an important phenomenon that inhibits gold recovery due to the presence of naturally occurring carbonaceous matter). Ausenco designed and constructed this facility, for more information, follow this link: [Goldstrike TCM Leach Project / Ausenco - Ausenco English](#)

Goldstrike operated with calcium thiosulfate for around 4 years before the rationalisation between Barrick & Newmont in Nevada provided feed that was amenable to cyanide CIL treatment after pressure oxidation and the use of thiosulfate was stopped. Thiosulfate is only for consideration for highly preg-robbing ores, or where environmental regulations prohibit application of cyanide. Even then the gold particle size needs to be as small as possible. The CaTS process worked at Goldstrike as the gold liberated during autoclave oxidation of the sulfides was essentially atomic.

Thiosulphate leaching was not considered as an alternative to cyanide leaching for the Grassy Mountain project for the following reasons:

- Thiosulphate leaching is not a viable alternative to cyanide leaching for free milling gold ores.
- Thiosulphate leaching is a costly process with complex chemistry and a high level of technical risk (no operating plants at present using this technology).
- High capital and operating costs and lower leach extraction are expected to make this process an uneconomical alternative to cyanidation for Grassy Mountain
- Estimated process comparison below:

Description	Units	CaTS (Thiosulphate leach)	Conventional Cyanide Leach and Cyanide Destruction
Leach feed grade, Au avg.	oz/ton	0.206	0.206
Leach feed rate, solids	Tons/h	34	34
Leach extraction, Au (at avg. leach feed grade)	%	<50% (assumed, in the absence of test work)	92%
Leach and precious metals recovery circuit. Capital cost, installed direct costs	US \$ M	137	11
Leach and precious metals recovery circuit. Operating cost, reagents	US \$/t feed	17	5
Technology risk		high	low
Operating complexity		high	medium

*Capital and operating costs for cyanidation circuit sourced from technical report dated 15 Sept 2020
Costs for CaTS process scaled from Goldstrike.*

This information indicates that thiosulfate will recover on the order of half the gold and cost on the order of an order of magnitude more than the selected cyanidation process. These cost impacts would be expected to make the GMM project economically infeasible.

We would also like to note that the BAPNT evaluation by Stantec does not screen out the use of thiosulfate based on practicability (costs/economics); it is carried through as Alternative A and is evaluated based on potential environmental benefits. The Impact Analysis in Chapter 3 of the Environmental Evaluation indicates that the proposed alternative (using cyanide) and Alternative A (thiosulfate) have generally the same potential impacts except for air quality (thiosulfate has



higher emissions because of burning fossil fuels to make steam).

Please contact me at (775) 625-3600, glen@paramountnevada.com if you have questions or need clarification.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Glen van Treek', written over a light blue horizontal line.

Glen van Treek
President

Calico Resources USA Corp./Paramount Gold Nevada Corp.

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