

Comments on Granite's Responses to the Utah DAQ Via Letters Dated July 4 and July 16, 2024

By

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I am providing the following comments after a careful review of Granite's responses to the DAQ's various Requests for Information (RFIs), including its additional air dispersion modeling using Weather Research Forecasting (WRF) meteorological data.

Phasing & Scope of Mine

1. The definitions and scope of Phase 1 and Phase 2 as noted throughout the record is not clear. DAQ should clearly define in the Approval Order what is meant by these two terms. Specifically, DAQ should clarify the areas that will be affected (on an annual basis) in each of these Phases.
2. DAQ should also clarify the total area that will be mined. The current documents suggest that the total mined area will be just 20 acres² – over an undefined period of time – with no more than 10 acres being mined at any one time. That seems to be the basis of the analysis and modeling. But, it is clear that the total available area for mining is substantially larger than 20 acres at this site. Regardless of whether the total area will be mined under a separate permitting or regulatory approval process than the current permit, DAQ should provide a fuller, complete, and accurate discussion of the operator's eventual mining goals for this site.

This issue is critical to determining air quality consequences to the project. With steep terrain slopes of 70 degrees and the proposed "reclamation" consisting of "six inches of topsoil" on those slopes, meaningful revegetation is impractical and not likely to be effective. So if the mine owners/operators believe that they can progressively mine over a much larger area than 20 acres in a piece meal approach, then each 10 acre parcel being progressively mined will represent only a fraction of the total source of fugitive dust, which will steadily increase over time.

Revised Air Dispersion Modeling

3. The revised modeling (results presented in the July 4, 2024 SLR Report) only focused on PM₁₀ and did not consider, at all, PM_{2.5}. There is no reason stated in the Granite modeling nor in the DAQ documentation as to why PM_{2.5} was not modeled. Nor is PM_{2.5} addressed in Granite's July 16, 2024 responses to the various DAQ RFIs.

In fact, the mining activities will generate PM_{2.5} and this pollutant will disperse, almost like a gaseous pollutant, given the fine particulate size. Given its size, it will also present additional

¹ I have previously provided my resume and biographical information in this matter. I can provide that again, if requested.

² See Granite's July 16, 2024 letter responding to DAQ's RFI #6(j).

challenges for capture/control. Finally, as the DAQ is aware, on February 7, 2024, the EPA revised the annual NAAQS for PM_{2.5} downward to 9 ug/m³.³ For all of these reasons, PM_{2.5} from the plant and cumulative sources should be modeled for the revised annual NAAQS as well as the current short-term 24-hour average NAAQS.

4. It is a step in the right direction that Granite has now modeled the impacts from the mine using a prognostic modeling approach,⁴ and that Granite proposed a reduction of annual throughput from the mine to 875,000 tons per year for Phase 1 and 900,000 tons per year for Phase 2 – from 1,000,000 tons per year originally assumed to be possible with no potential violations of the NAAQS. In other words, Granite and the DAQ were mistaken about the impacts as previously modeled using non-representative meteorological data from the SLC airport.

While the current prognostic model is an improvement, I believe that it needs additional improvements:

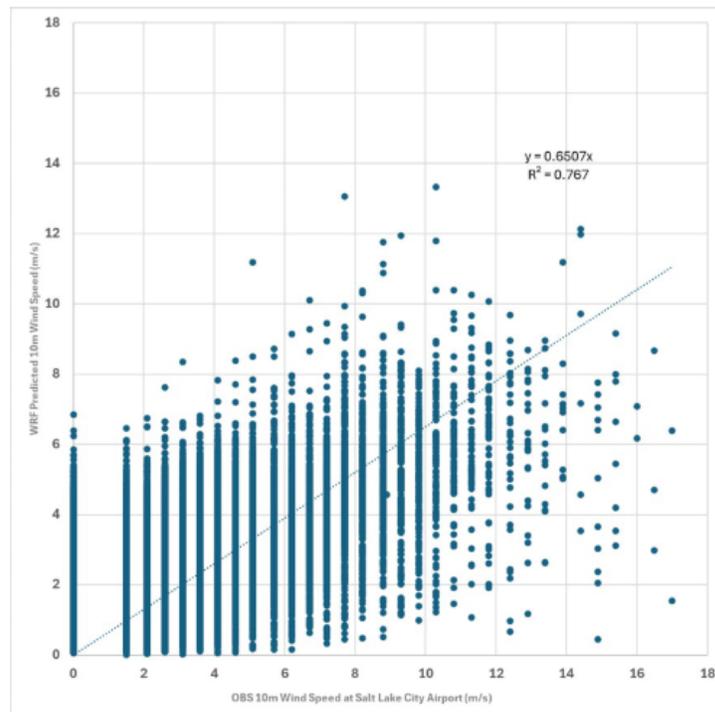
(a) The validation of the current model with SLC data for wind speed ($R^2 = 0.77$) as presented by Granite's consultant is not acceptable. In fact, the graphical presentation of this in Figure 8 of the modeling report, reproduced below, shows that even with very well defined geometry information as well as direct SLC meteorological data used for the comparison, the WRF pseudo-meteorological predictions are very inaccurate and subject to large errors at the SLC airport. We have no confidence, given these results, that the WRF model as currently used is providing useful or accurate data for use in AERMOD at the far more complex mine site.

