SELENIUM AREA WIDE INVESTIGATION

SOUTHEAST IDAHO PHOSPHATE MINING RESOURCE AREA

DEQ # WST.RMIN.SEAW.6005.67068

FINAL

AREA WIDE RISK MANAGEMENT PLAN:

REMOVAL ACTION GOALS AND OBJECTIVES, AND ACTION LEVELS FOR ADDRESSING RELEASES AND IMPACTS FROM HISTORIC PHOSPHATE MINING OPERATIONS IN SOUTHEAST IDAHO

FEBRUARY 2004

Prepared by:

STATE OF IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY
15 West Center
Soda Springs, Idaho 83276
(208) 547-1940

Mission: To protect human health and preserve the quality of Idaho's air, land, and water for use and enjoyment today and in the future.

March 11, 2004

TO STAKEHOLDERS AND PUBLIC COMMENTERS

Re: Final Area Wide Risk Management Plan Transmittal

Dear Stakeholders and Commenters,

This letter transmits the Idaho Department of Environmental Quality's (DEQ) *Final Area Wide Risk Management Plan* (RMP) dated February 2004. The RMP was developed as a discretionary guidance document to assist Lead and Support Agency representatives with their mine-specific risk management decision-making responsibilities regarding historic mining operation releases and associated impacts from selenium and related trace metals in the Southeast Idaho Phosphate Mining Resource Area. The RMP provides removal action goals, objectives, and action levels intended to assist in identifying site-specific areas of concern, focusing regulatory resources, and supporting consistent decision-making using a regional perspective. The document was developed in collaboration with our interagency partners as prescribed in the *Interagency Memorandum of Understanding* and Task 3 of the *Area Wide Investigation Scope of Work*.

A 45-day formal public comment period was provided for the *Draft Area Wide Risk Management Plan* in May through July of 2003. A number of revisions were made to the document based on the comments received. Most notable are the reduction of the selenium vegetation action level to 5 mg/l dw to address domestic animal grazing use; introduction of a tiered action level approach for non-regulated waters based on existing and potential future use of non-regulated surface water features as determined by an interagency functional use survey; and, the addition of Attachment 1 specifically describing the technical aspects of the action level development process. The final document also includes a glossary, list of acronyms, additional discussion on DEQ's risk management rationale, and separate attachments providing interagency ARAR lists and concurrence letters. A more detailed description of the RMP revisions is provided in the Foreword of Attachment 2 with DEQ's responses to public comments.

The Department thanks all of the stakeholders and public commenters for their involvement in this process, particularly the interagency technical group representatives for their collaboration. An electronic copy of this document will be posted on the Selenium Information System Project website (http://giscenter.isu.edu/Research/Techpg/Selenium/selenium.htm) in the next few weeks for those not included in hard copy distribution. The DEQ will also be conducting the annual Selenium Area Wide Advisory Committee (SeAWAC) update meeting on Thursday, May 6th at the Pocatello Regional Airport Conference Room from 1:00 to 5:00 p.m. This meeting is open to all interested parties.

Should you have any questions or comments regarding this document or the Area Wide Investigation, please do not hesitate to call me.

Sincerely,

Richard L. Clegg, P.E.
Selenium Project Officer

EXECUTIVE SUMMARY

In July 2000, the State of Idaho Department of Environmental Quality (DEQ) was designated as the Lead Agency for the Area Wide Investigation (AWI) of selenium and related trace metal releases from historic mines sites in the Southeast Idaho Phosphate Mining Resource Area, which consists of a 1,500 square mile area that encompasses all historic phosphate mining operations south of Grays Lake Refuge and north of Bear Lake, and includes the Gay Mine complex on the Fort Hall Indian Reservation as shown on Figure 1. The Area Wide Investigation Scope of Work requiring the DEQ to develop an Area Wide Risk Assessment and Risk Management Plan, among other technical tasks, is contained in formal agreements with Federal and Tribal Agencies in the form of a Memorandum of Understanding, and with the mining companies that comprise the Idaho Mining Association Selenium Committee in the form of an Administrative Order on Consent. The risk assessment was finalized and published in December 2002 upon completion of a formal public comment period. The draft risk management plan was made available for public comment from May through July 2003.

The Risk Management Plan is intended to provide discretionary guidance for other lead and support agency representatives responsible for administering site-specific activities under the Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA) of 1986, as amended, at the subject mines listed in the document. The specific removal action goals, objectives and action levels presented in the plan were developed to assist in focusing resources, identifying releases and areas of concern, minimizing future site-specific risk assessment needs, and making decisions about mine-specific risk management that use a regional perspective and are consistent. In accordance with the AWI scope of work, the plan is advisory in nature; all mine-specific risk management decision-making is at the discretion of the assigned Lead Agency, with consultation from the designated Support Agency representatives, according to site-specific goals, needs and conditions, and appropriate regulatory considerations.

The Risk Management Plan contains a brief summary of Area Wide activities performed to date, a synopsis of site-specific activities to be conducted at individual mines under the CERCLA non-time critical removal action process, and discussion of IDEQ's risk management approach including Area Wide removal action goals, objectives and action levels. In response to public comments, the final document has been revised to include: a glossary of technical terms and a list of common acronyms; expanded discussions on DEQ's risk management rationale; a separate attachment describing the action level development process; and additional attachments containing DEQ's formal public comment responses, Interagency concurrence letters and the preliminary list of applicable or relevant and appropriate requirements (ARARs) for subsequent mine-specific actions.

As previously noted, the Department recently published the Final Area Wide Human Health and Ecological Risk Assessment, which concluded that regional human health and population-level ecological risks are unlikely to occur in the overall Resource Area based on observed conditions. However, the assessment indicated that ecological subpopulation risks are evident in localized areas, particularly aquatic and riparian environments, impacted by historic mining operations and ongoing releases. These areas are estimated to comprise less than 5% of the overall Resource Area but the impacts are direct results of unanticipated, unauthorized releases from historic and ongoing phosphate mining operations. Due to the presence of numerous water quality violations and identified release pathways, DEQ concluded that where there is an absence of applicable chemical-specific regulatory criteria, ecological subpopulation risks are an appropriate measure for identifying and addressing existing environmental impacts caused by mining releases. This is also consistent with existing U.S. Environmental Protection Agency (USEPA) guidance on risk management, which requires response actions to address "local populations and ecological communities at or near the subject CERCLA site."

Mine-specific activities will be conducted using the non-time critical removal action process consistent with CERCLA and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This process requires compliance with all substantive Federal and State regulations, where practicable, and specifies the decision criteria to be used in selecting removal action alternatives to address environmental impacts and releases. The removal action approach is comprised of site-specific inspection/investigation (SI), engineering evaluation/cost analysis (EE/CA), removal action implementation, and removal closeout to include post removal controls and monitoring. The Lead Agencies for mine-specific activities are assigned based on jurisdictional land ownership and will be responsible for administration and oversight of the removal action activities with the assistance of designated Support Agency technical representatives. These duties include, but are not limited to, assignment of an On Scene Coordinator (OSC), maintenance of the Administrative Record, review and approval of deliverables, management of public involvement activities, oversight of CERCLA site actions, and development of the Removal Action Approval Memorandum, the EE/CA Recommended Alternative and the Action Memorandum providing the final removal action determination in accordance with decision criteria. Each EE/CA document and corresponding Agency Recommended Alternative will be subject to formal public comment to solicit input from stakeholders and other interested parties.

The Risk Management Plan contains four regional removal action goals and a number of removal action objectives intended to either achieve compliance with existing environmental regulations (ARARs) or to address areas that DEQ has concluded present unacceptable risks based on ecological subpopulation exposures. The first removal action goal is to protect surface water resources in southeast Idaho through achieving compliance with Federal and State regulatory criteria, developing and demonstrating effective best management practices, and developing a long-term monitoring strategy integrated with site-specific monitoring requirements to determine the effectiveness of implemented actions as required by the AWI scope of work, and to provide early warning of any further degradation issues should they occur in the future. The second goal is to protect wildlife and habitat in the Resource Area through reducing exposures to risk-based levels, and the continuing to develop and demonstrate modified best management practices and reclamation procedures that eliminate or control unacceptable exposure routes and associated risks. The third goal is to protect other multiple beneficial uses of the resource area through effective reclamation. Precautionary removal action objectives have been proposed under this goal for existing grazing management practices and residential development land use restrictions on mine waste units to provide for the protection of multiple use receptors. And the last removal action goal is to protect regional groundwater sources by characterizing and responding to any localized groundwater contamination, and developing and demonstrating effective best management practices to prevent future groundwater impacts. The area wide removal action goals and objectives are provided in Table ES-1 at the end of this summary.

In support of the remedial action goals and objectives, the DEQ developed a set of action levels, summarized in Table ES-2, that either trigger additional site investigation monitoring for regulated surface water or groundwater locations that have contaminant levels exceeding background levels, and may possibly indicate the presence of active releases, or that require EE/CA consideration and removal action alternative selection for media exceeding regulatory numeric criteria or the risk-based concentrations developed by DEQ. The risk-based action levels were developed using deterministic single media dose proportions as the initial basis. These action levels were tested and validated using probabilistic methods that assume simultaneous exposure from all action level media to numerous limited home range surrogate species representing sensitive receptors from the various feeding guilds present in the Resource Area. Due to the limited area of impact and low likelihood of population-level effects, the action level development approach used by DEQ applied slightly less conservative assumptions regarding acceptable hazard quotient ranges than a typical population-level ecological risk assessment might. However, many of the receptor dose model parameters, such as site use, bioavailability and secondary media exposure point concentrations, remained conservatively-biased to represent receptors residing exclusively in impacted areas during toxicologically critical periods such as spawning, nesting, and breeding. The DEQ's risk management decisions focus resources in areas where efforts to minimize potential impacts to ecological subpopulations will provide the greatest benefit.

Action levels were established for the primary media that support sensitive habitats and are most amenable to standard industry measurement and mitigation techniques, which were surface water, groundwater, sediments, fluvial/riparian soils, and vegetation. Several of these action levels were modified in response to public and interagency comments on the draft document. DEQ concluded that reductions of contaminants in these primary media should also have beneficial effects on secondary exposure pathways such as aquatic plants, benthic invertebrates, prey species, invertebrates, fish/bird eggs, that are not receptive to direct remediation or nondestructive monitoring methods. Elevated contaminant concentrations in the selected action level media are also indicative of the presence of past and/or ongoing releases. These media are subject to either existing regulatory criteria or a reasonably ascertainable range of accepted toxicological threshold reference values, whereas many of the secondary media benchmarks are still a matter of debate among technical experts.

Based on the results of the detailed risk management evaluation, DEQ is recommending that copper be removed from the mine-specific contaminants of concern (COC) list for all media, since the observed concentrations are well below the risk-based action levels. The remaining mine-specific COCs are cadmium, chromium, nickel, selenium, vanadium and zinc. Because of low media-specific concentrations observed in previous sampling events, DEQ also recommends that chromium, nickel and vanadium be excluded from the future mine-specific surface water and vegetation analyte lists, but remain on soil and sediment analyte lists. These constituents exhibit relatively low concentrations in the regional water column and do not appear to present measurable risks associated with plant uptake. If supplemental risk estimates are needed for site-specific evaluations, DEQ recommends using the area wide maximum observed concentration to represent conservative exposure point concentrations for any pathways and analytes that have been excluded.

DEQ also recommends implementing a long term monitoring program in the region to determine the effectiveness of implemented actions, as required by the AWI scope of work, and to detect any further potential degradation issues should they occur in the future. This program should be integrated with site-specific post removal monitoring requirements to avoid duplicative efforts. And finally, DEQ recommends follow up sampling of mine-specific surface water pathways during the seasonal runoff period of the next average annual precipitation year to ensure that all release sources and contaminant migration routes have been identified.

In conclusion, DEQ recognizes the potential threat selenium and related metal releases can present to the environment, and the catastrophic effects that have been observed at many selenium-contaminated sites around the country. The action levels and risk management decisions DEQ has made are specific to the Southeast Idaho Phosphate Mining Resource Area based on area wide knowledge and observations compiled over the last seven years. DEQ's conclusions recognize the limited areas of impact in the Resource Area and the local differences in habitat sensitivities, contaminant distribution, and population density from those encountered at many of the literature-referenced sites. The resultant action levels are not proposed for use at other selenium sites within the state or for risk management applications outside the Resource Area.

The DEQ's plan presents a balanced area-specific approach to addressing historic impacts and preventing releases from future mining activities based on socioeconomic factors, consideration of scientific uncertainties, risk tolerance, and environmental protection concerns. Furthermore, the plan meets the interagency goals implicit in the AWI scope of work. Implementation of removal actions to achieve the action level concentrations are intended to result in regulatory compliance, eliminate on-going releases, and address the impacted areas where removal action will provide the greatest ecological benefit.

DEQ appreciates the continued participation of all stakeholders and interested parties in this process, and look forward to your future involvement in our attempt to resolve the selenium issues in southeast Idaho. In these endeavors, the Department of Environmental Quality remains committed to protection of public health and the preservation of the environment in support of its many beneficial uses.

TABLE ES-1: AREA WIDE REMOVAL ACTION GOALS (RAGS) AND OBJECTIVES (RAOS)

RAG 1.0: PROTECT SOUTHEAST IDAHO'S SURFACE WATER RESOURCES.

RAO 1.1: Reduce risks to existing aquatic life and sensitive species from selenium and related trace metal concentrations in regional subbasins and stream segments through compliance with the National Toxics Rule and State Water Quality Regulation numeric criteria.

RAO 1.2: Develop and demonstrate Best Management Practices (BMPs) to prevent future mining releases and associated risks from selenium and related trace metals in receiving streams and water bodies.

RAO 1.3: Develop a long-term monitoring plan for regional surface water resources to ensure effectiveness of risk reduction measures from BMPs, removal actions, and reclamation methods.

RAG 2.0: PROTECT WILDLIFE, HABITAT AND ECOLOGICAL RESOURCES IN SOUTHEAST IDAHO

RAO 2.1: Reduce subpopulation risks to local wildlife, resulting from historic mining release exposures, to acceptable levels as established by risk-based action levels.

RAO 2.2: Minimize wildlife risks, to the maximum extent practicable, through the development and demonstration of effective Best Management Practices for future mines.

RAG 3.0: MAINTAIN AND PROTECT MULTIPLE BENEFICIAL USES OF THE SOUTHEAST IDAHO PHOSPHATE MINING RESOURCE AREA.

RAO 3.1: Reduce livestock grazing risks and associated losses from selenium exposures in forage and drinking water sources in the Resource Area.

RAO 3.2: Prevent potential future public health risks by prohibiting residential land use and development in the immediate vicinity of phosphate mining waste units and/or impacted areas.

RAG 4.0: PROTECT SOUTHEAST IDAHO'S GROUNDWATER RESOURCES

RAO 4.1: Identify, characterize, and respond to groundwater contamination sources in the Southeast Idaho Phosphate Mining Resource Area that may present potential public health or ecological risks.

RAO 4.2: Develop and demonstrate Best Management Practices (BMPs) to control future mining releases and associated risks from selenium and related trace metals in groundwater.

TABLE ES-2: DEQ PROPOSED AREA WIDE ACTION LEVELS

Monitoring Action Level for Regulated Surface Water Trending and Release Detection		
Constituent	**Action Level (ug/L)**	**Basis**
Selenium, Total Recoverable	1.6	Maximum AWI Background Concentration
Cadmium*	0.7	Maximum AWI Background Concentration
Chromium*	5.8	Maximum AWI Background Concentration
Copper*	3.3	Maximum AWI Background Concentration
Nickel*	4.0	Maximum AWI Background Concentration
Vanadium*	8.1	Maximum AWI Background Concentration
Zinc*	59.0	Maximum AWI Background Concentration

* Dissolved constituent analyses.

Removal Action Level for CWA*/State Water Quality Rules for Regulated Surface Water**		
Constituent	**Action Level (ug/L)**	**Basis**
Selenium, Total Recoverable	5.0	40 CFR 131.35/IDAPA 58.01.02
Cadmium***	1.0	40 CFR 131.35/IDAPA 58.01.02
Chromium, Total***	74.0	40 CFR 131.35/IDAPA 58.01.02****
Copper***	11.0	40 CFR 131.35/IDAPA 58.01.02
Nickel***	160.0	40 CFR 131.35/IDAPA 58.01.02
Vanadium, dissolved	20.0	Tier II Secondary Chronic Benchmarks
Zinc***	100.0	40 CFR 131.35/IDAPA 58.01.02

*CWA: Clean Water Act **Based on cold water criteria; remedial actions may be triggered at lower concentrations if confirmed degradation trends are observed. ***Dissolved with hardness adjustment required. ****Assumes 6 to 1 partitioning of Cr III to Cr VI.

Removal Action Level for Surface Waters Not Subject To CWA/IDAPA* Biota Standards**		
Constituent	**Action Level (mg/L)**	**Basis**
Selenium***: Riparian Habitat Use Domestic Animal Drinking Water Use Transitory Wildlife Drinking Water Use	 0.005 0.050 0.201	 Assumed Protective Level for Waterfowl/Amphibians Veterinarian Advisory Level for Domestic Animals ½ $NOAEL_1$ Single Media Estimate for Sensitive Species
Cadmium	0.245	½ $NOAEL_1$ Single Media Estimate for Sensitive Species
Chromium	8.7	½ $NOAEL_1$ Single Media Estimate for Sensitive Species
Copper	11.0	½ $NOAEL_1$ Single Media Estimate for Sensitive Species
Nickel	0.614	½ $NOAEL_1$ Single Media Estimate for Sensitive Species
Vanadium	0.972	½ $NOAEL_1$ Single Media Estimate for Sensitive Species
Zinc	43.4	½ $NOAEL_1$ Single Media Estimate for Sensitive Species

* IDAPA: State of Idaho rules. ** Based on subpopulation risks in impacted areas from avian/terrestrial surface water ingestion. *** Functional use to be determined by interagency inspection of all individual mine ponds and pit lakes. $_1$ NOAEL: No observed adverse effect level.

Monitoring Action Level* Groundwater Trending and Release Detection		
Constituent (Unfiltered)	**Action Level (ug/L)**	**Basis**
Selenium, Total Recoverable	5.0	Clean Water Act/ Water Quality Standard Criteria
Cadmium	1.0	Clean Water Act/ Water Quality Standard Criteria
Chromium	25.0	¼ Groundwater Quality Standard Criteria
Copper	11.0	Clean Water Act/ Water Quality Standard Criteria
Nickel	160.0	Clean Water Act/ Water Quality Standard Criteria
Vanadium	20.0	Tier II Secondary Chronic Benchmarks
Zinc	100.0	Clean Water Act/ Water Quality Standard Criteria

*Based on Surface Water Criteria in 40 CFR 131.35 and IDAPA 58.01.02

Removal Action Level for Groundwater (Total Recoverable)*		
Constituent (Unfiltered)	**Action Level (ug/L)**	**Basis**
Selenium	50	IDAPA 58.01.11
Cadmium	5	IDAPA 58.01.11
Chromium	100	IDAPA 58.01.11
Copper	1300	IDAPA 58.01.11
Nickel	730	Human Health Tap Water Criteria
Vanadium	260	Human Health Tap Water Criteria
Zinc	5000	IDAPA 58.01.11 (Secondary Standard)

*Based on drinking water maximum contaminant levels (MCLs)/human health exposure levels; remedial actions may be triggered at lower concentrations if confirmed degradation trends are observed.

Removal Action Level for Impacted and Reclaimed Vegetation*		
Constituent	**Action Level (mg/kg dw)**	**Basis**
Selenium	5.0 (8.3/0.75)	Land Management Agency Reclamation Goal for Unrestricted Grazing Use (NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals/Max BG**)
Cadmium	4.2 (3.7)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Chromium	30.6 (9.9)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Copper	88.0 (15.0)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Nickel	35.5 (4.3)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Vanadium	55.9 (5.5)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Zinc	615 (140)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)

*Based on subpopulation risks to avian and terrestrial receptors based on ingestion of forage or maximum AWI background level. **BG: Background.

Removal Action Level for Sediments Supporting Aquatic Life*		
Constituent	**Action Level (mg/kg dw)**	**Basis**
Selenium	2.6 (2.5)	Max BG (Reported EC10** for freshwater birds and fish)
Cadmium	5.1 (3.5)	Max BG (NOAA*** Probable Effects Level Benchmark)
Chromium	100 (90)	Max BG (NOAA Probable Effects Level Benchmark)
Copper	197 (25)	NOAA Probable Effects Level Benchmark (Max BG)
Nickel	44 (36)	Max BG (NOAA Probable Effects Level Benchmark)
Vanadium	72 (36)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Zinc	315 (210)	NOAA Probable Effects Level Benchmark (Max BG)

*Based on published benchmarks for aquatic life effects or maximum AWI background concentrations.
** EC10: Effective concentration for producing a specified effect in 10 percent of the test organisms.
*** NOAA: National Oceanic and Atmospheric Administration.

Removal Action Level for Sediments Not Supporting Aquatic Life*		
Constituent	**Action Level (mg/kg dw)**	**Probabilistic Risk Calculations**
Selenium	7.5 (2.6)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Cadmium	9.2 (5.1)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Chromium	187 (100)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Copper	402 (25)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Nickel	44 (23)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Vanadium	72 (36)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Zinc	210 (202)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)

*Based on subpopulation risks in impacted areas from avian/terrestrial incidental ingestion.

Removal Action Level for Riparian/Fluvial Soils*		
Constituent	**Action Level (mg/kg dw)**	**Basis**
Selenium	5.2 (3.3)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Cadmium	14 (5.6)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Chromium	130 (40.7)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Copper	117 (32)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Nickel	47 (15.9)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Vanadium	100 (25.1)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Zinc	738 (660)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)

*Based on published soil benchmarks or maximum AWI background concentration for riparian or upland soils. Waste rock soils excluded based on waste unit permitting.

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LIST OF ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable, relevant, and appropriate requirements
AWHHERA	Area Wide Human Health and Ecological Risk Assessment
AWI	Area Wide Investigation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best management practices
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Cd	Cadmium
COC	Contaminants of concern
Cr	Chromium
COPEC	Contaminants of potential ecological concern
DEQ	Department of Environmental Quality
DVM	Doctor of Veterinary Medicine
dw	Dry weight
EC_{10}	Effective concentration for producing a specified effect in 10 percent of the test organisms
EE/CA	Engineering evaluation/cost analysis
EPA	United States Environmental Protection Agency
FS	United States Forest Service
FWS	United States Fish & Wildlife Service
GYC	Greater Yellowstone Coalition
HQ	Hazard quotient
IA	Interagency
ISU	Idaho State University
IDAPA	Idaho Administrative Procedures Act
IDF&G	Idaho Department of Fish and Game
IDH	Idaho Division of Health
IFCAP	Idaho Fish Consumption Advisory Program
IMA	Idaho Mining Association
LOAEL	Lowest observed adverse effect level
MES	Mean egg selenium
mg/kg	Milligrams per kilogram (ppm)

mg/L	Milligrams per liter (ppm)
MOU	Memorandum of Understanding
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
Ni	Nickel
NOAEL	No observed adverse effect level
NOAA	National Oceanic and Atmospheric Administration
NTCRA	Non-time critical removal action
OSC	On-scene coordinator
PEL	Probable Effects Level
ppb	Parts per billion
ppm	Parts per million
RAG	Removal Action Goal
RAO	Removal Action Objective
RPM	Remedial Project Manager
Se	Selenium
SeAWAC	Selenium Area Wide Advisory Committee
SI	Site inspection/investigation
SISP	Selenium Information System Project
SOW	Statement of work
TBC	To be considered
TEL	Threshold Effects Level
TMDL	Total maximum daily load
UET	Upper Effects Threshold
ug/L	Micrograms per liter (ppb)
U of I	University of Idaho
USGS	United States Geological Survey
V	Vanadium
WOTUS	Waters of the United States
ww	Wet weight
Zn	Zinc

GLOSSARY OF TECHNICAL TERMS

Administrative Requirements - Those mechanisms that facilitate implementation of the substantive requirements of a statute or regulation such as reporting, permitting, recordkeeping, enforcement, etc.

Applicable or Relevant and Appropriate Requirements (ARARs) - Applicable requirements are those cleanup standards, standards of control and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those standards that while not "applicable" at the CERCLA site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site.

Area Wide Investigation (AWI) - These are the formal investigative activities that have been conducted in the Resource Area through the initial voluntary efforts of the IMA and Phosphate Industry/Interagency Working Group, and beginning in 2000, under the Lead Agency oversight of the Department of Environmental Quality and MOU Support Agencies.

Background Concentrations - These are location-specific estimates of the naturally occurring range of concentrations of selenium and/or mining-related metals prior to mining activities, established for the purpose of identifying the presence of mining releases.

Baseline Concentrations - These are the up-gradient concentrations measured at a site boundary in order to evaluate incremental contributions from site-specific sources at the subject site. Baseline conditions may exceed natural background concentrations if up-gradient contamination sources are present.

Benthic - Of or relating to or happening on the bottom of a body of water.

Bioaccumulation - The absorption and concentration of toxic chemicals, heavy metals, and certain pesticides in plants and animals. Toxicity can be expressed in several ways: lead that is ingested by calves can bioaccumulate in their bones, interfering with calcium absorption and bone development; stored chemicals may be released to the blood stream at a later time, for example, during gestation or weight loss; and/or chemicals may concentrate to lethal levels at upper ends of the food chain. Bioconcentration is a synonym for bioaccumulation.

Biomagnification - The increase in the concentration of bioaccumulated toxic chemicals in organisms higher on the food chain due to preferential storage of the toxic chemical in edible body parts. For example, chlorinated pesticides concentrate in the fat and skin of fish in contaminated lakes and streams and are biomagnified when those fish are eaten by larger fish, and perhaps eventually by mammals or birds of prey.

Biota - All the plant and animal life of a particular region.

Censored Data - These are analytical data that are excluded or assigned arbitrary values to account for instrument and analytical method limitations such as readings below detection limits. Censoring data may cause some bias in data set statistics, particularly for significant numbers of sample results at or near detection limits. However, data censoring is a standard industry practice and the resulting error is normally considered tolerable. See uncensored data.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – A regulation commonly known as Superfund, enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances from inactive sites that may endanger public health or the environment.

Contaminants of Concern (COC) – Those chemicals or elements in environmental media that have been identified as posing a risk to human or ecological receptors.

Contaminants of Potential Ecological Concern (COPEC) - Those chemicals or elements in environmental media that have been identified as posing a potential risk to ecological receptors.

Deterministic Calculations – Calculations conducted which define each variable as a single point estimate of the variable.

Depuration - The process of freeing from impurities, heterogeneous matter, or feculence; purification; cleansing. Normally occurs through excretion in bodily fluids, urine and feces, or exhalation.

Engineering Evaluation/Cost Analysis (EE/CA) – The process that evaluates potential removal actions to: (1) provide a framework for evaluating and selecting alternative technologies; (2) satisfy environmental review requirements for removal actions; and, (3) fulfill administrative record requirements for documentation of removal action selection. In doing so, the EE/CA identifies the objectives of the removal action and analyzes the effectiveness, implementability, and cost of various alternatives that may satisfy these objectives.

Episodic Exceedances - As used in this risk management document, episodic exceedances refer to occasional or seasonal observations of water column concentrations that exceed chronic water quality criteria. This term carries no regulatory significance but indicates that longer term, time-weighted average exposures would be appropriate in evaluating the actual level of chronic risks to receptors that may exist under these circumstances.

Guild - A group of species occupying a particular trophic level and exploiting a common resource base in a similar fashion.

Hazard Driver- One or more chemical constituents, physical factors, or circumstances that are responsible for a high percentage of the estimated risks.

Hazard Quotient (HQ) - A quantitative measure of potential risk of a chemical to a individual receptor calculated by dividing the site-specific dose by a reference dose to provide a comparative ratio.

Historic - As used in this risk management document, historic refers strictly to former mining sites that are now closed or inactive, as well as inactive subunits at operational sites subject to CERCLA actions. This term does not imply any cultural or archeological value at the subject sites.

Impacted Areas - As used in this risk management document, impacted areas are defined as those that exhibit periodic exceedances of water quality criteria, have concentrations that exceed risk-based action levels, or have concentrations significantly above background as a direct result of mining releases.

Individual - As used in this risk management document, individual is defined as a single organism or most sensitive member of a population or subpopulation in the Resource Area.

Invertebrates - Invertebrates are animals with no backbones. Invertebrates are cold-blooded; their body temperature depends on the temperature of their environment. Some major groups of invertebrates include: Protozoans - Very primitive, simple animals like amoebas, some of the Metazoa - Porifera (sponges), jellyfish, corals, tapeworms, flukes, insects, arachnids, crustaceans, mollusks, and echinoderms.

Lead Agency – The State or Federal agency or group that is assigned the primary responsibility for overseeing, administering, and directing the cleanup activities at a particular site or area.

Lentic-Pertaining to or living in still water (i.e. ponds and lakes).

Lotic-Of, relating to or living in actively moving water (i.e. streams and rivers).

Lowest Observed Adverse Effects Level (LOAEL) - The lowest dose of a chemical that has been reported in reliable laboratory studies to show adverse effects on the test subjects.

National Contingency Plan (NCP) - The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan (NCP), is the federal government's blueprint for responding to both oil spills and hazardous substance releases. The NCP is the result of our country's efforts to develop a national response capability and promote overall coordination among responders with preexisting contingency plans.

No Observed Adverse Effects Level (NOAEL) – The highest dose of a chemical that has been reported in reliable laboratory studies to show no adverse effects on the test subjects.

Non-Time Critical Removal Action – Removal actions to mitigate or eliminate contamination from releases where more than six months is available for planning and implementation.

Orphan Mine Sites - By definition, these are former mine sites in the resource Area that have documented past operations but are not currently subject to CERCLA actions. Most of these sites consisted of underground workings and exploration trenches, or small pit operations that are of a lesser magnitude than the major mine sites identified in the area wide investigation. The orphan mines sites will be separately screened by interagency representatives to determine future status regarding environmental/ecological risks.

Perennial - (adjective) Continuing more than two years; as, a perennial steam, or root, or plant. (noun) A perennial plant; a plant which lives or continues more than two years, whether it retains its leaves in winter or not.

Persistent Exceedances-As used in this risk management document, persistent exceedances refer to water column concentrations that consistently exceed regulatory criteria, regardless of seasonality. This term has no regulatory significance but indicates that a long-term and relatively constant exposure to receptors is present.

Population – As used in this risk management document, population is defined as the set of all individuals in a single species that inhabit the Resource Area.

Presumptive Remedy - This refers to a removal action alternative that has been evaluated by the approving Agencies and is considered an acceptable alternative for implementation under similar conditions without additional or subsequent alternative analysis. Presumptive remedies are identified to streamline removal activities and allow expeditious implementation at similar sites or under conditions where a previously approved technical solution is applicable.

Probable Effects Level (PEL) - The PEL is a value published by NOAA that represents the level (of a given constituent) above which adverse effects are frequently expected. It is based on the geometric mean of the 50^{th} percentile of impacted, toxic samples and the 85^{th} percentile of non-impacted samples.

Probabilistic Calculations - See Stochastic Calculations.

Removal Action - CERCLA and the NCP define removal actions to include "the cleanup or removal of released hazardous substances from the environment, such actions as may be necessarily taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from the release or threat of release."

Resource Area - As used in this risk management document, the Resource Area refers to the Southeast Idaho Phosphate Mining Resource Area, which extends north from the Bear Lake Refuge boundary to highway 34 at Gray's Lake Refuge, and east from highways 30 and 34 near Soda Springs to the Wyoming border. The areal extent of the Resource Area is approximately 1,500 square miles and encompasses the major mines subject to CERCLA actions and the identified orphan mines that have had past mining activity. In some cases, the active mining study area has been limited to the immediate vicinity of the major mines, which covers an areal extent of approximately 1,000 square miles.

Riparian - Of or relating to or located on the banks of a river or stream; "riparian land."

Stochastic Calculations – Calculations that consider the entire range of data for a parameter instead of a single point estimate to provide a quantitative characterization of variability and uncertainty. Also referred to as probabilistic calculations.

Subpopulation – As used in this risk management document, subpopulation is defined as the subset of a Resource Area population that exists within a single watershed, mine area or impacted zone. This definition may be synonymous with terms in EPA's risk characterization guidance requiring assessment of "local" populations or communities at or near a site.

Substantive Requirements-Those requirements that pertain directly to actions or conditions in the environment such as water quality criteria, risk-based standards, maximum contaminant levels, etc.

Support Agency – State or Federal agencies that have overlapping jurisdictions with the Lead Agency and provide input, review and support to the lead agency to ensure that all concerns and legal mandates are properly incorporated into final decisions at each site.

Surrogate Species – A species that may or may not be present in the Resource Area that is evaluated to provide information on potential risks to similar species that are present in the Resource Area. Surrogate species are used when adequate data is not available to evaluate potential risk for a species of interest.

Threshold Effects Level (TEL) - The TEL is a relative risk screening threshold published by NOAA based on the geometric mean of the 15^{th} percentile of the toxic effects dataset and the median of the no-effect dataset.

Trophic - Stage in a food chain or web leading from primary producers (lowest trophic level) through herbivores to primary and secondary carnivores (consumers- highest level).

Uncensored data - This process uses the raw data generated through analytical methods and instruments regardless of the reported sensitivities, detection limits or results. This method also requires some assumptions with regard to instrument calibration, uncertainties, and the true accuracy of reported concentrations. There are proponents for using uncensored data for theoretical evaluation, however, interpretation of uncensored data can be extremely rigorous and negative concentration values may be reported, which accounts for the general reluctance to use this approach universally.

Upper Effects Threshold - The UET is relative risk threshold published by NOAA based on the lowest reliable value among a compilation of apparent effects thresholds in faunal community impacts and bioassays.

Vernal - Of or pertaining to the spring; appearing in the spring.

Vernal Pool -– A vernal pools is a temporary pond, which contains water for at least two months, and does not have an outlet (such as a river or a stream). They are often found in wetlands areas. Vernal pools are safe breeding areas for many organisms, since these seasonal ponds cannot support fish, which would feed on the vulnerable young. Some species breed only in these temporary ponds. Vernal pools are the only ecological habitats defined by the animals that depend upon them, as opposed to the plants commonly found there.

Wetland - The EPA and the U.S. Army Corps of Engineers define a wetland as made of "areas saturated by surface or ground water so that they support vegetation adapted for life in saturated soil conditions." According to the Federal procedures for identifying and delineating jurisdictional wetlands, wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

1.0 INTRODUCTION

1.1 PURPOSE

This plan was developed by the Idaho Department of Environmental Quality (IDEQ, Department) to provide discretionary risk management guidance to Interagency representatives responsible for administering mine-specific removal actions for addressing releases of selenium and related trace metals originating from historic phosphate mining operations in Southeast Idaho. The proposed action levels, removal action goals and removal action objectives are intended to assist the designated lead Agencies and mining companies in selecting individual site remedies that support a consistent regional risk management approach, are protective of human health and the environment, and focus the effective use of resources. The intended audience and end users of this guidance document are the designated Interagency Lead and Support Agency representatives assigned to administer and oversee CERCLA site-specific activities for selenium contamination in the Southeast Idaho Phosphate Mining Resource Area.

The DEQ was designated as the Lead Agency for the Selenium Area Wide Investigation in July 2000 through the execution of an Interagency Memorandum of Understanding [1] and a subsequent Administrative Order on Consent [2] with the mining companies that comprise the Idaho Mining Association (IMA) Selenium Committee, as shown in Table 1.1.

TABLE 1.1: PARTIES TO AREA WIDE INVESTIGATION AGREEMENTS

Interagency Memorandum of Understanding	IMA Administrative Order on Consent
Department of Environmental Quality (DEQ)	P4 Production, LLC (P4 or Monsanto)
US Department of Agriculture, Forest Service Region 4 (USFS)	J. R. Simplot Company (Simplot)
US Environmental Protection Agency, Region 10 (USEPA)	Nu-West Industries, Inc. (Nu-West or Agrium)
US Department of Interior, Bureau of Land Management (BLM)	FMC Corporation (FMC)
US Department of Interior, Fish & Wildlife Service (FWS)	Rhodia, Inc. (Rhodia)
US Department of Interior, Bureau of Indian Affairs (BIA)	All Interagency MOU Parties
Shoshone-Bannock Tribes (Tribes)	

Both agreements include an Area Wide Investigation Scope of Work [3] tasking the DEQ with the development of regional removal action goals and objectives, and action levels for the implementation of CERCLA mine-specific removal action activities.

This document provides a summary of DEQ's Area Wide activities to date, an outline of the CERCLA removal action process being implemented to address mine-specific concerns, and a comprehensive discussion of DEQ's risk management approach, including regional removal action goals and objectives, and recommended area wide action levels. The plan is advisory in nature and does not supersede any Lead Agency authorities at individual mines to develop alternative approaches or decisions based on site-specific conditions in consultation with their designated Support Agency representatives.

1.2 PROJECT BACKGROUND

Area wide investigation activities in the Southeast Idaho Phosphate Mining Resource Area (Resource Area) were initiated in 1996 after several horses were diagnosed with selenosis, and subsequently euthanized, as a result of grazing in a pasture irrigated with selenium-contaminated water emanating from a historic mine site. The involved mining companies formed the *ad hoc* IMA Selenium Subcommittee (IMA) to initiate voluntary actions to identify the origin and environmental characteristics of selenium and other related trace metals in the Resource Area. A voluntary Industry/Interagency Working Group was also established to solicit the involvement of Agency personnel, stakeholders and other interested parties.

Investigations were conducted on a regional basis using a phased approach to develop data on source materials, potential pathways, receptors, release mechanisms, temporal effects, and range of observed concentrations in various media. The IMA published a number of regional investigation reports beginning in the fall of 1997 and continuing through the summer of 2000 [4-8]. Additionally, numerous scientists, researchers and technical representatives of various Agencies, academic institutions, and stakeholder organizations have conducted related research and investigative activities that supplement available area-specific information [9-19].

In late 1999, there was a general consensus among project stakeholders that the investigative efforts had reached a point where regulatory decision-making was necessary to proceed to a formal response action process to address selenium impacts. In accordance with the aforementioned agreements, the DEQ was assigned the role of Lead Agency in implementing the Area Wide Investigation scope of work focused on evaluating human health and regional ecological risks, and providing risk management guidance for subsequent site-specific actions using a regional perspective. The continuation of the area wide approach was considered to provide the most cost-effective and logical method for avoiding duplication of tasks common to all individual mines such as establishing background levels, developing lists of contaminants of concern, and performing repetitious risk assessments for analogous conditions. This assumed that more comprehensive site-specific investigations would be conducted after the regional assessment to characterize specific individual mine release sources, to delineate the exact nature and extent of localized contamination, and to select appropriate removal action alternatives at each mine.

Upon assuming the role of Lead Agency, the DEQ established an Interagency Technical Group (IATG) consisting of representatives assigned by the Federal, State, and Tribal Agencies with jurisdiction or interests in the Resource Area. The IATG participants included the previously-listed MOU signatory Agencies as well as occasional representation from the US Geological Survey (USGS), Idaho National Environmental and Engineering Laboratories (INEEL), Idaho Department of Lands (IDL), Idaho Department of Fish & Game (IDF&G), Idaho Division of Health (IDH) and other selected governmental entities with an open invitation to participate at their convenience. The IATG met frequently throughout the duration of the Area Wide Investigation process to collaborate on the Department's activities, and to provide review and concurrence during critical decision points and milestones.

The DEQ also established a Selenium Area Wide Advisory Committee (SeAWAC) comprised of former Industry/Interagency Selenium Working Group representatives and other stakeholders, to maintain the previously established communication channels and to provide a forum for discussion and information dissemination. SeAWAC meetings have been conducted for each critical decision point and project milestone to present information and solicit feedback from stakeholders. The SeAWAC meetings have been pre-announced and open to the public. Additionally, all risk-related deliverables published by the Department in the course of implementing the Area Wide Investigation scope of work have been made available for review and comment prior to final publication using formal public comment procedures.

In accordance with the scope of work, the DEQ conducted a comprehensive review of all existing data [20] at the time of transition; developed an Area Wide Conceptual Site Model [21]; performed a data gap analysis [22] based on regional risk assessment needs; and coordinated the collection of critical data for DEQ's Area Wide Risk Assessment efforts [23-26]. All referenced IMA and DEQ area wide investigation reports are available in downloadable form on the Selenium Information System Project (SISP) website maintained by Idaho State University at http://giscenter.isu.edu/Research/Techpg/Selenium/selenium.htm.

2.0 AREA WIDE SUMMARY

2.1 RISK ASSESSMENT FINDINGS AND CONCLUSIONS

The DEQ published the Final Area Wide Human Health and Ecological Risk Assessment (AWHHERA) in December 2002. The risk assessment activities were designed to evaluate the potential for regional human health risks and population-level ecological risks in the Southeast Idaho Phosphate Mining Resource Area from selenium and mining-related metal releases. Human health risk estimates were based on individual level exposures for adult and child recreational, Native American and modified-subsistence lifestyle scenarios, using 95% upper confidence limit exposure point concentration estimates. Ecological risk estimates were based on population-level exposures for various surrogate species receptors representing feeding guilds within the defined boundaries of the Southeast Idaho Phosphate Mining Resource Area (See Figure 1) using area-weighted average exposures. The assessment consisted of a tiered exposure model approach beginning with the most conservative assumptions and proceeding to more realistic parameters representing area wide conditions. The initial tier of evaluation utilized "Reasonable Maximum Concentration" methods and other conservative assumptions to screen out pathways and constituents presenting negligible risks. Tier 2 incorporated increasingly representative parameters based on area-specific knowledge. The final tier utilized historic data to evaluate the effects of constituents exhibiting temporal variations.

The risk assessment concluded that regional human health risks and population-level ecological risks were unlikely, based on observed conditions in the Resource Area. These conclusions were based on both modeling and a weight of evidence approach considering regional land and recreational use, population distribution, habitat availability, area wide surface and groundwater conditions, and other factors affecting potential exposures. The human health assessment did identify several locations and scenarios that could present elevated risks under conditions of sole use over extended periods of time such as the residential use of waste rock piles or fish diets exclusively from highly impacted first order streams. However, these conditions were considered highly unlikely based on current land use, 1st order stream characteristics and regional observations over the past seven years.

Tier 1 results indicated a likelihood for risks to aquatic and terrestrial ecological receptors residing in localized areas of highly elevated concentrations of selenium and mining-related metals. In these areas, terrestrial receptor dose model estimates significantly exceeded the no observed adverse effects level (NOAEL) threshold and the measurement endpoints for aquatic receptors exceeded referenced toxicological benchmarks. Areas exhibiting concentrations in excess of regulatory criteria or risk-based levels of concern as a result of historic mining releases are generally limited to a small percentage of the overall Resource Area and do not appear to present regional population level exposures. Similar observations, regarding the lack of exposure to regionally significant numbers of receptors, have been reported by other referenced researchers conducting supplemental studies in the Resource Area, however, some have been reluctant to endorse DEQ's conclusion without further research.

