United States Department of the Interior

FISH AND WILDLIFE SERVICE
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April 11, 2000

Mr. Holland Shepherd
New Mexico Energy, Minerals, and Natural Resources Department
Mining and Minerals Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505

Dear Mr. Shepherd:

Thank you for the opportunity to participate in the technical review of the Molycorp Mine Closeout/Closure Plan. While the Wildlife Work Plans (Studies E4 and B3) submitted by Molycorp February 29, 2000, are excellent first steps to evaluating potential wildlife impacts from Molycorp operations, these alone do not address the numerous site-specific issues that may contribute to site-wide ecological risk. To successfully reach the goal of a Post Mining Land Use (PMLU) of "self-sustaining ecosystem," ecological risks must be clearly identified, and then minimized via appropriate remediation and restoration. It is the Service's opinion that these Wildlife Work Plans will not generate the information necessary to adequately address potential adverse impacts from current, proposed, and historical mining activities. Adequate wildlife studies should consider the sensitivity of all potentially exposed organisms, multiple exposure routes, and all potential contaminants of concern. For example:

- Insects, reptiles, and rodents burrowing into tailings and waste-rock or consuming vegetation grown in tailings and waste-rock, may be adversely impacted by bioaccumulation of molybdenum and other metals. Other animals also may be adversely impacted if populations of these preybase animals are reduced, or if the preybase contains metal body-burdens (tissue and soil adhering to the body surface) that result in harmful bioaccumulation in the animals consuming them (e.g., raptors, coyotes and fox).

- Migratory birds and other animals consuming aquatic and semi-aquatic organisms in and around the Red River could be adversely impacted by bioaccumulation of molybdenum and other metals by the loss of an adequate prey base, and by habitat degradation.

An adequate Wildlife Work Plan should decisively address issues such as these. Additional studies, such as an ecologically-directed sampling throughout impacted and nearby "reference" areas, should be initiated to develop the foundation of a scientifically defensible ecological impact evaluation. These sampling results should then be compared to toxicity reference values and/or effects benchmarks determined from a literature review to generate the quantitative information needed to design an ecologically sound Closeout Plan (e.g., Oak Ridge National Laboratory "No Observable Effects Levels" (NOELs) at http://www.hsrd.ornl.gov/ecorisk or EPA's National Center for Environmental Assessment at http://www.epa.gov/nceawww1 and other primary literature sources (other useful website introductory pages attached)).

The Service has reviewed a portion of the literature available on the toxicity of molybdenum and other metals, and has concluded that there is sufficient information available to suggest possible adverse effects to fish and wildlife (e.g., Lynch et al. 1988; Eisler 1989; Andreasen 1992; Failing 1993; Slifer 1996; Allen et al. 1999; Schafer 1999 [and references therein]; TOXNET online toxicology database 2000 [results attached]). For example, Schafer (1999) determined Soil Screening Criteria (SSC) for the remedial investigation and screening ecological risk assessment at the Chino mine in southwestern New Mexico (calculations attached). These soil criteria were calculated using literature based bioaccumulation factors, toxicity reference values, and common, widespread species such as quail and red-tailed hawks (therefore these SSC are not specific to the Chino mine). Metal concentrations in waste-rock and tailings exceeding these SSC could pose a risk to these same species at Molycorp (Table 1). The SSC were: Al (0.32 %), Cr (III) (11 mg/kg), Cu (111), Mo (1 mg/kg), Pb (35 mg/kg), V(8 mg/kg), and Zn (41 mg/kg). Concentrations of all of these metals in Molycorp waste-rock (Robertson GeoConsultants 2000) exceed these SSC, and some, such as Cr, Pb, and V (that are highly toxic to wildlife) are elevated.

