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To: Field Managers, Nevada

From: State Director, Nevada

Subject: Ecological Risk Assessment Guidelines for Open Pit Mine Lakes in Nevada

Ecological Risk Assessment (ERA) is a process that analyzes the likelihood that adverse ecological effects may occur as a result of exposure to one or more stressors. Since 1996, the Bureau of Land Management (BLM) has been utilizing ERAs in Nevada to evaluate pit lake effects. In recent year's new ecological screening information, criteria and tools have been provided by the U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (EPA), U.S. Department of Energy (DOE), national laboratories, state universities, and state agencies.

Purpose

An ERA is a useful tool to aid in analyzing the current and future environmental impacts of mining pit lakes on wildlife and the ecosystem. When the BLM is preparing a National Environmental Policy Act (NEPA) analysis and it is predicted there is potential water quality problem with the future pit lake, an ERA should also be prepared.

Scope and Timing of the ERA

This guidance is intended to focus specifically on the potential ecological risks resulting from the development of pit lakes. The ERA for a pit lake should commence immediately after obtaining results of the ground water and pit lake geochemical modeling assessments. The pit lake geochemical analysis will usually cover the key phases in the evolution of the pit lake such as initial inflow and filling, 50% full and substantial full. The specific timeframes for these events depend upon the individual characteristics of each pit lake. The ERA will usually analyze critical chemical constituents (this typically includes the Nevada Profile 1 Analysis List) for each of the key phases in the evolution of the pit lake.

Some companies are providing the same information as found in screening and detailed ERAs, and integrating this information in the NEPA analysis. Where the same information from a screening-level or detailed ERA is included in the NEPA information, no further specific documentation is necessary.

It should be noted that the confidence and predictability of pit lake geochemistry and ecological risks decreases with increasing time after the end of mining. Therefore, predictions made several decades or centuries in the future should be viewed as indicators of relative trends, rather than absolute values.

Terminology

For these guidelines:

- A screening-level ERA uses conservative assumptions and simple assessment models to identify chemical constituents of potential concern. (e.g., the Hazard Quotient method) to eliminate chemicals that clearly could not cause significant effects on any endpoint, endpoints that could not be significantly exposed to any chemical, and pathways that could not serve as significant routes of exposures.

- A detailed ERA is a document that uses the results of the screening assessment as a guide for further hazard assessment. Chemicals, pathways and endpoints retained by the screening-level risk assessment are analyzed further for ecological risks. Food web models and probabilistic models are examples of this more detailed.

In Nevada, companies have been employing both screening-level ERAs (e.g., Mule Canyon Mine) and detailed ERAs (e.g., Round Mountain, Twin Creeks and Getchell Mines). Usually, a screening-level ERA should be prepared first to determine if a detailed ERA is necessary.

Triggers: When to Prepare an ERA

Decisions concerning when it is appropriate to prepare a screening-level versus detailed ERA for pit lakes should be based on an assessment of the chemical constituents predicted in the future pit lake. This assessment will be made using results of the pit water quality model. An analysis of chemical constituents which are predicted to be present in the pit lake must be conducted to determine whether a screening or detailed
ERA will be required.

The authorized officer has the discretion to require an ERA. How the pit lake will be managed in the future and what values the agency is trying to protect will ultimately guide the authorized officer's decision on whether or not to prepare an ERA.

The ERAs should normally be used for additional analysis when the predicted pit water chemistry identifies a potential problem with the future pit lake. Each Field Office should consider the following factors when making this determination:

- Predicted pit water chemical constituents
- Toxicity benchmark values for avian and terrestrial receptor species as determined by the U.S. Fish and Wildlife Service. (For the use of existing benchmark values done for past studies as an interim guide, see Attachment 1)

- Possible exposure pathways for human, terrestrial wildlife, or avian wildlife
- Whether the pit lake is predicted to exceed Nevada Maximum Contaminant Levels (MCL) for safe drinking water; only if pit is to be used as a water supply
- Whether the pit lake is predicted to exceed U.S. EPA Ambient Water Quality Criteria (AWQC) for aquatic life
- Whether the pit lake is predicted to exceed Nevada water standards for irrigation or watering livestock; only if water is used for these applications
- Potential for development of wildlife habitat at the pit lake
- Potential for development of aquatic life at the pit lake
- Baseline surface and ground water quality in the vicinity of the pit lake (background levels)
- Whether the pit lake will have surface water inflow or outflow
- Potential pit lake uses, for example recreation

Coordination

BLM should consult with other agencies and experts, especially the Nevada Division of Environmental Protection (NDEP), Nevada Division of Wildlife (NDOW) and USFWS when determining whether to complete an~~d~~ ERA. This determination to prepare an ERA must be made within the consideration of State of Nevada ground water and pit water quality laws. The state water quality regulatory agency, NDEP, is responsible for evaluating the potential for pit lakes to degrade state waters or to adversely impact human, terrestrial or avian health.

Those performing risk assessments at Nevada mines should work with the various Federal, State and local government agencies, especially NDEP, NDOW, and USFWS. In order to facilitate the completion of an ERA, the BLM Field Offices should contact the various agencies and organizations early in the risk assessment process and incorporate concerns or requirements on consistency as appropriate. The decision to prepare an ERA should also be fully coordinated with the mine operator. An early teleconference or coordination meeting to discuss problem formulations is essential.

Consistency among ERAs

A certain level of commonality should exist between all risk assessments performed for mine pit lakes in Nevada. All ERAs will include, but will not be limited to, the following sections and/or steps:

- Problem formulation
- Exposure assessment
- Habitat description and potential for future habitat development
- Selection (including rationale) of receptor species and exposure pathways
- Criteria for selection of chemicals of concern
- Effects assessment
- Risk characterization
- Assumptions and uncertainties

- Conclusions relative to biological impact to specific species
- Mitigation Potential

Inclusion of these sections will allow for 1) the development and implementation of consistent practices, 2) the completion of consistent products, 3) the comparison of predicted impacts at various sites, and 4) the evaluation of potential cumulative impacts resulting from open pit mining.

CONTACT PERSON: Questions concerning this policy should be directed to Dr. Tom Olsen, Division of Mineral Resources at (775) 861-6451.

2 Attachments
1. Table of References (2 pp)
2. Benchmark Values (1 p)

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Benchmark Values

Until the benchmark values are determined by the U.S. Fish and Wildlife Service, the BLM should use the interim benchmark values, which have been derived from past ERAs that have already been completed for pit lakes nearby in Nevada. An example of a benchmark value for mallards from the Mule Canyon ERA is listed in Table 1 below. ERAs have been, or are being prepared for the Cortez, Lone Tree, Twin Creeks, Mule Canyon, Round Mountain and Tallapoosa EISs. NSO will send the districts copies of ERAs that were completed in other district offices. These benchmark values generally represent concentration in water that would just being to affect the receptor species at a site these values usually exceed the human drinking water and aquatic life chemical standards.

Table 1

Constituent	Benchmark Value Mallards (MG/L)
Aluminum	21
Antimony	0.17
Arsenic	0.94
Cadmium	0.23
Cooper	1.1
Fluoride	5.3
Manganese	0.78
Mercury	0.002
Methyl Mercury	0.00038
Selenium	0.57
Silver	14
Thallium	0.002
Zinc	0.834

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