Based on the findings of the Area Wide investigations and risk assessment, DEQ developed this risk management plan to provide guidance in addressing existing compliance issues, ecological subpopulation impacts, and ongoing releases associated with historic phosphate mining operations. Supplemental mine-specific human health and/or ecological risk assessments, and Lead Agency-tailored contaminants of concern lists may be required at individual mines to evaluate potential unique conditions not considered during the Area Wide risk evaluation process.

2.2 CONTAMINANTS OF CONCERN

Preliminary ecological risk-based screening efforts by the IMA identified cadmium, manganese, molybdenum, nickel, selenium, vanadium, and zinc as the initial contaminants of potential ecological concern (COPECs) for continued evaluation from of a list of 16 target analytes. IMA's preliminary risk assessment findings concluded that selenium and cadmium were the primary hazard drivers in the Resource Area and the majority of their subsequent evaluations were focused on these two constituents.

While not discounting the Companies' efforts, DEQ felt it appropriate to conduct screening of a more comprehensive list of mining-related analytes as part of the Agency's independent risk evaluation process to secure interagency concurrence and ensure all potential historic impacts were being addressed in the removal action process. Screening efforts consisted of evaluating an expanded list of 23 constituents compiled from the various active mines' existing operational monitoring requirements and input from the USGS from previous regional geologic investigations [27].

The screening process considered background comparisons, frequency of detection, Environmental Protection Agency's (EPA's) preliminary remediation goals [28], literature-referenced human health and ecological screening criteria, and Tier 1 results from the risk assessment. Constituent exposures that exceeded a NOAEL in the screening process were initially retained as COPECs. Subsequent screening investigations were conducted independently by the DEQ and their MOU partners for cobalt (as reported in the final risk assessment report) and radium 226 [29] to address specific interagency concerns that arose after the referenced screening process. Cobalt was eliminated from further consideration and Radium 226 appeared to present risk only in a residential scenario. The list of contaminants of concern (COCs) resulting from DEQ's screening processes consisted of cadmium, chromium, copper, nickel, selenium, vanadium, and zinc. Selenium and cadmium were confirmed to be the primary regional hazard drivers as reported by the IMA.

Upon further evaluation, as discussed in Section 4.3.2.4 of this report, DEQ also recommends the removal of copper from the COC list resulting in DEQ's current mine-specific COC list of:

- Cadmium
- Chromium
- Nickel
- Selenium
- Vanadium
- Zinc

Section 4.3 discusses the proposed action levels for each of the COCs based on the Area Wide removal action goals and objectives.

2.3 STATE REGULATORY STATUS AND HEALTH ADVISORIES

This section outlines regional conditions in terms of State regulatory programs and published regional health advisories prompted by observations made during the course of the area wide investigations. IDAPA 20.03.02, which governs surface mining operations in Idaho, provides that "the State water quality standards, including protection of existing beneficial uses, shall be the standard that must be achieved by best management practices." Non-compliance with this standard requires the mine owner/operator to modify or improve such practices to meet the controlling standard of surface water quality.

Based on discussions with DEQ's Water Quality Division representatives, there are six impaired stream segments in the Resource Area currently intended for Section 303(d) listing under the Clean Water Act for selenium concentrations in violation of water quality standards using appropriate IDAPA 58.01.02 regulatory protocols and criteria. Sporadic exceedances of criteria have also been observed in other areas during area wide and DEQ sampling events [30, 31, 32]. The impaired stream listing process is a biennial activity and additional listings may be proposed as subsequent monitoring data becomes available.

In the Blackfoot watershed, East Mill Creek and Maybe Creek are recommended for listing based on exceedances of the Criteria Maximum Concentration (acute) of 20 ug/L as provided in IDAPA 58.01.02 (inadvertently revised to 18 ug/L in May 2003 and being restored to the original value). Dry Valley Creek, Spring Creek, and Chicken Creek are recommended for listing based on exceedances of the Criteria Continuous Concentration (chronic) of 5 ug/L as provided in IDAPA 58.01.02. Pole Canyon Creek in the Sage Creek watershed is also recommended for listing based on Criteria Continuous Concentration exceedances.

Beginning in 2001, DEQ independently initiated baseline water quality monitoring in the Resource Area, concurrent with the AWI scope of work activities, to evaluate the need for impaired stream listings and formal Total Maximum Daily Load (TMDL) activities with regard to selenium releases. In addition to DEQ's sampling efforts, area wide surface water data is also available from the IMA dating back to 1997, and through DEQ's Beneficial Use Reconnaissance Program, active mine monitoring programs, interagency efforts and other research sources. However, standard industry practices for surface water sampling seldom meet the regulatory 4-day average protocols for chronic criteria comparisons so the supplemental data sources do not necessarily provide adequate information for impaired stream listing. The available data was used to support the design of DEQ's annual follow-up sampling efforts using the appropriate regulatory protocols.

Streams that are formally classified as impaired water bodies are scheduled for future TMDL development. The TMDL process is a comprehensive contaminants study conducted for impaired waters, primarily intended to provide recommendations for individual discharge permit limits and allocations. In areas supporting multiple discharge sources, this process can sometimes result in individual discharge permit limits that are below regulatory numeric criteria to restore water quality in a receiving stream or subbasin. However, the elevated selenium concentrations in the Resource Area are primarily attributable to individual mine sites as opposed to multiple dischargers so the water quality standard would be the governing criteria. Consequently, DEQ believes conducting the formal TMDL process for selenium-impaired streams being addressed under CERCLA would be a poor use of limited resources since the CERCLA process is intended to achieve these levels. Nevertheless, the streams will be scheduled for TMDL activities by the State and evaluated by the EPA for equivalent action criteria at a later date. DEQ does expect modified best management practices (BMPs) and/or removal action activities to be employed at each mine under the CERCLA removal action process to eliminate the migration of contaminants and to comply with State water quality rules in accordance with Idaho's surface mining regulation provisions.

Two human health advisories have been issued for activities in the Resource Area. The first was a hunter's advisory [33] issued in fall of 2000 by the IDF&G and IDH recommending limited consumption of elk liver by area hunters. Elk survey data collected by IDF&G and the IMA in 1999 and 2000, and available on the Selenium Information System Project website (see Executive Summary for address), indicated that selenium liver concentrations observed in a small percentage of the elk could result in acute gastrointestinal effects, such as nausea, if significant quantities of liver were consumed over a short period of time.

The second advisory was issued by IDH in the fall of 2002 recommending limited consumption of fish from East Mill Creek by children under the age of seven [34] based on elevated selenium concentrations observed in fish tissue from this stream. While the Agencies recognize that extensive use of this stream is unlikely, based on past observations, this precautionary advisory has been issued and posted at the site to address any potential future use.

In addition, the US Department of Health and Human Services-Public Health Service recently published several regional health consultations for the Resource Area regarding ingestion of beef, elk, sheep and fish [35], evaluation of regional groundwater [36], and selenium concentrations in fish of the Upper Blackfoot River watershed [37], respectively. The advisories have identified no apparent public health hazards from moderate ingestion of meat or fish, other than the aforementioned advisories, or from the use of regional groundwater by the general public.

3.0 MINE-SPECIFIC REGULATORY APPROACH

3.1 NON-TIME CRITICAL REMOVAL ACTION PROCESS

The interagency MOU requires the designated Lead Agencies to administer and oversee site-specific investigations and removal actions consistent with the requirements of the *40 CFR Part 104; Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980*, as amended, and *40 CFR Part 300; National Oil and Hazardous Substances Pollution Contingency Plan* (NCP) for each major mine site. Removal actions are undertaken to clean up released hazardous substances from the environment and/or to monitor, assess, and evaluate releases or threats of release. The non-time critical removal action (NTCRA) process [38] projected for mine-specific application is used when the planning and implementation of a removal action is expected to take more than six months and there is time for more advanced planning. The NTCRA process has been selected in this instance because it is designated as one of EPA's accelerated clean-up model tools and is the typical CERCLA approach used by the land management agencies at similar sites. The mines currently subject to the NTCRA process are listed in Table 3.1.

TABLE 3.1: DESIGNATED MINE SITES FOR CERCLA REMOVAL ACTION ACTIVITIES

Mine Site Name	Owner/Operator	Lead Agency
Henry Mine*	P4 Production, LLC	DEQ
Ballard Mine*	P4 Production, LLC	DEQ
Enoch Valley Mine*	P4 Production, LLC	DEQ
Smoky Canyon Mine*	J. R. Simplot Company	US Forest Service
Conda Mine**	J. R. Simplot Company	DEQ
Lanes Creek Mine**	J. R. Simplot Company	DEQ
Gay Mine**	J. R. Simplot Company/FMC Corporation	Bureau of Indian Affairs
Dry Valley Mine	FMC Corporation	DEQ
South Maybe Mine*	Nu-West Industries, Inc.	US Forest Service
North Maybe Mine**	Nu-West Industries, Inc.	US Forest Service
Champ Mine	Nu-West Industries, Inc.	US Forest Service
Mountain Fuel Mine	Nu-West Industries, Inc.	US Forest Service
Rasmussen Ridge Mine	Nu-West Industries, Inc.	US Forest Service
Georgetown Canyon Mine	Nu-West Industries, Inc.	DEQ
Wooley Valley Mine	Rhodia, Inc.	US Forest Service

*Under Administrative Orders (AOC) for site inspection/investigation (SI) and engineering evaluation/cost analysis (EE/CA) activities at the time of publication. **AOC in active negotiation at the time of publication.

The NTCRA process provides a streamlined but structured approach to removal actions by specifying decision criteria, public involvement mechanisms, and alternative analysis requirements. This process allows flexibility in addressing issues of varying complexity and priorities through provisions for early actions and/or presumptive remedies. Removal action alternatives are identified and evaluated through comparisons with existing criteria provided by activity-, location- or chemical-specific applicable or relevant and appropriate requirements (ARARs), or in the absence of regulatory criteria, with developed risk-based action levels.

The NTCRA process includes four major components; Site Inspection or Investigation (SI), Engineering Evaluation/Cost Analysis (EE/CA), and Removal Action Implementation and Closeout. The initial AOCs between the Agencies and Companies address activities through the EE/CA development phase. Subsequent agreements will be required for implementation and closeout activities.

3.2 COMPLIANCE WITH ARARS

In accordance with Section 300.415(i) of the NCP, removal actions conducted under CERCLA are required to meet applicable or relevant and appropriate requirements (ARARs) to the extent practicable, considering the exigencies of the situation [39]. ARARs are the underlying rules, regulations, statutes, criteria, guidance documents, ordinances or other requirements that should be considered in effective removal action implementation. "Applicable" requirements are cleanup standards, standards of control and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental or facility siting laws specifically addressing a hazardous substance or contaminant, action, location or other circumstance found at a CERCLA site. "Applicable" requirements are legally defined and provide little flexibility in the interpretation of attainment upon completion of a removal action.

"Relevant and appropriate" requirements are those standards or requirements under Federal or State law that, while not applicable to a particular contaminant, action, or location at a CERCLA site, are well suited to address problems or situations sufficiently similar to the subject site. These requirements are determined on a site-specific basis. "To Be Considered" (TBC) information, such as credible health effects information or Agency policy, may also be identified in the ARAR process for consideration in the CERCLA decision-making process.

ARARs consist of three major types of requirements; chemical-, location- or action-specific, depending on the regulatory intent. These requirements may be classified as "substantive," those that apply directly to actions or conditions in the environment, or "administrative," those mechanisms that facilitate implementation of substantive requirements but are not critical to attainment. CERCLA activities within the defined boundaries of the site must comply, to the extent practicable, with all substantive requirements. Activities outside the defined boundaries of the CERCLA site must comply with all applicable requirements, both administrative and substantive.

The preliminary ARAR lists developed by each of the MOU Support Agencies for application during the mine-specific CERCLA actions are provided in Attachment 3.

3.3 SITE INSPECTION/INVESTIGATION

Mine-specific site inspections/investigations (SIs) shall be conducted in accordance with the statements of work (SOWs) attached to each site-specific AOC, and within the terms and conditions of the Agency-approved work plans submitted by the Company/contractor. Each site-specific SOW is derived from an IATG-generated template to provide consistency between site actions, but may be tailored by the Lead Agency during the mine-specific AOC negotiation process to address individual site conditions and concerns in consultation with the designated Support Agency representatives. Mine-specific investigations will include a comprehensive evaluation of all site surface water locations and groundwater resources, and characterization of the nature and extent of on-site and off-site impacts in soils, sediments, vegetation, and other applicable media for the identified COCs.

The SI reports developed for the individual mines will summarize and compile the findings of all investigative activities at the site, and identify the areas and media exceeding regulatory criteria and action levels. This report will be used by the Lead Agency to develop the EE/CA Approval Memorandum for the Administrative Record. An EE/CA Approval Memorandum documents that the site conditions and situation meet NCP criteria for removal action and that the action is non-time critical; secures Agency management approval and funding for oversight activities; and details the SI findings, potential threats to public health and the environment, site background conditions, etc.

3.4 ENGINEERING EVALUATION/COST ANALYSIS

Upon approval of the SI report, the Company(s) will prepare an EE/CA document(s) for Agency review ad approval. The EE/CA summarizes conditions at the site and establishes the site-specific removal action scope, goals, and objectives intended to be met by the removal action alternatives selected for analysis. Phased or multiple EE/CAs may be performed at each site to address specific areas or media of concern in the most efficient and timely fashion. The EE/CAs may provide for either emergency interim or final actions, as stipulated by the document depending on the urgency of the situation being addressed.

Under the NTCRA process, only a limited number of viable alternatives need to be considered for detailed analysis based on the appropriateness for addressing the removal action objectives. Alternatives may include a range of treatment technologies, mitigation approaches, source controls, best management practices, institutional or administrative controls, or other applicable methods for meeting the removal action goals and objectives. Each alternative will be described in detail and will be evaluated under the NTCRA decision criteria. The EE/CA will discuss all of the alternatives in a comparative analysis clearly identifying the advantages and disadvantages of each alternative in terms of the decision criteria. It will be the responsibility of the Lead Agency, with Support Agency input, to develop a written Recommended Removal Action Alternative document that will accompany the EE/CA document during the public comment period. In some cases, a presumptive remedy may be approved by the Agencies without the requirement for duplicative engineering evaluation/cost analysis. However, presumptive remedies will require a comprehensive review of alternatives through an EE/CA process at one of the mine sites prior to acceptance for use at other sites with similar conditions. Pilot and/or treatability studies may be performed prior to an EE/CA to evaluate the feasibility of a potentially viable alternative.

3.5 DECISION CRITERIA/ACTION MEMORANDUM

The NTCRA model provides specific decision criteria to be considered in selecting the appropriate alternatives during the EE/CA process. These criteria are broadly defined as effectiveness, implementability, and cost, and are considered for both short- and long-term applicability. The following summaries are provided for each criterion and are further detailed in the previously referenced NTCRA guidance document.

Effectiveness refers to the ability of an alternative to meet the stated removal objectives within the scope of the removal action. Effectiveness shall be discussed in terms of long- and short-term protectiveness of public health and the environment, and compliance with ARARs. The selected alternative should achieve a level of permanence while minimizing residual effects and extensive post-removal site control requirements unless the alternative is specifically proposed as an interim measure.

Implementability addresses the technical and administrative feasibility of a particular alternative. Technical feasibility shall include issues such as construction and operational considerations, reliability, schedule, equipment availability, access, maintenance, required infrastructure and other factors affecting performance of the alternative. Administrative feasibility shall consider permits, waivers, rights-of-way, impacts to surrounding areas, and ability to impose required institutional controls for the alternative.

Finally, each alternative shall be analyzed for projected costs. Evaluations will include direct and indirect removal action costs including capital, operational and maintenance costs, and post-removal site control costs such as monitoring and long term management/maintenance using a present value basis for estimates beyond 12 months. A sensitivity analysis can be included to evaluate potential cost and critical parameter variations for areas of uncertainty.

Upon the conclusion of the public comment period for the EE/CA (and Recommended Alternative), the Agencies will review and respond to comments, and develop an Action Memorandum that will respond to public comments and provide the final determination of the selected EE/CA alternative(s) or combination thereof. The selection will be based on the aforementioned decision criteria and community/regulatory acceptance of the alternatives. The Action Memorandum(s) will provide the basis for the implementation phase of each removal action activity.

3.6 REMOVAL ACTION IMPLEMENTATION/CLOSEOUT

The implementation phase of the removal action includes performing the selected EE/CA alternative(s) followed by closeout and post-removal site control and monitoring activities. These phases will require a separate AOC, to be developed upon selection of the EE/CA alternative(s), which will include activity milestones, schedule, monitoring obligations and other administrative requirements. In the case of multiple EE/CAs, separate or supplemental Action Memorandums and AOC supplements may be required for each activity.

4.0 DEQ'S REGIONAL RISK MANAGEMENT APPROACH

4.1 PURPOSE AND APPLICABILITY

The purpose of the regional risk management plan (RMP) developed by DEQ is to provide discretionary guidance to assist the designated Lead and Support Agencies in identifying mine-specific areas of concern, establishing site-specific removal action goals and objectives, selecting appropriate removal action alternatives, and focusing resources in a consistent manner across numerous sites and lead jurisdictions. The plan's intended audience are the Lead Agency On-Scene Coordinators (OSCs) and Support Agency representatives, who must also consider any additional site-specific concerns or unique conditions in their selected approach. However, the RMP is intended to minimize future risk assessment needs and streamline site-specific risk management decision-making processes by incorporating existing regulatory requirements and criteria, and providing action level thresholds considered by the DEQ to present unacceptable subpopulation-level risks in impacted areas.

DEQ's strategic approach to assessing impacts from historic mining operations in the Resource Area consisted initially of collecting critical regional data to evaluate potential public health and population-level ecological risks that may have warranted immediate time-critical responses. These area wide activities provided the basis for establishing the regional risk management guidance presented in this document, and for performing focused characterization and delineation activities at each of the individual mines to identify all discrete release pathways and existing impacts in localized areas. DEQ's resulting risk management goals and objectives are intended to be protective of human health and the environment by addressing areas that continue to present a threat of release, are in violation of Federal or State laws, or are deemed to present unacceptable risks to local ecological populations or communities residing in impacted areas at or near each individual mine site. As the Lead Agency for the Area Wide activities, DEQ also has an obligation to support interagency concerns for issues typically beyond DEQ's realm of responsibility. Therefore, some of the area wide goals and objectives address items such as grazing, beneficial uses, reclamation goals, and other regulatory areas that concurrently support interagency acceptance and/or relinquishment of existing mine leases with the MOU agencies.

4.2 REMOVAL ACTION GOALS AND OBJECTIVES

The Removal Action Goals (RAGs) developed by DEQ for the Resource Area specifically address the regional resources that are subject to protective measures and provide the underlying basis for the specific Removal Action Objectives (RAOs) supporting each goal. The DEQ Removal Action Goals focus on the overall protection of the State's surface water, groundwater, wildlife and habitat, and interagency responsibilities for multiple beneficial use of area resources. Each RAG corresponds to cited Federal and State regulations, which provide jurisdiction for addressing and managing the release of contaminants in the region. A comprehensive list of applicable laws and regulations is provided in Attachment 3.

The RAOs provide medium-specific (e.g. water, vegetation, soil, etc.) or operable unit-specific (e.g. waste rock piles, ponds, etc.) measures for protecting human health and/or the environment. An operable unit is a well-defined feature or sub-area of the overall site that can be addressed by a specific removal action alternative. The RAOs are intended to be specific enough to ensure compliance ARARs, to the extent practicable, without unduly limiting the range of alternatives that can be developed for addressing the issues. Corresponding RAGs and RAOs should be developed during the course of each mine-specific action.

4.2.1 *RAG 1.0: PROTECT SOUTHEAST IDAHO'S SURFACE WATER RESOURCES.*

Surface water resources in Idaho are regulated by the State under *IDAPA 58.01.02 Water Quality Standards and Wastewater Treatment Regulations,* and by the Federal Agencies under the Clean Water Act, *40 CFR 131.36 National Toxics Rule*. Both regulations establish numeric criteria for selenium and related trace metal concentrations in surface waters defined as waters of the State or United States (WOTUS), respectively. The State regulations include an anti-degradation policy and list of designated stream segments in Idaho for various beneficial uses. The default protection status for undesignated streams is cold-water biota and recreational use. The water quality regulations also provide the basis for the BMP standards cited in *IDAPA 20.03.02 Rules*

Governing Exploration and Surface Mining in Idaho, which require mine operators to implement BMPs that prevent the release of hazardous or deleterious substances from mining areas, and result in compliance with water quality standards.

4.2.1.1 RAO 1.1: Reduce risks to existing aquatic life and sensitive species from selenium and related trace metal concentrations in regional subbasins and stream segments through compliance with the National Toxics Rule and State water quality regulation numeric criteria.

Area Wide Investigation activities have been conducted in the Blackfoot, Bear, Portneuf and Salt River watersheds. Multi-year sampling events conducted by the IMA and DEQ have indicated the following:

- In the Blackfoot River watershed, persistent surface water criteria exceedances have been observed in Maybe Creek, East Mill Creek, and Spring Creek, and episodic and temporary exceedances are occurring in a number of other locations including the main stem of the Blackfoot River.
- In the Salt River watershed, persistent exceedances have been observed in Pole Canyon Creek with episodic exceedances in portions of Sage Creek.
- In the Bear River watershed, episodic exceedances have been observed in Georgetown and Montpelier Creeks.
- In the Portneuf River watershed in the vicinity of Gay Mine, no exceedances have been documented to date, although sampling has been limited.

Mine-specific actions should focus on identifying, characterizing and mitigating historic source areas causing surface water criteria exceedances. In most instances, these effects can be traced back to a relatively few operable units and surface water impacts should be reversible with appropriate responses. Most of the observed episodic exceedances appear to be related to loading in lower order stream segments (e.g. Maybe, East Mill and Pole Canyon Creeks). DEQ believes focused response efforts in specific source areas will eliminate a significant portion of the observed surface water impacts as well as other transport effects such as fluvial/sediment depositions, adjacent riparian zone accumulations, and uptake in aquatic flora/fauna.

Background-based monitoring action levels for regulated waters are provided to identify and establish temporal trends for potential release pathways during the site-specific investigation phase. Site-specific trend analysis should include data from a normal precipitation year prior to the elimination of suspect contaminant transport pathways.

The proposed removal action levels for addressing regulated waters are based on existing regulatory criteria. The sediment action level in regulated waters provide for the protection of aquatic life.

4.2.1.2 RAO 1.2: Develop and demonstrate best management practices (BMPs) to prevent future mining releases and associated risks from selenium and related trace metals in receiving streams and water bodies.

DEQ is aware of the work that has been conducted in modifying existing and developing new best management practices [40] with regard to minimizing selenium and trace metal releases from mining operations in the region. The Agencies appreciate these proactive efforts and encourage verification monitoring at the earliest practical time to demonstrate the effectiveness of such practices. BMPs demonstrated to be effective should be documented and submitted to the land management agencies for review and acceptance. Upon approval, effective BMPs should be utilized at future sites and discrepancies in the phosphate mining regulatory language of the State's surface mining regulations should be corrected by the Idaho Department of Lands through administrative rule making.

It should be noted that there is an independent working group, comprised of active mining company and land management agency operational and reclamation specialists, in the process of cataloguing any new and modified selenium-related BMPs being applied in the Resource Area. The list will include modified BMPs currently in use at active mines that were not documented in the original mine plans, and new BMPs proposed for future mines with the specific purpose of controlling selenium and related trace metal releases.

4.2.1.3 RAO 1.3: Develop a long-term monitoring plan for regional surface water resources to ensure effectiveness of risk reduction measures from modified BMPs, removal actions, and reclamation methods.

Phosphate mining is projected to continue in the region well into the future and warrants a long-term perspective in environmental protection measures. The Area Wide Investigation scope of work contemplates a monitoring program of three to five years beyond the completion of removal actions to assess the effectiveness of the implemented methods. Site-specific removal actions will have post-monitoring requirements that will be integrated into this program. Action levels established for continued monitoring of streams exceeding background levels are intended for site-specific investigation data evaluation but may also be useful for regional monitoring purposes.

DEQ recommends implementation of a separate long-term monitoring program for the Resource Area upon completion of the Area Wide efforts to avoid similar issues in the future. This plan would integrate the various monitoring programs already in place by all entities, such as DEQ's BURP activities and the Companies' operational mine monitoring requirements, and would identify other critical sampling locations for periodic long-term monitoring. Through coordinated sampling efforts, a regional database could be maintained to monitor trends in the Resource Area and provide cumulative effects information to guide future mining efforts.

4.2.2 *RAG 2.0: PROTECT WILDLIFE, HABITAT, AND ECOLOGICAL RESOURCES IN SOUTHEASTERN IDAHO.*

Ecological resources in Southeast Idaho are generally of high quality and very important to the multiple beneficial uses of the Resource Area. This region is subject to extensive hunting, fishing and recreational use; Native American cultural and traditional use; and area wildlife use. Sampling results, in the vicinity of the historic mine operations and areas impacted by releases, indicate elevated levels of selenium in virtually every environmental media and species of wildlife tested. While these areas are localized, the upper range of impacted area concentrations significantly exceeds published toxicological benchmarks. While observed effects to date have been limited primarily to incidents involving domestic livestock and sensitive receptors in the immediate vicinity of impacted areas, other toxicological endpoints such as impaired reproduction are much more difficult to detect or confirm without extensive research. Therefore, risk managers must rely on referenced toxicological information and basis of those studies, as opposed to visual observations in considering the likelihood for effects.

In contrast to many of the selenium-impaired sites around the country, the Resource Area supports an alkaline, lotic hydrology with significant temporal variations in constituent concentrations. Selenium speciation studies [41,42] in the Resource Area indicate a dominance of selenate compounds. Previous selenium studies have implied selenate environments are typically less toxic [43] than selenite-dominant conditions typically observed in chemically-reducing environments. These factors may explain the lack of more observable effects in the region. Nevertheless, toxicological effects are also associated with selenates [44], and reducing conditions would be expected to occur in the limited number of wetland areas within the Resource Area.

While DEQ's risk assessment efforts to date indicate ecological effects to be unlikely, subpopulation level risks in impacted areas continue to be of concern. The following discussion of maximum observed concentrations in impacted areas is intended to support DEQ's conclusion that unacceptable subpopulation exposures likely to produce toxicological effects are occurring in many areas affected by historic mining releases. It is not intended to represent overall conditions in the region or to imply that these impacts are ubiquitous within the Resource Area.

Elk surveys conducted by IDF&G and IMA in 1999 [45] and 2000 [46] to assess human health concerns from ingestion of elk tissue show a significant inverse correlation between elevated concentrations of selenium in elk liver versus the distance from the nearest phosphate mine. Approximately 50% of the elk harvested within 2 miles of historic reclaimed mining areas exhibit elevated selenium accumulations in their organs. These results indicate upper percentile elk-liver accumulations (~38 mg Se/Kg dw) that are below, but approaching, referenced large mammal toxic threshold liver concentration ranges [47] of 45-60 mg Se/Kg (dw). These surveys were limited to elk tissue concentrations during the fall hunting season and do not represent bioaccumulation that may occur in foraging wildlife with smaller home ranges. Small mammal whole body sample concentrations collected from selected impacted areas during the Area Wide

Investigation ranged up to 17 mg/kg (ww) or approximately 50-70 mg/kg (dw) as opposed to typical background levels of 1-4 mg/kg (dw).

The mean egg selenium (MES) effects threshold (effective concentration for producing a specified effect in 10% of the test organisms [EC_{10}]) for avian species is subject to scientific debate but reported to occur between 6 [48] and 16 [49] mg/kg (dw) depending on the source of information. However, actual effects levels are universally accepted to be both site- and species-specific. Over 10% of the 117 bird eggs collected in 1999 from the designated “mining areas” in support of initial population level studies had MES concentrations in excess of 10 mg/kg (dw). This initial regional-level study did not evaluate subpopulation risks in specific areas impacted by releases such as East Mill Creek, Spring Creek, or Maybe Creek. However, follow up bird egg samples collected in several Agency-identified impacted zones during 2002 [50] indicated significantly higher concentrations in these local populations; many of the eggs exhibiting concentrations in excess of 20 mg/kg (dw).

Whole body fish samples collected by IMA and DEQ in impacted stream segments during the area wide efforts ranged up to 33 mg/kg (dw) selenium as compared to typical background levels of 1 to 4 mg/kg (dw). Whole body fish concentrations in the previously referenced University of Idaho (U of I) cutthroat trout feeding trials only achieved concentrations in the low 20 mg/kg (dw) range, even though the study was initially intended to provide toxic ingestion doses. The draft alternate water quality standard [51] based on whole body fish concentrations and currently in technical review by the EPA, proposes 7.9 mg/kg (dw) as a general residual whole body fish regulatory criterion and 11.64 mg/kg (dw) as the genus mean chronic value for salmonids.

There are numerous other examples of significantly elevated media concentrations in areas that are receiving or have received uncontrolled releases from historic mine sites in the Resource Area. While these areas are localized and limited in number, DEQ has concluded that they clearly present unacceptable risks to sensitive local populations of aquatic, terrestrial, and avian ecological receptors residing at or near the mines, and are intended to be protected under the provisions of the State surface mining regulations, environmental laws, and Company-generated mine plans. Thus, DEQ considers a focused, hot spot management approach appropriate in identifying and addressing releases and associated impacts with the potential to affect wildlife populations and communities residing in those areas.

4.2.2.1 RAO 2.1: Reduce subpopulation risks to regional wildlife, resulting from historic mining release exposures, to acceptable levels as established by risk-based action levels.

Removal actions should focus on the reduction of subpopulation-level risks caused by unauthorized mining releases in impacted areas through controlling exposure point concentrations in designated media in accordance with the DEQ's regulatory- and risk-based action levels, and NCP decision criteria. Aquatic receptors are considered the most sensitive species for selenium and mining-related trace metal contamination. The existing cold water biota regulatory criteria have been applied as the action levels for regulated waters and those waters intended to be protective of aquatic life uses. In these same areas, sediment action levels have been established based on the National Oceanic and Atmospheric Administration (NOAA) probable effects levels (PELs) for aquatic species. For the purpose of action level applications, regulated waters include streams listed in the water quality rules, surface water that flows into regulated waters (perennial and intermittent), and waters that are clearly intended to support aquatic life.

For the purpose of applying proposed action levels, unregulated waters include closed system ponds or impoundments designed as water treatment units for tailings, sedimentation, overflow collection, evaporation, etc., that do not discharge into regulated waters and are not intended to support aquatic life. Unregulated water action levels are dependent on the existing and future functional use of the water feature, to be determined through a qualitatively use survey conducted by the site-specific Lead and Support Agency representatives during the site investigation phase.

The tiered selenium action levels for unregulated surface waters consist of three potential exposure scenarios. The most stringent action level, which is equivalent to the regulated water action level, will be applied for those surface water features that provide sensitive habitat for nesting, breeding, or resident receptors, and in each case, will be equal to the action level for regulated waters. The second, non regulated water action level will be applied for surface water features that provide a watering source for domestic animals. This selenium action level is set at 50 ug/L based on veterinarian handbook recommended drinking water concentrations for domestic animals. The final action level of 201 ug/L for unregulated water and 7.5 mg/kg (dw) for collocated sediment are based solely on transitory terrestrial receptor ingestion through drinking water and incidental ingestion, respectively, and do not include pathways presented by the introduction of aquatic plant or benthic invertebrate ingestion, as encountered in the first tier for more sensitive habitats and receptors. This tiered approach considers the actual risk that may be presented by these surface water features based on their existing or future use, and acknowledges the fact that an industrial use classification does not envision the concurrent development of sensitive habitat.

DEQ has also included risk-based action levels for vegetation and riparian/fluvial soils based on ingestion. The soil action levels specifically exclude waste rock materials since the overburden piles are permitted disposal units intended to segregate this material. However, reclaimed vegetation on historic mining units is subject to action level evaluation based on restoration of beneficial uses and risks imposed by this exposure pathway.

DEQ encourages the use of the proposed action levels as removal action target concentrations to the maximum extent possible. However, exceedances of the action levels initially trigger consideration of the impacted media under the EE/CA process and require critical evaluation of each impacted area to identify appropriate alternatives to reduce or control existing risks using removal action decision criteria. Removal action alternatives in the EE/CA process will likely include some use of source control through proactive remediation efforts but also allow consideration of long-term treatment techniques, effective management practices, mitigation strategies, institutional controls, no action alternatives, etc.

4.2.2.2 RAO 2.2: Minimize wildlife risks, to the maximum extent practicable, through the development and demonstration of effective best management practices for future mines.

As discussed in section 4.2.1.2, collaborative efforts should continue to develop improved and effective BMPs to minimize wildlife risks from exposures to mine wastes, reclaimed forage and surface water sources. Current reclamation seed mixes have been modified to minimize the use of deep-rooted plant species and secondary accumulators known to result in relatively high selenium uptake. Forest Service researchers have issued an interim soil salvage guidance document [52] based on ongoing studies [53]. It is intended to achieve reclaimed vegetation concentrations protective of foraging wildlife and below veterinarian-recommended grazing levels of 5 mg/kg dw for livestock.

Research should continue in the area of hydrologic controls for runoff and infiltration of reclaimed and mined areas to reduce on-site surface water and riparian zone development. During the summer months, COCs in potential wildlife-watering areas presented by small mine ponds may become highly concentrated through evaporative processes. Modified practices should be developed to eliminate or reduce these exposure point concentrations to recommended levels. Future BMPs should also include provisions to prevent successional development of wetland or riparian habitats with selenium or trace metal-impacted waters due to the elevated risks presented by accumulation and exposure in these sensitive habitats.

Demonstrated BMPs should be documented and submitted to the land management agencies for review and acceptance. Upon approval, effective BMPs should be used for future mining operations and any discrepancies in the current phosphate mining section of the State surface mining rules should be corrected by the Idaho Department of Lands through administrative rule making.

4.2.3 *RAG 3.0: MAINTAIN AND PROTECT MULTIPLE BENEFICIAL USES OF THE SOUTHEAST IDAHO PHOSPHATE MINING RESOURCE AREA.*

The Resource Area is primarily comprised of State and Federal public lands used extensively for recreation, grazing, Native American traditional and cultural uses, and other beneficial uses. The intent of the State's surface mining regulations (IDAPA 20.03.02), as well as a stated goal of Company-generated and Agency-approved mine plans, is to restore beneficial uses in mined areas through effective reclamation and best management practices. Many of the issues addressed in the first two Removal Action Goals will support multiple beneficial use goals through reducing wildlife impacts for fishers and hunters, reversing existing surface water resource degradation for recreational users, and developing effective BMPs to minimize future ecological impacts in the region. However, additional removal action consideration is warranted for livestock grazing and future potential land use risks to address specific risks identified by DEQ.

4.2.3.1 RAO 3.1: Reduce livestock grazing risks and associated losses from selenium exposures in forage and drinking water sources in the Resource Area.

The DEQ is not an implementing agency for mining reclamation or grazing management. However, it would be remiss to avoid discussion of the grazing issue since livestock impacts were the catalyst for initiating Area Wide Investigation efforts. Livestock losses have continued to occur in the Resource Area on nearly an annual basis since the inception of the project. In some cases, other potential stressors have obfuscated the conclusive causes of death reported in the associated histology reports. However, in all cases selenium has consistently been identified as a contributing factor. DEQ considers livestock grazing losses of the magnitude observed in the past to be unacceptable and believes appropriate actions are needed to eliminate these occurrences.

In IMA-commissioned white papers [54] authored by Scott MacGregor, DVM and Ed Duren, MS-PAS in 1999, the recommended maximum concentrations of selenium in grazing forage are: Horses and Mules-0.2 ppm (mg/kg dw), Sheep-0.3 ppm and Cattle-5 ppm with 30 to 40 ppm allowed over short grazing periods. The National Research Council recommends a 2 ppm selenium concentration in forage. Grazing studies involving groups of steers and sheep have been conducted by the IMA in conjunction with area wide activities. The results appear to indicate that plant tissue concentrations above these recommended levels may be tolerable for short periods of time assuming well-monitored use for domestic animal grazing. DEQ understands that the University of Idaho's recommendation [55] for general forage selenium levels in mining areas is 5 ppm (dw). Similarly, the Idaho State Veterinarian's Office has provided a recommendation of 5 ppm [56] for grazing, based on their literature review and professional judgment. DEQ, in consultation with the land management agencies, has agreed to establish a mean vegetative action level of 5 ppm (dw) for selenium to be consistent with the regional reclamation goal for grazing use and site relinquishment requirements.

Based on area wide data for the Resource Area, the vegetation concentrations in historic reclaimed areas and impacted riparian zones exceed this level. Mine-specific delineation efforts should identify and map areas where Se plant uptake exceeds the action level, with particular attention to peripheral vegetation beyond the waste unit boundaries such as irrigation channels, riparian zones and areas of natural plant succession. To prevent recurring livestock incidents prior to the development of removal action alternatives, the delineation results and vegetation maps for individual mines should be provided to regional grazers and land management agencies to support current grazing management and allotment procedures. Ultimately, these areas should be addressed in the removal action process to restore unrestricted grazing use as intended by the original mine plans, or to develop acceptable grazing management practices that do not shift undue management burdens to the grazers or management Agencies.

4.2.3.2 RAO 3.2: Prevent potential future public health risks by prohibiting residential land use and development in the immediate vicinity of phosphate mining waste units and/or impacted areas.

Area wide risk evaluations for Radium-226 and other COCs indicate that elevated human health risks are likely from constituents in waste rock using a residential exposure scenario. These increased risks occur from incidental soil ingestion, persistent fugitive dust and radiological exposures over a significantly extended period of time as opposed to recreational use. Based on discussions with EPA [57], similar concerns have been identified in reclaimed areas of Florida's phosphate fields that have been opened to residential development.

Based on current land use, it is unlikely that residential development will occur on reclaimed waste rock piles in the Resource Area considering that most land transfers involving mining areas would require some level of due diligence that would likely prevent this type of transaction, and that construction of homes on unconsolidated material would not be considered conducive to structural design. However, some of the historic mine sites are privately owned, others are on public lands that may be subject to future land swaps or transfers, and reclaimed areas on Tribal lands are routinely allocated to tribal members.

DEQ recommends precautionary measures to prohibit residential development of any phosphate mining waste units or impacted areas that may present potential public health risks in the future. Alternatives may include, but are not limited to, actions such as deed restrictions, covenants, environmental easements, land use ordinances or administrative rule-making.

4.2.4 *RAG 4.0: PROTECT SOUTHEAST IDAHO'S GROUND WATER RESOURCES.*

IDAPA 58.01.11 Ground Water Quality Rule provides the standards and criteria for ground water in the State of Idaho. These regulations allow temporary on-site ground water impacts during the period of active mineral extraction but require compliance upon completion of the mining operations. The rules also contain an antidegradation provision to protect the State's groundwater resources for future beneficial use.

DEQ is aware of elevated selenium ground water concentrations in several localized springs bordering mining waste units, monitoring wells on the perimeter of some impacted riparian areas, and a limited number of monitoring wells located on mine sites. However, review of available local public water supply records, mine site well sampling results, and selected sampling of private domestic wells adjacent to former mining operations have not indicated any regional aquifer impacts or human exposures above the drinking water standards. These results were also used by the US Department of Health and Human Resources to issue a regional health consultation concluding that there is no apparent public health hazard from drinking or using regional ground water.

Localized groundwater studies to characterize and delineate conditions in the vicinity of the subject mine sites were appropriately deferred to site-specific investigations due to the scale and complexity of conducting hydrogeologic evaluations on an area wide basis. DEQ continues to support this decision, and believes site-specific efforts will result in more detailed and cost-effective characterizations of flowpaths, local geology, and potential ground water release sources than a comprehensive regional effort could have achieved.

4.2.4.1 RAO 4.1: Identify, characterize, and respond to ground water contamination sources in the Southeast Idaho Phosphate Mining Resource Area that present potential public health or ecological risks.

Under the site-specific statements of work, each mine is required to characterize hydrogeologic conditions and delineate any localized ground water contamination from potential up-gradient sources. The evaluation includes local aquifer systems and springs recharged by site runoff or sub-irrigation. Periodic sampling of ground water quality parameters will be conducted to establish baseline conditions and temporal trends. If impacts exceeding the proposed action levels for either continued monitoring or corrective actions are discovered, appropriate response actions will be included in the site EE/CA and remedy selection process. Observed degradation trends may require early actions under State regulatory requirements prior to reaching removal action level concentrations dependent on modeling forecasts and risk considerations. The ground water investigation efforts will also include identification and sampling of existing domestic wells within an appropriate distance from each mine to confirm the absence of potential human health risk exposures.

4.2.4.2 RAO 4.2: Develop and demonstrate Best Management Practices (BMPs) to control future mining releases and associated risks from selenium and related trace metals in ground water.

Effective BMPs should continue to be developed and demonstrated to prevent releases to ground water from future mining activities. Additional areas of focus for modified BMPs may be identified during mine-specific activities. Demonstrated BMPs should be documented and submitted to the land management agencies for review and acceptance. Upon approval, effective BMPs should be used in future mine plans. Any discrepancies in the phosphate mining section of the State surface mining regulations should be corrected by the Idaho Department of Lands through administrative rule making.

4.3 ACTION LEVELS

In addition to Removal Action Goals and Objectives, Task 3 of the Area Wide Investigation Scope of Work required DEQ to develop risk-based cleanup levels for exposure media that meet both area wide ecological and human health protection goals. The EPA guidance document for NTCRAs states;

> *"A risk evaluation that identifies only contaminants of concern in affected media, contaminant concentrations, and toxicity associated with the chemicals can be sufficient to justify taking an action. In some situations, exposure pathways can be identified as an obvious threat to human health or the environment by comparing EE/CA contaminant concentrations to standards that are potential chemical-specific applicable or relevant and appropriate requirements (ARARs) for the action… When potential ARARs for chemicals of concern do not exist for a specific contaminant, risk-based chemical concentrations should be used."*

In accordance with this guidance, DEQ developed three separate tiers of action levels for removal action consideration. These are: background-based monitoring action levels to be used during the site investigation phase to identify potential release pathways; regulatory-based removal action levels to be used during the EE/CA phase to identify and achieve compliance levels with existing ARARs; and, risk-based action levels to be used during the EE/CA phase to address unacceptable risks and provide subpopulation-level protection for receptors residing in areas impacted by historic and ongoing phosphate mining releases. The term "subpopulation" is specifically used in this document to denote a subset of the regional population and to avoid any confusion with the regional population-level risk assessment findings. However, this is also consistent with EPA's risk characterization guidance [58] which requires the selection of response actions "that will result in the recovery and/or maintenance of healthy "local" populations/communities of ecological receptors that are or should be present at or near a subject CERCLA site. The regional "subpopulation" term used by DEQ for the area wide effort is considered synonymous with "local populations/communities at or near a site" for individual mine site activities. Additional information on action level development and rationale are provided in the following subsections.