These results must be interpreted in comparison to metal concentrations in natural scar areas and other natural background conditions. The Service acknowledges that there may already be some "background" ecological risk that should be considered when developing risk management strategies in the Closeout Plan. Nonetheless, the magnitude and extent of ecological risk due to Molycorp impacts must be quantified. For example, Cu, Mn, Ni, Pb, and Zn concentrations in waste rock are 1.3 to 3.6 times higher than concentrations in scar areas, and Mo concentrations are 5.1 times higher in waste rock than in scar areas (Kent 1995). Thus ecological risk from mine waste-rock is possible, even considering background conditions.

Kent (1995) also found that mine leachate had 44x more Cd, 29x more Cr, 15x more Zn, 12x Ni, 5x more Cu, 3x more Pb, and 2x more Mo than scar area leachates. Similarly, Robertson GeoConsultants (2000) determined that Al, Co, Cu, Mo, Ni, and Zn will readily leach from waste rock washed with artificial rainwater. These waste rock leachate tests suggest that water passing through the upper 5-10 feet of waste rock, and ponding in the numerous depressions throughout the mined area, could be hazardous to wildlife. Similarly, water leaching from waste rock dumps may be more hazardous than water leached from scar areas. Waste rock drainage collection systems that include ponds, and portions of the Red River below springs potentially containing waste rock leachate, could also be hazardous to fish and wildlife. Although these conclusions are preliminary and subject to further evaluation, until additional ecological risk data are gathered that prove otherwise, contaminants in and around the Molycorp mine should be considered potentially hazardous to wildlife visiting, feeding, and/or breeding in the area.

Existing studies referenced in the Wildlife Work Plans (Dreesen 1996, Chadwick 1997) do not adequately address potential wildlife impacts. For example, the plant molybdenum uptake data generated by Dreesen (1996) is not relevant for woody species and for animals consuming selected parts of a plant such as seeds or roots. A herbivorous animal will preferentially consume leaves, and secondarily bark, so whole woody plant measurements of molybdenum content have little value for determining risk to herbivores. Likewise, migratory birds and rodents typically consume seeds, not an entire plant. Considering that some woody species will likely re-colonize the tailings and waste-rock areas (either intentionally or opportunistically), and that herbivorous animals will commonly use this area, additional plant uptake, and possibly herbivory, studies will be necessary. In addition, plant uptake of Pb and Cr in tailings and waste-rock (Pb and Cr were not evaluated in the Dreesen (1996) study), plant uptake of all metals from waste-rock, and phytotoxicity should be evaluated.

Also, because some of plant species evaluated by Dreesen (1996) readily bioaccumulate molybdenum to potentially toxic concentrations, methods to exclude these species from the re-vegetated areas should be developed. These Wildlife Work Plans state that “In fact, in the early stages, it is possible that wildlife use may impede the re-vegetation goals and actions may have to be taken to minimize any use by wildlife.” Exclusion of herbivorous wildlife will be extremely difficult, so any re-vegetation programs should account for a certain amount of loss due to grazing by deer, elk, and antelope. In addition, mercury, selenium, and thallium are also ecologically hazardous substances, and should be routinely analyzed for in all media.

The Tailings Wildlife Evaluation Work Plan also states that, “It should be noted that winter grazing of sheep has occurred on the tailings facility in re-seeded areas for several years with no indication of problems.” This is a vague and unsupported statement, and if retained, should be evaluated via an appropriate Work Plan Task element. Similarly, the tailings area Wildlife Work Plan briefly mentions that phytotoxicity at the Tailings facility will be “observed” (Task 2.4d). First, phytotoxicity should also be evaluated at the Mine Site waste rock dumps, as metal concentrations are often higher, and the low pH will render these metals highly bioavailable. And second, phytotoxicity should be evaluated using a rigorous scientific approach.