In addition, I am not persuaded that the WRF model is acceptable given its better correlation for ambient temperatures ($R^2 = 0.98$), given that the temperature is a much more insensitive parameter.

³ <https://www.epa.gov/pm-pollution/national-ambient-air-quality-standards-naaqs-pm>

⁴ I fully concur with the discussions about why, given the complex terrain features at the mine site (see Section 3.1 of the SLR Report) and mountain valley flows as a result (see Section 3.2 of the SLR Report), using SLC airport meteorological data, as was previously done by Granite, was completely inappropriate. As SLR confirms at page 8 of its report, “[T]his comparison underscores that the local wind conditions and temperature patterns at the project site are markedly distinct from those observed and predicted at SLC.”

Figure 8: Comparison of 10 m height temperature between observations and WRF model results for SLC weather station from 2021 to 2023.



Therefore, DAQ should ask Granite to explain how the SLC validation for wind speed can be improved. Specifically, and at a minimum, Granite should re-model using a spatial resolution of 444 meters (which is 1/3 of the 1.33 km resolution and the next higher level of spatial resolution in WRF) instead of the 1.33 km currently used. Not only will this likely improve the SLC validation, the 444 meter resolution is warranted given the complex topography at the mine site itself, which is not resolved well at the 1.33 km spatial scale. The 444 meter resolution would be much more reflective of canyon topography and winds, and would likely result in additional throughput reductions in order to avoid further NAAQS violations.

In addition, Granite should determine if any of the model physics options listed in Section 2.2 of the SLR July 4, 2024 modeling report should also be improved in order to further improve the SLC wind speed comparison.

(b) In addition to comparisons of WRF and the SLC airport data, DAQ should provide comparisons with available meteorological data measurements collected in the canyon itself. For example, WindAlert (<https://windalert.com/spot/27567>) lists a monitor at the “Mouth of Parleys Canyon.” In addition, there appears to be a monitor maintained by an entity called WeatherFlow-Tempest near Kilgore.

DAQ should also require Granite to provide WRF predictions to the measured wind data collected at these sites and also any additional meteorological data sets that the DAQ may be aware of which are located in or around the Canyon and therefore more representative than the SLC airport locations. Proper validation at these Canyon-sites will provide more

confidence that the WRF is properly providing a representative met data set at the mine site for use in AERMOD.

5. The importance of using proper met data using WRF is illustrated by the extremely close modeled results for PM₁₀ NAAQS as confirmed in Table 1 of the July 9, 2024 letter from Granite to the DAQ, excerpted, with highlights below.

Table 1. AERMOD Dispersion Modeling Results using SLC International Airport and Prognostic Meteorological Data

Modeled Phase	Proposed Annual Tonnage (TPY)	Model Averaging Period	Model-Predicted Concentration Including Background (µg/m ³)	Percent of NAAQS (%)
Salt Lake City International Airport Meteorological Dataset				
Phase 1 Operations	1,000,000	24-hour	148.7	99
Phase 2 Operations	1,000,000	24-hour	147.4	98
MMIF Prognostic Meteorological Dataset				
Phase 1 Operations	875,000	24-hour	148.7	99
Phase 2 Operations	900,000	24-hour	146.1	97

Notes:
 µg/m³ = Micrograms per cubic meter
 MMIF = Mesoscale model interface
 NAAQS = National ambient air quality standards
 TPY = Tons per year

Note the fact that even with the lowered annual throughput production values, the predicted percent of PM₁₀ NAAQS are 99% and 97% for Phases 1 and 2. These results confirm that even lowering the production that Granite now accepts, i.e., 875,000 tons per year, is not enough to robustly prevent the exceedance of the 24-hour PM₁₀ NAAQS.