4.3.1 MEDIA AND RECEPTOR SELECTION

Pursuant to the Area Wide Investigation Scope of Work, DEQ is responsible for developing action levels for "exposure" media. DEQ concluded that the most direct human health and ecological exposure media in the Resource Area consisted of surface water, ground water, sediment, soil and vegetation and these were selected as the action level media. These media account for the initial introduction of contaminants into ecological systems and are the most amenable to measurement and risk reductions through removal action processes and current remedial technologies.

There are a number of secondary media measurement endpoints that have been identified through past research for comparison to toxicological benchmarks, such as bird eggs, fish eggs, whole-body fish concentrations, liver and tissue in mammalian and avian species, invertebrate concentrations, etc. However, the observed concentrations at these measurement endpoints are dependent on the initial exposure levels of the action level media, and associated sampling methods used to evaluate these secondary endpoints are intrusive, with a potential to create receptor losses that may outweigh any actual toxicological effects in moderately impacted areas. Also, while the secondary media endpoints may be valuable in research and the subsequent assessment of the removal action effectiveness, these media are not susceptible to direct remediation techniques in and of themselves. Accordingly, DEQ focused the development of monitoring and removal action levels on media that can be directly addressed with existing technologies to reduce existing exposures and associated risks.

DEQ also had to identify the group of target receptors for action level development and risk management decision-making. Previous risk assessment and area wide investigation results indicated that receptors with relatively large home ranges, such as elk and large predators, were unlikely to be exposed to significant risks from a limited number of non-contiguous, localized areas of impact. Direct measurement of elk sample populations in the vicinity of historic mining operations supports this conclusion. However, receptors with smaller home ranges and the potential to reside in impacted areas during toxicologically sensitive periods such as nesting and breeding times, were found to have exposures in excess of toxicological benchmarks. This conclusion is also supported through direct measurement of concentrations clearly in excess of toxicological benchmarks in amphibians, small mammals, fish, bird eggs and other secondary media measurement endpoints from highly impacted areas.

Based on these considerations, DEQ developed a list of limited home range surrogate species to represent the potential feeding guilds that may be at risk from historic phosphate mining releases at or near the individual mine sites in the Resource Area. While the specific surrogate species may not typically occur in Southeast Idaho, they were selected based on the availability of reliable toxicological reference data to represent similar feeding guild species that may reside in impacted zones at or near the mines. The selected receptors and feeding guilds are provided in Table 4-1.

TABLE 4-1: SURROGATE SPECIES AND FEEDING GUILDS

SURROGATE SPECIES RECEPTOR	FEEDING GUILD
American Robin (*Turdus migratorius*)	Terrestrial Omnivorous Birds
Coyote (*Canis latrans*)	Carnivorous Mammals
Deer Mouse (*Peromyscus maniculatus*)	Terrestrial Omnivorous Mammals
Eastern Cottontail (*Sylvilagus floridanus*)	Terrestrial Herbivorous Mammals
Great Blue Heron (*Ardea herodias*)	Aquatic and Riparian Area Piscivorous Birds
Mallard (*Anas platyrhynchas*)	Aquatic Area Omnivorous Birds
Meadow Vole (*Microtus pennsylvanicus*)	Aquatic and Riparian Area Herbivorous Mammals
Mink (*Mustela vison*)	Aquatic and Riparian Area Carnivorous Mammals
Northern Bobwhite (*Colinus virginianus*)	Terrestrial Herbivorous Birds
Northern Harrier (*Circus cyaneus*)	Raptors
Raccoon (*Procyon lotor*)	Aquatic and Riparian Area Omnivorous Mammals
Red-winged Blackbird (*Agelaius phoeniceus*)	Aquatic and Riparian Area Omnivorous Birds
Song Sparrow (*Melospiza melodia*)	Aquatic and Riparian Area Herbivorous Birds

In addition to risk management considerations for the terrestrial and avian receptors listed in the table, DEQ also considered sensitive aquatic receptors and waterfowl through toxicological benchmarks and cold-water biota regulatory criteria, and domestic animal receptors through veterinary recommendations for the appropriate exposure media.

4.3.2 BACKGROUND-BASED MONITORING ACTION LEVELS

The removal action process is intended to address the cleanup or removal of released hazardous substances from the environment. The site inspection/investigation (SI) phase of the removal action is designed to identify all potential release pathways and areas impacted by historic releases. The Department developed monitoring action levels for regulated surface water and ground water to evaluate the primary transport paths for selenium and related metal releases from the historic phosphate mining areas. Exceedance of an action level indicates a need to continue monitoring during the SI phase to establish annual and seasonal trends for potential release pathways, including temporal surface water data from a near-normal annual precipitation year.

The surface water monitoring action level for each constituent is based on the maximum background concentration observed in unimpacted streams during the 2001 area wide investigation sampling events conducted by DEQ. These levels are considered to be reasonably representative of the upper percentile (> 99.9) concentrations of the true regional background population, and exceedances would be considered by DEQ to be indicative of potential releases in regulated waters that may be attributable to historic mining operations. The surface water monitoring action levels are provided in Table 4-2.

TABLE 4-2: SURFACE WATER MONITORING ACTION LEVELS

Monitoring Action Level Regulated Surface Water Trending and Release Detection		
Constituent	**Action Level (ug/L*)**	**Basis**
Selenium, Total Recoverable	1.6	Maximum AWI Background Concentration
Cadmium*	0.7	Maximum AWI Background Concentration
Chromium*	5.8	Maximum AWI Background Concentration
Copper*	3.3	Maximum AWI Background Concentration
Nickel*	4.0	Maximum AWI Background Concentration
Vanadium*	8.1	Maximum AWI Background Concentration
Zinc*	59.0	Maximum AWI Background Concentration

* Micrograms per liter
** Dissolved constituent analyses.

Site-specific surface water monitoring should continue in identified areas until reasonable conclusions can be made regarding the presence of an active contamination source and the potential for future or ongoing releases warranting removal action.

The ground water monitoring level is based on the surface water criteria and protects against violations that may occur if groundwater surfaces in a spring or surface water body. These levels are above natural background conditions but well below (25% or less) the groundwater human health criteria providing adequate warning for any required response. The ground water monitoring action levels are provided in the following table.

TABLE 4-3: GROUND WATER MONITORING ACTION LEVELS

Monitoring Action Level* for Ground Water Trending and Release Detection		
Constituent (Unfiltered)	**Action Level (ug/L**)**	**Basis**
Selenium, Total Recoverable	5.0	Clean Water Act/ Water Quality Standard Criteria
Cadmium	1.0	Clean Water Act/ Water Quality Standard Criteria
Chromium	25.0	¼ Groundwater Quality Standard Criteria
Copper	11.0	Clean Water Act/ Water Quality Standard Criteria
Nickel	160.0	Clean Water Act/ Water Quality Standard Criteria
Vanadium	20.0	Tier II Secondary Chronic Benchmarks
Zinc	100.0	Clean Water Act/ Water Quality Standard Criteria

*Based on Surface Water Criteria in 40 CFR 131.35 and IDAPA 58.01.02, where available.
** Micrograms per liter

Similar to the surface water monitoring action level, exceedances of the groundwater monitoring action levels require continued periodic (typically semi-annual) monitoring until reasonable conclusions can be made regarding the presence of an active contamination source and the potential for future or ongoing releases. Due to the delayed response typically associated with ground water impacts and the projected timeframes for

SI activities, periodic ground water sampling may continue during post-removal monitoring to expedite other required EE/CA activities at individual sites.

4.3.3 REGULATORY-BASED REMOVAL ACTION LEVELS

DEQ established regulatory-based removal action levels for all primary media regulated under existing chemical-specific ARARs, as provided in Attachment 3 of this document. The regulatory-based action levels affect regulated surface water and ground water media.

Numerous surface water features are present in the Resource Area. These include streams, rivers, ponds, reservoirs, seeps, etc. Under the State water quality rules and the Clean Water Act, many of these features are regulated differently depending on the their contribution to the waters of the State or United States (WOTUS), and designated beneficial use(s). Waters of the State are defined by regulation as "all the accumulations of water, surface and underground, natural and artificial, public and private, or parts thereof which are wholly or partially within, or which flow through or border upon the State." The State protects these waters according to designated beneficial uses such as aquatic life, recreation, water supply, wildlife habitat, aesthetics, etc. For undesignated streams (those for which beneficial uses have not specifically assigned), the State presumes most waters will support cold water biota and generally applies this beneficial use as the standard. The regulatory-based removal action levels provided in Table 4-4 and are intended to be applied to regulated surface waters, which include all streams, rivers, reservoirs and contributing waters from seeps, springs and intermittent runoff pathways.

TABLE 4-4: REGULATED SURFACE WATER REMOVAL ACTION LEVELS

Removal Action Level for CWA/State Water Quality Rules Regulated Surface Water*		
Constituent	**Action Level (ug/L)**	**Basis**
Selenium, Total Recoverable	5.0	40 CFR 131.35/IDAPA 58.01.02
Cadmium**	1.0	40 CFR 131.35/IDAPA 58.01.02
Chromium, Total**	74.0	40 CFR 131.35/IDAPA 58.01.02***
Copper**	11.0	40 CFR 131.35/IDAPA 58.01.02
Nickel**	160.0	40 CFR 131.35/IDAPA 58.01.02
Vanadium, dissolved	20.0	Tier II Secondary Chronic Benchmarks
Zinc**	100.0	40 CFR 131.35/IDAPA 58.01.02

*Based on cold water criteria; remedial actions may be triggered at lower concentrations if confirmed degradation trends are observed. **Dissolved w/hardness adjustment required. ***Assumes 6 to 1 partitioning of Cr III to Cr VI.

Regulated waters exceeding these compliance-based action levels must be addressed during the EE/CA phase of the removal action process. Non-regulated waters, such as closed system industrial facilities, water treatment ponds, lagoons, sedimentation basins, etc., and sediments are addressed in the risk-based removal action subsection dependent on functional use and potential exposures.

Regulatory-based ground water removal action levels are based on existing chemical-specific ARARs intended to protect human health and future ground water resources. These levels represent either the Maximum Contaminant Levels (MCLs) or secondary standards for drinking water, or the human health tap water criteria depending on the constituent. Groundwater concentrations exceeding these compliance-based action levels are required to be addressed during the EE/CA phase of the removal action process. Groundwater removal action levels are provided in Table 4-5.

TABLE 4-5: GROUND WATER REMOVAL ACTION LEVELS

Removal Action Level for Ground Water (Total Recoverable)*		
Constituent (Unfiltered)	**Action Level (ug/L**)**	**Basis**
Selenium	50	IDAPA 58.01.11
Cadmium	5	IDAPA 58.01.11
Chromium	100	IDAPA 58.01.11
Copper	1300	IDAPA 58.01.11
Nickel	730	Human Health Tap Water Criteria
Vanadium	260	Human Health Tap Water Criteria
Zinc	5000	IDAPA 58.01.11 (Secondary Standard)

*Based on drinking water MCLs/human health exposure levels; remedial actions may be triggered at lower concentrations if confirmed degradation trends are observed. ** Micrograms per liter

It should also be noted that both the surface water and ground water rules contain anti-degradation provisions. Therefore, surface water or ground water monitoring data indicating that future action level exceedances from active sources are inevitable will result in initiation of removal action activities even though observed concentrations are below the regulatory-based action levels.

4.3.4 RISK-BASED REMOVAL ACTION LEVELS

In the absence of chemical-specific ARARs for some of the selected exposure media, DEQ was required to develop risk-based removal action levels. These action levels affect non-regulated surface water, sediment, soils and vegetation, and are based on subpopulation-level protection of sensitive receptors that may inhabit areas impacted by historic mining operation releases. The risk-based removal action level development process, explained in detail in Attachment 1, essentially consisted of calculating an acceptable single media dose for each surrogate species using a NOAEL-based toxicity reference value; using one half of the most sensitive receptor dose to represent multiple exposure paths typically dominated by one or two single media concentrations; performing proposed action level comparisons with area wide background values and other "to be considered" toxicological reference values for each media; and, conducting final verification through development of cumulative hazard quotient estimates assuming proposed action level concentrations for all media. Risk-based action level assumptions, rationale, and uncertainties are provided in the following media-specific subsections.

4.3.4.1 Surface Water

As discussed in Section 4.3.3, regulated surface waters that contribute to the waters of the State or the United States have removal action levels that are based on regulatory criteria for the protection of aquatic life. There is a wide range of scientific views regarding the protectiveness of the current regulatory criteria of 5 ug/L.

Previous research at selenium sites around the country has caused many governmental agency selenium experts to endorse a threshold value of 2 ug/L for water column concentrations in surface waters supporting aquatic life. Specific methods [59, 60] have been recommended for evaluating surface water hazards using the information developed from these and other sites. Hazard assessments conducted by the USGS in the Resource Area using these procedures have indicated a number of streams with moderate to high hazards based on the lower threshold values. Conversely, a number of academic, consulting and industry experts claim that the existing criteria of 5 ug/L is overly conservative because it is based on sensitive warm water species and developed from closed system and lotic scenarios such as lakes, reservoirs, ponds and backwater areas where selenium accumulation is known to be magnified. The EPA has also been evaluating the need for selenium water quality criteria revisions since 1997 [61] but has not proposed any changes to the existing numeric criteria.

After careful consideration of the various positions and available area wide data, DEQ chose to retain the existing regulatory criteria, a chemical-specific ARAR, as the removal action level for surface water supporting aquatic life. While DEQ concluded that the lower threshold values may apply for many selenium-impacted sites around the country, they do not appear to be appropriate for use under existing area wide conditions in the Resource Area. The lower thresholds were developed based primarily on closed system environments with persistent chronic exposures to restricted fish populations. These assumptions fail to consider aquatic species migration, seasonal fluctuations of water column concentrations, and depuration effects that may occur in the Resource Area during periods of lower concentrations. Three separate USGS hazard analyses of a number of regional streams in the Resource Area repeatedly resulted in the ranking of several background streams as moderate hazards, even though these streams were not impacted by mining releases. This may be due to nuances in the methods such as extrapolating fish egg concentrations or using single invertebrate species samples to represent cumulative ingestion contributions, however, it leads DEQ to conclude the hazard assessment methods are overly conservative for Resource Area application.

On the other hand, arguments against the current water quality standards being too conservative because they are based on warm water species, are also deemed to be unsupported based on the available information reviewed by DEQ. A number of studies from previous researchers [62] tend to suggest that cold water species may be more sensitive to selenium than many warm water species, although the differences appear relatively small. The current criteria are intended to protect cold-water biota, which includes the entire aquatic community and food web, not just single fish species. Therefore, more comprehensive studies would be required to support a position different than the current Federal and State criteria that DEQ is obligated to enforce. DEQ must assume that any clear evidence supporting either position would have resulted in proposed numeric criteria revisions by the EPA during their past six years of review. Therefore, DEQ concluded that restoring regulated waters to existing criteria concentrations should be protective of the overall aquatic populations in the region.

For non-regulated waters, DEQ has agreed with our interagency partners to apply a tiered selenium removal action level approach based on functional use of individual non-regulated surface water units. Non-regulated waters include pit lakes, ponds, sedimentation basins, and other units not originally intended to provide significant ecological habitat or support aquatic life. The lowest tier of protection for non-regulated water removal action level assumes exposures occur only through drinking water ingestion by transitory wildlife and occasional resting by migratory birds. This is the intended level of exposure for non-regulated surface water units that are classified as "industrial facilities" or exempted from Clean Water Act as treatment facilities. The selenium action level of 201 ug/L will be applied to those surface water units that are limited to these uses as determined by a qualitative use inventory to be conducted by designated Lead and Support Agency representatives.

The second selenium action level of 50 ug/L is based on veterinarian recommendations and will be applied to non-regulated surface water units used for domestic animal drinking water sources. The third and most stringent selenium action level of 5 ug/L will be applied for non-regulated surface water units that have developed significant riparian habitat beyond their intended use. This action level is protective of species such as migratory birds, amphibians and other sensitive receptors that may reside or be attracted to these areas known to accumulate high levels of selenium. The non-regulated surface water action levels are provided in Table 4-6.

TABLE 4-6: NON-REGULATED SURFACE WATER REMOVAL ACTION LEVELS

Removal Action Level for Surface Waters Not Subject To CWA/IDAPA Biota Standards*		
Constituent	**Action Level (mg/L)**	**Basis**
Selenium**: Riparian Habitat Use Domestic Animal Drinking Water Use Transitory Wildlife Drinking Water Use	 0.005 0.050 0.201	 Assumed Protective Level for Waterfowl/Amphibians Veterinarian Advisory Level for Domestic Animals ½ NOAEL Single Media Estimate for Sensitive Species
Cadmium	0.245	½ NOAEL Single Media Estimate for Sensitive Species
Chromium	8.7	½ NOAEL Single Media Estimate for Sensitive Species
Copper	11.0	½ NOAEL Single Media Estimate for Sensitive Species
Nickel	0.614	½ NOAEL Single Media Estimate for Sensitive Species
Vanadium	0.972	½ NOAEL Single Media Estimate for Sensitive Species
Zinc	43.4	½ NOAEL Single Media Estimate for Sensitive Species

* Based on subpopulation risks in impacted areas from avian/terrestrial surface water ingestion.
** Functional use to be determined by interagency inspection of all individual mine ponds and pit lakes

4.3.4.2 Sediments

For sediment removal action levels, DEQ assumed two scenarios; protection of aquatic life in regulated waters, and protection of terrestrial receptors in non-regulated waters. For sediments in areas supporting aquatic life, DEQ applied NOAA PELs, where available. In the absence of PELs, the literature-referenced effective concentration (EC_{10}) for reproductive effects in freshwater birds and fish was used for selenium, and background levels, which exceeded the non-regulated sediment risk levels, were used for vanadium. Where the regional background levels exceeded the benchmarks for any constituent, they were substituted for the referenced risk threshold values. The sediment removal action levels for regulated surface water areas are provided in Table 4-7.

TABLE 4-7: REGULATED AREA SEDIMENT REMOVAL ACTION LEVELS

Removal Action Level for Sediments Supporting Aquatic Life*		
Constituent	**Action Level (mg/kg dw)**	**Basis**
Selenium	2.6 (2.5)	Max BG (Reported EC10 for freshwater birds and fish)
Cadmium	5.1 (3.5)	Max BG (NOAA Probable Effects Level Benchmark)
Chromium	100 (90)	Max BG (NOAA Probable Effects Level Benchmark)
Copper	197 (25)	NOAA Probable Effects Level Benchmark (Max BG)
Nickel	44 (36)	Max BG (NOAA Probable Effects Level Benchmark)
Vanadium	72 (36)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Zinc	315 (210)	NOAA Probable Effects Level Benchmark (Max BG)

*Based on published benchmarks for aquatic life effects or maximum AWI background concentrations.

For non-regulated water areas, the sediment removal action level was based on incidental ingestion by terrestrial and avian receptors. The calculated risk-based values were then compared to area wide background concentrations and were replaced if exceeded. The sediment removal action levels for non-regulated surface water areas are provided in the following Table 4-8.

TABLE 4-8: NON-REGULATED AREA SEDIMENT REMOVAL ACTION LEVELS

Removal Action Level for Sediments Not Supporting Aquatic Life*		
Constituent	**Action Level (mg/kg dw)**	**Probabilistic Risk Calculations**
Selenium	7.5 (2.6)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Cadmium	9.2 (5.1)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Chromium	187 (100)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Copper	402 (25)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Nickel	44 (23)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Vanadium	72 (36)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Zinc	210 (202)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)

*Based on subpopulation risks in impacted areas from avian/terrestrial incidental ingestion.

4.3.4.3 Soils

DEQ developed soil removal action levels based on incidental ingestion by sensitive species residing in riparian zones and wetland areas because these are considered the most productive ecological habitat in the Resource Area and have the highest potential for significant exposure to sensitive receptors. This removal action level does not apply to surface materials on waste rock dump that were permitted as waste disposal facilities to consolidate high-metal concentration materials. These areas are considered to present much lower ecological habitat value or potential for resident populations because of the short, sparse vegetative cover provided in reclaimed areas. However, it should be noted that waste rock soil exposures were considered during the previous area wide risk assessment activities for regional human health and population-level ecological risk evaluations.

The riparian and fluvial soil removal action levels apply to surface soils in wetlands, runoff/flood deposition areas, and along the periphery of regulated waters. Background concentrations exceeding the calculated risk values were substituted for the appropriate constituents. Exceedances of the action level require the surface soil exposures and associated risks to be addressed during EE/CA activities. Riparian/fluvial soil removal action levels are provided in Table 4-9.

TABLE 4-9: RIPARIAN/FLUVIAL SOIL REMOVAL ACTION LEVELS

Removal Action Level for Riparian/Fluvial Soils*		
Constituent	**Action Level (mg/kg dw)**	**Basis**
Selenium	5.2 (3.3)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Cadmium	14 (5.6)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Chromium	130 (40.7)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Copper	117 (32)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)
Nickel	47 (15.9)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Vanadium	100 (25.1)	Max BG (½ NOAEL Single Media Estimate for Sensitive Species)
Zinc	738 (660)	½ NOAEL Single Media Estimate for Sensitive Species (Max BG)

*Based on published soil benchmarks or maximum AWI background concentration for riparian or upland soils. Waste rock soils excluded based on waste unit permitting.

4.3.4.4 Vegetation

The vegetation removal action level for selenium is based on the Land Management Agencies' reclamation goal for unrestricted grazing use upon completion of mining activities. The vegetation removal action levels for other constituents are based on one half of the NOAEL single media acceptable concentration assuming a site use factor of 0.5 and a hazard quotient of 10. These model adjustments, which were exclusive to the vegetation action level development process, recognize the spatial variability in vegetative uptake, interspecies variation, and typical presence of unimpacted vegetation in the immediate area of observed impacted zones. The action levels apply to all vegetated areas, including wetlands, riparian zones, and reclaimed areas from historic mining operations.

To demonstrate attainment of this action level on any discrete operational unit, the mine operator must achieve a mean selenium vegetation concentration of 5 mg/kg dw or less using a statistically-acceptable number of random samples. Individual aliquots should consist of approximately one square meter composites of all vegetation above the ground surface. The sampling area must be defined as a single operational unit, such as a waste rock pile or defined wetland area. Where dissimilar reclamation practices have occurred on a single unit, the unit should be subdivided and separate verifications should be performed. This verification procedure is intended to allow for variability while representing the average forage levels that may be encountered by grazing animals within each operational unit or portion of a unit.

This random sampling procedure is not required for initial site investigation purposes. Many of the historic reclaimed areas clearly exceed the vegetative removal action level under current conditions, and directed sampling methods utilizing transects and specific area of interest sampling points may support a more effective approach to delineating existing vegetative impacts. The random sampling method specified above is intended to verify effective site restoration and reclamation upon completion of removal actions. This method is different from the vegetation monitoring procedure for reclamation currently published by the US Forest Service in the interim soil salvage guideline. However, a similar reclamation verification approach is projected to be adopted by the Land Management Agencies in the near future. The vegetation removal action levels are presented Table 4-10.

FIGURE 4-10: VEGETATION REMOVAL ACTION LEVELS

Removal Action Level for Impacted and Reclaimed Vegetation*		
Constituent	**Action Level (mg/kg dw)**	**Basis**
Selenium	5.0 (8.3/0.75)	Land Management Agency Reclamation Goal for Unrestricted Grazing Use (NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals/Max BG)
Cadmium	4.2 (3.7)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Chromium	30.6 (9.9)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Copper	88.0 (15.0)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Nickel	35.5 (4.3)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Vanadium	55.9 (5.5)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)
Zinc	615 (140)	NOAEL HQ=10, SUF=0.5; Herbivorous Birds and Mammals (Max BG)

*Based on subpopulation risks to avian and terrestrial receptors based on ingestion of forage or maximum AWI background level.

4.3.4.5 Risk Management Assumptions, Rationale and Uncertainties

In performing the assigned risk management responsibilities, DEQ was required to reach timely conclusions and make a number of decisions based on area wide observations, scientific literature, and best professional judgment. We believe these decisions have been reasonable and objective, and are critical to the continued progress of resolving the historic phosphate mining selenium issues in Southeast Idaho by allowing site-specific actions to proceed. DEQ risk managers objectively weighed existing scientific views and evidence regarding many controversial issues in selenium science, and discussed these issues with our interagency counterparts, to reach what we consider to be reasonable and balanced decisions with particular emphasis on our regulatory obligations to protect public health and the environment. This section discusses the rationale for many of our decisions, and the assumptions and uncertainties associated with our risk management approach.

One of the most controversial assumptions made by the DEQ stems from our earlier risk assessment, which was subject to a formal public comment period and published in December 2002. Some stakeholders continue to object to the conclusion that significant regional human health and population-level ecological risks are unlikely. DEQ reached these conclusions in consideration of the findings of the Area Wide risk modeling and regional observations.

The human health risk concerns from some stakeholders appear to primarily originate from the lack of intrusive groundwater investigations during the Area Wide Investigation, which were deferred to the site-specific investigation phase to achieve an appropriate resolution and scale necessary for adequate hydrogeologic characterizations. However, as part of the regional evaluation, DEQ conducted a comprehensive review of available records from groundwater-based public drinking water supplies; reviewed data from a significant number of wells located on and in the vicinity of historic and active mining operations, and requested that the Division of Health identify and sample a selected number of domestic wells representing residents adjacent to mining areas, which they did. None of this data indicated any ground water with concentrations above or even approaching drinking water standards at human receptor exposure point locations. This same information provided the basis for the US Public Health Service to issue a health consultation stating that there were no apparent public health hazards present in Southeast Idaho from the use of regional ground water. DEQ remains confident in the previous regional human health risk conclusions regarding this issue.

Similarly, we believe our regional population-level ecological risk conclusions are both sound and intuitive in consideration of the facts. Selenium contamination in the Resource Area was not discovered until 1996 as a result of domestic animal effects within a pasture being irrigated with the highest level of impacted surface water observed in the region. While occasional but highly publicized incidents involving domestic animals continue to occur, they are inappropriately used to support the position that population-level ecological risks are present. All of the documented livestock losses associated with selenium have occurred on or in the direct vicinity of historically reclaimed waste dumps, which are known to present a threat to domestic animals restricted to grazing these areas. Some grazing operations continue to use these areas in light of the potential risks and observed losses, to take advantage of the productive forage from reclaimed vegetation as compared to native growth. Some have negotiated indemnification agreements with the site operators acknowledging the inherent risks but allowing their continued voluntary use. These incidents should not be confused with the potential effects to free ranging wildlife.

Historic mining units and, most likely, the associated releases have been present for decades without any apparent regional wildlife population effects, typically defined as a measurable decrease in numbers. The EPA requires risk characterizations and response actions to consider effects on local populations or communities at or near a subject CERCLA site. For the area wide effort, the Site is the Resource Area and population-level risk estimates address the entire population of species within its boundaries; approximately 1,500 square miles. Within this area, historic mining reclamation covers approximately 5,000 acres or less than 0.5% of the available habitat. The Department's risk modeling and the direct measurement of elk tissue concentrations collected over two years from a significantly large sample of the regional population has demonstrated that free ranging wildlife with large home ranges are not being exposed to toxic levels of selenium from historically reclaimed forage.

Ecological receptors considered most sensitive to selenium contamination are birds and fish. Waterfowl and the aquatic community receptors are particularly susceptible due to their attraction and occurrence in wetland and riparian areas where selenium tends to accumulate. However, on an area wide population-level basis there have been no impacted areas identified within the Resource Area that attract regionally significant numbers of birds. Furthermore, regional waterfowl habitat is significantly dominated by the wildlife refuges at Gray's Lake and Bear Lake bordering the north and south ends of the Resource Area, respectively, which are unimpacted. Avian population studies by the University of Idaho and reported observations from the risk-targeted surveys of the most highly impacted areas in the Resource Area, also appear to support the risk assessment models and conclusions that impacts to regional bird populations are unlikely.

Regarding fish and aquatic communities, DEQ is aware of a number of stream segments that have been identified through our follow-up investigations as impaired water bodies and several others identified for future investigation. However, the water quality observations for the majority of the affected streams in the Resource Area indicate that peak concentrations occur during spring runoff and tend to dissipate to near background conditions during late spring and early summer. Therefore, the cumulative impacts with regard to chronic exposures to regional aquatic communities are expected to be minimal. There are a limited number of streams with persistent concentrations above acute criteria for aquatic receptors such as East Mill Creek, Maybe Creek, and Pole Canyon Creek, however, these 1st order streams represent a small percentage of the associated watersheds and are not expected to produce population-level effects on a regional scale. This is further supported by the fact that Maybe Creek and Pole Canyon Creek do not have surface hydrology connections during much of the year and resident fish populations have not been observed. As additional lines of evidence regarding population-level effects, IDF&G's annual fish monitoring program, DEQ's annual BURP program activities or any of the numerous hazard assessments and risk-targeted studies conducted by other Agency or academic researchers have yet to report any evidence of population-level effects that may be attributable to selenium contamination from localized sources.

While DEQ's population-level conclusions may be controversial to some, our decision to establish action levels for localized impacts and releases based on regional subpopulation-level risks minimizes the potential implications of this conclusion. We have defined subpopulation risks as those that may occur to groups of receptors residing in impacted areas during critical periods. The EPA requires response action risk considerations for "local" populations or communities at or near a subject site. For site-specific activities, the term "local" population is synonymous with the area wide term "subpopulation." We have also stated that wetland, riparian, and aquatic habitats represent sensitive environments in the Resource Area warranting specific ecological community considerations beyond a regional assessment of risks.

State and Federal mining laws are intended to protect surface water quality and groundwater resources through prevention of releases without regard to actual risks, and the mining plans developed by the Companies and approved by the Land Management Agencies commit to management practices that will prevent releases and restore beneficial uses. DEQ believes any localized impacts caused by unauthorized releases that present risks to ecological communities should be addressed as an obligation to meet the goals of previous mining plans and comply with the existing environmental laws and regulations as identified by the ARAR lists provided in Attachment 3. This is considered a reasonable and balanced risk management decision positioned between addressing only regional population-level risks which would disregard ongoing releases and localized impacts from historic mining operations, or requiring all media impacted by any mining releases to be restored to background conditions without any consideration of potential risks.

In the development of the risk-based removal action levels, DEQ recognized and accepted the potential for limited and minor toxicological effects occurring in localized areas. However, attaining the recommended action levels would reduce average levels in reclaimed vegetation by approximately a third and surface water concentrations in the highly impacted areas by over 95%, would require every area previously identified during the USFWS risk-targeted study or ranked as a high hazard during the USGS hazard assessments to be addressed in the removal action process, and would respond to every location associated with a previous livestock grazing incidents. The result would be a measurable improvement over current conditions and the elimination of exposures with the potential to cause significant effects.

During the risk management process, DEQ made the decision to eliminate small mammals such as mice and meadow voles from the risk indicator species list and to use only higher-level species for that purpose. This decision was based on several factors. Mice and vole populations in Southeast Idaho are ubiquitous and abundant, and will not be affected by subpopulation effects in impacted areas. Small mammal populations were evaluated through direct measurement during the Area Wide Investigation process and individual receptors were found to reside in the higher impacted areas. Additionally, direct measurement of observed whole body concentrations indicated that small mammals did not constitute a significant risk to any predator species.

Small mammal receptors have extremely small home ranges, tenths of an acre in some cases. Using these species as risk management indicators presents an unreasonable bias that would virtually prohibit any type of public works, infrastructure, and residential or industrial development anywhere in the country. Since this level of ecological protection is not a land use precedent elsewhere, DEQ determined that the risk management decisions for the Resource Area should be consistent.

There are also apparent concerns over the DEQ's acceptance of a maximum mean hazard quotient in the 20's for the risk indicator species. The typical approaches for ecological population considerations use a value of 10 or less. However, the mean hazard quotient calculations reported in the chemical-specific action level summaries of section 4.3.5 hypothetically assume that all media simultaneously occur at the action level concentrations. This was intended to assess an upper bound condition where exceedances were observed in every action level media and the removal action activities resulted in achieving action level concentrations throughout the impacted area. In fact, very few areas exhibit simultaneous exceedances of action level concentrations in more than one or two media. In the USGS hazard assessments, more often than not, variable hazard levels were reported for water, sediment, and invertebrate concentrations; similarly, most vegetation exceedances occur in reclaimed areas as opposed to areas with regulated waters; and so on. Therefore, the mean action level developed in our risk management approach is a conservative assumption and would be representative of few actual impacted areas.

DEQ also considered other factors in the acceptance of the proposed action levels, which were initially developed based on one half of the single media dose assuming a NOAEL hazard quotient of 1. The mean hazard quotients with values in the 20s apply only to the most sensitive species identified and the typical value of 10 or less is usually applied as an indicator of potential population-level risks. In this case, the hazard quotient represents potential risks to subpopulations in impacted areas, which translate to a very small percentage of the overall area. The potential for catastrophic events to overall populations, even if the action level concentrations allow some minor toxicological risks in the limited impacted areas, are minimal.

The last consideration in the acceptance of the action levels is the conservatism of the models. In back-calculating the acceptable single media dose that served as the basis for each media action level, and in validating the action levels through cumulative hazard quotient estimates, the DEQ utilized a significant number of conservative assumptions and parameters. The models assumed a site use factor of 1 representing receptors with small home ranges that could spend 100% of their time during critical periods in an impacted area. This would not be considered a typical occurrence. The models assumed 100% bioabsorption of ingested constituents. Metals absorption is typically much less than 100% although actual bioabsorption factors are difficult to estimate and selenium is typically reported to range up to 85%. The models not only assume all primary media at action level concentrations, but also hold the secondary media concentrations, such as aquatic plant, benthic invertebrate, and other potential dose contributors, at existing concentrations without consideration of reductions expected to occur as a result of the primary media reductions.

Table 4-11 summarizes the uncertainties associated with the models used but it should be evident that the risk management evaluation contains a significant level of conservatism. Therefore, the hazard quotient values reported for each constituent should be considered an upper bound estimate at best. For these reasons, DEQ concluded that the proposed action levels are acceptable for the protection of ecological subpopulations in impacted areas.

TABLE 4-11: RISK MANAGEMENT MODEL ASSUMPTIONS AND UNCERTAINTIES

Method/Assumption	Effect
Assumed Site Use Factor of 1 in hazard quotient calculations.	This assumption would have a tendency to overestimate risks, particularly in receptors with large home ranges. In this application, the more sensitive species were those with small home ranges in sensitive habitats such as riparian zones. Additionally, most measurement endpoints are based on reproductive effects and the receptors tend to reside in these areas during their primary breeding and nesting periods. Therefore, the effect on the risk calculations is expected to be minor.
Assumed 100% absorption factor for all COCs in hazard quotient calculations.	This would have the tendency to overestimate risks by assuming 100% of a COC ingested would be absorbed by the target organism. However, absorption factors are both chemical and species-specific parameters that vary widely in literature, when available. Accordingly, the effect on risk calculations may vary from low to moderate. For instance, selenium absorption in mammals is typically reported above 90%, which would have little effect, while cadmium absorption in mammals is reported to be much lower (<20%) and therefore would have a moderate effect.
No allowance for reduced concentrations in dependent media pathways.	The risk calculation process does not provide any estimates for reductions in dependent media pathways. For instance, achieving surface water action levels will also reduce aquatic plant and benthic macroinvertebrate uptake, although the risk model does not take this into account. This would result in overestimating risks, however, the overall effect is expected to be low since the exposure paths affected are generally secondary contributors to risk.
Use of probabilistic methods and mean values from resulting hazard quotient distributions for risk management purposes.	While most practitioners agree that appropriate stochastic methods in assessing risks generally provide more realistic estimates, this approach is not always used, in lieu of more conservative methods. The resulting values from most risk evaluations usually represent 95th percentile or greater risk estimates. Therefore, the use of mean values (~50th percentile) from stochastic methods will provide hazard quotients lower than more conservative approaches. In this application, the observed distributional ranges of HQ values indicate a moderate comparative effect that would tend to underestimate risks.
Minimal consideration of cumulative effects within a target organism.	The Area Wide Risk Assessment did not identify any significant synergistic relationships in which project COCs preferentially targeted the same organs or had the same toxicological effects on receptors. However, additive effects from introducing numerous simultaneous toxicological stressors have not been quantified and could have a moderate effect in underestimating risks.

4.3.5 CHEMICAL-SPECIFIC ACTION LEVEL SUMMARIES

The following subsections provide summaries of the chemical-specific action levels discussed in the previous text. Each section discusses the basis for developing the action levels; provides a comparison table for risk-based action level concentrations with background and impacted area data; compares established toxicity thresholds or benchmarks for available media; and tabulates hazard quotient mean values and ranges for surrogate species assuming action level concentrations for all media. Risk-based action level comparisons use the available EPA ecological soil screening levels and the

Netherlands critical limits [63] for metals in soils, and the NOAA threshold effects level (TEL) and upper effects threshold (UET) values [64, 65] for sediments.

4.3.5.1 Proposed Selenium Action Levels

Selenium has been identified by DEQ as the primary hazard driver for the area wide investigation efforts and is the major focus of regional activities. The following action levels are proposed for each of the primary media exhibiting elevated levels of selenium.

TABLE 4-12: SELENIUM ACTION LEVELS

Media of Concern or Targeted Action Level Item	Units	Background		Impacted Areas			Se Action Levels
		Mean	Max	Mean	Max	Median	
Continued Surface Water Monitoring	ug/L	-	-	-	-	-	1.6
CWA-Regulated Surface Water	ug/L	NA	1.6	9.2	1140	1.3	5
Non-Regulated Surface Water	ug/L	-	-	251	2200	255	
• Riparian Habitat Use							5
• Domestic Animal Use							50
• Transitory Wildlife Use							201
Continued Groundwater Monitoring	ug/L	-	-	-	-	-	5
Groundwater	ug/L	-	-	-	-	-	50
Sediments (regulated areas/aquatic life)	mg/kg dw	1.2	2.6	12.5	188	3.4	2.6
Sediments (terrestrial exposure)	mg/kg dw	-	-	-	-	-	7.5
Riparian/Fluvial Soils	mg/kg dw	1.01	3.3	10.49	150	1.7	5.2
Vegetation	mg/kg dw	0.24	0.75	7.72	39	2.5	5.0

The action levels for selenium were developed using the previously described approach with the exception of the sediment concentrations for regulated waters and the vegetation action level. In the absence of a published PEL value, the EC_{10} for freshwater birds and fish, 2.5 mg/kg dw was selected for sediment. However, the maximum observed area wide background concentration for selenium in sediments was 2.6 mg/kg dw so the action level defaulted to this value. The vegetation action level was lowered from 8.3 ppm dw for transitory wildlife grazing use to 5.0 ppm dw, in consultation with land management agency representatives, to meet their regional reclamation beneficial use goals for domestic animal grazing.

For comparative purposes, the EPA's Region IV ecological soil screening level for selenium is reported to be 0.81 mg/kg, which is equivalent to the Netherlands criteria often cited as a good risk screening reference. Since the impacted soils are limited to localized areas and the screening values are typically considered to be conservative values for population-level applications, it is appropriate that slightly higher action levels would apply in this instance. There are no NOAA TEL, PEL or UET sediment values established for selenium.

Using the combined selenium action level concentrations, the following hazard quotients were calculated for the selected target species.

TABLE 4-13: SELENIUM HAZARD QUOTIENT RESULTS FOR SURROGATE SPECIES

Receptor Species	Mean HQ	HQ Range	Receptor Species	Mean HQ	HQ Range
American Robin	28.6	12.3-70.4	Raccoon	5.3	4.3-6.8
Song Sparrow	22.8	20.5-25.7	Mallard Duck	4.2	2.2-7.7
Red-Winged Blackbird	22.5	14.1-53.2	Coyote	2.2	1.4-3.6
Eastern Cottontail	14.2	12.3-17.1	Great Blue Heron	1.6	1.0-2.8
Northern Bobwhite	10.6	7.7-18.5	Northern Harrier	1.2	0.5-2.9
Mink	9.7	7.1-16.8			

As additional lines of evidence for selenium being identified as the primary hazard driver, it exhibited the highest single mean HQ at 28.6 and was the only COC to result in a mean HQ>1 for every target receptor, even though the action level process was similar for all COCs.

4.3.5.2 Proposed Cadmium Action Levels

Cadmium has also been identified as a primary hazard driver in the Area Wide Investigation efforts because of the low associated risk thresholds and regulatory criteria, which is similar to selenium. Cadmium occurs more frequently as an elevated constituent in the Resource Area than the other COCs, but significantly less than selenium. The following action levels are proposed for impacted areas exhibiting elevated cadmium concentrations.

TABLE 4-14: CADMIUM ACTION LEVELS

Media of Concern or Targeted Action	Units	Background		Impacted Areas			Cd Action Levels
		Mean	Max	Mean	Max	Median	
Continued Surface Water Monitoring	ug/L	-	-	-	-	-	0.7
CWA-Regulated Surface Water	ug/L	NA	0.7	NA	2.3	<0.1	1.0
Non-Regulated Surface Water	ug/L	-	-	4.1	50	0.3	245
Continued Groundwater Monitoring	ug/L	-	-	-	-	-	1.0
Groundwater	ug/L	-	-	-	-	-	5
Sediments (regulated areas/aquatic life)	mg/kg dw	1.07	5.1	191.8	1400	130	5.1
Sediments (terrestrial exposure)	mg/kg dw	-	-	-	-	-	9.2
Riparian/Fluvial Soils	mg/kg dw	2.75	14.0	4.14	63	2.45	14.0
Vegetation	mg/kg dw	0.45	3.7	2.1	46	0.55	4.2

The action levels for cadmium were developed using the described approach with exception of the sediment concentration for regulated waters, and riparian soils. The NOAA PEL for cadmium in sediment is 3.53 mg/kg dw and the calculated risk-based riparian soil action level was 5.6 mg/kg dw. However, the maximum observed background concentrations for these media were 5.1 mg/kg dw and 14.0 mg/kg, respectively, and were used as the default values.

For comparative purposes, the EPA's Region IV ecological soil screening level for cadmium is reported to be 1.6 mg/kg and the Netherlands criteria is 0.8 mg/kg. The EPA Region IV sediment screening benchmark is reported to be 1.0 mg/kg, and the NOAA TEL and UET are 0.6 and 3.0 mg/kg dw, respectively.

Using the combined action level concentrations for cadmium, the following hazard quotients were calculated for the selected target species.

TABLE 4-15: CADMIUM HAZARD QUOTIENT RESULTS FOR SURROGATE SPECIES

Receptor Species	Mean HQ	HQ Range	Receptor Species	Mean HQ	HQ Range
Song Sparrow	20.0	18.1-22.6	Raccoon	2.2	1.9-2.8
American Robin	15.9	8.6-34.8	Mallard Duck	1.0	0.7-1.7
Red-Winged Blackbird	15.0	10.8-25.4	Coyote	0.8	0.74-0.81
Northern Bobwhite	7.6	6.2-10.5	Great Blue Heron	0.4	0.1-1.3
Eastern Cottontail	6.0	5.2-7.2	Northern Harrier	0.2	0.1-0.6
Mink	2.3	1.6-3.8			

4.3.5.3 Proposed Chromium Action Levels

Chromium was identified in the Area Wide Risk Assessment screening process as a contaminant of potential ecological concern based on observed upper percentile concentrations. It occurs frequently in the Resource Area but is primarily considered to be of concern in riparian soils and sediments. The following action levels are proposed for impacted areas exhibiting elevated total chromium concentrations.