The overall objective for the Wildlife Studies Work Plans should be to assure a PMLU of self-sustaining ecosystem/wildlife habitat. As stated in several previous correspondences and conversations between the Service, MMD, and Molycorp, there are unresolved questions concerning the toxicity and bioaccumulation potential of molybdenum and other metals from plants, small mammals, and insects contacting tailings below the soil cover, uncovered waste-rock, and metals in the Red River basin. The Service is concerned that a descriptive review of previous studies and published information on metals and the environment, and the potential for adverse effects to wildlife, will not provide sufficient information to determine appropriate Closeout strategies. This approach may fail to address issues that would best be resolved by a more quantitative comparison of contaminant concentrations in various environmental media (air, soil, sediments, plants, etc.) to effects benchmarks for plants and animals in the area. Therefore, at a minimum, soil metal content at ecologically relevant depths should be evaluated throughout the impacted area, including the mine site, tailings facility, and the Red River Basin.

However, as discussed at the last Technical Review Committee meeting, comparisons such as these are inherently uncertain, and this uncertainty is purposely biased towards protection of the environment in a "worst-case" scenario. To reduce this uncertainty, actual field data collection and site-specific studies (e.g., evaluation of soil-metal bioavailability, determination of insect and rodent metal body-burdens, caged-animal experiments, laboratory toxicity testing) may be advantageous. In addition, although the Closeout of the tailings facility will eventually involve re-contouring of the surface to eliminate ponded water, in the interim there will be several areas with ponded water aside from the current tailings disposal region. The effects of these ponded areas on contaminant infiltration, mobility, and ecological risk should be evaluated.

Please contact Russ MacRae of my staff at (505) 346-2525, ext. 124 if you have questions or require further assistance.

Sincerely,

Joy E. Nicholopoulos
Field Supervisor

cc (w/ attachment):
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cc (w/o attachment):
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
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Molycorp Closeout Plan Technical Review Committee Members

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Table 1. Metal concentrations reported in Robertson GeoConsultants (2000) for Molycorp waste-rock dumps and a natural scar area compared to Soil Screening Criteria (SSC; in parentheses) derived by Schafer (1999) for the Chino Cu smelter near Hurley, New Mexico. Al is expressed as a percent, while all other values are in mg/kg dry weight (part per million, ppm).

Site ID	**Site Name**	**Depth**	**pH**	**NP/AP**	**Al (0.32)**	**Cr (11)**	**Cu (111)**	**Mo (1)**	**Pb (35)**	**V(8)**	**Zn (41)**	
WRD-1	Spring Gulch	5-10	7.7	0.6	0.56	153	120	150	64	11	71	
WRD-2	Spring Gulch	5-10	4.2	0.1	NA	NA	NA	NA	NA	NA	NA	
WRD-2	Spring Gulch	40-45			0.94	86	123	22	70	20	36	
WRD-3	Sugar Shack South	0-5	5.9	0.6	NA	NA	NA	NA	NA	NA	NA	
WRD-3	Sugar Shack South	20-25			1.91	177	126	550	56	83	341	
WRD-4	Sugar Shack South	5-10	5.0	0.2	1.63	146	154	146	44	65	122	
WRD-5	Sugar Shack South	5-10	6.9	0.3	1.32	141	144	12	42	32	75	
WRD-6	Sugar Shack West	0-5	2.7	< 0.1	1.11	115	118	10	54	33	65	
WRD-7	Sugar Shack West	5-10	3.7	< 0.1	0.95	90	93	38	268	17	320	
WRD-8	Capulin	10-15	3.8	< 0.1	NA	NA	NA	NA	NA	NA	NA	
WRD-8	Capulin	25-30			0.76	152	50	14	264	2	274	
WRD-9	Capulin	10-15	2.7	< 0.1	NA	NA	NA	NA	NA	NA	NA	
WRD-9	Capulin	20-25			0.55	192	32	16	54	6	70	
SSB-1	Scar Area	0-5	3.8	0.1	1.47	217	48	12	58	44	47	
SSB-2	Scar Area	9-14	2.9	< 0.1	NA	NA	NA	NA	NA	NA	NA	
SSB-2	Scar Area	24-29			1.22	160	78	10	46	59	42	