Of course, there is absolutely no information about how the modeling results may compare with the PM_{2.5} NAAQS as noted earlier – since no PM_{2.5} NAAQS modeling has been done.

Cost-Effectiveness of Controls for Reducing Particulate Matter Emissions

6. Granite’s July 16, 2024 Response to the DAQ is also deficient in many ways. First, this response presents cost-effectiveness calculations using certain capital cost data obtained from vendors, along with additional assumptions. Because the cost-effectiveness calculations rely on an incomplete and skewed set of the assumptions, DAQ cannot reasonably rely on these calculations unless it does the following:

- (a) DAQ should obtain from Granite the complete record of the discussions it had with the two vendors for enclosures – leading to the presentation of the cost information provided in Attachment B to this July 16, 2024 letter. For example, what information about the mine activities, storage piles, throughput rates, emissions calculations, and other details were presented to the vendors?
- (b) Granite’s cost-effectiveness analysis presents highly skewed and high cost-effectiveness values because it assumes that capital costs for all of the options considered need to be amortized over a very short period of time, namely just 3 years “...due to the quarry’s progressive nature.”⁵ This makes no sense. Even with the progressive nature, all

air pollution controls including enclosures and/or watering equipment will not be completely discarded and new equipment obtained every three years. In fact, much of the equipment should be reuseable. Therefore the assumption of 3 years as the useful life of controls, which drives up the calculated cost-effectiveness, is wrong.

DAQ should require Granite to re-calculate the cost-effectiveness, with fully supported data about the useful life of equipment.

(c) Similarly, the cost-effectiveness calculations assume an interest rate of 7.5% per year,⁶ also with no support. DAQ should obtain support from Granite for this value. At a minimum, the public record must show Granite's Weighted Average Cost of Capital (WACC) given its corporate structure and allocations between equity and debt.

(d) Granite makes numerous assumptions about the control efficiencies of the various options it considers as described in the July 16, 2024 letter. For example, it says that it used a control efficiency of 70% for water application on disturbed land (see Response to RFI #2). Yet, there is no technical or engineering support for this 70% reduction assumption and how that is related to the "high-pressure sprinkler system" and the curious precise design details (such as its radius of 178 feet and its discharge rate of 247 gallons per minute, etc.) Similarly, it is not clear in Response to RFI #4 why the use of a suction capacity of a very-precise 706 cubic feet per minute should properly control "particulate matter) from drilling. Of course, it is obvious that the suction capacity will depend on particle size, which is not addressed in this response.

(e) The July 16, 2024 letter also seems to raise an equity issue – namely that "other aggregate producers in the region have not been mandated to implement similar control technologies." This is wholly besides the point. The need to limit emissions from the mining activity so as to protect NAAQS and other values is highly site specific. Topography, meteorological data, production levels, availability of resources such as water for dust control, and other factors – collectively affect the degree to which pollutants including PM₁₀ and PM_{2.5} should be controlled. These factors vary from site to site. Therefore what may or may not be required at a different site – even in the Canyon itself – is irrelevant.

(f) The July 16, 2024 response also provides summary calculations about how much Granite's cost of production (in \$/ton of production, as summarized in Table 2 to Granite's July 16, 2024 Response) would increase under various control scenarios.

(g) Finally, Granite's response to DAQ's RFI #5 simply and inappropriately dismisses the source of water that Granite relies on for controlling particulate matter emissions, simply noting that "...sufficient water will be available under a source or combination of sources

⁵ As shown in Table 1 to its July 16, 2024 Response to the DAQ, Granite uses either 3 years or 5 years depending on the type of source in order to determine cost-effectiveness. Both are too short and both assume that there will be no reuse of capital equipment.

⁶ See Table 1 in Granite's July 16, 2024 Letter Response to DAQ.

of water.” Punting this issue that is central to limiting emissions from the mine is inappropriate. DAQ should not accept this response.

7. Granite’s July 16 Response to RFI #6 regarding fugitive dust control measures and how they will be complied with under Utah Admin. Rules R207-309-10(3) is nothing more than a regurgitation of the regulatory language itself with little additional details about how compliance with the regulations will actually be achieved.