TABLE 4-16: CHROMIUM ACTION LEVELS

Media of Concern or Targeted Action	Units	Background		Impacted Areas			Cr Action Levels
		Mean	Max	Mean	Max	Median	
Continued Surface Water Monitoring	ug/L	-	-	-	-	-	5.8
CWA-Regulated Surface Water	ug/L	NA	5.8	NA	4.6	NA	74
Non-Regulated Surface Water	mg/L	-	-	0.0071	0.038	0.0044	8.7
Continued Groundwater Monitoring	ug/L	-	-	-	-	-	25
Groundwater	ug/L	-	-	-	-	-	100
Sediments (regulated areas/aquatic life)	mg/kg dw	39.59	100	65.65	191	49	100
Sediments (terrestrial exposure)	mg/kg dw	-	-	-	-	-	187
Riparian/Fluvial Soils	mg/kg dw	46.3	130	103.3	970	59	130
Vegetation	mg/kg dw	1.76	9.9	1.51	5.7	1.2	30.6

The action levels for chromium were developed using the described approach with exception of the sediment and riparian soil concentrations, which defaulted to the maximum observed background concentration for each media.

Maximum observed surface water and vegetation concentrations for chromium samples collected during the area wide investigations are well below the action level concentrations. DEQ recommends that these pathways be eliminated from future site-specific investigative activities and that maximum observed area wide concentrations values of 0.0046 mg/L and 5.7 mg/kg dw, respectively, be used as conservative exposure point estimates if supplemental risk calculations are required involving these media.

For comparative purposes, the EPA's Region IV ecological soil screening level for chromium is reported to be 0.4 mg/kg while the Netherlands criteria is 100 mg/kg. The NOAA TEL for sediment is 36.3 mg/kg dw and the UET is 95 mg/kg dw.

Using the combined action level concentrations for chromium, the following hazard quotients were calculated for the selected target species.

TABLE 4-17: CHROMIUM HAZARD QUOTIENT RESULTS FOR SURROGATE SPECIES

Receptor Species	Mean HQ	HQ Range	Receptor Species	Mean HQ	HQ Range
Song Sparrow	20.2	18.1-22.6	Mink	0.6	0.5-0.7
Red-Winged Blackbird	10.8	9.3-12.9	Raccoon	0.6	0.5-0.8
American Robin	7.0	6.0-8.4	Great Blue Heron	0.5	0.4-0.8
Northern Bobwhite	6.2	5.7-6.8	Coyote	0.3	0.30-0.31
Mallard Duck	1.7	1.1-2.7	Northern Harrier	0.2	0.1-0.2
Eastern Cottontail	0.7	0.6-0.8			

4.3.5.4 Proposed Copper Action Levels

Copper was identified in the Area Wide Risk Assessment screening process as a contaminant of potential ecological concern based on observed upper percentile concentrations exceeding a hazard quotient of 1 in the Tier 1 deterministic assessment. Copper occurs frequently in the Resource Area but is at relatively low levels overall. The following action levels were developed for impacted areas exhibiting elevated copper concentrations.

TABLE 4-18: COPPER ACTION LEVELS

Media of Concern or Targeted Action	Units	Background		Impacted Areas			Cu Action Levels
		Mean	Max	Mean	Max	Median	
Continued Surface Water Monitoring	ug/L	-	-	-	-	-	3.3
CWA-Regulated Surface Water	ug/L	NA	3.3	2	15	0.2	11
Non-Regulated Surface Water	mg/L	-	-	0.0017	0.0044	0.0015	11
Continued Groundwater Monitoring	ug/L	-	-	-	-	-	11
Groundwater	ug/L	-	-	-	-	-	1300
Sediments (regulated areas/aquatic life)	mg/kg dw	11.34	25	14.81	44	14	197
Sediments (terrestrial exposure)	mg/kg dw	-	-	-	-	-	402
Riparian/Fluvial Soils	mg/kg dw	17.56	32	23.86	120	21	117
Vegetation	mg/kg dw	5.45	15	5.57	14	4.7	88

The action levels for copper were developed using the described approach for all media. Based on the proposed action levels, only surface water and riparian soil had a maximum observed concentration that would trigger EE/CA consideration and these were both marginal exceedances that occurred at a single data point. All other maximum observed media concentrations were significantly below the action level concentrations. DEQ recommends that copper be eliminated as a COC for future mine-specific activities.

For comparative purposes, the EPA's Region IV ecological soil screening level for copper is reported to be 40 mg/kg dw while the Netherlands criteria is 36 mg/kg dw. EPA Region IV sediment screening benchmark is reported to be 18.7 mg/kg dw while the NOAA TEL for sediment is 35.7 mg/kg dw and the UET is 86 mg/kg dw.

Using the combined action level concentrations for copper, the following hazard quotients were calculated for the selected target species.

TABLE 4-19: COPPER HAZARD QUOTIENT RESULTS FOR SURROGATE SPECIES

Receptor Species	Mean HQ	HQ Range	Receptor Species	Mean HQ	HQ Range
Song Sparrow	20.0	17.9-22.4	Mink	1.3	1.2-1.7
Red-Winged Blackbird	10.3	8.6-13.1	Mallard Duck	0.7	0.6-0.9
American Robin	6.2	5.2-7.2	Coyote	0.6	0.59-0.62
Northern Bobwhite	5.9	5.3-6.6	Great Blue Heron	0.3	0.2-0.4
Eastern Cottontail	2.9	2.5-3.5	Northern Harrier	0.1	0.06-0.13
Raccoon	1.4	1.3-1.5			

Using the maximum observed impacted vegetation concentration for copper in the song sparrow model representing the most sensitive receptor, the mean hazard quotient becomes 3.3, and all the other receptor HQs drop well below 10. This further supports eliminating copper from the COC list.

4.3.5.5 Proposed Nickel Action Levels

Nickel was identified in the Area Wide Risk Assessment screening process as a contaminant of potential ecological concern based on observed upper percentile concentrations. It occurs throughout the Resource Area but is of primary concern in riparian soils and sediments. The following action levels are proposed for impacted areas exhibiting elevated nickel concentrations.

TABLE 4-20: NICKEL ACTION LEVELS

Media of Concern or Targeted Action	Units	Background		Impacted Areas			Ni Action Levels
		Mean	Max	Mean	Max	Median	
Continued Surface Water Monitoring	ug/L	-	-	-	-	-	4
CWA-Regulated Surface Water	ug/L	1	4	1.8	43	1.1	160
Non-Regulated Surface Water	ug/L	-	-	48.2	1500	8.1	614
Continued Groundwater Monitoring	ug/L	-	-	-	-	-	160
Groundwater	ug/L	-	-	-	-	-	730
Sediments (regulated areas/aquatic life)	mg/kg dw	19.13	44	41.01	164	27	44
Sediments (terrestrial exposure)	mg/kg dw	-	-	-	-	-	44
Riparian/Fluvial Soils	mg/kg dw	24.62	47	47.9	280	34	47
Vegetation	mg/kg dw	0.86	4.4	2.18	8.6	1.8	35.5

The action levels for nickel were developed using the described approach with exception of the sediment and riparian soil concentrations, which defaulted to the maximum observed background concentration for each media.

The maximum observed regulated surface water and vegetation concentrations are well below the action level concentrations. DEQ recommends that these pathways be eliminated from future investigative activities. If exposure point concentration estimates are required for these media in subsequent risk calculations, the maximum observed area wide values of 0.043 mg/L and 8.6 mg/kg dw, respectively, should be used as conservative estimates.

For comparative purposes, the EPA's Region IV ecological soil screening level for nickel is reported to be 30 mg/kg dw while the Netherlands criteria is 35 mg/kg dw. The NOAA TEL for nickel in sediment is 18 mg/kg dw and the UET is 43 mg/kg dw.

Using the combined action level concentrations for nickel, the following hazard quotients were calculated for the selected target species.

TABLE 4-21: NICKEL HAZARD QUOTIENT RESULTS FOR SURROGATE SPECIES

Receptor Species	Mean HQ	HQ Range	Receptor Species	Mean HQ	HQ Range
Eastern Cottontail	20.7	16.8-25.7	Mink	3.4	2.7-4.6
Song Sparrow	14.8	12.3-17.3	Coyote	1.5	1.3-1.6
Red-Winged Blackbird	7.4	5.8-9.2	Mallard Duck	0.3	0.1-0.5
Raccoon	5.0	3.9-7.1	Great Blue Heron	0.05	0.04-0.07
Northern Bobwhite	4.3	3.6-4.9	Northern Harrier	0.04	0.03-0.06
American Robin	4.3	3.5-5.2			

4.3.5.6 Proposed Vanadium Action Levels

Vanadium was identified in the Area Wide Risk Assessment screening process as a contaminant of potential ecological concern based on observed upper percentile concentrations. It occurs throughout the Resource Area but is of primary concern in unregulated surface water, riparian soils and sediments. The following action levels are proposed for impacted areas exhibiting elevated vanadium concentrations.

TABLE 4-22: VANADIUM ACTION LEVELS

Media of Concern or Targeted Action	Units	Background		Impacted Areas			V Action Levels
		Mean	Max	Mean	Max	Median	
Continued Surface Water Monitoring	ug/L	-	-	-	-	-	8.1
CWA-Regulated Surface Water	ug/L	NA	8.1	1.2	6.2	1.0	20
Non-Regulated Surface Water	ug/L	-	-	23.2	3000	7.6	972
Continued Groundwater Monitoring	ug/L	-	-	-	-	-	20
Groundwater	ug/L	-	-	-	-	-	260
Sediments (regulated areas/aquatic life)	mg/kg dw	35.3	72	54.3	133	49	72
Sediments (terrestrial exposure)	mg/kg dw	-	-	-	-	-	72
Riparian/Fluvial Soils	mg/kg dw	51.8	100	82.1	500	66	100
Vegetation	mg/kg dw	0.74	5.5	0.98	5.3	0.77	55.9

The action levels for vanadium were developed using Tier II Secondary Chronic Benchmarks and Human Health Tap Water Criteria for surface and groundwater action levels, respectively. The intended action levels for sediments and riparian soils using the established process were 36.4 mg/kg dw and 25.1 mg/kg dw, respectively. However, both media defaulted to the higher maximum observed background concentration values.

The maximum observed regulated surface water and vegetation concentrations are well below the action level concentrations. DEQ recommends that these pathways be eliminated from future investigative activities. If exposure point concentrations are required for these media for subsequent risk calculations, the maximum observed area wide values of 0.0062 mg/L and 5.3 mg/kg dw, respectively, should be used to represent conservative estimates.

For comparative purposes, the EPA's Region IV ecological soil screening level for vanadium is reported to be 2 mg/kg dw. Vanadium does not have any NOAA sediment values established. Using the combined action level concentrations for vanadium, the following hazard quotients were calculated for the selected target species.

TABLE 4-23: VANADIUM HAZARD QUOTIENT RESULTS FOR SURROGATE SPECIES

Receptor Species	Mean HQ	HQ Range	Receptor Species	Mean HQ	HQ Range
Eastern Cottontail	20.8	16.8-25.4	Coyote	1.5	1.4-1.7
American Robin	6.2	5.2-7.2	Northern Bobwhite	1.0	0.8-1.1
Raccoon	4.3	3.6-5.6	Mallard Duck	0.05	0.02-0.08
Mink	3.3	2.8-4.5	Northern Harrier	0.008	0.005-0.014
Song Sparrow	3.3	2.7-3.8	Great Blue Heron	0.007	0.005-0.009
Red-Winged Blackbird	1.7	1.4-2.1			

4.3.5.7 Proposed Zinc Action Levels

Zinc was identified in the Area Wide Risk Assessment screening process as a contaminant of potential ecological concern based on observed upper percentile concentrations in vegetation, sediments and riparian soils. The following action levels are proposed for impacted areas exhibiting elevated zinc concentrations.

TABLE 4-24: ZINC ACTION LEVELS

Media of Concern or Targeted Action	Units	Background		Impacted Areas			Zn Action Levels
		Mean	Max	Mean	Max	Median	
Continued Surface Water Monitoring	ug/L	-	-	-	-	-	59
CWA-Regulated Surface Water	ug/L	14.5	59	23.1	120	11	100
Non-Regulated Surface Water	mg/L	-	-	0.3729	6.6	0.0081	43.4
Continued Groundwater Monitoring	ug/L	-	-	-	-	-	100
Groundwater	ug/L	-	-	-	-	-	5000
Sediments (regulated areas/aquatic life)	mg/kg dw	83.53	210	196.03	866	110	210
Sediments (terrestrial exposure)	mg/kg dw	-	-	-	-	-	210
Riparian/Fluvial Soils	mg/kg dw	165.2	660	191.86	1400	130	738
Vegetation	mg/kg dw	31.93	140	58.13	790	33	615

The action levels for zinc were developed using the described approach except for the groundwater action level based on the secondary drinking water standards, and the sediment action level defaulted to the maximum observed background concentration.

For comparative purposes, the EPA's Region IV ecological soil screening level for zinc is reported to be 50 mg/kg dw while the Netherlands criteria is 140 mg/kg dw. EPA Region IV sediment screening benchmark is reported to be 124 mg/kg dw while the NOAA TEL and UET for zinc in sediment are 98 mg/kg dw and 520 mg/kg dw, respectively.

Using the combined action level concentrations for zinc, the following hazard quotients were calculated for the selected target species.

TABLE 4-25: ZINC HAZARD QUOTIENT RESULTS FOR SURROGATE SPECIES

Receptor Species	Mean HQ	HQ Range	Receptor Species	Mean HQ	HQ Range
Song Sparrow	22.1	19.7-24.7	Mink	1.4	1.3-1.8
Red-Winged Blackbird	11.7	10.2-13.9	Coyote	0.7	0.71-0.75
American Robin	7.7	6.7-9.0	Great Blue Heron	0.4	0.3-0.6
Northern Bobwhite	6.7	5.9-7.3	Mallard Duck	0.4	0.3-0.5
Eastern Cottontail	4.9	4.2-5.9	Northern Harrier	0.1	0.12-0.18
Raccoon	1.4	1.3-1.5			

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5.0 SUMMARY AND CONCLUSIONS

As the Lead Agency for the Area Wide Investigation of selenium and related metal releases from historic phosphate mining operations, DEQ was assigned the task of developing a regional Risk Management Plan. The document is intended to provide discretionary risk management guidance to assist other Lead and Support Agencies in making site-specific risk management decisions in a consistent manner by applying a regional perspective. However, this document does not supercede any Lead Agency authorities nor does it reduce their need to modify their risk management approaches to meet site-specific goals and conditions. The Risk Management Plan provides a brief summary of prior area wide activities, a description of the steps required in implementing the mine-specific non-time critical removal action process, and proposed area wide removal action goals, objectives and action levels in accordance with the Area Wide Investigation scope of work.

DEQ's risk assessment efforts indicated that regional human health and population-level ecological risks were unlikely based on current conditions. However, localized subpopulation risks to aquatic, terrestrial, and avian receptors were apparent in impacted areas as indicated by observed concentrations significantly above referenced risk threshold values and benchmarks. These impacts and releases are to be addressed on a mine-specific basis using the non-time critical removal action process consistent with CERCLA and the NCP.

DEQ's risk management decisions focus on identifying individual release pathways and impacted areas from historic mining operations, achieving compliance with Federal and State regulatory requirements, and reducing exposures that may result in unacceptable risks to local ecological populations and communities in sensitive habitats at or near individual mine sites. The Area Wide Removal Action Goals and Objectives target the protection of surface water, ground water, wildlife, and multiple beneficial uses in the Resource Area.

Monitoring action levels were developed for continued trend monitoring at individual sites based on area wide surface water background concentrations and ground water goals. Regulatory-based removal action levels were developed in consideration of existing chemical-specific ARARs. Risk-based removal action levels were developed from referenced toxicological benchmarks and subpopulation risk models for sensitive receptors residing in impacted areas during critical periods. Area wide subpopulation risks are considered synonymous with risks to local populations/communities at or near the individual sites per EPA risk guidance.

Based on the risk management analysis, DEQ is recommending that copper be eliminated from the site-specific COC list, and that future site-specific surface water and vegetation sampling requirements be eliminated for chromium, nickel and vanadium. Supplemental risk assessment needs that require estimates of exposure point concentrations for surface water or vegetation should use the maximum observed values for chromium, nickel and vanadium as conservative approximations.

DEQ recommends that site-specific investigations include data from a near-normal annual precipitation year prior to completing the removal action process and that the Agencies and Companies consider the development of an integrated long-term monitoring program in the Resource Area to ensure the maintenance of future water quality.

In conclusion, this plan was developed by DEQ, in collaboration with our interagency partners, to provide discretionary guidance for site-specific risk management decision-making. It provides a basis for addressing releases and associated impacts from historic phosphate mining operations by developing consistent goals and objectives with a regional perspective.

DEQ appreciates the continued efforts and involvement of all stakeholders in attempting to resolve the selenium issues in Southeast Idaho, and we remain committed to the protection of public health and preservation of the environment in support of it's varied beneficial uses. Stakeholders and interested parties can remain engaged in this process through attending periodic meetings of the Selenium Area Wide Advisory Committee (SeAWAC), reviewing downloadable Area Wide and Site-specific documents posted on the Selenium Information System Project website (See Section 1.2), participating in future EE/CA public comment periods, and/or visiting or contacting the Lead or Support Agency representatives to check on the status of the regulatory efforts.

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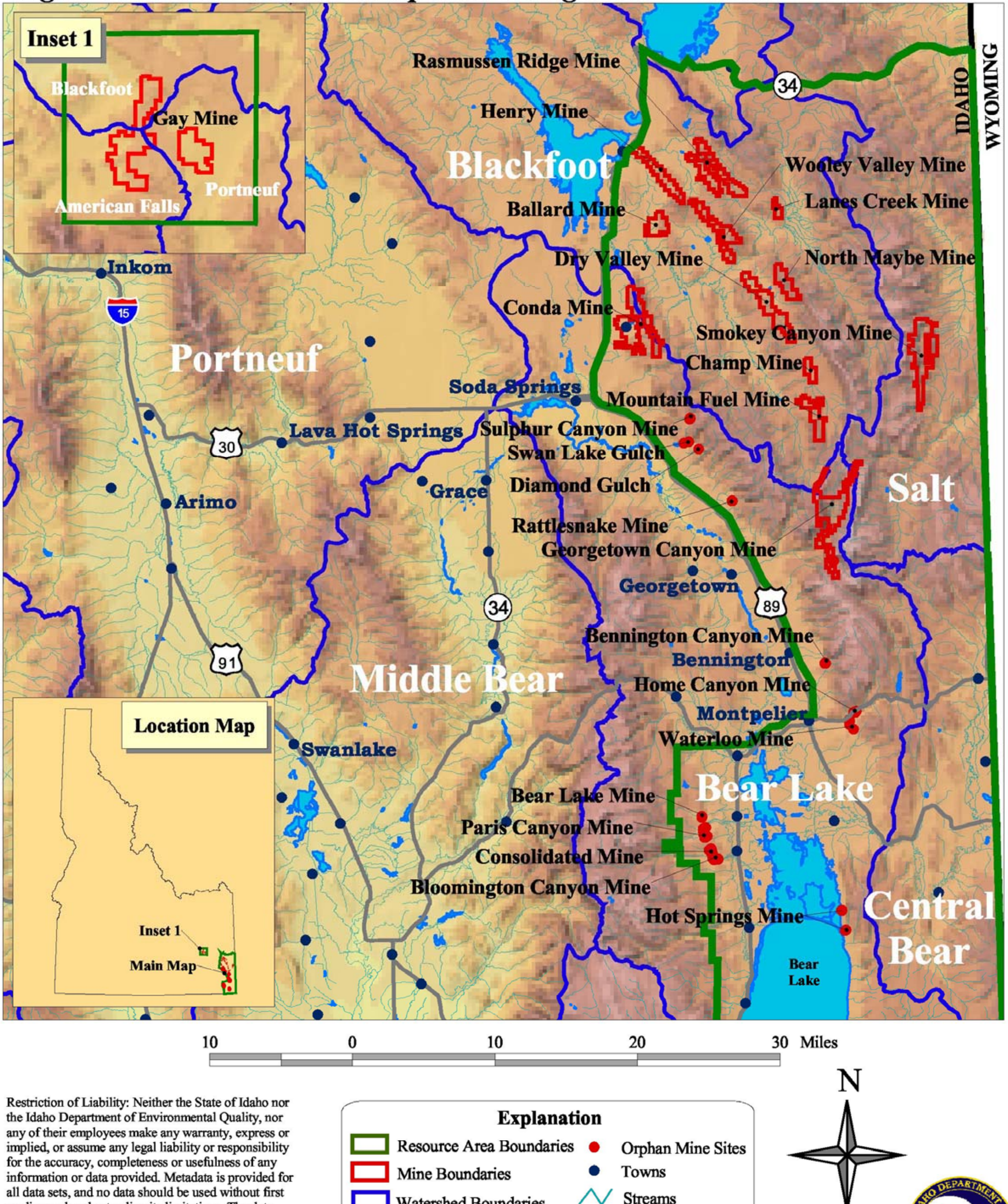
FIGURES

Figure 1: Southeast Idaho Phosphate Mining Resource Area



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ATTACHMENT 1

ACTION LEVEL DEVELOPMENT PROCEDURES

ATTACHMENT 1

PROCEDURES FOR DEVELOPMENT OF ACTION LEVELS FOR RIPARIAN SOIL, SEDIMENT, SURFACE WATER, AND TERRESTRIAL VEGETATION

1.0 INTRODUCTION

The development of action levels for riparian soil, sediment, surface water, and terrestrial vegetation was conducted in a sequential manner using both stochastic and risk-based calculations, background concentrations, and promulgated standards. The general process was as follows.

1. **Development of Risk-Based Acceptable Media Concentrations -** Acceptable media concentrations were calculated for riparian soil, sediment, surface water, and terrestrial vegetation by modifying a standard dose and hazard quotient (HQ) calculation to calculate the acceptable media concentration based on the use of no observed adverse effects level (NOAEL) toxicity reference values (TRV) and an HQ of 1.0. The acceptable media concentrations were calculated for multiple species covering important feeding guilds in the Phosphate Resource Area. To account for exposure from multiple media, the acceptable risk-based action levels were set at one-half of the calculated single dose values.

2. **Comparisons to Promulgated Criteria or Standards -** If available, promulgated criteria or guidance were compared to the calculated action levels. Criteria were available for regulated surface water and sediments. The surface water criteria selected were the chronic ambient water quality criteria (AWQC). AWQC were selected for surface water because these are promulgated criteria that are enforced. The sediment criteria selected were the National Oceanographic and Atmospheric Administration (NOAA) probable effects levels (PEL). The PELs were selected because these are the levels above which effects are anticipated and the area is naturally high in a number of metals. The surface water and sediment criteria were compared to the calculated acceptable action levels and the lowest concentration was retained as the preliminary action level. In the case of riparian soil and terrestrial vegetation, the calculated acceptable action levels became the preliminary action levels.

3. **Comparison to Background Concentrations -** Because of the high concentrations of some naturally occurring metals in the Phosphate Resource Area, the preliminary action levels were compared to the background data set for each media. If the maximum detected concentration in the background data set for a media (assumed to represent an upper percentile of the true background population) exceeded the preliminary action level, the maximum detected background concentration was used as the action level. Background concentrations were also used to establish surface water monitoring action levels for identification of potential mining release pathways during site-specific investigations.

4. **Risk Evaluation of Selected Action Levels -** Due to exposure to contaminants from multiple media in the Phosphate Resource Area, the final stage of action level development was to incorporate the selected action levels for each contaminant into a stochastic HQ calculation for the most sensitive receptors for that contaminant to determine a NOAEL-based TRV HQ. These HQs for the sensitive species were evaluated and risk management decisions were made concerning the acceptability of the selected action levels.

The following sections describe each step in the action level development process.

2.0 DEVELOPMENT OF RISK-BASED ACCEPTABLE MEDIA CONCENTRATIONS

The calculated acceptable action levels were calculated for sediment, riparian soil, surface water, and terrestrial vegetation for the following receptors.

- American Robin (*Turdus migratorius*)
- Coyote (*Canis latrans*)
- Deer Mouse (*Peromyscus maniculatus*)
- Eastern Cottontail (*Sylvilagus floridanus*)
- Great Blue Heron (*Ardea herodias*)
- Mallard (*Anas platyrhynchas*)
- Meadow Vole (*Microtus pennsylvanicus*)
- Mink (*Mustela vison*)
- Northern Bobwhite (*Colinus virginianus*)
- Northern Harrier (*Circus cyaneus*)
- Raccoon (*Procyon lotor*)
- Red-winged Blackbird (*Agelaius phoeniceus*)
- Song Sparrow (*Melospiza melodia*)

Acceptable concentrations for each media were calculated by assuming that only the media of concern contributed to the dose, site use was 100 percent contaminated area, TRVs were NOAEL-based with acceptable HQs equal to 1.0, and the body weight was the mean value. The ingestion rates for each receptor for the various media were calculated based on the body weight. The formula for calculating the ingestion rate for each receptor and all other exposure parameters are found in Table 1-1.

The dose equations used for each receptor are as follows.

American Robin

The dose equation used for the American robin is as follows:

$$Dose_{Total} = (SUF) \times \frac{\left[(C_{soil} \times IR_{soil}) + \left\{ \begin{matrix} 49.0\% (C_{terrestrial\ plants} \times IR_{prey}) + \\ 49.0\% (C_{terrestrial\ insects} \times IR_{prey}) \end{matrix} \right\} \right]}{BW}$$

where

C_{soil}	=	Concentration of chemical in riparian soils
$C_{terrestrial\ insects}$	=	Concentration of chemical in terrestrial invertebrates
$C_{terrestrial\ plants}$	=	Concentration of chemical in terrestrial plants
IR_{soil}	=	Ingestion rate of riparian soil (kg per day)
IR_{prey}	=	Ingestion rate of prey (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for terrestrial riparian soils, terrestrial plants, and terrestrial insect data. It is assumed that the water requirement for the American robin is obtained from its food source.

Coyote

The dose equation used for the coyote is as follows:

$$\mathrm{Dose}_{\mathrm{Total}} = (\mathrm{SUF})(\mathrm{TTC}) \times \frac{\left[\begin{matrix} (\mathrm{C}_{\mathrm{soils}} \times \mathrm{IR}_{\mathrm{soils}}) + (\mathrm{C}_{\mathrm{surface\ water}} \times \mathrm{IR}_{\mathrm{water}}) \\ + \left\{ \begin{matrix} 9.7\% (\mathrm{C}_{\mathrm{terrestrial\ plants}} \times \mathrm{IR}_{\mathrm{prey}}) \\ + 87.5\% (\mathrm{C}_{\mathrm{smallmammals}} \times \mathrm{IR}_{\mathrm{prey}}) \end{matrix} \right\} \end{matrix} \right]}{\mathrm{BW}}$$

where

C_{soil}	=	Concentration of chemical in riparian soils
$C_{small\ mammals}$	=	Concentration of chemical in small mammals

$C_{terrestrial\ plants}$ = Concentration of chemical in terrestrial plants

$C_{surface\ water}$ = Concentration of chemical in surface water

IR_{prey} = Ingestion rate of prey (kg per day)

IR_{soil} = Ingestion rate of riparian soil (kg per day)

IR_{water} = Ingestion rate of surface water (kg per day)

BW = Body weight of receptor species (kg)

SUF = Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for terrestrial riparian soils, surface water, terrestrial plants, and terrestrial mammal.

Deer Mouse

The dose equation used for the deer mouse is as follows:

$$Dose_{Total} = (SUF) \times \frac{\left[(C_{soil} \times IR_{soil}) + \left\{ \begin{matrix} 53.4\%(C_{terrestrial\ plants} \times IR_{prey}) + \\ 44.6\%(C_{terrestrial\ insects} \times IR_{prey}) \end{matrix} \right\} \right]}{BW}$$

where:

C_{soil} = Concentration of chemical in riparian soils

$C_{terrestrial\ insects}$ = Concentration of chemical in terrestrial invertebrates

$C_{terrestrial\ plants}$ = Concentration of chemical in terrestrial plants

IR_{soil} = Ingestion rate of riparian soil (kg per day)

IR_{prey} = Ingestion rate of prey (kg per day)

BW = Body weight of receptor species (kg)

SUF = Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for terrestrial riparian soils, terrestrial plants, and terrestrial insect data. It is assumed that the water requirement for the deer mouse is obtained from its food source.

Eastern Cottontail

The dose equation used for the eastern cottontail is as follows:

$$Dose_{Total} = (SUF) \times \frac{\left[(C_{soil} \times IR_{soil}) + 97.6\% (C_{terrestrial\ plants} \times IR_{prey}) \right]}{BW}$$

where:

C_{soil}	=	Concentration of chemical in riparian soils
$C_{terrestrial\ plants}$	=	Concentration of chemical in terrestrial plants
IR_{soil}	=	Ingestion rate of riparian soil (kg per day)
IR_{prey}	=	Ingestion rate of prey (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for terrestrial riparian soils and terrestrial plants. It is assumed that the water requirement for the eastern cottontail is obtained from its food source.

Great Blue Heron

The dose equation used for the great blue heron is as follows:

$$\mathrm{Dose}_{\mathrm{Total}} = (\mathrm{SUF}) \times \frac{\begin{bmatrix} (\mathrm{C}_{\mathrm{sediments}} \times \mathrm{IR}_{\mathrm{se\,dim\,emts}}) + (\mathrm{C}_{\mathrm{surface\ water}} \times \mathrm{IR}_{\mathrm{water}}) \\ + 82.8\% (\mathrm{C}_{\mathrm{fish}} \times \mathrm{IR}_{\mathrm{prey}}) + 17.2\% (\mathrm{C}_{\mathrm{terrestrialinverts}} \mathrm{x} \mathrm{IR}_{\mathrm{terrestrialinverts}}) \end{bmatrix}}{\mathrm{BW}}$$

where:

C_{fish}	=	Concentration of chemical in fish
$C_{terrestrial\ invertebrates}$	=	Concentration of chemical in riparian invertebrates
$C_{sediments}$	=	Concentration of chemical in sediments
$C_{surface\ water}$	=	Concentration of chemical in surface water
$IR_{sediments}$	=	Ingestion rate of riparian soil (kg per day)

IR_{prey}	=	Ingestion rate of prey (kg per day)
$IR_{surface\ water}$	=	Ingestion rate of surface water (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consisted of data for aquatic sediments, surface water, fish, and terrestrial invertebrates.

Mallard

The dose equation used for the mallard is as follows:

$$Dose_{Total} = (SUF) \times \frac{\left[\begin{array}{l}(C_{\text{sediments}} \times IR_{sediment}) + (C_{surface\ water} \times IR_{water}) \\ + \left\{\begin{array}{l}24.5\%(C_{aquatic\ plants} \times IR_{prey}) \\ + 72.2\%(C_{aquatic\ invertebrates} \times IR_{prey})\end{array}\right\}\end{array}\right]}{BW}$$

where:

$C_{aquatic\ plants}$	=	Concentration of chemical in aquatic plants
$C_{aquatic\ invertebrates}$	=	Concentration of chemical in aquatic invertebrates
$C_{sediments}$	=	Concentration of chemical in sediments
$C_{surface\ water}$	=	Concentration of chemical in surface water
$IR_{sediment}$	=	Ingestion rate of sediment (kg per day)
IR_{prey}	=	Ingestion rate of prey (kg per day)
$IR_{surface\ water}$	=	Ingestion rate of surface water (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for sediments, surface water, aquatic plants, and aquatic invertebrates.

Meadow Vole

The dose equation used for the meadow vole is as follows:

$$\mathrm{Dose}_{\mathrm{Total}} = (\mathrm{SUF}) \times \frac{\begin{bmatrix} (\mathrm{CsoilxIR}_{\mathrm{soil}}) + 95.6\%(\mathrm{C}_{\mathrm{terrestrial\ plants}} \times \mathrm{IR}_{\mathrm{prey}}) \\ + 1.96\%(\mathrm{C}_{\mathrm{terrestrialinvertebrates}} \times \mathrm{IR}_{\mathrm{prey}}) \end{bmatrix}}{\mathrm{BW}}$$

where:

$C_{terrestrial\ invertebrates}$	=	Concentration of chemical in terrestrial invertebrates
$C_{terrestrial\ plants}$	=	Concentration of chemical in terrestrial plants
C_{soil}	=	Concentration of chemical in riparian soil
IR_{soil}	=	Ingestion rate of riparian soil (kg per day)
IR_{prey}	=	Ingestion rate of prey (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for riparian soils, terrestrial plants, and terrestrial insects. It is assumed that the water requirement for the meadow vole is obtained from its food source.

Mink

The basic equation used for the mink is as follows:

$$\mathrm{Dose}_{\mathrm{Total}} = (\mathrm{SUF})(\mathrm{TTC}) \times \frac{\begin{bmatrix} (\mathrm{C}_{\mathrm{sediments}} \times \mathrm{IR}_{\mathrm{sediment}}) + (\mathrm{C}_{\mathrm{surface\ water}} \times \mathrm{IR}_{\mathrm{water}}) + (\mathrm{C}_{\mathrm{soil}} \times \mathrm{IR}_{\mathrm{soil}}) \\ + \left\{ \begin{array}{l} 3.86\%(\mathrm{C}_{\mathrm{aquatic\ plants}} \times \mathrm{IR}_{\mathrm{prey}}) \\ 3.86\%(\mathrm{C}_{\mathrm{terrestrial\ plants}} \times \mathrm{IR}_{\mathrm{prey}}) \\ + 6.4\%(\mathrm{C}_{\mathrm{aquatic\ invertebrates}} \times \mathrm{IR}_{\mathrm{prey}}) \\ + 4.7\%(\mathrm{C}_{\mathrm{smallmammals}} \times \mathrm{IR}_{\mathrm{prey}}) \\ + 62.4\%(\mathrm{C}_{\mathrm{fish}} \times \mathrm{IR}_{\mathrm{prey}}) \end{array} \right\} + \end{bmatrix}}{\mathrm{BW}}$$

where

$C_{aquatic\ plants}$	=	Concentration of chemical in aquatic plants
$C_{aquatic\ invertebrates}$	=	Concentration of chemical in aquatic invertebrates
C_{fish}	=	Concentration of chemical in fish

$C_{terrestrial\ plants}$ = Concentration of chemical in terrestrial plants

C_{soil} = Concentration of chemical in riparian soil

$C_{sediments}$ = Concentration of chemical in sediments

$C_{small\ mammals}$ = Concentration of chemical in small mammals

$C_{surface\ water}$ = Concentration of chemical in surface water

$IR_{sediment}$ = Ingestion rate of sediment (kg per day)

IR_{soil} = Ingestion rate of riparian soil (kg per day)

IR_{prey} = Ingestion rate of prey (kg per day)

IR_{water} = Ingestion rate of surface water (kg per day)

BW = Body weight of receptor species (kg)

SUF = Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for sediments, surface water, aquatic and terrestrial plants, aquatic invertebrates, small mammals, and fish.

Northern Bobwhite

The dose equation used for the northern bobwhite is as follows:

$$Dose_{Total} = (SUF) \times \frac{\left[(C_{soil} \times IR_{soil}) + \begin{Bmatrix} 83.8\%(C_{terrestrial\ plants} \times IR_{prey}) + \\ 14.1\%(C_{terrestrial\ insects} \times IR_{prey}) \end{Bmatrix} \right]}{BW} \quad (7\text{-}2)$$

where:

$C_{terrestrial\ insects}$ = Concentration of chemical in terrestrial invertebrates

$C_{terrestrial\ plants}$ = Concentration of chemical in terrestrial plants

C_{soil} = Concentration of chemical in riparian soil

IR_{soil} = Ingestion rate of riparian soil (kg per day)

IR_{prey} = Ingestion rate of prey (kg per day)

BW = Body weight of receptor species (kg)

SUF = Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for terrestrial riparian soils, terrestrial plants, and terrestrial insects. It is assumed that the water requirement for the northern bobwhite is obtained from its food source.

Northern Harrier

The dose equation used for the northern harrier is as follows:

$$\mathrm{Dose}_{\mathrm{Total}} = (\mathrm{SUF})(\mathrm{TTC}) \times \frac{\left[\begin{array}{l} (C_{\mathrm{soils}} \times IR_{\mathrm{soils}}) \\ + \left\{ \begin{array}{l} 2.5\%(C_{\mathrm{terrestrial invertebrates}} \times IR_{\mathrm{prey}}) \\ + 96.8\%(C_{\mathrm{small mammals}} \times IR_{\mathrm{prey}}) \end{array} \right\} \end{array} \right]}{BW} \quad (7\text{-}15)$$

where

$C_{small\ mammals}$ = Concentration of chemical in small mammals

$C_{terrestrial\ invertebrates}$ = Concentration of chemical in terrestrial invertebrates

C_{soil} = Concentration of chemical in riparian soil

IR_{prey} = Ingestion rate of prey (kg per day)

IR_{soil} = Ingestion rate of riparian soil (kg per day)

BW = Body weight of receptor species (kg)

SUF = Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for terrestrial riparian soils, terrestrial invertebrate, and small mammals.

Raccoon

The dose equation used for the raccoon as follows:

$$
Dose_{Total} = (SUF) \times \frac{\left[\begin{array}{l} (C_{sediments} \times IR_{sediment}) + (C_{surface\ water} \times IR_{water}) \\ + \left\{ \begin{array}{l} 24.0\%(C_{aquatic\ plants} \times IR_{prey}) \\ + 24.0\%(C_{terrestrial\ plants} \times IR_{prey}) \\ + 31.7(C_{aquatic\ invertebrates} \times IR_{prey}) \\ + 9.1\%(C_{smallmammals} \times IR_{prey}) \\ + 1.8\%(C_{fish} \times IR_{prey}) \end{array} \right\} \end{array} \right]}{BW}
$$

where:

$C_{aquatic\ invertebrates}$	=	Concentration of chemical in aquatic invertebrates
$C_{aquatic\ plants}$	=	Concentration of chemical in aquatic plants
$C_{terrestrial\ plants}$	=	Concentration of chemical in terrestrial plants
$C_{sediments}$	=	Concentration of chemical in sediments
$C_{small\ mammals}$	=	Concentration of chemical in small mammals
$C_{surface\ water}$	=	Concentration of chemical in surface water
$IR_{sediment}$	=	Ingestion rate of sediment (kg per day)
IR_{prey}	=	Ingestion rate of prey (kg per day)
IR_{water}	=	Ingestion rate of surface water (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for sediments, surface water, aquatic and riparian plants, aquatic invertebrates, riparian mammals, and fish.

Red-Winged Blackbird

The dose equation used for the red-winged blackbird is as follows:

$$\text{Dose}_{\text{Total}} = (\text{SUF}) \times \frac{\left[(\text{C}_{\text{soil}} \times \text{IR}_{\text{soil}}) + \left\{ \begin{array}{l} 78.4\% (\text{C}_{\text{terrestrial plants}} \times \text{IR}_{\text{prey}}) + \\ 21.5\% (\text{C}_{\text{terrestrialinvertebrates}} \times \text{IR}_{\text{prey}}) \end{array} \right\} \right]}{\text{BW}}$$

where:

$C_{\text{terrestrial invertebrates}}$	=	Concentration of chemical in terrestrial invertebrates
$C_{\text{terrestrial plants}}$	=	Concentration of chemical in terrestrial plants
C_{soil}	=	Concentration of chemical in riparian soil
IR_{soil}	=	Ingestion rate of riparian soil (kg per day)
IR_{prey}	=	Ingestion rate of prey (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consists of data for riparian soils, terrestrial plants, and terrestrial insects. It is assumed that the water requirement for the red-winged blackbird is obtained from its food source.

Song Sparrow

The dose equation used for the song sparrow is as follows:

$$\text{Dose}_{\text{Total}} = (\text{SUF}) \times \frac{\left[(\text{C}_{\text{soil}} \times \text{IR}_{\text{soil}}) + 98.0\% (\text{C}_{\text{terrestrialplants}} \times \text{IR}_{\text{prey}}) \right]}{\text{BW}}$$

where:

$C_{\text{terrestrial plants}}$	=	Concentration of chemical in terrestrial plants
C_{soil}	=	Concentration of chemical in riparian soil
IR_{soil}	=	Ingestion rate of riparian soil (kg per day)
IR_{prey}	=	Ingestion rate of prey (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0

Input consisted of data for riparian soils and riparian plants. It was assumed that the water requirement for the song sparrow is obtained from its food source.

To determine acceptable action levels for a media, the dose equations were modified to allow the calculation of media concentrations based on an HQ of 1.0 and NOAEL-based TRVs. The general calculation is as follows.

$$AC_{media1} = (((TRV * BW) / SUF) - (IR_{media2} * C_{media2}) - (IR_{media3} * C_{media3})) / IR_{media1}$$

where:

AC_{media1}	=	Acceptable concentration in media 1
C_{media2}	=	Concentration of chemical in second media
C_{media3}	=	Concentration of chemical in third media
IR_{media1}	=	Ingestion rate of media 1 (kg per day)
IR_{media2}	=	Ingestion rate of media 2 (kg per day)
IR_{media3}	=	Ingestion rate of media 3 (kg per day)
BW	=	Body weight of receptor species (kg)
SUF	=	Site use factor to account for the amount of time that the organism spends using the site, always set as 1.0
TRV	=	Toxicity reference value

The equations were modified based on the media of exposure for each individual receptor. The TRVs used in the calculations are presented in Tables 1-2 and 1-3.

After the riparian soil, sediment, surface water, and terrestrial plant concentrations that corresponded to a NOAEL-based HQ of 1.0 were calculated, the risk managers evaluated the distribution of the calculated acceptable concentrations for each media. Based on this evaluation, a sensitive receptor was selected for each media. The calculated acceptable action level for each media was set at one-half the single media concentrations to account for exposure from multiple media.

3.0 COMPARISONS TO PROMULGATED CRITERIA OR STANDARDS

Surface water and sediment were compared to AWQCs and PELs, respectively, for all contaminants. Terrestrial vegetation was compared to existing reclamation management criteria for selenium only. Based on the comparisons conducted, the lower of the promulgated criteria/standard or the calculated acceptable action level were selected as the preliminary action level for each media and contaminant.

4.0 COMPARISON TO BACKGROUND CONCENTRATIONS

Sediment, riparian soils, and vegetation preliminary action levels were compared to maximum observed background concentrations found during the Area Wide Investigation sampling activities. The maximum observed background concentrations in the existing dataset are considered to represent an upper percentile value of the true background population within the Resource Area. If this background concentration was greater than the preliminary action level, the action level was set at the maximum detected background concentration. The background data is presented in Table 1-4. Background values were also used to establish surface water monitoring action levels for initial identification of potential mining release pathways during site-specific investigations.

