

Chris Garrett

Subject: FW: Rosemont Mine: trends, weight of evidence and ecological risk

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Subject: RE: Rosemont Mine: trends, weight of evidence and ecological risk

Hello Jim,

We greatly appreciate you, your staff, and technical team taking the time to listen to EPA's outstanding concerns regarding the Rosemont EIS. I am responding to your request that I provide you with EPA's views on important factual trends that can assist you in understanding the likely effects of the proposed Rosemont mine on sensitive aquatic species and habitats.

As you know, we are concerned about ecological risk when there is something of value that requires protection. I think we can agree that the Cienega Creek watershed is extremely valuable and worthy of protection for myriad reasons. Weighing the risks of an action is a means to make optimal decisions in the face of uncertainty. If, as is the case here with the groundwater models and the natural resources of concern, uncertainty is large and the ecological stakes are high, then risk to the natural environment from the project is also likely high. Under any high risk scenario, the margin of error in determining probable impacts should be skewed towards the end that heightens protection. It is a central tenant of risk assessment to strive to avoid damage that is difficult or impossible to reverse.

In the face of high uncertainty and risk it is often useful to look at several factual trends. We can combine multiple pieces of evidence, weight each piece of evidence as to strength and quality, and then weigh all the categories of evidence to reach an informed conclusion. This method is often known as a weight-of-evidence approach that can be used to build a case of likely environmental outcomes from a project. Combining various lines of evidence reduces the probability of making false conclusions based on a single line of evidence (*e.g.*, only relying only on models with limited accuracy), allows the use of multiple methods or evidence sources where each type of evidence independently tells you something different about the situation being assessed (*i.e.*, likely mine project effects on ground and surface water resources), allows consideration of all reliable forms of evidence, and consequently allows decision makers to make better informed decisions.

Below I have listed several trends or lines of available evidence that are important to weighing the relative risk of the mine project upon the aquatic environment upon which I am certain we can all agree. These lines of evidence are not exhaustive and a rigorous risk or weight-of-evidence assessment incorporating all lines of evidence could be developed. Nevertheless, considered together, these trends or lines of evidence below all clearly support a conclusion

that the risks to the aquatic environment from surface and groundwater impacts posed by Rosemont mine project are great.

- Ten federally listed endangered and threatened plant and animal species, several of which are obligate aquatic, survive within the Rosemont project impact and assessment areas. By definition these species populations are already at risk of local extinction, extirpation, or further population declines under current environmental conditions. Experts from the USFWS and BLM acknowledge that some of the best remaining habitat in the American Southwest for the listed fish, amphibians and plants will suffer further loss and degradation from the additive groundwater-related impacts of the mine project. It is well understood that the aquatic resources at risk are of local, regional, national, and arguably, international significance.
- It is a well-known fact that the long-term trend in surface flows in Cienega Creek is one of steep, continuing decline due to several factors including increasing domestic groundwater pumping and persistent natural drought. One consequence of declining ground and surface water availability is a continuing long-term, decreasing trend in the length of available wetted stream channel along Cienega Creek. Currently, during the driest portions of the year only a couple miles of permanent surface water remains in Cienega Creek and only several hundred feet in Empire Gulch (Pima County and BLM have documented in detail these ongoing trends of decreasing surface water availability).
- In response to decreased ground and surface water availability, Pima County has documented changes in the species composition of riparian communities from hydro- and mesoriparian communities to more xeric plant communities. Such changes signal that the system may be close to an ecological tipping point wherein there will be large scale, landscape-level changes from wetter- toward drier-end riparian communities. There are several historical examples in the arid American West of this sort of dramatic ecological change; one such example is the arroyo cutting of the 18th and 19th centuries along Cienega Creek.
- It is a fact that the proposed mine pit will reverse the current direction of groundwater flow away from sensitive aquatic resources near Empire Gulch, Gardner Canyon and Cienega Creek, among other areas, toward and into the mine pit. It is also understood that the mine project will inhibit some mountain front recharge important to maintain these down-gradient aquatic resources. It is accepted that these changes to the regional hydrology and water balance are permanent and irreversible, and therefore will persist in perpetuity. There is no mitigation that can fully offset changes of such great size, extent and impact.
- It is accepted that the abilities of the three groundwater models to accurately reflect changes in groundwater levels decreases with increasing distance from the mine, and the further into the future we project, to a point where the models become speculative. The models are least accurate in predicting drawdown that might affect the most important aquatic and wetland resources.
- Despite groundwater model limitations, the critical tendency is that all three groundwater models show an increasing, long-term trend of significant declines in groundwater levels due to the mine pit. Groundwater declines increase in magnitude over time and at greater distances from the mine pit until equilibrium is reached. The fact that the mine will result in regional groundwater drawdown and the drying of some perennial streams is not in dispute.

- Climate change is a fact. Climate models predict a trend of increasing temperatures, decreasing precipitation, and increased periods of prolonged drought in the arid American Southwest. It is a fact that this will lead to less available surface and ground water for use by species dependent on these resources.

Please don't hesitate to call me if you would like to discuss my comments further.

Best regards,

Rob

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