5.0 RISK EVALUATION OF SELECTED ACTION LEVELS

Following the selection of action levels, a risk evaluation was conducted for all receptors based on the action levels that were selected. The risk evaluation was necessary to ensure that cumulative doses from media selected for action level development and other media (aquatic plants, terrestrial invertebrates, etc.) did not result in unacceptable risks to receptors in the Phosphate Resource Area. The calculations used for each receptor are presented in Section 2.0.

Due to the wide variability of concentrations in various media in the impacted areas of the Phosphate Resource Area and a range of potential body weights for each receptor species, a partial stochastic risk calculation was performed for each receptor. Media for which action levels were developed (sediment, surface water, riparian soils, and terrestrial vegetation) used the action levels as deterministic dose variables.

Body weights and associated media ingestion rates were used as stochastic variables. A normal distribution was assumed for the body weights of all receptors. The distribution assumptions and basis for the body weight distribution for each receptor are presented in Table 1-5.

Any media that had no action level established was utilized as a stochastic variable in the calculations. Statistical analyses and distribution data for all media from impacted areas is presented in Table 1-6.

The HQs for each receptor and contaminant were calculated using the Crystal Ball© software program and presented as distributions of HQs. The distribution of the HQs was evaluated by the risk managers to ensure that the selected action levels were protective.

TABLE AT1-1

SUMMARY OF EXPOSURE PARAMETER BASIS FOR BIRDS AND MAMMALS
ACTION LEVEL DETERMINATIONS
SOUTHEAST IDAHO PHOSPHATE RESOURCE AREA

Exposure Parameter	Mean	Reference and Basis of Value
Body Weight (grams)		
Northern bobwhite	191.1	Robel (1969, as cited in EPA 1993) based on average body weight of both sexes for three seasons from Kansas
Eastern cottontail	1,231	Lord (1963, as cited in EPA 1993) based on mean for both sexes from Illinois
American robin	81.0	Based on EPA (1993) the mean body weight for breeding and non-breeding male and females calculated as 81.02 grams with a range of 63.5 to 103 grams based on Clench and Leberman (1978) and Wheelwright (1986) as cited in EPA 1993.
Deer mouse	21.0	Millar (1989, as cited in EPA 1993) based on body weights for both males and females from North America
Song sparrow	22.9	The mean body weight based on adults of both sexes is estimated to be 22.9 grams based on Smith and Arcese (1988).
Meadow vole	35.4	Based on EPA (1993) the mean body weight for both male and females is calculated as 35.4 grams based on Abramsky and Tracy (1980) and Myers and Krebs (1971).
Red-winged blackbird	59.0	Beletsky (1996)
Great blue heron	2,295	Mean body weight for adult males and females is assumed to be 2, 295 grams grams based on Butler (1992).
Mallard duck	1,134	Nelson and Martin (1953, as cited in EPA 1993) based on average of mean body weights for both males and females from throughout the United States
Raccoon	6,700	Based on EPA (1993) the mean body weight for both male and females is calculated as 6,700 grams based on Sanderson (1984) with a reported range of 5,100 to 8,300 grams.
Mink	852	Mitchell (1961, as cited in EPA 1993) based on the average of mean body weights for both males and females for summer and fall from Montana
Coyote	10,800	The mean body weight for the coyote is 10,800 grams based on adult females from New Mexico (Windberg and others 1997; Berg and Chesness 1978) with a range of 9,500 to 12,000 grams.
Northern harrier	441	The mean body weight was calculated as 441 grams based on information found in Bildstein (1988), as cited in MacWhirter and Bildstein (1996).

TABLE AT1-1

SUMMARY OF EXPOSURE PARAMETER BASIS FOR BIRDS AND MAMMALS
ACTION LEVEL DETERMINATIONS
SOUTHEAST IDAHO PHOSPHATE RESOURCE AREA

Exposure Parameter	Mean	Reference and Basis of Value
Dietary Composition		
Northern bobwhite	85.6% Vegetation; 14.4% invertebrates	Handley (1931, as cited in EPA 1993) based on average percentage from birds in the southeastern United States
Eastern cottontail	100% Vegetation	EPA (1993)
American robin	50% Vegetation and 50% invertebrates	EPA (1993)
Deer mouse	54.5% Vegetation and 45.5% invertebrates	Flake (1973, as cited in EPA 1993) based on average of four seasons diet for mice from Colorado short grass prairie
Song sparrow	Primarily herbivorous and granivorous; may consume insects and other invertebrates during yoke formation	University of Michigan (2000) (http://aniumaldiversity.ummz.umich.edu/accounts/melospiza/m._melodia$narrative.html)
Meadow vole	98% Vegetation and 2% invertebrates	Lindroth and Batzli (1984, as cited in EPA 1993) based on average of two studies during four seasons in Illinois
Red-winged blackbird	90% plant material, seeds, and brains in fall and winter; 70% insects and 17% grain during the breeding season	Diet during fall and winter taken from Brent (1985), Martin and others (1961), and Crase and DeHaven (1978), as cited in Ziener and others (1990). Diet of males and females during breeding season in agricultural and nonagricultural land based on McNicholl (1987)
Great blue heron	72% Fish, 17% invertebrates, and 11% miscellaneous	Prey ingestion percentages (Zeiner and others 1990)
Mallard duck	25.3% Vegetation and 74.7% invertebrates	Swanson and others (1985, as cited in EPA 1993), based on spring breeding season in south central North Dakota prairie pothole area

TABLE AT1-1

SUMMARY OF EXPOSURE PARAMETER BASIS FOR BIRDS AND MAMMALS
ACTION LEVEL DETERMINATIONS
SOUTHEAST IDAHO PHOSPHATE RESOURCE AREA

Exposure Parameter	Mean	Reference and Basis of Value
Raccoon	48.48% Vegetation, 31.78% invertebrates, 9.28% mammals, 6.33% reptiles/amphibians, 1.75% fish, 1.5% birds, and 0.91% other not identified	Tabatabai and Kennedy (1988) and Hamilton (1951), as cited in EPA (1993), based on average of percent wet volume of digestive tract or stomach contents of raccoons from Tennessee (four seasons) and New York (summer only)
Dietary Composition (continued)		
Mink	54% Trout, 19% other fish, 7.5% invertebrates., 2.5% amphibians, 5.5% birds and mammals, 9% vegetation, and 2.5% unidentified	Alexander (1977, as cited in EPA 1993), based on stomach contents for four seasons from Michigan streams and rivers
Coyote	90% Mice, rats, rabbits, squirrels, and carrion. Some deer and ground nesting birds. Various fruits, berries, seeds, and grasses consumed when available.	Omnivorous, based on http://www.ukans.edu/~mammals/canis-latr.html
Northern harrier	80% Mammals, 15% birds, 3% reptiles and amphibians, and 2% invertebrates	Bildstein (1987), based on pellet content in the northern part of the harrier range and another study by Brown and Amadon (1968)
Food Ingestion Rate (g/day)		
Northern bobwhite	See Note 1	Value used was calculated using body weight in an allometric equation for all birds, food requirements for omnivores (10.5 x [BW in grams]$^{0.681}$)/14 (Nagy and other 1999)
Eastern cottontail	See Note 1	Value used was calculated using body weight in an allometric equation for herbivorous mammals, food requirements for herbivores (7.94 x [BW in grams]$^{0.646}$)/10 (Nagy and others 1999)
American robin	See Note 1	Value used was calculated using body weight in an allometric equation for all birds, food requirements for omnivores (10.5 x [BW in grams]$^{0.681}$)/14 (Nagy and others 1999)

TABLE AT1-1

SUMMARY OF EXPOSURE PARAMETER BASIS FOR BIRDS AND MAMMALS ACTION LEVEL DETERMINATIONS SOUTHEAST IDAHO PHOSPHATE RESOURCE AREA

Exposure Parameter	Mean	Reference and Basis of Value
Deer mouse	See Note 1	Value used was calculated using body weight in an allometric equation for rodents, food requirements for omnivores (5.48 x [BW in grams]$^{0.712}$)/14 (Nagy and others 1999)
Food Ingestion Rate (g/day) (continued)		
Song sparrow	See Note 1	Value used was calculated using body weight in an allometric equation for all birds, food requirements for omnivores (10.5 x [BW in grams]$^{0.681}$)/14 (Nagy and others 1999)
Meadow vole	See Note 1	Value used was calculated using body weight in an allometric equation for rodents, food requirements for herbivores (5.48 x [BW in grams]$^{0.712}$)/10 (Nagy and others 1999)
Red-winged blackbird	See Note 1	Value used was calculated using body weight in an allometric equation for all birds, food requirements for omnivores (10.5 x [BW in grams]$^{0.681}$)/14 (Nagy and others 1999)
Great blue heron	See Note 1	Value used was calculated using body weight in an allometric equation for all birds, food requirements for piscivores (10.5 x [BW in grams]$^{0.681}$)/16.2 (Nagy and others 1999)
Mallard duck	See Note 1	Value used was calculated using body weight in an allometric equation for all birds, food requirements for omnivores (10.5 x [BW in grams]$^{0.681}$)/14 (Nagy and others 1999)
Raccoon	See Note 1	Value used was calculated using body weight in an allometric equation for omnivorous mammals, food requirements for omnivores (6.03 x [BW in grams]$^{0.678}$)/14 (Nagy and others 1999)
Mink	See Note 1	Value used was calculated using body weight in an allometric equation for omnivorous mammals, food requirements for omnivores (6.03 x [BW in grams]$^{0.678}$)/14 (Nagy and others 1999)

TABLE AT1-1

SUMMARY OF EXPOSURE PARAMETER BASIS FOR BIRDS AND MAMMALS
ACTION LEVEL DETERMINATIONS
SOUTHEAST IDAHO PHOSPHATE RESOURCE AREA

Exposure Parameter	Mean	Reference and Basis of Value
Coyote	See Note 1	Value shown is calculated using mean body weight (BW=10,500 grams) in an allometric equation for omnivorous mammals, food requirements for omnivores (6.03 x [BW in grams]$^{0.678}$)/14 (Nagy and others 1999).
Northern harrier	See Note 1	Calculated using mean body weight (BW=513.0 grams) in an allometric equation for all birds, food requirements for all birds (10.5 x [BW]$^{0.681}$)/18 (Nagy and others 1999)
Water Ingestion Rate (L/day)		
Northern bobwhite	NA	See Note 2
Eastern cottontail	NA	See Note 2
American robin	NA	See Note 2
Deer mouse	NA	See Note 2
Song sparrow	NA	See Note 2
Meadow vole	NA	See Note 2
Red-winged blackbird	NA	See Note 2
Great blue heron	See Note 1	Published value of 0.045 g/g-day, based on estimated value for both sexes (EPA 1993). Actual value used was based on the following equation: $IR_{water} = 0.059*BW(kg)^{0.67}$ (EPA 1993)

TABLE AT1-1

SUMMARY OF EXPOSURE PARAMETER BASIS FOR BIRDS AND MAMMALS
ACTION LEVEL DETERMINATIONS
SOUTHEAST IDAHO PHOSPHATE RESOURCE AREA

Exposure Parameter	Mean	Reference and Basis of Value
Mallard duck	See Note 1	Actual value used was based on the following equation: $IR_{water} = 0.059*BW(kg)^{0.67}$ (EPA 1993)
Raccoon	See Note 1	Published value of 0.083 g/g-day (EPA 1993), based on estimated rate for female. Actual value used was based on the following equation: $IR_{water} = 0.099*BW(kg)^{0.90}$ (EPA 1993)
Mink	See Note 1	Published value of 0.11 g/g-day (EPA 1993), based on estimated rate for female. Actual value used was based on the following equation: $IR_{water} = 0.099*BW(kg)^{0.90}$ (EPA 1993)
Water Ingestion Rate (L/day) (continued)		
Coyote	See Note 1	Actual value used was based on the following equation: $IR_{water} = 0.099*BW(kg)^{0.90}$ (EPA 1993)
Northern harrier	NA	See Note 2
Soil/Sediment Ingestion Rate (g/day)		
Northern bobwhite	See Note 1	Ingestion of soil (I_{soil}) as percentage of food intake reported at 2% for omnivores (Beyer 1994)
Eastern cottontail	See Note 1	Ingestion of soil (I_{soil}) as percentage of food intake reported at 2.4% for herbivores (Beyer 1994)
American Robin	See Note 1	Ingestion of soil (I_{soil}) as percentage of food intake reported at 2% for omnivores (Beyer 1994)
Deer mouse	See Note 1	Deer mouse consumption habits are assumed to be similar to those of the white-footed mouse. Ingestion of soil (I_{soil}) as percentage of food intake reported at 2% for white-footed mouse (Beyer 1994)
Song sparrow	See Note 1	Ingestion of soil (I_{soil}) as percentage of food intake reported at 2% for white-footed mouse (Beyer 1994)
Meadow vole	See Note 1	Ingestion of soil (I_{soil}) as percentage of food intake reported at 2.4% for meadow vole (Beyer 1994)
Red-winged blackbird	See Note 1	Ingestion of soil (I_{soil}) as percentage of food intake reported at 2% for white-footed mouse (Beyer 1994)
Great blue heron	See Note 1	Ingestion of sediment (I_{sed}) as percentage of food intake based on 0.7%of IR, which is based on studies of the bald eagle (Pascoe and others 1996)

TABLE AT1-1

SUMMARY OF EXPOSURE PARAMETER BASIS FOR BIRDS AND MAMMALS
ACTION LEVEL DETERMINATIONS
SOUTHEAST IDAHO PHOSPHATE RESOURCE AREA

Exposure Parameter	Mean	Reference and Basis of Value
Mallard duck	See Note 1	Ingestion of sediment (I_{sed}) as percentage of food intake reported at 3.3% for mallard (Beyer 1994)
Raccoon	See Note 1	Ingestion of soil/sediment ($I_{soil/sed}$) as percentage of food intake reported at 9.4% for raccoon (Beyer 1994)
Mink	See Note 1	Mink food consumption habits are assumed to be similar to those of the raccoon. Ingestion of soil/sediment ($I_{soil/sed}$) as percentage of food intake reported at 9.4% for raccoon (Beyer 1994)
Coyote	See Note 1	Coyote food consumption habits are assumed to be similar to those of the red fox. Based on ingestion of soil (I_{soil}) as percentage of food intake reported at 2.8% for the red fox (Beyer 1994)
Northern harrier	See Note 1	Harrier food consumption habits are assumed to be similar to those of bald eagles. Based on 0.7% of estimated sediment ingestion rate for bald eagle in Pascoe and others (1996)

Notes:

BW	Body weight	EPA	U.S. Environmental Protection Agency	g/day	Grams per day	kg	Kilogram
				IR	Ingestion rate	L/day	Liter per day

Note 1: Body weight was used as a stochastic variable in the analysis. Since these values are dependent on body weight, specific values are not presented.

Note 2: Water intake requirements were assumed to be met through food intake.

TABLE AT1-2

AVIAN TOXICITY REFERENCE VALUES -- NO OBSERVED ADVERSE EFFECTS LEVEL BASIS

Chemical of Potential Ecological Concern	Literature-based NOAEL TRV (mg/kg-day)	Source of Study	Study	Endpoint	Body Weight of Study Subject (g)
Metals					
Cadmium	8.00E-02	Navy (1998)	Cain and others (1983)	No observed adverse effect level for blood chemistry in mallards	798.5
Chromium	1.00E+00	Sample and others (1996)	Haaseltine and others, unpublished data	Reduction of duckling survival in black ducks	1,250
Copper	2.30E+00	Navy (1998)	Norvell and others (1975)	Adverse effects on weight gain in boilers	639
Nickel	1.38E+00	Navy (1998)	Cain and Pafford (1981)	Adverse effects, such as tremors and edema, in toe and leg joints of mallards	613.75
Selenium	2.30E-01	Navy (1998)	Heinz and others (1989)	Adverse effects in hatchling body weight and survival, effect on number of hatchlings produced per hen, and malformed embryos in mallards	1,107
Vanadium	1.14E+01	Sample and others (1996)	White and Dieter (1978)	Adverse effects on mortality, body weight, and blood chemistry in mallards	1,170
Zinc	1.72E+01	Navy (1998)	Gasaway and Buss (1972)	Decrease in body weight at 40 days, decrease in gonad weight, decrease in organ to body weight ratio (pancreas, adrenal, and kidney), decreases in pancreas and liver weight, leg paralysis, and diarrhea in mallards	955

EPA = U.S. Environmental Protection Agency
g = Gram
mg/kg-day = Milligram per kilogram per day
NA = Not Available
Navy = U.S. Department of Navy
NOAEL=No observed adverse effects level
TRV = Toxicity reference value

TABLE AT1-3

MAMMALIAN TOXICITY REFERENCE VALUES -- NO OBSERVED ADVERSE EFFECTS LEVEL BASIS

Chemical of Potential Ecological Concern	Literature-based NOAEL TRV (mg/kg-day)	Source of Study	Study	Endpoint	Body Weight of Study Subject (g)
Metals					
Cadmium	6.00E-02	Navy (1998)	Webster (1988)	NOAEL for effects on fetal weight	32.2
Chromium	3.28E+00	Sample and others (1996)	McKenzie and others (1958)	Physiological effects in rats	350.0
Copper	2.67E+00	Navy (1998)	Pocino and others (1991)	Adverse effect on food ingestion rate, body weight, number of cells in the thymus, or mortality in mice	30.0
Nickel	1.33E-01	Navy (1998)	Smith and others (1993)	Increase in the number and proportion of G2 pups born dead or dying shortly after birth	248.6
Selenium	5.00E-02	Navy (1998)	Harr and others (1966)	Hepatic lesions in Wistar rats	24.6
Vanadium	2.10E-01	Sample and others (1996)	Domingo and others (1986)	Reproduction in rats	260.0
Zinc	9.61E+00	Navy (1998)	Aughey and others (1977)	Hypertrophy and vacuolation of pancreatic islets cells and fascicolata cells in the adrenal cortex	25.5

Notes:

EPA = U.S. Environmental Protection Agency
g = Gram
mg/kg-day = Milligram per kilogram per day
Navy = U.S. Department of Navy
NOAEL = No observed adverse effects level
TRV = Toxicity reference value

TABLE AT1-4

SUMMARY OF DESCRIPTIVE STATISTICS FOR BACKGROUND AREAS IN THE PHOSPHATE RESOURCE AREA

Medium	Chemical	Distribution[a]	SUMMARY STATISTICS												
			Sample Size		Detection Frequency (Percent)	Censored Data		Detected Data		Detected & Censored Data					
			Detected	Total		Min	Max	Min	Max	Median[b]	Q95[b]	Mean[c]	SD[c]	CV	UCL_{95}[d]
Benthic Macroinvertebrate	Cadmium	Not Tested	12	39	31	0.12	3.30	0.18	4.00	1.65	3.80	N/A	N/A	N/A	N/A
	Chromium	Not Tested	2	2	100	N/A	N/A	0.09	0.51	0.30	0.51	N/A	N/A	N/A	N/A
	Copper	Not Tested	3	3	100	N/A	N/A	1.00	2.70	2.50	2.70	2.07	0.93	45	3.63
	Nickel	Not Tested	1	1	100	N/A	N/A	0.27	0.27	0.27	0.27	N/A	N/A	N/A	N/A
	Selenium	Unknown[b]	35	39	90	0.40	0.47	0.29	12.00	2.80	11.00	4.15	0.92	22	6.82
	Vanadium	Not Tested	2	2	100	N/A	N/A	0.45	0.59	0.52	0.59	N/A	N/A	N/A	N/A
	Zinc	Not Tested	3	3	100	N/A	N/A	18.5	45.3	30.30	45.30	31.37	13.43	43	54.01
Fish	Cadmium	Unknown[b]	38	50	76	0.50	0.50	0.06	4.50	0.17	0.66	0.51	0.20	39	1.26
	Chromium	Not Tested	4	4	100	N/A	N/A	1.20	2.20	1.50	2.20	1.60	0.24	15	2.64
	Copper	Not Tested	4	4	100	N/A	N/A	2.20	5.30	3.65	5.30	3.70	0.77	21	8.38
	Nickel	Not Tested	3	3	100	N/A	N/A	0.37	0.57	0.43	0.57	0.46	0.06	13	0.79
	Selenium	Lognormal	63	63	100	N/A	N/A	0.52	22.00	3.00	11.60	3.95	0.41	10	4.80
	Vanadium	Not Tested	0	4	0	0.42	0.51	N/A	N/A	0.22	0.25	N/A	N/A	N/A	N/A
	Zinc	Not Tested	4	4	100	N/A	N/A	71.20	81.40	74.05	81.40	75.17	2.19	3	N/A
Aquatic Plant	Cadmium	Lognormal	24	37	65	0.14	0.14	0.06	1.10	0.33	0.83	0.38	0.05	13	0.50
	Chromium	Not Tested	4	4	100	N/A	N/A	1.30	23.00	8.40	23.00	11.03	5.99	54	3,681.29
	Copper	Not Tested	4	4	100	N/A	N/A	1.80	6.50	4.25	6.50	4.22	1.31	31	22.90
	Nickel	Not Tested	4	4	100	N/A	N/A	0.49	9.40	4.00	9.40	4.99	2.81	56	2,928.56
	Selenium	Lognormal	37	37	100	N/A	N/A	0.41	12.00	1.40	7.95	2.10	0.28	13	2.75
	Vanadium	Not Tested	4	4	100	N/A	N/A	0.18	2.50	0.86	2.50	1.13	0.57	51	149.97
	Zinc	Not Tested	4	4	100	N/A	N/A	26.60	58.10	39.05	58.10	40.69	6.50	16	70.26
Terrestrial Plant	Cadmium	Unknown[b]	30	30	100	N/A	N/A	0.06	3.70	0.25	2.88	0.45	0.10	22	0.74
	Chromium	Unknown[a]	30	30	100	N/A	N/A	0.55	9.90	1.60	6.00	1.76	1.64	93	2.27
	Copper	Unknown[a]	30	30	100	N/A	N/A	3.00	15.00	4.30	12.25	5.45	2.59	48	6.25
	Nickel	Unknown[a]	30	30	100	N/A	N/A	0.24	4.30	0.51	3.20	0.86	0.86	100	1.13
	Selenium	Lognormal	30	30	100	N/A	N/A	0.05	0.75	0.20	0.64	0.24	0.03	11	0.30
	Vanadium	Lognormal	25	25	100	N/A	N/A	0.18	5.50	0.55	4.42	0.74	0.13	17	1.07
	Zinc	Unknown[b]	30	30	100	N/A	N/A	14.00	140.00	24.00	108.10	31.93	3.05	10	38.42
Small Mammals	Cadmium	Lognormal	27	28	96	0.00	0.00	0.01	0.99	0.02	0.97	0.14	0.06	42	0.45
	Chromium	Lognormal	28	28	100	N/A	N/A	0.27	1.10	0.46	0.90	0.48	0.03	5	0.53
	Copper	Lognormal	28	28	100	N/A	N/A	0.50	3.40	1.35	3.40	1.48	0.14	10	1.78
	Nickel	Normal	27	28	96	0.01	0.01	0.01	0.32	0.18	0.31	0.17	0.09	54	0.19
	Selenium	Unknown[b]	28	28	100	N/A	N/A	0.15	2.10	0.29	1.59	0.36	0.04	11	0.46
	Vanadium	Lognormal	15	28	54	0.10	0.10	0.10	0.29	0.10	0.26	0.11	0.01	10	0.14
	Zinc	Lognormal	28	28	100	N/A	N/A	7.90	58.00	18.00	52.60	22.50	2.41	11	27.79
Terrestrial Invertebrate	Cadmium	Normal	12	12	100	N/A	N/A	0.09	12.00	5.95	12.00	5.52	3.85	70	7.51
	Chromium	Normal	12	12	100	N/A	N/A	2.50	10.00	6.10	10.00	6.70	2.43	36	7.96
	Copper	Unknown[b]	12	12	100	N/A	N/A	0.91	44.00	1.85	44.00	8.07	3.70	46	49.24
	Nickel	Normal	12	12	100	N/A	N/A	1.10	5.70	3.05	5.70	2.93	1.22	41	3.56
	Selenium	Lognormal	20	20	100	N/A	N/A	0.58	28.00	3.70	28.00	10.09	3.59	36	28.48
	Vanadium	Unknown[a]	12	12	100	N/A	N/A	0.63	31.00	23.50	31.00	18.43	11.22	61	24.24
	Zinc	Normal	12	12	100	N/A	N/A	100.00	370.00	205.00	370.00	207.50	82.14	40	250.09

TABLE AT1-4

SUMMARY OF DESCRIPTIVE STATISTICS FOR BACKGROUND AREAS IN THE PHOSPHATE RESOURCE AREA

Riparian Soil	Cadmium	Lognormal	19	19	100	N/A	N/A	0.42	2.70	0.94	2.70	1.04	0.10	10	1.27
	Chromium	Lognormal	20	20	100	N/A	N/A	30.00	110.00	44.50	108.15	51.80	3.70	7	59.37
	Copper	Normal	20	20	100	N/A	N/A	6.80	26.00	18.00	25.95	17.19	4.55	26	18.95
	Nickel	Normal	20	20	100	N/A	N/A	5.80	37.00	24.00	36.80	22.79	6.92	30	25.47
	Selenium	Normal	20	20	100	N/A	N/A	0.36	2.30	1.00	2.26	1.01	0.45	45	1.18
	Vanadium	Normal	20	20	100	N/A	N/A	27.00	83.00	50.50	82.35	51.80	12.43	24	56.61
	Zinc	Unknown[a]	20	20	100	N/A	N/A	39.00	190.00	97.50	187.50	97.35	29.57	30	108.78
Upland Soil	Cadmium	Unknown[b]	14	14	100	N/A	N/A	0.57	14.00	0.81	14.00	2.75	1.00	36	8.81
	Chromium	Unknown[b]	14	14	100	N/A	N/A	21.00	130.00	35.00	130.00	46.30	7.82	17	68.31
	Copper	Lognormal	14	14	100	N/A	N/A	9.60	32.00	16.50	32.00	17.56	2.12	12	22.69
	Nickel	Lognormal	14	14	100	N/A	N/A	12.00	47.00	21.50	47.00	24.62	3.39	14	33.24
	Selenium	Lognormal	13	14	93	0.04	0.04	0.41	3.30	0.62	3.30	1.01	0.25	25	1.92
	Vanadium	Normal	14	14	100	N/A	N/A	25.00	100.00	46.00	100.00	49.50	22.85	46	60.31
	Zinc	Unknown[b]	14	14	100	N/A	N/A	40.00	660.00	99.00	660.00	165.20	44.04	27	341.77
Sediment	Cadmium	Lognormal	12	12	100	N/A	N/A	0.10	5.10	0.64	5.10	1.07	0.45	42	5.16
	Chromium	Lognormal	12	12	100	N/A	N/A	11.00	100.00	37.00	100.00	39.59	6.55	17	58.29
	Copper	Normal	12	12	100	N/A	N/A	3.20	25.00	10.70	25.00	11.34	5.97	53	14.44
	Nickel	Lognormal	12	12	100	N/A	N/A	6.40	44.00	18.00	44.00	19.13	2.75	14	26.42
	Selenium	Normal	12	12	100	N/A	N/A	0.52	2.60	1.05	2.60	1.22	0.58	48	1.52
	Vanadium	Normal	12	12	100	N/A	N/A	14.00	72.00	33.00	72.00	35.29	17.57	50	44.40
	Zinc	Lognormal	12	12	100	N/A	N/A	38.00	210.00	80.50	210.00	83.53	11.29	14	112.67
Surface Water (stream)	Copper	Not Tested	10	29	34	0.0001	0.0010	0.0002	0.0033	0.0001	0.0030	N/A	N/A	N/A	N/A
	Nickel	Normal	20	29	69	0.0001	0.0001	0.0003	0.0040	0.0009	0.0034	0.0011	0.0009	81	0.0014
	Selenium	Not Tested	3	29	10	0.0010	0.0010	0.0011	0.0016	0.0005	0.0015	N/A	N/A	N/A	N/A
	Cadmium	Not Tested	6	29	21	0.0001	0.0002	0.0001	0.0007	0.0000	0.0006	N/A	N/A	N/A	N/A
	Chromium	Not Tested	6	27	22	0.0001	0.0005	0.0004	0.0058	0.0001	0.0049	N/A	N/A	N/A	N/A
	Vanadium	Not Tested	14	29	48	0.0001	0.0003	0.0005	0.0081	0.0005	0.0061	N/A	N/A	N/A	N/A
	Zinc	Lognormal	15	29	52	0.0100	0.0100	0.0100	0.0590	0.0100	0.0565	0.0145	0.0033	23	0.0246

TABLE AT1-4

SUMMARY OF DESCRIPTIVE STATISTICS FOR BACKGROUND AREAS IN THE PHOSPHATE RESOURCE AREA

Notes:

	All concentration units are milligrams/kilogram for soil/sediment and tissue and milligrams/liter for surface water
a	For all cases with at least 5 detected samples, tested using the Shapiro-Wilk W test (alpha equal to 0.05). Distributions confirmed as normal or lognormal are listed as "Normal" or "Lognormal." For cases with fewer than 5 detected samples, distribution testing was not conduc probability plots and box plots. Distributions assumed to be normal or lognormal are listed as Unknown[a] or Unknown[b].
b	Estimated for all cases using a nonparametric approach, based on rank ordering of the data
c	For all cases with at least 3 samples and a detection frequency of 50 percent, calculated using distribution-dependent formulae. For lognormal distributions, the mean and SD are the minimum variance unbiased (MVU) estimators,
d	The UCL95 for lognormal distributions was calculated using Land's method (EPA 1992, Gilbert 1987).
e	The lesser of the UCL95 and the maximum detected concentration. If the UCL95 was not calculated, the maximum detected concentration was used.
*	Could not be estimated using Land's method
EPC	Exposure point concentration
CV	Coefficient of variation ([SD/mean]*100)
Min	Minimum concentration reported
Max	Maximum concentration reported
N/A	Not applicable
Q95	95th percentile (quantile)
SD	Standard deviation
UCL_{95}	The one-sided 95 percent upper confidence limit of the mean
Unknown[a]	
Unknown[b]	Distribution assumed to be lognormal based on examination of probability plots and outlier box plots

References

Gilbert, R. O. 1987. *Statistical Methods for Environmental Pollution Monitoring* . John Wiley & Sons, Inc., New York, NY.

U.S. Environmental Protection Agency (EPA). 1992. "Supplemental Guidance to RAGS: Calculating the Concentration Term". Intermittent Bulletin, Volume 1, Number 1. Publication 9285.7-081.

TABLE AT1-5

BODY WEIGHT DISTRIBUTION ASSUMPTIONS

Species	Basis of Assumed Body Weight Distributions
American Robin (*Turdus migratorius*)	Based on EPA (1993) the mean body weight for breeding and non-breeding male and females calculated as 81.02 grams with a range of 63.5 to 103 grams based on Clench and Leberman (1978) and Wheelwright (1986). The average SD based on Wheelwright (1986) is +/- 6.25 grams.
Coyote (*Canis latrans*)	The mean body weight for the coyote is 10,800 grams based on adult females from New Mexico (Windberg and the body weight distribution for the coyote. Storm et al. (1976) reported body weight data on the red fox in Illinois and Iowa. The mean body weight for both male and females was 4,535 grams with an average SD of +/- 112.5 grams. mean body weights. This results in a SD of +/- 260 grams.
Deer Mouse (Peromyscus maniculatus)	Based on EPA (1993) the mean body weight for both male and females is calculated as 21 grams based on Millar results in an estimated range of body weights of 18.2 to 23.8 grams.
Eastern Cottontail (*Sylvilagus floridanus*)	700 to 1,800 grams based on Lord (1963). The average SD based on EPA (1993) is +/- 164 grams.
Great Blue Heron (*Ardea herodias*)	Mean body weight for adult males and females is assumed to be 2, 295 grams grams based on Butler (1992). EPA estimated range of body weights of 1,023 to 3,567 grams.
Mallard (*Anas platyrhynchas*)	Based on EPA (1993) the mean body weight for both male and females is calculated as 1,134 grams. The average
Meadow Vole (*Microtus pennsylvanicus*)	Based on EPA (1993) the mean body weight for both male and females is calculated as 35.4 grams based on Abramsky and Tracy (1980) and Myers and Krebs (1971). The average SD for adult males and females based on
Mink (*Mustela vison*)	females was 1,354 grams with an average SD of +/- 276 grams. Therefore, the SD for the wild mink body weight results in a SD of +/- 174 grams. This results in an estimated range of body weights of 156 to 1,548 grams.
Northern Bobwhite (*Colinus virginianus*)	to 208 grams.
Northern Harrier (*Circus cyaneus*)	The mean body weight was calculated as 441 grams based on information found in Bildstein (1988), as cited in MacWhirter and Bildstein (1996). The range in body weights was reported as 297 to 752 grams. No data was on the American kestrel in California. The mean body weight for both male and females was 116 grams with an
Raccoon (*Procyon lotor*)	Based on EPA (1993) the mean body weight for both male and females is calculated as 6,700 grams based on scaled based on mean body weights. This results in a SD of +/- 263 grams.
Red-winged Blackbird (*Agelaius phoeniceus*)	The mean body weight based on both males and females (Beletsky 1996) is estimated to be 59 grams. No specific to 77.2 grams.
Song Sparrow (*Melospiza melodia*)	The mean body weight based on adults of both sexes is estimated to be 22.9 grams based on Smith and Arcese sparrow will be used. This results in an estimated range of body weights of 19.3 to 26.5 grams.

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TABLE AT1-6
SUMMARY OF DESCRIPTIVE STATISTICS FOR IMPACTED AREAS IN THE PHOSPHATE RESOURCE AREA

Medium	Chemical	Distribution[a]	SUMMARY STATISTICS												
			Sample Size		Detection Frequency (Percent)	Censored Data		Detected Data		Detected & Censored Data					
			Detected	Total		Min	Max	Min	Max	Median[b]	Q95[b]	Mean[c]	SD[c]	CV	UCL_{95}[d]
Benthic Macroinvertebrate	Cadmium	Not Tested	22	60	37	1.00	3.30	0.07	62.00	0.48	33.68	N/A	N/A	N/A	N/A
	Chromium	Not Tested	3	3	100	N/A	N/A	0.42	1.80	0.98	1.80	1.07	0.69	65	2.24
	Copper	Not Tested	4	4	100	N/A	N/A	1.80	7.10	3.05	7.10	3.75	2.46	66	6.65
	Nickel	Not Tested	4	4	100	N/A	N/A	0.28	4.20	0.77	4.20	1.51	1.82	121	3.64
	Selenium	Unknown[b]	60	60	100	N/A	N/A	0.92	170.00	4.60	99.15	13.21	2.79	21	20.65
	Vanadium	Not Tested	3	3	100	N/A	N/A	0.54	1.60	0.99	1.60	1.04	0.53	51	1.94
	Zinc	Not Tested	4	4	100	N/A	N/A	13.60	122.00	45.30	122.00	56.55	46.40	82	111.15
Fish	Cadmium	Unknown[b]	56	81	69	0.50	0.50	0.06	34.20	0.19	2.31	0.85	0.34	40	1.80
	Chromium	Not Tested	4	4	100	N/A	N/A	2.20	3.60	2.65	3.60	2.77	0.34	12	4.07
	Copper	Not Tested	4	4	100	N/A	N/A	4.00	7.70	5.70	7.70	5.78	0.78	13	8.88
	Nickel	Not Tested	4	4	100	N/A	N/A	0.59	1.20	0.83	1.20	0.86	0.13	15	1.42
	Selenium	Unknown[b]	105	107	98	0.10	0.10	0.36	37.00	5.40	23.92	7.56	0.82	11	9.24
	Vanadium	Not Tested	0	4	0	0.44	0.60	N/A	N/A	0.24	0.30	N/A	N/A	N/A	N/A
	Zinc	Not Tested	4	4	100	N/A	N/A	87.90	124.00	106.75	124.00	106.35	10.27	10	140.48
Aquatic Plant	Cadmium	Unknown[b]	75	75	100	N/A	N/A	0.04	41.00	1.10	29.80	3.24	0.66	20	4.85
	Chromium	Normal	6	6	100	N/A	N/A	5.20	52.60	24.65	52.60	26.28	20.51	78	43.16
	Copper	Normal	6	6	100	N/A	N/A	1.70	11.40	5.45	11.40	5.55	3.30	59	8.26
	Nickel	Normal	6	6	100	N/A	N/A	2.50	24.20	12.40	24.20	13.03	9.85	76	21.14
	Selenium	Unknown[b]	75	75	100	N/A	N/A	0.59	62.00	4.40	41.00	7.70	0.98	13	9.85
	Vanadium	Normal	6	6	100	N/A	N/A	0.35	24.40	7.25	24.40	8.92	9.11	102	16.41
	Zinc	Lognormal	6	6	100	N/A	N/A	35.30	162.00	60.30	162.00	70.39	15.10	21	136.43
Terrestrial Plant	Cadmium	Unknown[a]	39	39	100	N/A	N/A	0.11	46.00	0.55	3.70	2.10	7.27	346	4.06
	Chromium	Unknown[b]	39	39	100	N/A	N/A	0.48	5.70	1.20	5.40	1.51	0.16	11	1.86
	Copper	Unknown[a]	39	39	100	N/A	N/A	3.40	14.00	4.70	12.00	5.57	2.35	42	6.21
	Nickel	Unknown[a]	39	39	100	N/A	N/A	0.35	8.60	1.80	5.10	2.18	1.80	83	2.66
	Selenium	Lognormal	39	39	100	N/A	N/A	0.09	39.00	2.50	26.00	7.72	2.51	33	17.01
	Vanadium	Lognormal	36	36	100	N/A	N/A	0.21	5.30	0.77	3.35	0.98	0.11	12	1.22
	Zinc	Unknown[b]	39	39	100	N/A	N/A	20.00	790.00	33.00	160.00	58.13	7.47	13	75.22
Small Mammals	Cadmium	Lognormal	29	29	100	N/A	N/A	0.00	0.14	0.03	0.13	0.04	0.01	21	0.07
	Chromium	Lognormal	29	29	100	N/A	N/A	0.33	1.50	0.62	1.25	0.66	0.04	6	0.73
	Copper	Unknown[b]	29	29	100	N/A	N/A	0.60	5.10	1.20	3.45	1.25	0.10	8	1.44
	Nickel	Unknown[b]	28	29	97	0.01	0.01	0.02	1.60	0.25	1.09	0.33	0.05	16	0.47
	Selenium	Unknown[b]	29	29	100	N/A	N/A	0.19	7.00	0.86	6.10	1.87	0.50	27	3.58
	Vanadium	Not Tested	10	29	34	0.10	0.10	0.10	0.26	0.07	0.21	N/A	N/A	N/A	N/A
	Zinc	Unknown[b]	29	29	100	N/A	N/A	9.40	22.00	14.00	21.50	14.71	0.76	5	16.16
Terrestrial Invertebrate	Cadmium	Lognormal	30	30	100	N/A	N/A	0.36	70.00	4.35	65.05	9.04	2.64	29	18.77
	Chromium	Lognormal	30	30	100	N/A	N/A	2.30	26.00	5.70	24.35	7.64	1.04	14	10.12
	Copper	Unknown[a]	30	30	100	N/A	N/A	1.30	49.00	15.00	46.25	19.68	15.08	77	24.36
	Nickel	Lognormal	30	30	100	N/A	N/A	0.83	12.00	3.00	10.35	3.92	0.60	15	5.41
	Selenium	Lognormal	33	33	100	N/A	N/A	1.30	260.00	13.00	204.00	33.37	10.39	31	72.32
	Vanadium	Lognormal	30	30	100	N/A	N/A	0.22	62.00	2.25	53.75	8.95	3.66	41	27.86
	Zinc	Lognormal	30	30	100	N/A	N/A	140.00	400.00	200.00	378.00	229.42	11.20	5	250.64
Riparian Soil	Cadmium	Lognormal	20	20	100	N/A	N/A	0.23	63.00	2.45	60.33	4.14	1.19	29	8.85
	Chromium	Unknown[a]	21	21	100	N/A	N/A	16.00	970.00	59.00	888.00	103.24	200.62	194	178.74
	Copper	Unknown[b]	21	21	100	N/A	N/A	6.20	120.00	21.00	111.80	23.86	3.46	15	32.48
	Nickel	Lognormal	21	21	100	N/A	N/A	11.00	280.00	34.00	270.00	47.90	8.80	18	72.52
	Selenium	Unknown[a]	21	21	100	N/A	N/A	0.88	150.00	1.70	137.90	10.49	32.53	310	22.74
	Vanadium	Unknown[a]	21	21	100	N/A	N/A	15.00	500.00	66.00	464.00	82.14	99.50	121	119.59
	Zinc	Unknown[a]	21	21	100	N/A	N/A	33.00	1,400.00	130.00	1,297.00	191.81	285.28	149	299.18
Sediment	Cadmium	Lognormal	19	19	100	N/A	N/A	0.65	14.00	2.80	14.00	4.54	1.12	25	8.44
	Chromium	Lognormal	19	19	100	N/A	N/A	16.00	191.00	49.00	191.00	65.65	10.10	15	91.74
	Copper	Lognormal	19	19	100	N/A	N/A	4.20	44.00	14.00	44.00	14.81	2.23	15	20.51
	Nickel	Lognormal	19	19	100	N/A	N/A	11.00	164.00	27.00	164.00	41.01	7.40	18	61.73
	Selenium	Unknown[b]	19	19	100	N/A	N/A	1.10	188.00	3.40	188.00	12.50	4.73	38	39.55
	Vanadium	Normal	19	19	100	N/A	N/A	14.00	133.00	49.00	133.00	54.28	30.43	56	66.39

TABLE AT1-6
SUMMARY OF DESCRIPTIVE STATISTICS FOR IMPACTED AREAS IN THE PHOSPHATE RESOURCE AREA

Medium	Chemical	Distribution[a]	SUMMARY STATISTICS												
			Sample Size		Detection Frequency (Percent)	Censored Data		Detected Data		Detected & Censored Data					
			Detected	Total		Min	Max	Min	Max	Median[b]	Q95[b]	Mean[c]	SD[c]	CV	UCL_{95}[d]
	Zinc	Lognormal	19	19	100	N/A	N/A	35.00	866.00	110.00	866.00	196.03	44.13	23	338.91
Surface Water (mine)	Cadmium	Lognormal	52	80	65	0.0001	0.0001	0.0001	0.0500	0.0003	0.0094	0.0041	0.0023	56	0.0122
	Chromium	Lognormal	71	80	89	0.0005	0.0005	0.0005	0.0380	0.0044	0.0230	0.0071	0.0010	14	0.0093
	Copper	Unknown[b]	80	80	100	N/A	N/A	0.0004	0.0044	0.0015	0.0040	0.0017	0.0001	7	0.0019
	Nickel	Unknown[b]	80	80	100	N/A	N/A	0.0007	1.5000	0.0081	0.3055	0.0482	0.0160	33	0.0909
	Selenium	Lognormal	74	80	92	0.0010	0.0010	0.0013	2.2000	0.0255	1.6580	0.2510	0.1310	52	0.6779
	Vanadium	Lognormal	71	80	89	0.0003	0.0003	0.0004	3.0000	0.0076	0.0715	0.0232	0.0069	30	0.0412
	Zinc	Lognormal	40	80	50	0.0100	0.0100	0.0100	6.6000	0.0081	0.8165	0.3729	0.2903	78	2.2205
Surface Water (stream)	Copper	Not Tested	32	65	49	0.0001	0.0005	0.0002	0.0150	0.0002	0.0023	N/A	N/A	N/A	N/A
	Nickel	Unknown[b]	47	65	72	0.0001	0.0001	0.0004	0.0430	0.0011	0.0079	0.0018	0.0004	20	0.0027
	Selenium	Lognormal	41	66	62	0.0010	0.0010	0.0010	1.1400	0.0013	0.0725	0.0092	0.0050	54	0.0284
	Cadmium	Not Tested	12	66	18	0.0001	0.0001	0.0001	0.0023	0.0000	0.0006	N/A	N/A	N/A	N/A
	Chromium	Not Tested	16	66	24	0.0001	0.0005	0.0002	0.0046	0.0002	0.0017	N/A	N/A	N/A	N/A
	Vanadium	Lognormal	46	66	70	0.0003	0.0003	0.0003	0.0062	0.0010	0.0043	0.0012	0.0002	13	0.0016
	Zinc	Unknown[b]	43	66	65	0.0100	0.0100	0.0100	0.1200	0.0110	0.0926	0.0231	0.0045	20	0.0345

Notes:

a	For all cases with at least 5 detected samples, tested using the Shapiro-Wilk W test (alpha equal to 0.05). Distributions confirmed as normal or lognormal are listed as "Normal" or "Lognormal." For cases with fewer than 5 detected samples, distribution testing was not conducted. For cases in which distributions could not be confirmed using the Shipiro-Wilk W test, distributions were estimated using
b	Estimated for all cases using a nonparametric approach, based on rank ordering of the data
c	For all cases with at least 3 samples and a detection frequency of 50 percent, calculated using distribution-dependent formulae. For lognormal distributions, the mean and SD are the minimum variance unbiased (MVU) estimators, following equations 13.3 and 13.5 in Gilbert (1987). For cases with 3 or 4 samples and detection frequencies of at least 50%, a normal model is assumed.
d	The UCL95 for lognormal distributions was calculated using Land's method (EPA 1992, Gilbert 1987).
e	The lesser of the UCL95 and the maximum detected concentration. If the UCL95 was not calculated, the maximum detected concentration was used.
*	Could not be estimated using Land's method
EPC	Exposure point concentration
CV	Coefficient of variation ([SD/mean]*100)
Min	Minimum concentration reported
Max	Maximum concentration reported
N/A	Not applicable
Q95	95th percentile (quantile)
SD	Standard deviation
UCL_{95}	The one-sided 95 percent upper confidence limit of the mean
Unknown[a]	Distribution assumed to be normal based on examination of probability plots and outlier box plots
Unknown[b]	Distribution assumed to be lognormal based on examination of probability plots and outlier box plots

References

Gilbert, R. O. 1987. *Statistical Methods for Environmental Pollution Monitoring* . John Wiley & Sons, Inc., New York, NY.

U.S. Environmental Protection Agency (EPA). 1992. "Supplemental Guidance to RAGS: Calculating the Concentration Term". Intermittent Bulletin, Volume 1, Number 1. Publication 9285.7-081.

ATTACHMENT 2

DEQ RESPONSES TO FORMAL PUBLIC COMMENTS

FOREWORD TO IDEQ RESPONSES

The Idaho Department of Environmental Quality (DEQ) conducted a formal 45-day (extended to 60 days for commenters requesting extensions) public comment period on the draft *Area Wide Risk Management Plan* published in May 2003. The plan establishes area wide removal action goals (RGs) and removal action objectives (RAOs). Recommended action levels are included for continued monitoring of potential release pathways from previous phosphate mining activities, development of engineering evaluations/cost analysis for impacted areas presenting subpopulation level ecological risks, and compliance with applicable Federal and State regulations. The plan was developed by the Department under Task 3 of the *Area Wide Investigation Scope of Work* referenced in previous agreements with DEQ's Interagency partners and the mining companies. It is intended to provide discretionary guidance in assisting the lead agencies in developing site-specific RAOs, RGs and, if necessary, risk-based clean up levels (RBCULs) that meet both site-specific and area wide ecological and human health protection goals.

The Department received comments from the Bureau of Land Management (BLM), Environmental Protection Agency (EPA), Fish and Wildlife Service (FWS), Greater Yellowstone Coalition (GYC), Idaho Mining Association Selenium Committee (IMA), Patrick Porgans & Associates (PPA), Shoshone Bannock Tribes (Tribes), and US Geological Survey (USGS). This foreword is intended to address general comments that are prevalent in numerous sets of comments and to outline any risk management plan revisions resulting from those concerns. Specific Department responses are provided as bold and italicized inserts to each individual comment received, with the exception of PPA who requested a separate letter, which is also enclosed.

As observed in previous area wide public comment efforts, many of the views and concerns voiced are diametrically opposed and do not allow for consensus decision making. This illustrates differences in organizational perceptions and philosophies, and the lack of scientific consensus and uncertainties inherent in selenium science and the risk evaluation process. As a result, the Department has given careful consideration to the available technical references and relevant studies concerning issues of contention, and have developed independent conclusions based on the scientific literature, site-specific data, area wide observations, regional goals and collaboration with Interagency partners. The project-specific decisions made by the Department are considered to be protective of the environment but are intended to apply only to actions in the Southeast Idaho Phosphate Mining Resource Area based on observed area wide conditions.

The following subsections provide general discussions of the issues raised by multiple commenters or concerns that resulted in revisions to the final risk management plan:

<u>Addition of Attachment 1:</u> Many of the reviewers indicated that the risk calculations used to support the development of action levels were difficult to follow or replicate. Some reviewers suggested that risk assessment and risk management efforts are phased activities that should be documented in separate reports with the implication that the Risk Management Plan (RMP) contained new risk assessment efforts.

The Department previously published a separate *Area Wide Human Health and Ecological Risk Assessment* (AWHHERA) that evaluated regional human health and population level ecological risks based on area wide data. The AWHHERA included a Tier I screening evaluation that indicated localized ecological risks were likely in areas of significantly elevated selenium concentrations. The risk management calculations contained in the RMP are intended to support the development of chemical-specific action levels and not to reassess area wide risks. The supporting calculations focus on data from known impacted areas (areas that have received contaminants from historic mining releases as documented through sampling efforts) and provide estimates of subpopulation level risks, in the form of hazard quotients, assuming the proposed action levels can be achieved in these areas.

In an effort to respond to the commenters' primary concerns, the Department has developed a separate attachment to the final plan that gives a more detailed description of the risk calculation models, methods and input parameters. Additional text has also been added to the body of the plan concerning action level development and application, and the Department's risk management rationale.

<u>Definition of Terms:</u> Numerous comments were received regarding the definition of certain technical terms used in the plan. Many of these terms were defined in previous documents and the Department may have incorrectly assumed that reviewers and interested parties had a moderate level of familiarity with earlier area wide publications. To respond to this issue, the Department has included a glossary of technical terms and list of common acronyms in the preface of the plan.

<u>Vegetation Action Level for Selenium:</u> Several reviewers voiced concerns over the proposed action level of 8.3 ppm for selenium in vegetation. This action level was developed by the Department assuming exposure to foraging wildlife based on our authority to regulate risks in the environment. However, this approach was considered deficient by many commenters, because it exceeds the common veterinarian advised forage level of 5 ppm for domestic grazing animals and was not considered protective for this beneficial use. The Department has had subsequent discussions with the land management agencies responsible for mine administration, reclamation, multiple beneficial use determinations, relinquishment, and grazing management, and we have agreed to lower the selenium action level for vegetation to 5 ppm to be consistent with reclamation goals and to provide for future acceptance of the sites by these Agencies. While more extensive grazing management practices may be possible to allow for higher levels in forage, the land management agencies believe reclaimed forage levels should support unrestricted multiple use, as intended by the original mine plans. This would help prevent an extensive grazing management burden for historic sites to be shifted to the land management agencies in lieu of an effective remedy.

<u>Non-Regulated Water and Sediment Action Levels for Selenium:</u> A significant number of reviewers objected to the selenium action level of 201 ppb for non-regulated waters. The Department calculated this action level for application at closed system ponds and pit lakes that are defined as water treatment or industrial facilities under the former or existing mine plans. These surface water features were not intended to support aquatic life or provide additional habitat, do not contribute to waters of the State or U.S., and are specifically designed to protect regulated waters, therefore, are exempt from the Clean

Water Act provisions. In developing this action level, the Department assumed the sole exposure pathways from these non-regulated surface water features were for transient wildlife drinking water and/or occasional resting by migratory birds. The Department added a caveat that ponds with developed riparian or wetland habitat, which was not their permitted intent, would require case-by-case risk management decisions from the site-specific lead agency concerning acceptable concentrations.

The plan has been modified to include a requirement for a site-specific surface water feature inventory and qualitative functional use evaluation for each mine. This evaluation will be conducted by the lead and support agency representatives during the initial phases of each mine-specific investigation. The purpose of the evaluation will be to characterize the current ecological use of each non-regulated surface water feature based on observational data. The previously proposed non-regulated action levels for water and sediments will apply for those units that appear to provide only transient wildlife drinking water or resting exposure pathways. The regulated surface water action levels for water and sediment (which are considered protective to waterfowl and riparian use) will apply to those surface water features that have ecological exposure pathways beyond their permitted and/or intended industrial use. Additionally, a surface water action level of 50 ppb will be applied for any non-regulated surface water locations specifically intended for livestock watering based on veterinarian recommended drinking water levels for domestic animals.

<u>TMDL Considerations:</u> A number of commenters have mentioned issues concerning the State's TMDL process and the discussions contained in the draft plan regarding these issues. Early in the Area Wide Investigation (AWI) process, it was decided that some baseline TMDL-related data would be collected concurrently with the selenium investigation process being conducted by the Department's waste and remediation program, but those efforts would be separately funded and independently managed through the DEQ's surface water program. Throughout the process, we have included summaries of the annual reports and findings in TMDL-related documents in the Area Wide Investigation documents. However, formal administrative responsibilities for these efforts have remained within the appropriate program jurisdictions.

In the draft risk management plan, some TMDL-related information was provided based on discussions with our program counterparts. This included our understanding that six streams were being proposed for listing as impaired streams under Section 303(d) of the Clean Water Act. It has been brought to our attention that the six streams cited in the plan did not appear in the State's draft 303(d) list and that there may be other streams potentially eligible for listing based on currently available data. The DEQ's water program representatives and EPA counterparts are currently reviewing this information as part of the formal 303(d) process and will make any final determinations regarding these issues. All streams listed on the 2003 or subsequent 303(d) lists will be scheduled for TMDL's or some equivalent process (i.e. CERCLA, site-specific actions, etc.).

Contrary to some of the public comments submitted, the Risk Management Plan does not indicate that DEQ has the discretion to choose streams for impaired listing or to determine whether formal TMDLs are required. However, DEQ does have the responsibility to assess data quality and protocols in determining the eligibility for listings. The Criteria Continuous Concentration (CCC), or chronic water quality criteria, is specifically evaluated under the Clean Water Act and Idaho water quality rules on the basis of two separate exceedances of four-day averaged samples in a three year period; while the Criteria Maximum Concentration (CMC), or acute water quality criteria, require a single one-hour average exceedance. Standard environmental industry standards typically dictate the use of discrete surface water samples that do not always meet these regulatory definitions or protocols. Therefore, the presence of some historic data indicating an exceedance does not necessarily support an impaired stream listing. The DEQ must verify the suitability of sample quality and protocols as appropriate before submitting our proposed listings. The Department's TMDL baseline efforts associated with the selenium project over the last three years have attempted to resolve these issues for a significant number of suspected impaired streams by implementing the required sampling protocols. Future annual efforts will be expanded to include additional streams that may be suspect.

It is also within the DEQ's authority to make recommendations to the EPA for their final determination regarding the utility of a formal TMDL process on certain impaired streams. The EPA has the authority to waive the formal TMDL process if similar or equivalent actions are already being conducted under other programs. We believe formal TMDL processes for the currently identified impaired streams would be a poor use of Department and taxpayer resources since these are subject to CERCLA activities and, like the TMDL goal, are intended to achieve surface water quality compliance levels. Because the TMDL baseline activities described are independent of the Area Wide Investigation, detailed responses to public comments regarding specific streams or listings have been deferred to the 303(d) public comment process, however, general responses are provided where appropriate.

<u>Hazard Quotients for Action Level Acceptance</u>: There were numerous questions regarding the Department's rationale for accepting action levels that resulted in mean hazard quotients in the 20's. The RMP discusses the fact that hazard quotients up to 10 are often used as a benchmark for potential population level risks. However, this is a theoretical threshold that depends on the accuracy of the toxicity reference value used in developing the hazard quotient ratio. The true toxicological effects level lies somewhere between literature-referenced No Observed Adverse Effects Level (NOAEL) concentrations and Lowest Observed Adverse Effects Level (LOAEL) concentrations. These reported values are dependent on the number of available toxicological studies conducted for specific contaminants and receptors. In the absence of a significant amount of research data, these values are estimated using safety factors ranging from 10 to 1000 that may result in very conservative values, which can be orders of magnitude different. Therefore, the use of a hazard quotient of 10 for population level risks is a somewhat arbitrary and precautionary practice that does not accurately reflect the same measure of risks for differing species and contaminants.

The Department considered the fact that our action levels are based on sub-population level exposures. This assumes exposure to a much smaller number of individual animals than a population level threshold, and results in less dire consequences if a small percentage of the subpopulation experiences minor adverse effects from exposure. Documented adverse effects from current existing conditions have been relatively rare during the area wide study or in area-specific research with the exception of individual receptors and domestic animal incidents in highly impacted areas. These occurrences have not been observed in areas where the concentrations are at levels of scientific contention but those that are well over the proposed action levels. Therefore, the Department has accepted action levels that result in focusing removal action efforts in areas with selenium concentrations that are likely to cause measurable adverse effects. We believe this approach results in the greatest benefits in reducing existing exposures and protecting the environment, and avoids endless debate on the grey area exposure levels that provide little improvement in ecological population or subpopulation conditions.

Additionally, the models used in developing the proposed action levels contain a number of input assumptions that result in very conservative hazard quotient estimates. The models assume 100% site use for sub-population receptors when this would likely apply to very few of the target receptors in the limited, non-contiguous areas of impact. The models assume 100% bioabsorption of ingested contaminants although toxicological studies generally show less than total absorption of ingested inorganics. The models provide HQs based on achieving action level concentrations in the targeted media but do not account for concurrent reductions in secondary media such as aquatic plant or macroinvertebrate concentrations. As a result, meeting action levels would actually result in much greater HQ reductions than indicated in the plan. In each case where the input variables contained a significant level of uncertainty, the Department erred on the conservative side. Thus, the reported hazard quotients are expected to be very conservative estimates for the majority of the exposed subpopulations in the resource area.

Based on area wide observations, conservatism of the models and the targeted sub-population receptor set, the Department has concluded that the calculated hazard quotients are appropriate for indicating areas of unacceptable risks. The Department's approach is discussed in further detail in the final risk management plan.

Interagency Concurrence: The Area Wide Investigation is being conducted under a *Memorandum of Understanding (MOU)* between USDA-Forest Service Region 4, Environmental Protection Agency Region 10, US Department of Interior (Bureau of Land Management, Bureau of Indian Affairs, and Fish and Wildlife Service), the Shoshone-Bannock Tribes, and the Idaho Department of Environmental Quality. The MOU designates IDEQ as the Lead Agency for the Area Wide Investigation, provides procedures for communication and coordination between the Agencies, and assigns responsibilities for designated lead and support agency representatives for both the area wide and subsequent site-specific activities.

Since the inception of this project, interagency representatives have worked together to reach consensus decisions and to assure all of the MOU participant's interests and regulatory obligations were met. Upon assuming the lead agency role for the Area Wide Investigation, the DEQ established an Interagency Technical Group made up of Support Agency project managers assigned by each of the MOU signatory agencies. The technical group also invited USGS, Idaho Department of Lands, Idaho Division of Health and Idaho Fish & Game to participate, at their convenience. This group has met on a monthly basis throughout the project and has been involved in discussions and decisions at each critical milestone, providing their comments and concurrence as required by the MOU.

The draft risk management plan was discussed with this group throughout its development by DEQ and was presented as a preliminary draft to the Interagency project managers and upper level managers in March of 2003. Subsequent discussions were held with various Interagency representatives throughout this extended review process and while many issues were resolved prior to the end of public comment, the IDEQ asked that all comments be formally submitted during the public comment period to provide a level of transparency regarding their concerns. In many cases, other technical representatives in each Agency were consulted and asked to provide comments. A similar approach has been used throughout the Area Wide Investigation process. While the IDEQ is designated as the Lead Agency and is ultimately responsible for publication of related Area Wide documents, the Interagency efforts to date have been collaborative and represent a general Interagency consensus among the technical representatives assigned by the MOU agencies. ARAR lists and concurrence letters from the Interagency representatives are presented in Attachments 3 and 4, respectively.

In conclusion, we appreciate the comments from all of the interested parties and hope we have addressed the major issues, or at least provided the basic rationale for our decisions. The Department has attempted to be balanced, impartial and objective in our decisions, and firmly believes that an adequate amount of data, research and analysis has been performed since the inception of this project to reach reasonable conclusions in unison with our Interagency partners. We will continue to conduct relevant studies and monitoring, as necessary, and will make appropriate adjustments to our risk management approach as warranted by new scientific findings or changes in regulatory requirements. However, the Department believes it is time to initiate the mine-specific actions that will lead to alternative analysis and remedial activities.

Each mine will be subject to a comprehensive CERCLA site investigation to characterize and delineate any other impacted areas and releases with oversight by the appropriate lead and support Agencies. All identified areas will be addressed under the removal action process and the overall site will require acceptance of the appropriate land management agencies for final reclamation conditions suitable for relinquishment. The area wide risk management plan provides "discretionary" guidance, as specified in the Area Wide Scope of Work, to assist the assigned Lead Agencies in establishing their site-specific removal action goals and objectives, and to provide recommended action levels for delineation of impacted areas based on the likelihood to cause subpopulation effects. As we move forward, we will continue to work with our Interagency partners to identify and address the areas of impact within the framework of the appropriate regulatory processes with a common goal of protecting human health and the environment.

Once again, the DEQ appreciates the comments submitted by all of the interested parties and we look forward to your continued involvement.

Date: July 3, 2003

To: Rick Clegg, IDEQ
Cc: Susan Burch, FWS
Christine Cutler, Shoshone-Bannock Tribes
Dean Fox, BIA
Jeff Jones, USFS
Chris Morris, IDL
Matt Wilkening, EPA

From: Bill Stout, BLM

Re: Comments on Final Draft *Area Wide Risk Management Plan*

General Comments

One of the goals of the Area Wide Risk Management Plan is to reduce the amount of risk assessment needed in each of the site-specific investigations. In order to do so, two sets of action levels are proposed. These action levels will instigate either monitoring or investigation and EE/CA consideration. One of the future use goals of phosphate mine reclamation has been grazing as part of a multiple-use program. The BLM feels that although the IDEQ is not a grazing management agency, the action level for vegetation should reflect the current and future uses of the vegetation, in this case, grazing. We feel that the proposed action level of 8.3 ppm selenium in vegetation should be reduced to 5 ppm selenium. This would more effectively reflect the vegetation selenium levels recommended by the Idaho State Veterinarian's Office and other organizations.

Response: The Department appreciates BLM's comments and assistance with this issue. Pursuant to our subsequent Interagency discussions, the vegetation action level has been adjusted to 5 ppm reflect the land management Agencies' reclamation goals. We have also been assured that any future reclamation monitoring protocols developed for future mine plans by the land management Agencies will be consistent with this recommendation.

The BLM also feels that a separate action level, based solely on wildlife consumption, for non-regulated surface water is not practical and should be eliminated. There is a varying degree to which non-regulated surface impoundments support life. A blanket action level assuming use only as a drinking water source only covers one end-member of impoundment character. The current action levels for regulated surface water should be applied to all surface water until a site-specific investigation can determine the character and extent of any existing ecosystems. Thus, the action level for a surface water pond would be .005 ppm until evidence suggests a higher action level is appropriate. The logic used in this document would be that the action level for a surface water pond would be .201 ppm until evidence suggests a lower action level is appropriate.

Response: The Department has revised the process for applying the non-regulated surface water action level. A qualitative functional use evaluation will be required for each non-regulated surface water feature, to be conducted by the designated Lead Agency and Support Agency representatives during the early stages of each mine-specific action. The proposed non-regulated surface water action level of 201 ppb will apply to the ponds, pit lakes or other features whose exposure pathways are limited to transient wildlife drinking water or migratory bird resting locations. A 50 ppb action level will apply to units intended as livestock watering locations. And a 5 ppb action level, protective of waterfowl and riparian use, will be applied for those surface water features presenting additional sensitive habitats beyond their intended use.

Specific Comments

Sect. 4.1 pg.12: Population-level, subpopulation-level, and individual-level need to be more clearly defined.

Response: See Glossary.

Sect 4.2.2.1: Remove "historic" from the title.

Response: The term "historic" has been defined in the Glossary as it's intended use in the plan and to remove any connotations towards archeological or cultural significance.

Sect 4.2.3.1: While it is true that effective grazing management plans should be developed by the Federal agencies, the action levels should not exclude the grazing. Sheep and cattle are both current and future receptors.

Response: See response to Comment #1.

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NATIONAL SCIENCE AND TECHNOLOGY CENTER
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, COLORADO 800225-0047

In Reply Refer to:
1703 (ST-130)

April 4, 2003

Memorandum

To: Bill Stout, BLM Pocatello Field Office

From: Karl Ford, Ph.D, DBAT, NSTC Toxicologist

Re: Comments on Draft Area-Wide Risk Management Plan

I briefly reviewed the subject document. I could not evaluate the risk based "maximum acceptable concentrations" without more information on the exposure assumptions and toxicity factors. I do have some general comments and concerns on the text of the Plan:

Response: The Department appreciates your timely review of the preliminary draft document and your participation in the May 13, 2003 conference call to discuss your comments. We believe most of your concerns were resolved during our discussions with any remaining issues being expressed in the BLM's OSCs written comments.

1. Section 3.0 was not complete and could not be reviewed.

Response: Acknowledged; the preliminary draft document sent to you was released for Interagency presentations in March 2003 and Section 3.0 was still in development.

2. Page 3. Throughout the document are statements that "population-level ecological risks are unlikely." This statement is not supported nor referenced. The term "population level" needs to be defined. Biologists sometimes consider a population as all individuals in the known world-wide population or other spatially defined population. Toxicologists tend to use the term population to include a sample of the population used for toxicity testing, hence an EC5 could be an effective concentration for 5% of the test population. Confusion then takes place when the scale of the population is not defined. It is recommended the term be carefully defined and supported or referenced.

Response: The terms have been defined in Glossary. For clarification, the Area Wide efforts focused on regional ecological populations in the Resource Area. For mine-specific risk management guidance, the term "subpopulation" is used to indicate a subset of regional populations and to avoid confusion with the Department's regional population-level findings. The regional subpopulation term should be considered synonymous with "local populations or communities at or near a site" as specified by USEPA's risk management guidance documents.

3. Page 3. Similarly, individual-level risks are referred to but not defined. Depending on definitions, it may not be possible to quantify individual-level risks. It is recommended the term be carefully defined and supported or referenced.

Response: Corrected.

4. Page 8. Is this a CERCLA action and if so, was EPA CERCLA risk assessment guidance followed? There seems to be an effort to disregard EPA guidance as too conservative and to be less conservative:

> " In fairness to the responsible parties, we have tried to make reasonable assumptions..."

This suggests that the authors found EPA guidance to be unreasonable. This view relates to several of my comments below.

Response: EPA CERCLA risk assessment guidance was used for the Area Wide Risk Assessment and the development of the risk management plan supporting calculations. However, the acceptance of proposed action levels considered effects to sub-population level receptors based on area wide observations. The actual calculation of HQ values for the selected action levels was conducted using NOAEL-based reference values to provide an adequate level of conservatism. EPA's general screening values assume population-level exposures and effects to larger numbers of receptors. Therefore, the Department is comfortable with slightly less conservative values in defined areas of impact. The action levels focus removal action resources to areas at which significant chronic or acute effects are most likely to occur and not on borderline concentrations that are still in contention. The noted text has been removed and additional explanation of rationale has been included in the final plan.

5. Page 10 line 3 where "releases from mining operations" is stated. Do you mean "active" mining operations? If so, it is more apparent why land management agencies may be the reviewer or acceptor of BMPs. If not, it is not apparent why land management agencies would have a say as they are not a regulator.

Response: Existing BMPs for current or future mining activities have been modified to prevent similar releases in the future. The historic sites and inactive portions of active sites do have some identified ongoing releases, or evidence of past releases. The MOU provides for a collaborative Interagency effort to resolve these issues. The land management Agencies are responsible for approving long term BMPs in proposed mine plans that are protective to surface water quality and other multiple beneficial uses, as well as responsibility for final relinquishment of existing leases. The regulatory enforcement Agencies are responsible for ensuring protection of human health and the environment through compliance with State and Federal laws, and corrective actions in impacted areas. The overlapping jurisdictions require an integrated approach and are not separable issues.

5. Section 4.2.2 singles out elk, egg, and whole body fish as receptors with impacts, but does not mention wildlife habitat, especially surface water, wetlands and vegetation.

Response: The referenced section was intended to highlight measurable concentrations observed in impacted areas to demonstrate exposures and/or effects that are occurring over the spectrum of receptors through bioaccumulation mechanisms. The proposed action levels, on the other hand, are focused on media most amenable to direct remedial techniques and controllable exposure pathways. These media comprise the habitat and primary exposure paths that result in elevated concentrations in higher trophic level receptors.

6. Section 4.2.2.1. The definition and selection of media is confusing. Reclaimed vegetation was selected and may be a medium, but may be a receptor too. Ignoring the main source material - the reclaimed waste rock dumps - may be a technical problem that will limit the effectiveness of any remediation. Later in 4.3.1.1, I find media includes 3 categories of surface water, two for groundwater, two for sediment, along with riparian soils and vegetation. A better discussion should be included somewhere on why and how these media were selected. I still don't know what non-regulated surface water is and why the action levels are so high for this medium.

Response: There are action levels established for monitoring to ensure all releases are identified, and separate action levels established for triggering the removal action process. Surface water and sediment also required the development of separate action levels based on aquatic protection versus non-aquatic receptor use. The waste rock dump soils were excluded from action levels because they are classified as waste storage units. The composition of the dumps and presence of highly mineralized surface soils are no different than when initially approved by the Land Management Agencies except for the discovery of selenium releases beyond the boundaries of the waste units and the uptake in reclaimed forage. IDEQ has assumed that the waste rock dumps present an infinite source that will exist for the foreseeable future. Therefore, action levels are focused on eliminating future releases and mitigating existing impacts. Additional discussion has been provided in the Action Level development section and Attachment 1.

7. Section 4.2.2.2, RAO 2.2 seems to have the same objective of reducing exposures as RAO 2.1 and I don't see the need for a separate RAO. Also in this section, it is not clear why BMPs would be approved by land management agencies (unless they pertain to active mining).

Response: RAO 2.1 refers to reducing exposures resulting from releases at historic sites by implementing removal actions triggered by action level concentrations. RAO 2.2 refers to developing effective BMPs for current and future mining to prevent future exposures from occurring. Since the land management Agencies are responsible for approving operational mine plans, they should have a selection of demonstrated BMP alternatives that will prevent recurrences of releases in the future. The State surface mining regulations, administered by the Idaho Department of Lands, does include a section specific to phosphate mining operations. These general BMP provisions for active mining, such as maximizing infiltration through waste rock dumps, should be revised to be consistent with the findings of our regional efforts to prevent similar occurrences in the future.

8. RAO 3.1 cites various vegetation action levels for selenium, including a FS goal of 5 ppm. It also states separate action levels have been proposed for historic reclaimed areas and impacted riparian zones, but I could only find one action level in Section 4.3.1.1? This section also states that ultimately state and federal grazing management agencies should develop criteria. Why then, is a relatively high criterion proposed in Section 4.3.1.1 of 8.3 ppm? More on this later.

Response: We have agreed to lower this action level to 5 ppm at the request of the land management agencies in support of their future reclamation goals.

9. As a general comment, are there any threatened and endangered species or habitat in the Area? If so, are the action levels sufficient for protection of these species and how was that determined? If not, there may be no concurrence from the Fish and Wildlife Service under the Endangered Species Act.

Response: T&E species have been considered throughout the process, and a Fish & Wildlife representative is included in the Interagency technical group working on this project. The action levels are primarily driven by aquatic species and receptors with relatively small home ranges, and are therefore considered protective for the few T&E species identified.

10. Page 17. The authors have chosen sediment NOAA PELs probably because they include selenium. I use a more current EPA sediment PEC, but while that database does not have selenium, it does have Cd, Cr, Ni and Zn (Ingersoll et al, 2000).

Response: Comment noted. The Department agrees that the PECs in Ingersoll et al 2000 are more current than the NOAA PELs for Cd, Cr, Ni and Zn. However, the PECs are generally higher than the PELs for the selected metals so we chose the more conservative reference.

11. Page 18, first paragraph. Why are no fish or aquatic invertebrates included as receptors? A site conceptual model showing the sources, pathways and key receptors should be included.

Response: Fish and aquatic invertebrates were considered as receptors during this process. The key media that impact fish and aquatic invertebrates are surface water and sediment. In most cases, the action levels selected for these media are either regulatory criteria or PELs that are expected to be protective of these receptors. A previous Area Wide conceptual site model was developed and published as a separate document during the area wide investigation process as specified by EPA's risk assessment guidance documents. The CSM did include aquatic species as receptors.

12. Page 18, second paragraph. In the next two pages, difficulties with the dose models are apparent. It is stated that dose equations were manipulated to compute acceptable maximum media concentrations (later referred to as Action Levels in subsequent embedded tables). But, in the subsequent sections beginning with 4.3.1.1, what the authors actually did was select action levels and then calculate hazard quotients. This is a very unusual and questionable practice. In every other risk assessment/management project I have worked on, the dose equations are manipulated to compute action levels and it is done. For this project, it appears that initial exercise resulted in action levels too low (or even negative numbers, page 18, paragraph 2?). This suggests something is wrong with the site conceptual model, exposure assumptions, feeding strategies, bioaccumulation factors, toxicity factors or the algebra.

Response: The text has been revised for clarification. A new Attachment 1 has been added to the plan to provide detailed description of the calculation methods and models, and to further describe the action level development procedure.

13. Page 18-19. The discussion on the last half of page 18 and page 19 is equally disconcerting. Apparently, various other efforts were tried with unacceptable results. Apparently, a HQ of 10 and a site use factor remedied this problem. I don't object to a site use factor as long as it is supportable by the species' ecology/home range. I don't see why a HQ of 10 was used. These problems may have resulted from the probabilistic method used or problems with the site conceptual model, exposure assumptions or toxicity factors.

Response: The HQ of 10 and site use factor of 0.5 were used only for the development of the vegetation action level. The HQ of 10 was used to calculate the single media concentration for vegetation and allowed for the heterogeneity observed in different plant species and within relatively small study areas. The site use factor was based on professional judgment considering the spatial configuration of impacted vegetation, particularly along waterways, and the size of the smallest home ranges for the targeted receptor set. It was concluded to be unlikely that any receptor would be restricted to the exclusive use of only impacted vegetation within their referenced home range dimensions. This is now a moot point since the calculated vegetation action level was further decreased in consideration of grazing use for domestic

animals. Attachment 1 provides additional information on model inputs.

14. Page 20, first paragraph states that HQ "between 1 and 10 are often accepted as being protective.." This is quasi-true among ecological risk assessors, but needs to be referenced and supported. Often the reason it is quasi-true is due to uncertainty in the ecological risk assessment process. But then the argument is carried to subpopulation effects occurring in less than 5% of the Area. And that the

> "aforementioned methods and assumptions present a *slight level of conservatism* (emphasis added) and therefore (we) accept the resulting hazard quotients and proposed action levels..."

So what the reader understands is that the action levels have been made less conservative by use of a HQ of 10 and a site use factor of 0.5 across the board. Without better justification, this approach may result in action levels that may be 50 times higher than they should be.

Response: As noted in the previous response, the site use and hazard quotient adjustments applied only to the calculation of the vegetation single media dose. All other pathways assumed an HQ of 1 and site use factor of 1 in developing acceptable single media concentrations. The final hazard quotient calculation for combined action level concentrations also assumed a site use factor of 1. It is unlikely that a significant number of subpopulation level receptors will be limited to impacted media for every path of exposure when the areas of impact are relatively small and non-contiguous, and comprise a cumulative total of less than 5% of overall area.

15. Section 4.3.1.1. As commented on before, some of the media are not defined. For example, how are terrestrial sediments different from aquatic sediments? What is non regulated surface water and why is the action level 40 times higher? Are receptors 40 times less exposed in these areas? There is considerable discussion in the literature that even the CWA water quality criterion of 5 ug/L is too high for protection of aquatic food chain effects, but the authors are going to allow 201 ug/L for non-regulated water? I also object to the vegetation action level of 8.3 ppm, based on the text on page 14 and on the Maximum Tolerable Level recommended by the National Academy of Sciences Mineral Tolerance of Domestic Animals (MTDA). This value is 2 ppm.

Response: As previously discussed, aquatic receptors are the most sensitive group for selenium exposure. Waters regulated for the protection of cold-water biota in State and Federal regulations are required to meet the 5 ppb toxics criteria. Non-regulated surface water are tailings ponds, sedimentation basins, pit lakes, etc. that are used to protect regulated waters, and, by definition, exempt from the water quality rules. These surface water features are not intended to support aquatic life, therefore, the initial action level was based on drinking water pathways for terrestrial receptors. Similarly, aquatic sediments applied to areas intended to support aquatic life and terrestrial sediments referred to sediment exposures from non-regulated waters through incidental exposure while drinking or feeding. However,

the original non-regulated water selenium action level has been modified to a tiered action level approach based on the functional use of each unit, to be determined through Interagency surveys. Surface water features with significant riparian habitat will use the regulated surface water criteria of 5 ppb, units used for domestic animal watering will use the veterinarian recommended value of 50 ppb, and only non-regulated unit used for transitory wildlife watering will use the original action level of 201 ppb. The vegetation action level has also been lowered 5 ppm to meet the land management agencies regional reclamation goals for selenium.

16. Page 21, second paragraph justifying a higher soil action level for Se is unpersuasive. The argument is that impacted soils are localized, therefore a higher limit is warranted is not logical. The text goes on to mention forage levels (what is the connection to the previous sentence?) and concludes that the slightly higher Se action level is within the same order of magnitude is also unpersuasive. Yes, the proposed action level is 10 times lower than the EPA and Netherlands value and that is an order of magnitude, but this is highly significant and could drive risks 10 fold higher.

Response: The EPA and Netherland's values represent soil screening values, not cleanup levels. They were provided solely for comparative purposes. Soil levels of 5 ppm are not expected to present acute health risks as evidenced by the land management agencies' soil salvage guideline of 13 ppm for acceptable topsoil concentrations for reclamation. Therefore, localization of soils is a relevant consideration in averaging chronic exposure scenarios. A 5 ppm soil concentration in only 5% of a given area is equivalent to 0.8 ppm for the entire area. Under EPA and Netherlands criteria, the later scenario would pass screening level consideration and not warrant further consideration. The forage reference was a similar comparison but will be changed to reflect the action level revision.

17. Page 22 table and text. The Ingersoll PEC for cadmium is 4.98, the BLM Risk Management Criteria range from 3-5 ppm, and the EPA SSL is 1.6 ppm. The sediment and soil action levels are probably acceptable, except for the terrestrial sediments should be the same as aquatic sediments and riparian soils. I see no reason to increase this action level. The NAS vegetation MTDA level is 0.5, nearly an order of magnitude lower than the proposed action levels and this value seems too high.

Response: As explained in response #15, the terrestrial or non-regulated sediment concentration is based on a different set of exposure assumptions than those for aquatic life protection. Likewise, the original vegetation action level assumed limited wildlife exposure while the MTDA considers domestic animal exposures over the entire life of the receptor.

18. Since livestock has been an issue, I recommend cattle (or even elk) be included in the list of receptors, and HQs be computed for them with the action levels.

Response: Elk were included in the previous risk assessment and were found to have negligible risks due to their expansive home range. Sheep and cattle were excluded from the risk assessment process based on objections from EPA and FWS because they are a managed resource. However, we have lowered the vegetation action level to encompass the land management agencies' reclamation goal for grazing use and we have added an additional tier of non-regulated surface water to account for domestic animal drinking water sources.

19. Chromium, copper, nickel, vanadium and zinc. Comparing mean and maximum concentrations to the proposed action levels and other published action levels, I am not concerned about these elements and have no comments on them as they pose little risk.

Response: Comment noted.

If you have any questions on these comments, please call me at 303-236-6622 or email me at: Kford@blm.gov.

Response: Once again, we appreciate your input and subsequent discussion on your issues of concern. We hope we have sufficiently addressed those concerns and have accurately reflected the basis of our discussions.

EPA Comments on
Idaho's Department of Environmental Quality
Area Wide Risk Management Plan for the Southeast Idaho Selenium Project

General Comments:

I. The intent of this work is risk management, not specifically risk assessment. Given that the objective of the document is to provide guidance in making risk management decisions in the Resource Area, it is perhaps not surprising that the document is written without sufficient explanation of the underlying risk assessment. One approach for providing more documentation of the risk assessment would be to create two documents—one discussing the risk assessment and one the risk management. The risk assessment document (or set of documents) could then be more complete and descriptive on the process that is being used to characterize environmental concentrations associated with risk ranges. From the risk assessor's perspective, it is sometimes difficult in the current document to appreciate where the risk assessment stops and the risk management begins. For example, the decision to not include existing mine features (i.e. mine ponds) because these features are currently regulated under waste management regulations may make sense from a risk management perspective but is problematic from a risk assessment perspective. This type of existing or historic features may represent an uncontrolled exposure pathway that is not addressed in the risk assessment. Separating the documents would address this type of issue.

Response: We appreciate EPA's technical review of our draft risk management plan, however, it appears the reviewer has mistakenly classified a portion of this document as a probabilistic risk assessment (PRA). The Department published an Area Wide Human Health and Ecological Risk Assessment as a separate document in January 2003. There are some supporting calculations contained in the risk management plan for the sole purpose of developing action levels for impacted areas based on subpopulation level risks. There are no new Area Wide risk assessment estimates presented. The risk management plan does provide "hypothetical" hazard quotient estimates under an assumption that the proposed action levels can be achieved.

The Department has included Attachment 1 to the final plan to provide a more detailed explanation of the supporting calculations. It should also be noted that the only mine feature excluded from action levels is waste rock dump soil based on waste disposal unit classification.

II. In the review of a risk assessment, two sequential steps would be expected, not one: a) acceptance by EPA of the Area wide Probabilistic Risk Assessment (PRA) results, and b) EPA approval of the State's recommended risk management decision based on the PRA. The Area Wide PRA as presented is a mixed bag of risk assessment and risk management, thereby forcing these two steps together. To assist in determining what should be provided in the PRA, the following is a long quotation of EPA policy (the preface for "Guiding Principles for Monte Carlo Analysis") regarding PRA, with annotations in bold that have added that are specific to the Area Wide PRA. To the extent that this document is a PRA, it should follow this guidance at a minimum.

Response: The EPA reviewer has incorrectly characterized this effort as an Area Wide Probabilistic Risk Assessment. This is a risk management effort and the plan under review contains no area wide risk assessment calculations. The data used applies only to conditions within impacted areas and the risk calculations derive estimates of risk assuming action levels can be attained, which is a risk management activity. The Area Wide risk assessment was previously developed using regional data and a more conservative deterministic method to ensure a high level of confidence in the final results. It should also be noted that the EPA's approval process for this effort consists of a concurrence from the EPA's support agency project manager under the terms of the Interagency Memorandum of Understanding.

[Citation: Fred Hansen, Deputy Administrator, EPA Science Policy Council, Memo of 15 May 1997, entitled POLICY FOR USE OF PROBABILISTIC ANALYSIS IN RISK ASSESSMENT AT THE US ENVIRONMENTAL PROTECTION AGENCY.]

CONDITIONS FOR ACCEPTANCE

When risk assessments using probabilistic analysis techniques (including Monte Carlo analysis) are submitted to the Agency for review and evaluation, the following conditions are to be satisfied to ensure high quality science. These conditions, related to the good scientific practices of transparency, reproducibility, and the use of sound methods, are summarized here and explained more fully in the Attachment, "Guiding Principles for Monte Carlo Analysis."

1. The purpose and scope of the assessment should be clearly articulated in a "problem formulation" section that includes a full discussion of any highly exposed or highly susceptible subpopulations evaluated (e.g., children, the elderly). The questions the

assessment attempts to answer are to be discussed and the assessment endpoints are to be well defined.

General Comment IIa. There is, within the Area wide PRA, a broad but incomplete discussion of the purposes of the assessment. There is no problem formulation section or work plan that we found, although one is required by this policy memo and RAGS 3A. Lacking one, we cannot comment on it; but it does not appear that the PRA depends solely for formulation upon the deterministic risk assessment (DRA) that preceded it. Some observations:

- The DRA addresses (in our opinion) the issues related to human health assessment sufficiently with respect to sensitive or susceptible subpopulations.
- The DRA does discuss and select ecological endpoints. The Area wide PRA then adopts these, but later deletes some that are the most sensitive endpoints due to smallest home range and closest association with site soils and vegetation. Either a) the use of these highly susceptible sub-populations gives answers that are not helpful in a site management context, or b) the original selection was flawed in terms of representing the endpoints of interest. Lacking a documented formulation step for the PRA, it is difficult to distinguish whether this decision is for reasons more related to risk management or to risk assessment. The Area wide PRA document's organization (which mixes analytical and management steps) reinforces this confusion.
- Need for evaluation of ecological subpopulations (by which we infer is meant inhabitants of a particular sub-region) appears to be the chief justification for the Area wide PRA. EPA expects the authors to address a) why these subpopulations have been added as a refinement to the assessment endpoints; b) the added value of the PRA to assess subpopulations; c) should the population really be the assessment endpoint, what is the intended population protection goal?

Response: The Area Wide Human Health and Ecological Risk Assessment (AWHHERA) was developed to assess existing regional human health and population-level ecological risks using a conservative deterministic approach. The plan contained a problem formulation section and was based on an approved work plan with appropriate endpoints for that purpose. It concluded that regional human health and population-level ecological impacts are unlikely. However, Tier I calculations indicated that significantly impacted areas are likely to present subpopulation-level risks.

Because regional risks are unlikely, subsequent investigative and cleanup activities are intended to occur on a mine-specific basis targeted at addressing identified localized impacts on a subpopulation basis using the CERCLA removal action process. The risk management plan is intended to be a "discretionary" guidance document to assist Lead Agencies in these efforts. The action levels and supporting calculations contained in the plan do not constitute a new risk assessment or a PRA. Stochastic calculation methods were used in action level development to allow consideration of distributional effects and variability within the assessed subpopulations, which we felt provided added value. The AWHHERA indicated that receptors with large home ranges were at considerably less risk than those with smaller home ranges due to the limited, non-contiguous nature of the observed impacts caused by historic mining releases. Therefore, the target receptor list for action level evaluation was reduced to exclude those species that showed low risks even under "worst case" conditions in the deterministic assessment.

Regardless of the regional or population-level results, the State believes the impacts caused by unauthorized releases from historic mines should be addressed through the removal action process. These actions are triggered by concentrations that are likely to cause acute or significant chronic effects to the targeted subpopulations. Some minor effects in subpopulations are considered acceptable with the knowledge that overall populations will be unaffected. In this sense, the risk assessment and risk management plan are separate activities that do not require identical endpoints. Our goal is to eliminate ongoing releases from historic mining areas and cleanup areas of impact presenting unacceptable risks.

The elimination of mice and voles as subpopulation risk indicator species was a risk management decision by the State based on their ubiquitous presence in the region and the bias presented by their extremely small home ranges (<0.32 and <0.035 acres, respectively). Similar risk management decisions had to have been made by the EPA and other governmental agencies in the past to allow approval of any significant public works project, highway system construction, mine plan or other significant activity whose size would clearly have eliminated habitat in excess of that needed to support a small rodent subpopulation.

2. The methods used for the analysis (including all models used, all data upon which the assessment is based, and all assumptions that have a significant impact upon the results) are to be documented and easily located in the report. This documentation is to include a

discussion of the degree to which the data used are representative of the population under study. Also, this documentation is to include the names of the models and software used to generate the analysis. Sufficient information is to be provided to allow the results of the analysis to be independently reproduced.

General Comment IIb(1). The software name and the exposure models are supplied. However, simply including the spreadsheets (often with citations but no appended references) does not really fulfill the requirement to explain the analysis. The documents include a large number of spreadsheets and Crystal Ball © reports. These are well organized in folders by topic and organism. There is no coherent centralized discussion of how the work was done, and how assumptions made may affect the results. Again, we request that the Area wide PRA be separated and fully documented. Also, statements are made of work that is not shown so far as we can find it (e.g., that derived RAOs were substituted into the original equations to check against convolution errors).

Response: The Department has included a separate attachment detailing the models and methods used in the risk management plan supporting calculations. Appendix D contains the results for action level substitutions into the hazard quotient models.

General Comment IIb(2). This paragraph discusses how errors might occur based on the less-than-fully-documented approach. Although Monte Carlo (and other methods of stochastic analysis) address variability in some aspect of an individual (e.g., body weight, ingestion rate), or in some exposure parameter (e.g., food ingestion rate, food concentration), the outcomes are still *individual* outcomes. That is, the test organism is repeatedly artificially replicated with a set of conditions that the computer selects from the specified variable distributions. Then, the results (as exposure point concentrations) are aggregated, and summarized statistically. This is *analogous* to a population or subpopulation, and RAGS 3A states that it is helpful to think of the resulting distribution as a population; but this is not a population level study. The basis of the toxicity measures is also initially an individual's response (reported as a statistical interval from replicated individuals).

Thus, the PRA seems to say that the results inform us about protection of populations at the sites, when the PRA really informs us about the expected outcome for an individual at the site exposed over and over to the site chemistry. The results could suggest that no greater than 5% of these replicated individuals exceed an HQ of 20. If that is the protection goal, then this should be stated in the PRA formulation phase or somehow called out in this document. Here, the goal seems to be developed after the assessment, and also appears (to us) to be complicated with a suggested *population* protection component that may not be present. A hypothetical example of an absence of population protection might occur should a young robin pass through a critical life stage with a low body weight and high invertebrate ingestion, thus with high dose. Were that life stage not protected (in the example given, if it were in the 5% over HQ=20), then the population may not be protected from young-of-the-year effects. That type of potential error should be considered in the formulation step (and perhaps it was. However, such documentation appears to be missing). If the potential error has been covered by selection of a conservatively low toxicity comparator, then a sufficient factor of safety may exist; and that would be worth stating in formulation and the risk assessment.

Response: As you are aware, most of the toxicological data and benchmarks do contain safety factors, and effects levels are typically based on the sensitive end of the scale. The hazard quotients were developed using NOAELs for selenium induced reproductive effects, which are much lower than other chronic or acute effects. The hazard quotient models also assume a site use factor of 1, 100% bioabsorption of constituent intake, and no reduction allowance for secondary ingestion paths of exposure (i.e. aquatic plants, macroinvertebrates, etc.) as action levels are achieved in primary exposure media, all of which are conservative assumptions that tend to result in highly conservative estimates. The State is reluctant to apply additional safety factors when we have already adopted a conservative subpopulation approach for implementing removal action and addressing releases. This approach is considered more protective than population-level risk management typically endorsed by the EPA. Refer to Attachment 1 for additional discussion on the risk models and calculation methods.

3. The results of sensitivity analyses are to be presented and discussed in the report.

Probabilistic techniques should be applied to the compounds, pathways, and factors of importance to the assessment, as determined by sensitivity analyses or other basic requirements of the assessment.

General Comment IIc. Tornado plots are provided for the factors that have been varied, but not for all factors. The "missing" factors may not be important to the assessment; but this is not clear because the work plan is not present.

Response: A work plan was provided for the AWHHERA and is not required in the development of risk management plans. Refer to Attachment 1 for additional discussion.

4. The presence or absence of moderate to strong correlations or dependencies between the input variables is to be discussed and accounted for in the analysis, along with the effects these have on the output distribution.

General Comment IId. This discussion is not in the text, and perhaps should be. It is not clear how body weight (which was main factor varied) and the concentration of the food might be correlated.

Response: Refer to Attachment 1 for additional discussion.

5. Information for each input and output distribution is to be provided in the report. This includes tabular and graphical representations of the distributions (e.g., probability density function and cumulative distribution function plots) that indicate the location of any point estimates of interest (e.g., mean, median, 95th percentile). The selection of distributions is to be explained and justified. For both the input and output distributions, variability and uncertainty are to be differentiated where possible.

General Comment IIe. A large number of spreadsheets are provided, so it is likely the input and output distributions are sufficiently documented. However, as stated above, the rationale for selection of distributions is not documented, and many of the literature citations are not referenced in full. There is no discussion of how the distributions were selected apart from a citation.

Response: Refer to Attachment 1 for additional discussion.

6. Calculations of exposures and risks using deterministic (e.g., point estimate) methods are to be reported if possible. Providing these values will allow comparisons between the probabilistic analysis and past or screening level risk assessments. Further, deterministic estimates may be used to answer scenario specific questions and to facilitate risk communication. When comparisons are made, it is important to explain the similarities and differences in the underlying data, assumptions, and models.

General Comment IIg. The availability of the DRA does not mean that the results in the PRA were compared in a meaningful way to it. The DRA is generally better documented than is the PRA in regard to capability of being communicated to the public. Indeed, there are parts of the PRA that we question should be included (e.g., negative environmental concentration values for background risk), as these are confusing and do not appear to build the case for acceptance of the approach.

Response: The referenced information was provided to illustrate the level of effort in developing action levels, even though this initial step did not affect the final outcomes. We agree that it has caused some confusion and have removed this section from the final document.

7. Since fixed exposure assumptions (e.g., exposure duration, body weight) are sometimes embedded in the toxicity metrics (e.g., Reference Doses, Reference Concentrations, unit cancer risk factors), the exposure estimates from the probabilistic output distribution are to be aligned with the toxicity metric.

General Comment IIh. There has been no attempt so far as can be seen to do this.

Response: The proposed action levels were initially developed using a proportion of the acceptable single media dose as described in Attachment 1. These dose equations were done using determinsistic methods for a NOAEL HQ=1 and did not require alignment with the toxicity metric. Stochastic methods were employed only in the final step of verification for evaluating the resulting subpopulation hazard quotient distributions.

The stated goal of the Risk Management Plan is to develop Remedial Action Guidelines. Presumably, this is in accordance with requirements of EPA's Risk Assessment Guidance for Superfund, Part B. This reviewer couldn't find a reference for this critical document. In addition, a great many more references are "dangling," i.e., refer to literature that is not cited in the references list. The following comment applies to the risk assessment guidance. It is not clear to us (and may be a policy matter) for how it applies to a risk management document.

Response: The EPA's Risk Assessment Guidance document was not referenced in this plan because we did not consider this to be a risk assessment effort. The document was referenced and followed in the development of the previously published AWHHERA and the basic principles were applied in our action level supporting calculations and models. We do not believe the following PRA elements apply to the risk management plan supporting calculations but we have provided a general response for each item.

Risk Assessment Guidance for Superfund, Part 3A (Process for Conducting Probabilistic Risk Assessment, PRA), lists requirements for submission of a PRA starting on page 6-1.

Element of PRA	Adequacy of Present Document	Further Comment
Statement of Ecological Risk Endpoints and/or Human Risk	Sufficient, possibly including past documents *Response: Comment Noted*	
Value Added by Conducting a PRA *Response: Stochastic methods were used in the risk management calculations to capture variation in subpopulation exposures and effects; the State did conclude that this was value added.*	Appears to be incomplete; statement that area-wide effects are 5% of total does not seem to explain added value.	Reviewers believe that there are values added; but this description may be located in the deterministic risk assessment. It should be further described or out-referenced. Evidently, PRA is less conservative, and more suited to reasonable interpretation.

Discussion of Data Adequacy for Moving to Various Tiers in PRA	Sufficient *Response: Comment Noted*	
Description of Methods and Models to be Used *Response: Refer to Attachment 1.*	Present but dispersed through several paragraphs and not very easy to find.	A separate paragraph describing methods and procedures would fix this.
Obtaining and Using Exposure Factor Distributions *Response: References added.*	These are presented as "dangling" citations.	Add references to some document.
Methods for Deriving the Concentration Term *Response: See Attachment 1.*	Not always well documented	There is no example of the solution of the dose equations for environmental concentrations. One can infer this from the spreadsheets; but it is not transparent. Selection of variables should be discussed in the main text.
Initial Sensitivity Analysis *Response: The tornado plots are provided in support of risk management decisions. Unlike risk assessment, risk management decisions are conducted after the fact.*	We could not find this. Tornado plots are attached, and in some cases (coyote), accomplish this end. In other cases, only 1 variable is used, so the Tornado plot only shows one factor dominating (of course).	The approach preferred by EPA in the RAGS 3A guidance for probabilistic risk assessment is that a sensitivity analysis should be prepared <u>before</u> the key variables are selected. This information may be present in the deterministic assessment (we didn't yet have time to look for it).
Preliminary Monte Carlo Simulation;	These analyses are provided; sufficient *Response: Comment noted.*	
Refined Sensitivity Analysis	We suspect that is what was intended by including Tornado plots after selection of the variable used in the simulation. *Response: Correct.*	
Discussion of Influential and Uncertain Variables	Not discussed. *Response: Correct.*	We presume that variability alone is implied by the analyses.

Specific Comments:

1) The document states at paragraph 4.3.1 that, "While these proposed action levels do represent the Agency's desired remedial target concentrations for the specified impacted media, the actual effect of media action level exceedances observed during mine-specific activities is to trigger EE/CA consideration of the affected media/area and to select appropriate removal action alternatives…."

Under Risk Assessment Guidance for Superfund, part 3A, RAOs that are thus developed are derived from probabilistic estimates of risk, and should be checked by re-introduction of the solution into the equation to assure that the answers are correct. At Section 4.3.2.2, page 27, it states, "The final phase of the evaluation was to insert the action level concentrations for each selected media into the original stochastic model to evaluate the resulting hazard quotient ranges and analyze the results with regard to uncertainties, related benchmarks and resource area remedial requirements." This is not accessible to the reviewer, however, it is essential to verify the environmental benchmark estimates.

Response: The exhibits in Appendix D are the hazard quotient distributions that result from reintroducing the proposed action levels into the original models. Stochastic methods were introduced to provide a sense of distributional effects for the range of body weights and ingestion data. Benchmark comparisons for published screening values are discussed in the chemical-specific subsections of 4.3.2.

2) Use of single medium concentrations is essential to solving the dose equations, and makes sense for many of the components. (E.g., cottontail, where the bulk of the food is from terrestrial vegetation.) However, in some cases (more omnivorous animals), more detail should be provided to justify the medium selected for variation.

Response: Refer to Attachment 1 for additional discussion.

3) One of the boundary conditions for the work is, apparently, the limit of regulation under the Clean Water Act (WOTUS). This is seen in the text and explicitly stated in RAO 1.1, "in regional surface water sub basins and stream segments." "Nonregulated waters" referring to the Clean Water Act that are not (if we understand this correctly) WOTUS but may be RCRA regulated units include mine ponds (presumably that do not drain into WOTUS). This determination for the RAO does not appear to be qualified by the possibility that waterfowl may be attracted to such areas and be exposed. In contrast, the area-wide work includes media in RCRA regulated units that could be significant for exposure of terrestrial wildlife (e.g., vegetation on waste piles). Whether these ponds are CWA regulated or not appears to be secondary to the potential impact

to the wildlife that may be attracted there. There are other ARARs that we could not find listed, the Migratory Bird Act (likely relevant), the Magnuson-Stevenson Act (in the Effective Fish Habitat section--possibly not relevant but should be mentioned), and the Endangered Species Act (applicable if species are present).

Response: The reference to "non-regulated" waters does refer to areas that are not WOTUS and are also, by definition, RCRA-exempt. The plan has been modified to allow consideration of a lower action level if waterfowl exposures are evident, as determined by an Interagency survey. Additionally, the action level for vegetation on waste rock piles initially included in the plan was based on potential wildlife exposure. This has been lowered to include reclamation goals established for grazing of domestic animals. ARARs are currently being developed by all of the involved Agencies for inclusion in the mine-specific CERCLA processes.

4) Section 4.3.2, Page 25. "…the Agency decided to remove the Deer Mouse and Meadow Vole from the list of risk indicator species because of their ubiquitous presence in the resource area and the resulting risk bias presented by their extremely small home range." Removing these species from the risk assessment should be clarified. Are the Deer Mouse and Meadow Vole considered to be part of the secondary media mentioned earlier in the section that would experience proportionally reduced concentrations after achieving action levels in other media?

Response: Yes, we would expect a proportional reduction in this species. However, due to their ubiquitous presence in the region and their extremely small home range, we do not feel that subpopulation exposures to this receptor would have significant consequences or justify expanded remedial actions solely for these target species. Small mammals were also assessed through direct measurement during the Area Wide investigation and were not found to present any significant food chain risks as prey for higher trophic-level receptors, even under existing conditions.

5) Section 4.3.2.1, Page 28. Use of a maximum background value for Se as screening value for EE/CA: "The Agency intended to use NOAA PELs for this media action level, where available. However, selenium did not have a published PEL value, therefore, the reported EC10 for freshwater birds and fish, which has a value of 2.5 mg/kg dw, was selected. However, the maximum observed background concentration for this media was 2.6 mg/kg dw, which exceeds the

proposed action level, so the maximum background value was used." In this case (and in most others where this was done), there is not a great difference between the calculated and the selected value based on background. However, the implication that the nonimpacted areas' concentrations do not represent a possible toxic effect to wildlife should be specifically discussed. Most of the EPA guidance dealing with background references an upper quantile (not a maximum) comparison.

Response: While our studies include a statistically significant number of background samples, they are still relatively small data sets in comparison to what we expect to collect through future site-specific investigations. Undoubtedly, with the presence of naturally exposed outcrops, we can anticipate finding some higher background values in the future. Therefore, we have to assume the current maximum concentrations actually represent upper quantiles of the true background sample population. We should not expect responsible parties to clean up areas that occur naturally and believe this is an appropriate approach for establishing background reference values using the current data set.

6) Section 4.3.2, page 27…"Values between 1 and 10 are often accepted as being protective of ecological receptors on a population-level basis. In this case, the risk evaluation focuses on subpopulation effects occurring within less than 5% of the overall area. Therefore, the Agency was inclined to accept the slightly higher levels as representative values within the accuracy typically associated with risk processes, and to conclude that the proposed action levels are adequately protective and meet the Agency's risk management goals." This is professional judgment, but does not really state what the implications are for exposed subpopulations. Does it imply for instance that some minor toxic effects are acceptable in regions abutting former or current mines?

Response: As stated earlier, some minor toxic effects on a subpopulation basis are considered acceptable by the State with the knowledge that population level effects will not stem from these areas. Our goal is to identify and address areas with the likelihood to cause acute or significant chronic effects in resident subpopulations. Furthermore, an average hazard quotient of 20 using the NOAEL was deemed acceptable for this purpose only after careful consideration of the conservative input assumptions for the model and the small percentage of overall area impacted by releases. Similarly, it is our understanding that the EPA sets their water quality standards based on a 95% protection standard for aquatic populations. We expect our subpopulation approach to result in an overall population protection standard above 95%.

June 27, 2003

Rick Clegg
Idaho Department of Environmental Quality
Soda Springs Satellite Office
15 West Center
Soda Springs, ID 83276

RE: GYC comments on the Area Wide Risk Management Plan

Dear Rick:

Attached are the comments of the Greater Yellowstone Coalition (GYC) on the Area Wide Risk Management Plan. These comments were prepared for GYC by our consultant, Sheryl Hill. As you will discover in reading our comments, we have identified numerous deficiencies, discrepancies, and omissions in our review of the Plan. Many of the problems that we have identified arise from IDEQ's use of the earlier *Final Area Wide Human Health and Ecological Risk Assessment, Selenium Project, Southeast Idaho Phosphate Mining Resource Area* in developing the Plan. Earlier this year we submitted comments on the Assessment. We have attached those comments to our current comments on the Plan since they bear directly on its development and are cause for many of the Plan's problems.

Response: The Department appreciates GYC's involvement in this process and we will try to address the majority of the comments submitted by your organization. However, in reviewing your comments we found a significant number that pertain to writing style preferences, sentence structure, use of technical terms and other minor issues that fail to provide any measured improvement to our proposed risk management approach, which should have been the primary subject of the review process. GYC apparently misinterpreted the intended use and audience of this plan, and focused their comments on improving content for those with no project background, and readability for non-technical reviewers. However, the risk management plan is specifically defined as a "discretionary" guidance document for other Interagency representatives who are already familiar with the technical aspects of the project and who are responsible for conducting site-specific activities.

As a courtesy, the Department has briefly responded to GYC's appended comments on the Area Wide Risk Assessment that was published in December 2002. We regret the fact that we were not provided with GYC's comments on this document during the designated public comment period.

While our comments are detailed, thorough, and comprehensive, our primary concerns can easily be summed up in a few sentences. On the surface it appears that IDEQ hopes to obfuscate the issue of cleanup at the various contaminated mine sites through the generation of volumes of confusing and, in a number of cases, incoherent data – perhaps with the assumption that the public will be so intimidated by the mass alone, that they won't pursue a careful review of the documents. We are extremely concerned that IDEQ has intentionally down played the significant contamination problems arising from past phosphate mining in southeast Idaho in order to lessen the economic burden of the mining companies who are ultimately responsible for remedial actions needed to protect Idahoans and their environment. We are further concerned that IDEQ misrepresented the views of the experts, and substituted non-peer reviewed research and opinion for the easily available solid, comprehensive, peer reviewed research. We offer the following examples:

- IDEQ states that development of TMDLs for selenium "would be a poor use of limited resources" (see comments pg. 7, par. 1), but IDEQ does not have discretion under the Clean Water Act to decide whether it will or will not prepare TMDLs for impaired waterbodies.
- The opinions of researchers at the U.S. Geological Survey and U.S. Fish and Wildlife Service regarding the potential ecological risks of contaminants, particularly selenium, originating from phosphate mining sites, have been misrepresented in order to give the impression there is support among the scientific community for the conclusions of the area-wide human health and ecological risk assessment that is the basis for the risk management plan (see comment for pg. 4, par. 2 of the plan).
- The use of monitoring data has been used incorrectly by IDEQ to give the false impression that more sites, and therefore a larger area of the phosphate mining area has been sampled. The action levels presented by IDEQ in the risk management plan are therefore invalid.
- Numerous statements throughout the risk management plan clearly indicate that IDEQ believed insufficient data were available to conduct a risk assessment of groundwater resources, and yet IDEQ issued a human health risk assessment document that claimed there were no potential risks to human health from ingestion of groundwater.
- Streams that should be listed as impaired on Idaho's § 303(d) for development of selenium TMDLs have not been listed by IDEQ. Data collected during the TMDL baseline study indicate that the Blackfoot River from the headwaters to the reservoir should be listed for selenium.
- Despite numerous references to "limited resources" in the risk management plan, IDEQ has invested substantial time and money in developing "area-wide" risk assessments and an "area-wide" risk management plan using data that is inadequate both spatially and temporally even though the Agency has acknowledged that site-specific investigations and removal actions were imminent. It would be much more appropriate to conduct an area-wide risk assessment after the sources of contamination have been more thoroughly documented through site-specific investigations.
- The risk management plan is only advisory, and the authorities of IDEQ and other agencies in regard to preventing additional contamination and ensuring that past contamination is remediated is not clearly explained in the risk management plan.

Response: We appreciate GYC's summation of specific issues exemplifying your major concerns, and we will address each of these in our responses. As far as downplaying significant contamination problems or lessening the economic burden for remedial actions, we have to disagree with this characterization. The risk management plan establishes action levels for delineating contaminated areas based on the potential for subpopulation-level ecological effects. This is actually a more conservative level of protection than most CERCLA actions that focus on regional population level ecological effects, but is well within the State's jurisdiction in addressing unauthorized releases to the environment.

IDEQ appears to have forgotten that its responsibilities are to provide a clean and healthy environment for the people of Idaho, not protect the financial bottom line of a handful of mining companies. Where did we get the idea that IDEQ would disregard its responsibility to the people of Idaho? The answer is, from the Plan itself. The IDEQ has clearly stated its bias in support of phosphate mining in southeast Idaho (see comment for page 20, paragraph 1) which seems to be an inappropriate expression of policy on the part of a State agency mandated to protect human health and the environment.

Response: The IDEQ is fully aware of our regulatory obligations and responsibilities, and will continue to exercise them in a manner that is protective to human health and the environment, and assures compliance with current environmental laws, as stated in the risk management plan. The fact that we do recognize the socioeconomic importance of the mining industry in Idaho is not contrary to our mission and is a decision-making consideration required under CERCLA processes. To avoid the perceptions often attributed to other stakeholder organizations, we believe it is important to clarify that our goal is not the elimination of mining in Idaho but the responsible use of natural resources in a manner that preserves the quality of our environment.

As erroneous as it is IDEQ seems to have bought into the concept that here in Idaho we have to choose between a healthy environment and jobs. The reality is that what is good for Idahoans and their environment, in this case cleaning up the contaminated sites, is good for the economy through the jobs a real cleanup of these sites will create.

Response: It should be noted that nowhere in the plan is there any mention by IDEQ of the concept of choosing between a healthy environment and jobs, as implied. Furthermore, the primary intent of this plan is to establish the procedures and action levels required for cleaning up contaminated sites.

We are convinced that the issues and problems with the Plan that we have raised must be remedied if IDEQ is to carry out its mandated responsibilities.

Response: Once again, we appreciate GYC's willingness to be involved in this process. The Department has committed significant effort and resources to this issue. Throughout the process, we have and will continue to work diligently with our Federal, State and Tribal counterparts to pursue reasonable and objective solutions to the phosphate mining issues. We hope to allay many of GYC's concerns as we move forward with the site-specific investigations and removal action processes at each individual mine, and results of our risk management effort become more apparent.

Sincerely,

Marv Hoyt
Idaho Representative

Preface: The section numbers and headings shown below are identical to those appearing in the document entitled, *Public Comment Draft, Area Wide Risk Management Plan: Remedial Action Goals and Objectives, and Risk-based Action Levels for Addressing Releases from Historic Phosphate Mining Operations in Southeast Idaho, May 2003*, prepared by the Idaho Department of Environmental Quality, Soda Springs, Idaho. Comments correspond to page (pg.) and paragraph (par.) numbers in the plan; paragraph numbers begin with the first complete paragraph appearing on a page of text.

Response: The Risk Management Plan was developed as a "discretionary" guidance document to assist other Agencies in their site-specific lead and support roles. The plan is intended to provide technical and policy guidance for On Scene Coordinators and Support Agency Project Managers to support consistent regulatory decision-making. The content of the plan assumes a level of familiarity with the project background and regulatory processes required to perform assigned regulatory responsibilities. The plan was not written as a public information tool, as repeatedly implied by the GYC reviewer. Therefore, IDEQ's responses and plan revisions will be limited to those issues that are relevant to the Department's risk management approach.

EXECUTIVE SUMMARY

Pg. i, par. 1: The first sentence states that the Idaho Department of Environmental Quality (IDEQ) was designated the lead agency for the area-wide investigation, but fails to mention the subject of the investigation or the risks that the plan addresses.

Response: Corrected.

Pg. i, par. 1: The third sentence states that the "risk management plan is intended to provide guidance to other Lead and Support Agencies, [*sic*] and mining companies in focusing limited resources, identifying areas of concern, minimizing future risk assessment needs and assisting in mine-specific risk management decision making in an [*sic*] consistent manner." These objectives are similar to those of the *Final Area Wide Human Health and Ecological Risk Assessment, Selenium Project, Southeast Idaho Phosphate Mining Resource Area, December 2002,* i.e., "focus limited resources" by addressing "…areas of concern…" on an area-wide basis, thereby "…minimizing future risk assessment needs…" How is the risk management plan distinctive from, and complementary to, the risk assessment?

Response: The Area Wide Risk Assessment provided quantitative estimates of existing regional human health and population-level ecological risks based on area-specific data. The risk management plan expands on those results by setting future regional removal action goals and objectives, and action levels, which trigger the development of removal action alternatives. The risk assessment is a technical document, which follows EPA guidance and results in general conclusions based on risk modeling. The risk management plan is a regulatory decision document that provides "discretionary" guidance for the other Agencies and may include policy considerations.

Pg. i, par. 1: A draft technical memorandum was written by Richard Clegg, IDEQ, to the Administrative Record for the Selenium Area Wide Investigation on May 15, 2002. The plan reiterates most of the information contained in the draft memorandum. Was the draft technical memorandum finalized? Why didn't IDEQ cite the draft technical memorandum in the plan? Do the memorandum and plan constitute a duplication of effort on the part IDEQ?

Response: The Risk Management Plan is an expanded version of the original technical memorandum and supercedes the earlier draft document. The memorandum was not referenced or finalized because it was used as a framework for developing the current plan. Based on discussions within the Department, coordination with our Interagency partners, comments on the draft technical memorandum and the further review of the Area Wide Scope of Work, we decided our risk management efforts needed to include chemical-specific action levels and a brief regulatory summary of the overall removal action process. This change did not require any duplication of effort since the content of the technical memorandum was incorporated into the expanded document.

Pg. i, par. 1: The fourth and fifth sentences state that the plan is "strictly advisory in nature," and that all "mine-specific decision making is at the discretion of the assigned Lead Agency with consultation from Support and Land Trust Agency [*sic*] representatives in accordance with site-specific goals and conditions." What did IDEQ and other entities involved in the area-wide investigation hope to achieve by producing an area-wide risk management when a) the plan is advisory and need not be implemented by the agencies responsible for overseeing cleanup of sites contaminated by mining, and b) the plan may not be consistent with "site-specific goals and conditions"?

Response: The plan is intended to provide "discretionary" guidance to the other Agencies in order to have some level of consistency in regulatory decision-making at individual mine sites. Since each site is different in terms of construction, size, ownership, operations, etc. and may have differing site-specific concerns and regulatory oversight, it is important that the goals and objectives support an overall strategy but allow the Lead Agency to make site-specific decisions based on any unique conditions that may be encountered. The Area Wide Investigation approach was intended to provide a common framework for proceeding with site-specific activities, not to override the existing authorities of the other Agencies.

Pg. i, par. 1: Define "Support and Land Trust [Agencies]," and explain their regulatory authorities in the context of "mine-specific decision making."

Response: Definitions are provided in the glossary. Regulatory authorities and citations will be included in the site-specific consent orders and ARAR lists, as required for CERCLA actions.

Pg. i, par. 1: Replace the phrase "non-time critical removal action process" with a phrase that is understandable by the intended audience of the *Executive Summary*, i.e., the public. Include the definition of "removal action" stated in the Comprehensive Environmental Response, Compensation and Liability Act, i.e., "…the cleanup or removal of released hazardous substances from the environment."

Response: The term "removal action" has been added to the glossary. The phrase "non-time critical removal action" refers to a specific process outlined by EPA guidance and is appropriately used in this document. The EPA guidance document for this process is referenced in the bibliography for those who want additional information.

Pg. i, par. 2: The first sentence is vague regarding the risks addressed by the risk assessment. Please explicitly state that the plan is intended to address risks associated with elevated concentrations of selenium and other contaminants produced by phosphate mining in southeast Idaho.

Response: The plan should be read in context. It is evident to the objective reader that the subject of the area wide effort is selenium and other mining-related metals.

Pg. i, par. 2: The conclusions regarding unlikely human health and population-level ecological risks from exposure to selenium and other contaminants associated with phosphate mining in southeast Idaho were based on flawed assumptions, as explained in a review of the *Final Area Wide Human Health and Ecological Risk Assessment, Selenium Project, Southeast Idaho Phosphate Mining Resource Area, December 2002,* submitted to IDEQ by the Greater Yellowstone Coalition on April 29, 2003, and attached to these comments as Appendix A. It is irresponsible of IDEQ to reiterate these conclusions in an area-wide risk-management plan without clearly defining the "current observed conditions" on which they are based. Specifically, IDEQ should inform the clarify that risks to humans who consume contaminated groundwater or spring water were not assessed even though a) livestock deaths due to selenium toxicosis have been documented, and b) the aquifer underlying a large portion of the resource area is the source of drinking water for 6,000 people living in the area.

Response: We disagree with GYC's characterization of the area wide risk assessment effort and believe your comment demonstrates an apparent lack of familiarity with the regional activities conducted to date. Groundwater characterization efforts were deferred to site-specific activities because "localized" groundwater conditions could not be effectively defined on a regional scale. However, all available wells on mining lease areas were sampled, all public water supply sampling records were reviewed (including those involving the referenced aquifer), and a selected group of domestic wells representing residents closest to mining sites were identified and sampled by the Division of Health to assess the potential for domestic well impacts. Based on these studies, there were no indications that any individuals are being exposed to contaminated drinking water, as implied.

After reviewing the available data, the US Department of Health and Human Services published a Health Consultation entitled "Evaluation of Selenium in Groundwater; Southeast Idaho Phosphate Resource Area" in September 2001 that also concluded there is no apparent public health hazard from drinking and/or using regional groundwater. GYC's reference to livestock deaths is irrelevant since these incidents consistently occur in the immediate vicinity of waste rock dumps and are not groundwater driven. Furthermore, there are no human health receptors residing within those areas. The site-specific investigation process will continue to evaluate localized groundwater conditions in the vicinity of each mine and we will take the appropriate action if impacts are discovered.

Pg. i, par. 2: Please explain the statement, "…subpopulation risks are an appropriate measure for prioritizing and addressing existing impacts and ongoing releases." This statement implies that IDEQ will quantify subpopulation risks in specific areas, prioritize the areas based on risks, and implement risk management at the highest-priority areas first. Is this correct?

Response: The Department has proposed action levels based on subpopulation-level ecological risks in each identified impacted area as opposed to a less conservative population-level effect typically used in CERCLA actions. We believe this is warranted due to past and continued unauthorized releases from historic sites. Impacted areas exceeding those action level concentrations are determined to present unacceptable risks and are subject to the removal action process. Prioritization refers only to identifying impacted areas and selecting appropriate removal action alternatives. Areas exhibiting the highest concentrations of contaminants obviously warrant the most stringent remedies, however, the process is not time driven. All removal actions will proceed in accordance with the level of complexity and time required to identify, design and implement effective solutions.

Pg. i, par. 3: Define the abbreviations, "CERCLA" and "NCP," and avoid using jargon such as "non-time critical removal action process" unless it is defined. Please remember that the *Executive Summary* is intended to be a summary that is comprehensible to readers who are unfamiliar with specific technical language.

Response: A list of acronyms has been included in the final plan. The term "non-time critical removal action" is not jargon, it is a very specific regulatory term describing a process defined in EPA guidance and the National Contingency Plan. For the record, an Executive Summary is intended to outline the important aspects of a more comprehensive document and briefly provide a summary of any major findings or conclusions. It is intended to be a time management tool that allows management, thus "Executive", to get a feel for the document without having to read the entire report. Reiterating all of the details contained in the report defeats the purpose of providing a summary.

The technical language contained in the report is routine for the intended audience of regulators and Agency representatives. We have provided a glossary and list of acronyms to assist readers unfamiliar with certain terms but it is not the intent of this plan to fully educate individuals lacking a background in this subject area. We suggest reviewing the cited references in the bibliography for further information regarding the conduct of CERCLA activities.

Pg. i, par. 3: How does one distinguish between a "substantive" and nonsubstantive Federal or State regulation, and what criteria are used to determine whether compliance with regulations is "practicable"?

Response: This information is contained in the body of the text and the terms have been added to the glossary.

Pg. ii, par. 1: The first two complete sentences shown on page ii appear to be contradictory. The first sentence states that the "…designated lead agency…is responsible for developing an EE/CA

Recommended Alternative [*sic*]…" whereas the next sentence refers to a "Company-developed [*sic*] EE/CA." Does the responsible mining company develop an EE/CA to which the designated agency responds with an alternative? Please clarify this process.

Response: The Companies are responsible for developing EE/CA documents that include a comparative analysis of a number of alternatives. The Agency selects or develops a Recommended Alternative, similar to the EIS process. Both documents are made available during a formal public comment period and prior to the Lead Agency's final selection.

Pg. ii, par. 2: The first sentence states that the "…regional remedial action goals and objectives…" are intended to "…address areas of unacceptable risks." The only risks acknowledged to this point by IDEQ are population-level ecological risks. And yet the fourth goal listed at the end of this paragraph is "…to protect regional groundwater sources by characterizing and responding to any local groundwater contamination…" This is a reasonable and appropriate goal for IDEQ to pursue under the management plan, but as explained above, IDEQ chose not to assess potential human health and ecological risks due to groundwater contamination because it was considered a "*de minimus*" route of exposure (refer to Appendix A of these comments). Is IDEQ claiming in the plan that groundwater contamination is an unacceptable risk?

Response: The Department consistently acknowledges the presence of localized impacts and subpopulation-level risks in the area. The area wide risk assessment concluded that groundwater was a "de minimus" path for regional human health considerations based on the information provided in our earlier comment. We have not excluded the possibility of localized groundwater impacts at or near the mines or impacted areas, which is the reason we published action levels and included groundwater characterization in the site-specific investigation requirements. If localized impacts are discovered in the vicinity of any individual mine, they will be addressed.

Pg. ii, par. 2: Because IDEQ is responsible for enforcing Idaho's water quality standards (*IDAPA 58.01.02*) it would be preferable if the first goal was restated to reflect that obligation. As written, the first goal simply refers to '…achieving compliance with Federal and State regulatory criteria." Water quality criteria are not legally enforceable until they are incorporated into State water quality standards. It is the responsibility of IDEQ to enforce Idaho's State water quality standards.

Response: This is a removal action process and our goal is to achieve numeric criteria in areas that are currently out of compliance due to unauthorized releases. Enforcement responsibilities are inherent to the Department and do not need to be listed as a separate goal.

Pg. ii, par. 2: The second goal and first objective of the regional remedial action is "…to protect wildlife and habitat in the resource area through reduced exposures in areas exceeding risk-based action levels…" This seems to indicate that IDEQ is going to promote management that reduces the exposure of wildlife and habitat to contaminants, but not necessarily ensure that current concentrations of contaminants present in sediment, soil, surface water, and vegetation are reduced through remediation, or that the future release of contaminants is prevented. Is this the correct interpretation of the statement?

Response: Removal action alternatives can include a number of different approaches in addition to remediation, including, but not limited to administrative and institutional controls, mitigation methods, water treatment, source controls, management practices, etc. The appropriate alternatives are selected through specific decision criteria outlined in the plan. The removal action goals were written in a manner that does not presume or limit the available alternatives for consideration by the Lead Agencies.

Pg. ii, par. 2: The objectives stated under goal three should be explained in greater detail so their relevance to management of the risks associated with phosphate mining is apparent to the reader. Explain how and why "…effective grazing management practices…" and "…land-use restrictions preventing future residential development of designated mining waste units…" will "…protect other multiple beneficial uses of the resource area."

Response: Grazing and residential development are other multiple beneficial uses of the resource area so they are discussed under this goal. The effectiveness of grazing management practices and the restriction on residential development are both objectives intended to minimize unnecessary risks related to potential beneficial uses.

Pg. ii, par. 3: The first sentence is incomprehensible as it is currently written. What is the subject of the phrase "…or require EE/CA consideration and alternative selection for media exceeding regulatory numeric criteria or risk-based concentrations"?

Response: The subject is "a set of risk-based action levels that… or…". The sentence has been rephrased.

Pg. ii, par. 3: Please rephrase the second sentence so it contains less jargon and can be understood by a reader who does not have training in performing risk assessments using deterministic and probabilistic models. Explain why it was considered appropriate to apply less conservative assumptions and measurement endpoints for this process than for the risk assessment process.

Response: This document is not intended to be used by individuals without appropriate training or experience, however, the technical terms have been included in the glossary. The sentence has been corrected to read "less conservative risk thresholds". The risk models used by the Department contain a number of conservative assumptions regarding secondary media concentrations, site use and bioabsorption of contaminants that together result in compounding the conservatism of the hazard quotient estimates. A subpopulation receptor group can absorb some minor toxicological effects without the potential for significant population level impacts. For this reason, we have accepted less precautionary action levels and hazard quotients than those used in typical population-level screening efforts, and we have not been as concerned with defining the exact value for lower end risk thresholds that are currently subject to a significant amount of scientific controversy.

Pg. ii, par. 3: Please rephrase the last sentence. Who's limited resources is the Agency concerned about? It's own, those of the mining companies, or those of the responsible agencies? And how does the Agency's "…focus on where to commit limited resources…" relate to the phrase, "…a stronger weight of evidence approach is deemed appropriate"? Furthermore, how does a weight-of-evidence approach relate to the deterministic and probabilistic methods mentioned in the preceding sentence?

Response: The Department is concerned with the effective use of resources, regardless of who's they are. It is also a fact that all involved parties have a limit to the resources available to them. Effective resource utilization is a cornerstone of responsible project management. Poor resource utilization has the potential to affect taxpayer-funded Agency budgets, local employment, and residents/businesses that are dependent on the mining industry. Therefore, we have targeted areas of impact that have a likelihood of causing acute or significant chronic effects, and not areas based on disputed precautionary thresholds that do not show consistent evidence of toxicological effects. A weight of evidence approach considers the area-specific data and observations, to supplement the interpretation of scientific literature from other sites and the risk estimates provided by probabilistic and deterministic models.

Pg. iii, par. 1: The second sentence states that the action levels developed by IDEQ "…result in identifying and addressing areas that do not meet regulatory criteria, are subject to ongoing releases, or are in the upper percentile of areas impacted by historic releases." If this statement is intended to justify development of action levels by IDEQ, it does not accomplish that purpose. First, it was not necessary for IDEQ to develop action levels to determine locations where concentrations of contaminants do not meet regulatory criteria; the concentrations could simply be compared to the criteria. Second, action levels do nothing to identify ongoing releases. This can only be accomplished by sampling over time. And third, calculation of areas in the upper percentile of areas impacted by historic releases can be accomplished without developing action levels. If this is how IDEQ will use the action levels, it is inappropriate.

Response: First, the action levels confirm the Department's intent to reach regulatory compliance levels; the CERCLA process does allow Lead Agencies the discretion to waive regulatory requirements. Second, the surface water and groundwater monitoring action levels, based on background concentrations, do allow identification of ongoing releases by requiring continued monitoring for those areas that exceed background but do not currently exceed regulatory criteria. Third, the risk-based action levels are the criteria that trigger the removal action process in impacted areas. Simply calculating the upper percentile of concentrations in impacted areas is a statistical exercise but it does not cause any action in addressing these areas of concern. The Department has concluded that the intended use of the action levels is appropriate.

Pg. iii, par. 2: The first sentence references the "…existing mine-specific contaminants of concern list." Wasn't the list of contaminants of concern developed during the risk assessment process and isn't it unrelated to specific mine sites?

Response: A Contaminants of Concern list can be modified throughout the regulatory process according to additional findings and analysis. The risk assessment process identified a list of

COCs for subsequent investigation. The list was further refined as additional data became available or particular pathways of concern were eliminated for some constituents in the risk management process. Lead Agencies also have the discretion to add and remove specific constituents based on site-specific conditions or findings in their subsequent investigations. Therefore, the mine-specific COC list is related to, but may differ from, the Department's recommended COC list.

Pg. iii, par. 2: Please check the meaning of the phrase "in lieu of," then rephrase the third sentence so that it is meaningful. It makes no sense to stop analyzing for contaminants because their concentrations are low, and then substitute maximum concentrations of the contaminants measured in the past at some unrelated location to assess potential risks posed by these chemicals at a specific site. If IDEQ believes these contaminants occur at concentrations so low they do not pose a risk, this should be clearly stated.

Response: The recommendation that these analytes be removed from the specific media lists is in response to overwhelming evidence that they do not exceed the action levels for that media, therefore, investigative resources are better utilized elsewhere. However, if a subsequent risk assessment effort should be required during the site-specific actions, the negated pathways must still be included in the cumulative risk model, therefore, an estimate of the exposure point concentration must be made. The Department believes the maximum observed concentration represents a conservative estimate of this pathway. Furthermore, it should be obvious that the Department would not be recommending elimination of any analyte that we felt posed a significant risk of exposure through these specific pathways.

Pg. iii, par. 3: The conclusion stated in the first sentence that "…the Agency's risk management plan presents a reasonable approach to addressing historic impacts and preventing releases from future mining activities…" is not supported by any of the information presented thus far in the *Executive Summary*. The conclusion is the biased opinion of the author. It would be more precise to state that the Agency has developed an approach that attempts to balance a specific list of issues the Agency is mandated to address.

Response: The conclusion is the Department's position concerning the risk management plan and is supported by IDEQ management and technical staff, not just the author. As discussed earlier, the Executive Summary is comprised of outtakes of the significant findings and conclusions from the body of the text, and is not intended to repeat every word or phrase contained therein. The Department believes this concluding statement is appropriate.

Pg. iii, par. 3: How can IDEQ state that the proposed action levels will result in regulatory compliance? Has IDEQ deliberately attempted to develop action levels that it believes will be acceptable to the entities responsible for complying with regulations? Furthermore, isn't it the responsibility of IDEQ to ensure regulatory compliance based on what is determined to be protective of human health and the environment without consideration of what is acceptable to a particular regulated community?

Response: The action levels are based on a number of different factors. Monitoring action levels are based on exceedances of observed background levels, regulated media action levels

are based on Federal and State criteria contained in current environmental law, and non-regulated media action levels are based on risk estimates for protection of ecological subpopulations residing in impacted areas. This is a very reasonable action level hierarchy and we are puzzled by the GYC's reaction, particularly in the absence of any suggestion of alternative action levels or approaches. The Department has clearly expressed our intent to comply with the current regulatory criteria, as opposed to entertaining requests for CERCLA variances and/or waivers to avoid corrective actions. We consider these regulation-based action levels to be protective of human health and the environment.

Pg. iii, par. 3: Shouldn't all areas affected by contaminants released by phosphate mining be addressed by the risk management plan instead of just "…upper percentile impacted areas"? The end of this paragraph contains the statement that "…the Agency remains committed to protection of public health and the preservation of the environment in support of its many beneficial uses." And yet in this instance, IDEQ seems to have determined that the only areas affected by phosphate mining that will be addressed are the "upper percentile areas," which are not explicitly defined.

Response: The purpose of risk management is to determine concentrations that constitute unacceptable risks and where to focus resources for clean up activities. The GYC consistently cites their concern for taxpayers but are apparently in favor of cleaning up all impacted areas, regardless of existing risks or effects. This would include any area exceeding background regardless of concentrations or risk thresholds, and would result in the commitment of significantly greater resources with little environmental benefit. The Department has concluded that the more effective approach, particularly in a subpopulation-focused effort, is to target the areas with the likelihood of causing an effect versus the lower concentrations that are below thresholds or subject to significant scientific debate. Our reference to upper percentile areas refers to those areas with concentrations that exceed the action levels and are likely to cause toxicological effects to subpopulation receptors.

1.0 INTRODUCTION

1.1 PURPOSE

Pg. 1, par. 1: In the first sentence, the author refers to "…releases of selenium and related trace metals originating from historic phosphate mining operations." Aren't the proposed action levels and remedial-action goals and objectives applicable to current mine operations as well as historic mine operations?

Response: CERCLA, by definition, regulates hazardous constituent releases from inactive sites. The Interagency MOU and subsequent consent orders all, correctly, refer to historic mining operations for CERCLA actions. The active sites, on the other hand, are subject to operational administration within the jurisdiction of the land management agencies with a requirement to implement effective best management practices that prevent releases to the environment. The area wide investigation process has provided a collaborative forum for the land management agencies to discuss the development of modified practices at active sites, and

improvements in operational monitoring and administration of these sites. However, the site-specific investigations and removal actions are specifically limited to inactive sites and/or historic portions of the active mines, and the removal action goals and objectives apply to these areas.

Pg. 1, par. 1: The author states that the action levels and remedial-action goals and objectives presented in the plan are intended to "…support a consistent regional approach to risk management," presumably on the part of IDEQ, designated lead agencies for specific sites, and the mining companies. This seems to be reason enough for developing this plan. However, the author also states that the action levels and remedial-action goals and objectives presented in the plan are intended to "…focus the use of limited resources." It seems inappropriate for IDEQ to approach risk management within this context. Who's resources are limited (i.e., those of IDEQ, other State and Federal agencies, or the mining companies), which resources are limited, and who determined which resources are limited? Is it possible that more resources could be committed after specific sites have been adequately characterized? The mission of IDEQ is to "…protect human health and preserve the quality of Idaho's air, land, and water for use and enjoyment today and in the future," and this plan should have been developed within the context of that mission.

Response: The DEQ is aware of their mission as a State regulatory agency. However, the risk management plan was developed under our MOU obligations as the Lead Agency in an Interagency effort to address mining impacts under CERCLA. CERCLA provides the authority to take the actions necessary to address a pollutant release or the threat of release from a site that may endanger public health or the environment. CERCLA also requires cost considerations as part of the decision-making process. Therefore, it is incumbent on the Department to consider available resources of all entities and to proceed in the most cost effective and responsible manner. This is not contrary to our regulatory mission.

Pg. 1, par. 3: The explanation of the content of the document given in the first sentence is vague and misleading. Please be more direct in explaining that the main purpose of the document is to present the results of mathematical modeling that IDEQ performed in order to calculate action levels of chemical contaminants originating from phosphate mines. And please clarify the significance of "action levels" for the reader at this point in the document.

Response: This section is entitled "Introduction" and briefly outlines the content in each subsection of the report. The several word descriptions are not intended to be comprehensive or complete, but to provide the reader with a sense of the document organization. It is inappropriate to provide extensive descriptions of each section of the plan in this paragraph since detailed information is contained in each of the appropriate subsections.

Pg. 1, par. 1, 2, and 3: With the exceptions enumerated above and in the *Editorial Comments* below, these paragraphs contain an introduction that is more succinct and much better written than the one contained in the *Executive Summary*. Please edit the main body of the document and the *Executive Summary* so that they are consistent in style and content.

Response: The public comment process was intended to allow interested parties to review and comment on issues that affect the technical content of the plan and Department's risk management approach. Writing styles are unique to each author's preference and not germane to this review process.

1.2 PROJECT BACKGROUND

Pg. 1, par. 4: The phrase "livestock losses due to selenium releases" is ambiguous, and a reader who is unfamiliar with the area-wide selenium investigation would probably not understand that it is a euphemism for chronic selenium poisoning in horses. Please be specific regarding the observed toxic effects of selenium in the phosphate mining area.

Response: This section provides a brief summary of the project background for contextual purposes. Additional specificity on each particular incident or issue does not affect the overall intent of the plan and is not required.

Pg. 1, par. 4: Please describe the approximate location and size of the region (i.e., name the counties, major watersheds, and size of the region). It is important for the reader to understand that "area-wide" refers to an area of approximately 2,500 square miles, and that individual mine sites were not the focus of studies.

Response: The intended audience of the risk management plan, which consists of other Lead and Support Agency representatives responsible for implementing site-specific risk management activities, are familiar with the defined boundaries, focus and intent of the study. The project background section of the plan is to provide a brief synopsis of our previous activities, not to reiterate the contents of all of the previous documents produced during this process. We refer the reviewer to associated AWI documents referenced in the bibliography for detailed descriptions of earlier phases of work.

Pg. 1, par. 4: Please name the mining companies, stakeholders, and other interested parties involved in the "industry/interagency working group."

Response: Not relevant to DEQ's current efforts; see previous comment.

Pg. 2, par. 1: Instead of using the phrase, "macro-level approach," please simply state that the investigations were conducted in a manner that did not focus on contamination originating from specific mine sites, but on contamination throughout the area that may have originated at any of numerous mine sites that are currently operating or have operated in the past.

Response: "Macro-level approach" is an appropriate term for the technical representatives for which this guidance document is intended.

Pg. 2, par. 1: References are cited for the reports produced by the IMA Selenium Committee but there are no references cited for the "related research and investigative activities" conducted by scientists, agencies, academic institutions, and stakeholder organizations. Please provide these references.

Response: A number of related studies are referenced in latter portions of the text. A significant number of references are contained in the Department's information repository and have been reviewed for general information, but are not specifically cited. Please see the repository index posted on DEQ's website for a list of further references.

Pg. 2, par. 2: According to the first sentence, stakeholders determined that "formal regulatory involvement was appropriate" in 2000, almost four years after chronic selenium toxicosis in livestock was confirmed. Wasn't IDEQ involved in a "formal regulatory" manner up to that time, and if not, why? Doesn't IDEQ have regulatory responsibilities and authorities regarding contamination originating from mine sites? Why was the appropriateness of "formal regulatory involvement" determined by stakeholders instead of the responsible regulatory agencies?

Response: The early phases of the Area Wide Investigation were primarily conducted by the regional mining companies and were focused on determining the potential sources, pathways, effects and mechanisms for selenium releases. There was a voluntary working group, consisting of interested stakeholders including the GYC, academic representatives and regulatory Agencies participating in providing input and reviewing the findings of these studies. The voluntary approach was considered the most effective way to collect this early information because of the Companies' accessibility to immediate resources. However, based on the scale and complexity of this issue it took several years of progressive study to begin to define the problems.

In 2000, it was apparent that a significant amount of information had been collected and that regulatory decision-making needs such as risk assessment, action levels, contaminants of concern lists, and other risk-based determinations were achievable by filling the remaining critical data gaps through Agency efforts. Due to the overlapping regulatory responsibilities and authorities, the Department of Justice and the State Attorney General's Office had to determine the appropriate regulatory structure and approach for conducting these efforts and a Memorandum of Understanding was developed and executed by the appropriate parties. The MOU designated the Department as the Lead Agency for the continued Area Wide Investigation with specific tasks under an AWI scope of work. It also assigned Lead and Support Agency roles for both the AWI and site-specific actions. A subsequent Order was negotiated with the Companies for Interagency performance and recovery of costs for the AWI. This is the formal regulatory involvement to which we refer.

It should be noted that the State does not have CERCLA authority without assignment by the Federal government and the EPA. Furthermore, the DEQ does not have mine administration authority, those belong to the State and Federal Land Management Agencies. Therefore, our independent authorities regarding this issue were limited to surface and groundwater enforcement and administrative procedures, which we chose not to exercise based on continued voluntary actions.

Pg. 2, par. 2: According to the second sentence, IDEQ agreed to implement the area-wide scope of work "with the understanding that more comprehensive mine-specific investigations would ultimately be required…to delineate the area and extent of localized contamination." Supposedly in the interest of avoiding duplication of effort, all parties agreed to an area-wide approach that required the State of Idaho to pay for sampling and development of a human health and ecological risk assessment and risk management plan. This approach seems to have *guaranteed* duplication of effort while delaying implementation of remediation efforts because all interested parties were aware that comprehensive sampling of specific mines would eventually have to occur.

Response: To the contrary, by performing an area wide risk assessment and establishing regional action levels, the need for future site-specific risk assessment efforts have been greatly reduced. Without the area wide efforts, the same process would have been duplicated for fifteen separate CERCLA site actions. The risk management plan provides specific action levels that are considered to present unacceptable risks and do not require further assessment, so future efforts should be restricted to unique site conditions that may be encountered. The regional removal action goals and objectives provide a reasonable framework for developing site-specific goals and objectives. Regardless of the initial approach, delineation of localized contamination would eventually be required; the area wide efforts allowed us to consider regional impacts and to identify, in advance, the primary sources, pathways and exposures of concern by collecting targeted data at all of the individual sites. Without the area wide efforts, each site-specific action would have required independent determination of these factors and would have increased the time required to reach the development of the cleanup alternative phase.

It should also be noted that the performance of the AWI was conducted under a legal cost recovery agreement that requires the Companies, not the State, to pay for the expenses incurred by the DEQ, EPA, FWS, Tribes and their contractors. The land management agencies deferred their cost recovery issues to a later date.

Pg. 2, par. 3: Please identify the Federal, State, and Tribal agencies serving on the interagency technical group, and the participants of the Selenium Area-Wide Advisory Council.

Response: This information has been included in the final text.

Pg. 3, par. 1: “Time of transition” apparently refers to a transition from the IMA Selenium Committee to IDEQ as the entity responsible for the area-wide investigation. This statement again raises questions regarding the responsibilities and authorities of IDEQ and land management agencies responsible for the land on which mines are located.

Response: See our earlier response regarding formal authorities and the ARARs provided in Attachment 3.

Pg. 3, par. 1: Copies of references 1 and 2 are not available on the *Southeastern Idaho Selenium Project* Internet web page. Please post these documents so they are readily available for review.

Response: The SISP web page is intended for availability of technical documents generated in the direct performance of the AWI and site-specific actions. The requested documents are legal instruments that will not be posted to the website but are available for review at our information repository.

Pg. 3, par. 1: It is unlikely that the website will remain available indefinitely. References should specify the location from which the documents can be obtained.

Response: It is our intent to maintain the website throughout the duration of the AWI which is projected for at least 7 more years. Duplicate copies of these references are maintained by the Lead Agencies for each designated site.

2.0 AREA WIDE SUMMARY

2.1 RISK ASSESSMENT FINDINGS AND CONCLUSIONS

Pg. 3, par. 4: The phrase "current conditions" is vague. Because the conclusions of the area-wide risk assessments were contingent on "current conditions," those conditions should be specified.

Response: The conditions are specified in the risk assessment and based on the data collected for that effort.

Pg 4, sentence continued from page 3: Please clarify the meaning of the phrase "several areas that could present elevated risks." The end of that sentence indicates that "circumstances" should be used in place of "areas," particularly because it was not the intent of the risk assessment to identify geographic areas that did or did not pose risks.

Response: Corrected.

Pg. 4, par. 1: The first sentence is incomplete. Please specify which chemicals occurred in sufficient concentrations to pose potential risks.

Response: Corrected.

Pg. 4, par. 1: What is the basis for the claim that areas in which concentrations of contaminants exceeded regulatory criteria or risk-based levels of concern was limited to less than five percent of the resource area? Large portions of the resource area, including areas surrounding abandoned mine sites, have not been sampled. It is unlikely that all contamination throughout the resource area has been detected by the limited amount of sampling conducted to date. Based on the observation contained in the last two sentences of paragraph 1, i.e., that the percentage of samples containing contaminants that exceed regulatory criteria or risk-based levels of concern is associated with precipitation, it appears that that aerial extent of contamination has been confused with the frequency of exceedances detected in samples analyzed.

Response: The less than 5% estimate of exceedances is based on area ratios of elevated vegetation on historic reclaimed dumps (~5000 acres) and estimated areas of impacted vegetation adjacent to elevated surface water sources as compared to overall regional vegetative resources; and, impacted stream segment lengths as opposed to total basin stream

lengths. We believe this estimate actually represents a conservative upper bound. While there is still a significant amount of characterization data to be collected to delineate localized impacts, area wide efforts have included sampling of every major stream segment; waste dump soils and vegetation from every mine; all identified ponds, seeps and pit lakes; and sampling adjacent to representative impacted and background streams. This level of effort can hardly be characterized as limited sampling efforts, and has provided an adequate amount of data to to reach regional conclusions on the level of impacts occurring in the Resource Area.

Pg. 4, par. 2: The second sentence, which states that a study conducted by the U.S. Geological Survey, supports "the conclusion that population-level ecological effects are unlikely" is incorrect. Although the reference cited for this study is a poster presentation at the Society of Environmental Toxicology and Chemistry in 2003, a more appropriate reference is the final report of the study, which was published in October 2002. This report, *Selenium and other trace elements in water, sediment, aquatic plants, aquatic invertebrates, and fish from streams in southeastern Idaho near phosphate mining operations: June 2000*,[1] contained the results of analyses of samples collected from nine sites in the Blackfoot River basin. The authors used a protocol published in 1995 by Dennis Lemly of the U.S. Forest Service, which was modified in response to comments provided by Harry Ohlendorf of CH2M Hill, Inc., M. Sylvester of the U.S. Geological Survey, and B. Osmundson of the U.S. Fish and Wildlife Service, to assess the hazard of selenium based on its potential for food-chain bioaccumulation and reproductive impairment in fish and aquatic birds. The authors concluded that high hazard existed at five of the nine sites sampled, moderate hazard existed at two of the sites, and low hazard existed at two of the sites (pages 50 and 51). High hazard denoted "an imminent, persistent toxic threat sufficient to cause complete reproductive failure in most species of fish and aquatic birds," moderate hazard denoted "persistent toxic threat of sufficient magnitude to substantially impair but not eliminate reproductive success," and low hazard denoted "a periodic or ephemeral toxic threat that could marginally affect the reproductive success of some sensitive species, but most species will be unaffected" (page 50). The conclusions of the report, as stated in the final paragraph, are as follows:

> A preliminary assessment of selenium hazard in the Caribou National Forest was conducted using selenium residue data in water and fish collected from 1997-1998 (Lemly 1999).[2] Lemly (1999) concluded that there was a high potential for toxic impacts to fish and wildlife associated with the Blackfoot River, its tributaries, and Blackfoot Reservoir. The results of the present study add substantially more support to the premise that selenium concentrations in several aquatic ecosystem components were sufficiently elevated to cause adverse effects to aquatic resources in the Blackfoot River watershed.

[1] Reference: Hamilton, S.J., K.J. Buhl, and P.J. Lamothe. 2002. *Selenium and other trace elements in water, sediment, aquatic plants, aquatic invertebrates, and fish from streams in southeastern Idaho near phosphate mining operations: June 2000, Final Report, October 10, 2002.* U.S. Geological Survey, Columbia Environmental Research Center, Field Research Station, Yankton, SD.

[2] Reference: Lemly, A.D. 1999. Preliminary assessment of selenium hazards on Caribou National Forest, Idaho. Report, U.S. Forest Service, Blacksburg, VA. 16 pages.

The study by Skorupa et al. (2002), which is listed as reference 16, is also cited incorrectly by IDEQ as supporting the findings of its risk assessment. In fact, the conclusions of this study were as follows.

> "... the hottest sampling sites discovered during this brief survey of the Idaho phosphoria region were hotter than the hottest sampling sites discovered during approximately a decade of sampling across ten states for the NIWQP [National Irrigation Water Quality Program]. However, the potential for damage to avian populations depends not only on how contaminated (hot) a site is, but also on how attractive it is to breeding water birds. What made Kesterson Reservoir such a large scale catastrophy was that it was highly contaminated AND it attracted thousands of breeding water birds each spring. This brief survey did not discover any sites that were suspected of exposing inordinately high numbers of breeding water birds. Although this survey was not designed to census bird numbers, the authors gained a qualitative impression that none of the sites surveyed supported more than a few hundred breeding water birds, and most of the sites surveyed probably supported substantially fewer breeding water birds." [see p. 78 of report]

In a follow-up communication with Dr. Skorupa, he provided the following written clarification of his findings and recommendations:

> …it was our opinion that there are probably many, many, more locations presenting a risk to birds than we had the time to investigate. Especially vernal, ephemeral wetlands that none of the field surveys before ours ever sampled in any manner (such as for water, sediment, invertebrates, birds, etc.); and as far as I am aware, no survey after ours has done so either. Our primary recommendation, was to point out the critical need for additional sampling, i.e., to point out the obvious, that in just a matter of a few days of fieldwork we had found enough evidence of risk that a much more extensive RISK-TARGETED survey was warranted and should be a highest priority. The University of Idaho/IMA avian study was… extensive, but it was not RISK-TARGETED. It did not seek specifically to find contaminated sites and systematically evaluate such sites. Nonetheless, based on our very limited RISK-TARGETED survey, the PROVISIONAL conclusion supported was that the realized risk to birds should generally be considered relatively low if the conditions during Spring of 1999 were reasonably representative of long-term conditions. Ideally though, [investigators should repeat] what we did for several breeding seasons to get an idea of year-to-year variability in conditions, and … do it much more extensively to get a more comprehensive picture because even though individual sites each attracted relatively small numbers of birds, if you have enough sites out there then the issue of cumulative effects might become the controlling factor for a risk assessment. That's why it was concluded in our report that.... "The general lack of data for such vernal wetlands constitutes a critical data gap that could profoundly influence the outcome of regional risk assessments." [see p. 79 of report].
>
> …my team spent only 8 days in the field (4 days in May, 4 days in June; 1999) and in that short time we managed to discover an American Coot egg with more

> selenium (80 ppm) in it than ever found anywhere else in the U.S. even though American Coots have been extensively sampled for more than a decade, across 10 different western states, at places identified as the worst selenium sites those states have to offer. We managed to discover aquatic invertebrates with the highest level of selenium (788 ppm) ever reported from much more intensive and extensive sampling across the western U.S. We managed to discover a significant salamander die-off (more than 250 carcasses visible from our vantage point) which has subsequently been diagnosed as selenium toxicosis by the National Wildlife Health lab, and to my knowledge the 120 ppm Se in the salamander tails reported by that lab (independent of the lab doing the other analyses cited above) is also a record high for selenium concentrations in any salamander tissue. We found dead white pelicans and dead beaver (on the shores of a reservoir that we also obtained a deformed coot embryo from) that were not the result of predation, but whose cause of death we could not determine. We found all of those extraordinary results at separate locations (some separated by more than 50 miles) …those findings … begs … the question …what would we find in 30 days, or 60 days, or one year, or three years of RISK-TARGETED searching.

Please explain how IDEQ interpreted the results of these reports, or the poster presented at the annual meeting of the Society of Environmental Toxicology and Chemistry, as supporting the conclusion that “population-level ecological effects are unlikely.” Also, please explain why IDEQ did not reference the 1999 report by Lemly or the 2002 report by Hamilton et al. in either the area-wide risk assessment or the area-wide risk management plan. Finally, please explain why IDEQ considers it appropriate to cite “preliminary reports” of studies that have not been made available for public or scientific peer review (i.e., references 17 and 18) to support its conclusion that “population-level ecological effects are unlikely.”

Response: None of the cited reports conclude that population level effects are occurring. Most of the adverse data collected in these studies not only occurred in impacted areas previously identified by the area wide investigation efforts, but in areas that far exceed the Department’s proposed action levels. The concentration thresholds used in these studies were developed based on observations from sites with significantly different conditions and are still an issue of considerable scientific debate. A closer analysis of the referenced studies, communications and subsequent publications by these authors reveal discrepancies that have raised concerns with the Department as to the accuracy of their statements and validity of the assumed risk thresholds for application in Southeast Idaho.

In addition to the cited USGS report of October 2002, two subsequent USGS reports were published in May 2003 for streams evaluated by the same methods from data collected in September 2000 and May 2001. Smoky Creek, Trail Creek and Upper Slug Creek were all scored as moderate hazards, and Deer Creek and Crow Creek were scored as high hazards, even though they were specifically selected as background sites because there was no mining activity occurring near these streams. This suggests that the scoring system is conservatively biased and does not accurately reflect the conditions and true risks posed by the streams under evaluation.

The referenced report by Skorupa states in the abstract that “… the high risk sites identified in this survey did not appear to be exposing regionally significant

numbers of breeding waterbirds". This is much closer to supporting a no population level effect conclusion than discounting it. The implication that his short duration survey coincidentally identified significant numbers of extraordinary toxicological results is misrepresentative. The areas targeted for study by his team were not random but based directly on the previous findings of the area wide investigations beginning with the most contaminated sites identified by Area Wide investigations and working down the list until they ran out of money. The observed concentrations in these areas are extremely high so it is no surprise that high concentrations were also discovered in the associated biotic media, nor does this discount any of the Department's conclusions since these same areas would also exceed the proposed action levels and are subject to removal action processes.

The other statements by Dr. Skorupa also raise questions that cause us to suspect that he was pressed into defensive responses by the commenters. He cites a salamander die off that was reportedly confirmed by the National Wildlife Lab to be a result of selenium toxicosis. However, he fails to mention that out of the 19 salamander specimens submitted during this event, only one was confirmed as selenium poisoning based on tail concentrations, and even this diagnosis was questioned in the case report "because this salamander also had a widespread iridovirus infection". The official conclusion of the diagnostic services case report was that the cause of the salamander illness and deaths was a combination of two diseases: chronic selenium poisoning and iridovirus infection. Similarly, he mentions the observance of dead pelicans and beavers without any mention of the location or a shred of scientific evidence linking it to selenium. In his risk targeted report he attributes two observed avian embryonic deformations to selenium but then provides contradictory evidence as to why these effects may not be selenium related. The State does not discount the presence of high selenium concentrations in the specific areas evaluated by Dr. Skorupa nor do we question his scientific findings at other sites. However, local climatic and ecological conditions are drastically different from the study areas used to develop his risk thresholds, and the findings from his risk targeted studies do not translate to ubiquitous conditions in the Resource Area.

Finally, the Department does not rely on any of the referenced preliminary reports as the basis of our conclusions. We have merely provided this information to illustrate the findings of some of the other researchers that have been conducting activities in the area. We acknowledge the fact that some of the documents have not been peer-reviewed but this also applies to Dr. Skorupa's risk-targeted report, which was the basis for these comments. In cases where publications were not cited, it is because they were not provided to the Department by the authors. Contrary to the tone of GYC's comments, the reviewer has not provided a single scientific reference where any researcher has concluded that there are population-level effects occurring in Southeast Idaho as a result of selenium releases.

Pg. 4, par. 3: The first sentence states that "Based on the findings of the Area Wide Risk Assessment, the Agency has concluded that it is appropriate to address existing impacts and releases on a mine-specific basis, with continued regional monitoring of aquatic populations and water quality." Please explain what alternative approaches IDEQ considered for addressing existing contaminant impacts and releases prior to conducting the area wide risk assessment. Why was it necessary to conduct an area-wide risk assessment in order to arrive at this conclusion? Did IDEQ anticipate prior to completing the risk assessment that it would be unnecessary to conduct mine-specific human health and/or ecological risk assessments?

Response: CERCLA allows a number of different approaches to addressing contamination issues both in regulatory process and in focus of activities. For large-scale issues, it is possible to define the site boundaries as an entire region or combination of numerous sites. The area wide efforts confirmed the presence of individual site sources and absence of ubiquitous contamination conditions within the Resource Area. If the individual site contributions would have been determined to be inseparable, a regional CERCLA approach may have been recommended. However, the AWI did confirm that observed releases and resultant impacts can be traced back to individual site sources and responsible parties, and should be resolved on a mine-specific basis. See our earlier response as to the benefits of the Area Wide risk assessment.

2.2 CONTAMINANTS OF CONCERN

Pg. 4, par. 4: This section begins with a discussion of COPECs, and yet it's entitled "Contaminants of Concern." Please explain contaminants of concern and how they differ from COPECs.

Response: Contaminants of Potential Concern (COPC) and Contaminants of Potential Ecological Concern (COPECs) refer to constituents that were evaluated in the human health and ecological risk assessment processes, respectively. Contaminants of Concern (COCs) are those that are not screened out during the risk assessment process and continue to be subject to investigation because they present risks under certain conditions.

Pg. 4, par. 4: Please give the reference or references for information cited in this paragraph.

Response: See reference #5, 1998 Regional Investigation Report, Section 5.0 and Appendix B.

Pg. 5, par.4: It is commendable that IDEQ sought assistance from the U.S. Geological Survey to ensure that all potential environmental contaminants resulting from phosphate mining were addressed in the remedial action process. Because reference 19 is not readily available to the public (i.e., is not available as a report or publication), please summarize its contents so the reader can understand the basis of the recommendations.

Response: The reference indicates that the recommendations were made in the form of notes provided by USGS researchers. The recommended constituents were provided to the Department as a list with some limited descriptive text, based on several years of geologic investigation results and their best professional judgment of chemicals that presented the greatest potential for release.

Pg. 5, par. 2 and 3: Was a screening process separate from the one described in the area-wide human health and ecological risk assessment conducted by IDEQ to identify COCs? The first sentence of this paragraph, and the fact that the area wide risk assessment document is not referenced, seem to indicate so, but the COCs listed in paragraph 3 are the same as those listed in the risk assessment. This discussion is confusing because it gives the impression that the "screening process" and the risk assessment are redundant. Wouldn't it be more accurate in the last sentence of paragraph 3 to refer to "the COC list identified in the area-wide risk assessment" instead of the "existing COC list"?

Response: The screening process consisted of several steps. Initial screening considered background concentrations, frequency of detection, EPA PRGs and other initial considerations. The second step consisted of Tier I evaluations assuming the presence of maximum observed concentrations for each exposure pathway as part of the risk assessment process. Subsequent independent screening activities were conducted for other selected constituents, and further evaluation performed during the risk management process resulted in the existing recommended list. For instance, the risk assessment-based COC list contained Copper; the current COC list does not.

Pg. 5, par. 3: There is no discussion in Section 4.3.1 that provides justification for removal of copper from the COC list by IDEQ. Please provide this information.

Response: The text has been corrected to refer to Section 4.3.2.4.

Pg. 6, par. 1: Before simply stating that proposed risk-based action levels are provided in Section 4.3.2, please provide some context for the reader by explaining that the action levels were calculated by IDEQ, and that they are intended to trigger specific actions on the part of IDEQ, responsible management agencies, and the mining companies.

Response: This requested details are provided in the referenced section of the plan.

2.3 REGULATORY STATUS AND ADVISORIES

This section heading is vague. To what or to whom does "regulatory status" pertain? Perhaps a better heading would be, "Regulatory Responses by IDEQ, Idaho Department of Fish and Game, and Idaho Division of Health to Releases of Contaminants."

Response: The title was changed to "State Regulatory Status and Health Advisories" since it involves Idaho administrative and regulatory agency actions.

Pg. 6, par. 2: Why is a distinction made between the use of the risk management plan in addressing the release of contaminants from a) "historic mining sites and inactive areas of operational [mining] sites," and b) "permitted operational activities at active mining facilities"? Why does IDEQ emphasize that the "risk management decisions are not intended to direct any of the permitted operational actions at active mining facilities," but that "the knowledge gained may assist in the development of improved best management practices." Please explain the authorities and responsibilities of IDEQ in relation to both active and inactive mining facilities.

Response: See earlier DEQ response regarding authorities for inactive and operating mines.

Pg. 6, par. 3: Why hasn't the Blackfoot River below Spring Creek and above the reservoir been proposed for Section 303(d) listing due to selenium contamination? The criteria continuous concentration of 5 µg/L selenium was used as the basis for listing Dry Valley and Spring Creeks. According to the *Final 2002 supplement to 2001 total maximum daily load baseline monitoring report,* prepared November 2002 by Tetra Tech EM for IDEQ, the average values for three samples collected during a four-day period between May 7 and May 11, 2002 at three sites on the Blackfoot River were 7.0 µg/L, 7.0 µg/L, and 8.7 µg/L. These concentrations obviously exceed the criteria continuous concentration of 5 µg/L selenium.

Response: The State of Idaho water quality standards require two exceedances of the CCC in a three-year period using four-day averages to constitute violations. The Department's water program representatives are currently reviewing the 303(d) list recommendations in response to formal public comments under that process.

Pg. 6, par. 3: According to IDAPA 58.02.01.210, the criteria maximum concentration for selenium is 18 µg/L, not 20 µg/.

Response: IDAPA 58.01.02.210 (01)(a) previously incorporated by reference 40 CFR 131.36 (b)(1) (National Toxics Rule). On May 3, 2003, numeric standards for the selenium CMC were revised from 20 ug/L to 18 ug/L in the Idaho's Water Quality rules. This change reportedly incorporated a conversion factor from the USEPA's National Recommended Water Quality Criteria: 2002 document. However, this conversion was intended to translate total recoverable criteria to dissolved fraction concentrations, and the corresponding sampling methodology revision was not made. The revision was not intended to be a substantial rule change and it is our understanding that the criteria will be returned to its original value.

Pg. 6, par. 3: There appears to be confusion within IDEQ regarding streams that have been proposed for Section 303(d) listing. Please ensure that the following documents are corrected so that accurate information is presented to the public. According to the risk management plan, East Mill, Maybe, Dry Valley, Spring, Pole Canyon, and Chicken Creeks have been proposed for Section 303(d)-listing because selenium concentrations exceed State water quality standards. However, according to Section 5 of the *Draft Integrated (303(d)/305(b)) Report*, which was posted by IDEQ on June 4, 2003 at http://www.deq.state.id.us/water/surface_water/IntegratedReport/Section5.pdf, the only stream segments listed as impaired by selenium are "lower Spring Creek," "lower Mill Canyon," and "upper Mill Canyon." But according to *Idaho DEQ Waterbody Use Reports* for stream segments found using the searchable data base which was accessed using the above-referenced web page, selenium is listed as a pollutant for Maybe Creek, one segment of Dry Valley Creek, two segments of Mill Canyon, and two segments of Spring Creek. According to the *Idaho DEQ Waterbody Use Report* for Chicken Creek is impaired by "siltation" and "other habitat alterations," but not selenium. Finally, Pole Canyon Creek does appear in any section of the *Draft Integrated (303(d)/305(b)) Report* or in lists of water body units in the upper Snake River basin or Bear River basin, as published in Idaho's water quality standards (i.e., IDAPA 58.01.02.150 and IDAPA 58.01.02.160). The discrepancies between the various documents produced by IDEQ are illustrated in Table 1.

Table 1. Lists of stream segments that contain selenium in concentrations in sufficient concentrations to justify addition to Idaho's Section 303(d) list of impaired water bodies, as reported in various documents prepared by the Idaho Department of Environmental Quality.

Area Wide Risk Management Plan	*2002-2003 Draft Integrated (303(d)/305(b)) Report*	***Idaho DEQ Waterbody Use Reports***
East Mill Creek	Upper Mill Canyon (ID17040207SK015_02a)	**Upper Mill Canyon (ID17040207SK015_02a)**
	Lower Mill Canyon (ID17040207SK015_02b)	**Lower Mill Canyon (ID17040207SK015_02b)**
Maybe Creek		**Maybe Creek (ID17040207SK014_02)**
Dry Valley Creek		**Dry Valley Creek (ID17040207SK013_03)**
Spring Creek	Lower Spring Creek (ID17040207SK015_03)	**Spring Creek (ID17040207SK015_02)**
		Lower Spring Creek (ID17040207SK015_03)
Pole Canyon Creek		
Chicken Creek		

Response: The IDEQ Water Program is aware of the discrepancies referenced in GYC's comments and is currently reviewing the information. The summary provided in the Risk Management Plan was based on discussions with regional water program representatives and our understanding of their intent.

Pg. 7, par. 1: Section 303(d) of the Clean Water Act requires States to prepare lists of impaired waterbodies that do not support beneficial uses and therefore require development of total maximum daily loads (TMDLs). It is the responsibility of IDEQ to prepare TMDLs for Section 303(d)-listed waterbodies and to submit them to the U.S. Environmental Protection Agency for review and approval. As the results of numerous lawsuits have demonstrated during the past ten years, neither the State nor the U.S. Environmental Protection Agency has the discretion to decline to write a TMDL for a Section 303(d)-listed waterbody that does not support its beneficial uses or that contains concentrations of contaminants that violate State numeric water quality standards. Despite the belief on the part of IDEQ that "a formal TMDL process for the proposed selenium 303(d) listed streams [*sic*] would be a poor use of limited resources," the U.S. Environmental Protection is obligated under the Clean Water Act to ensure that TMDLs are prepared. Is IDEQ relinquishing its responsibility to prepare TMDLs in the phosphate mining area to Region 10 of the U.S. Environmental Protection Agency?

Response: The 303(d) listed water bodies will be scheduled for TMDL development, as required by law. IDEQ's recommendations with regard to equivalent action provisions will be provided to the USEPA at that time.

Pg. 7, par. 1: Because selenium concentrations in Section 303(d)-listed streams can be traced to individual mine sites, and because contributions of selenium are "sole-source," the TMDL-development process should be quite simple. How do these facts justify the conclusion by IDEQ that "a formal TMDL process … would be a poor use of limited resources"?

Response: The primary use of a TMDL report is to provide information for discharge allocations that will restore water quality in impaired streams. With a single source discharge occurring on a stream, there is no need to perform these potentially costly studies to determine an appropriate discharge requirement; the existing numeric criteria would eliminate the problem.

3.0 MINE-SPECIFIC REGULATORY APPROACH

General Comments:

1. The significance of Section 3 is obscured by IDEQ's emphasis on the technical aspects of the NTCRA process. This section should begin with a clear and unambiguous statement such as the following. "The next step in addressing the problem of contaminants produced by phosphate mining is to conduct investigations of individual mine sites in order to prevent additional contamination of the resource area and to determine the extent to which contamination that has already occurred might be reduced though clean up activities. This step will be completed in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, and the National Oil and Hazardous substances Pollution Contingency Plan, using a process referred to as a non-time critical removal action."

Response: As previously stated, the Agency representatives responsible for implementing the "technical aspects of the NTCRA process" are the intended audience for this plan. Therefore, the Department feels the existing language is appropriately targeted.

2. Please prepare a figure showing major elements of the non-time-critical removal action process, including a) the products expected at various points in the process, b) the points at which various entities (i.e., mine companies, agencies, and the public) are responsible for generating a product, c) the types of decision documents that must be generated by specific agencies at various points in the process, and d) an approximate time-line for completing each element of the process.

Response: General information on the NTCRA process is outlined in the referenced EPA guidance manual. Specifics on deliverable timeframes and requirements will be specified in enforceable mine-specific Orders, not in policy and guidance documents.

3. Sections 3.3, 3.4, 3.5, and 3.6 are all subsets of Section 3.1. The section on compliance with ARARs seems out of place and the reason for so much emphasis on ARARs, as evidenced by a separate section heading and several paragraphs on the subject, is not apparent. Please revise Section 3.0 so that it a) flows in a more logical manner, b) contains a clear and concise explanation of the process and the responsibilities of IDEQ, the mine companies, and responsible agencies, and c) explains the significance of the actions proposed to the public.

Response: The establishment of ARARs is an important step in the CERCLA process for On Scene Coordinators and warrants specific discussion in the guidance document. The ARAR discussion was intended to generally outline requirements regarding the level of regulatory compliance with ARARs by designated Lead Agencies, and their discretion in implementing mine-specific actions, and achieves this purpose as written.

3.1 NON-TIME CRITICAL REMOVAL ACTION PROCESS

Pg. 8, par. 1: Please explain exactly what is meant by the requirement that site-specific investigations be "consistent with CERCLA." Please specify the responsible agencies for each mine site, and explain how orphaned sites will be addressed.

Response: This paragraph refers to the language of the Interagency MOU, which simply requires site-specific activities to be conducted within the framework of CERCLA and the NCP to ensure consistency, regardless of the Lead Agencies' cited regulatory authorities. The mine sites and designated Lead Agencies have been added to the revised plan. Orphan sites are being addressed by the Interagency Technical Group under a separate screening and investigative process, but using a consistent action level approach. A separate Orphan Site Report will be published at a later date.

Pg. 8, par. 2: The explanation of the non-time-critical removal action process is so vague that it was necessary to spend a substantial amount time researching the topic in order to understand what IDEQ is actually proposing. It should not be necessary for the reader to engage in extensive research in order to understand the proposed actions of IDEQ. Please replace this paragraph with a more explicit explanation of the non-time-critical removal action process. For example, the following information, which should be contained in the plan, was excerpted from a summary available on the Internet through the U.S. Department of Defense web site at http://www.hqda.army.mil/acsimweb/brac/web/env/eldbull.htm:

> Removal actions are undertaken to deal with contamination as required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLA defines a removal action as: "…the cleanup or removal of released hazardous substances from the environment, [and] such actions as may be necessary in the event of the threat of release of hazardous substances into the environment…" Removals include actions required to: (1) monitor, assess or evaluate a release or threat of a release; (2) the disposal of removed material and (3) other actions taken prevent or mitigate damage to public health or the environment.
>
> **Types of Removal Actions:** There are three types of removal actions -- emergencies, time-critical removals and non-time critical removals.

> *Emergencies*: Removal should begin right away. Emergency removals include actions that must be taken within hours or days after a serious threat to human health or the environment has been substantiated. …
>
> *Time Critical*: This type of removal concerns a release that should be addressed within six months. Time-critical removals tend to involve less acute circumstances than an emergency, yet prompt action is still warranted. Important factors are the nature and extent of the release and its possible impact on nearby populations or a particularly sensitive environment. …
>
> *Non-Time Critical*: Here, both the process of planning and the actual removal [are] expected to take more than six months. Generally, this approach is reserved for situations that require the removal of a contaminant, but there is time for more advance planning. Examples could include: (1) a response to deal with the contamination that, though isolated from public access, could eventually pose a threat to groundwater or (2) the removal of hazardous chemical containers that will likely begin to leak before the year is out. Because more planning time is allotted for these actions, non-time critical actions generally involve more up-front documentation and public notice.
>
> **How To Decide if a Removal Action is Needed:** The NCP provides the following considerations to help [determine] if a removal action is appropriate. … Relevant factors [to be considered] include the extent of contamination, the likelihood of contamination migration and the human or environmental impacts anticipated:
>
> - Exposure (actual or potential) to humans, animals, or the food chain from hazardous substances, pollutants or contaminants.
> - Actual or potential contamination of drinking water supplies and the presence of particularly sensitive eco-systems. …
> - The potential for migration of high levels of hazardous substances, pollutants or contaminants in soils that are at or near the surface.
> - Weather conditions that may cause hazardous substances, pollutants or contaminants to be released or dispersed. …
> - Availability of another appropriate response to deal with the situation and other factors indicating a threat to human health or the environment.

Response: The Risk Management Plan reiterates the NTCRA process for the technical representatives responsible for implementation. The plan is not intended, nor is it required, to provide this level of basic regulatory knowledge to the targeted users of the guidance document.

Pg. 8, par. 3: Listing the steps of the NTCRA does not help the reader understand the process because terminology such as "action memorandum," "site closure" and "post-removal site control" are not intrinsically meaningful. Once again, it was necessary to spend a substantial amount time researching the topic in order to understand what IDEQ is proposing. Please replace this paragraph with a more explicit explanation of the non-time-critical removal action process. The following information, which should be contained in the plan, was from an information sheet available through the U.S. Department of Energy web site at http://tis.eh.doe.gov/oepa/guidance/cercla/ntc-removals.pdf:

A non-time-critical removal action includes four major components: (1) site evaluation, (2) engineering evaluation/cost analysis (EE/CA), (3) removal action, and (4) closeout.

All removals require a removal site evaluation (RSE) [40 CFR 300.410(b)]. The site evaluation includes a removal preliminary assessment (PA) and if warranted, a removal site inspection (SI). In the removal PA, readily available information is used to identify the source and nature of the release, evaluate the magnitude of the threat, assess the threat to public health, and determine if more information is needed to characterize the release. If more information is required, a removal SI is performed. Section 300.410 of the NCP describes the RSE process.

Once the RSE is complete, the findings must be documented [40 CFR 300.410(f)]. An approval memorandum documents that the site meets the NCP criteria for initiating an NTC removal and provides detailed information on the site.

An engineering evaluation/cost analysis (EE/CA) process involves development of the EE/CA, conducting community relations activities, and documentation of the removal action decision in an action memorandum. The EE/CA identifies the objectives of the removal action and analyzes the removal action alternatives in terms of cost, effectiveness, and implementability. Components of the EE/CA include the following:
1. *Executive summary*.
2. *Site characterization*. In addition to site data, EPA guidance recommends completing a streamlined risk assessment (SRE) as part of the site characterization process.
3. *Identification of removal action objectives.* Factors to consider in determining specific removal action objectives are listed in 40 CFR 300.415(b)(2)(i)-(viii).
4. *Identification and analysis of removal action alternatives.* Each alternative is analyzed in terms of effectiveness, implementability, and cost.
5. *Comparative analysis of removal action alternatives*.
6. *Removal action recommendation*. Based on the comparative analysis, an action is recommended and the basis for the recommendation is explained.

Response: The Department would recommend the use of EPA guidance documents as the reference for CERCLA processes. Nevertheless, the information in the existing Risk Management Plan is written for use by Lead Agency representatives and is not meant to be "intrinsically meaningful" to untrained individuals.

Pg. 8, par. 3: Because the Interagency MOU is not widely available, please explain the roles and responsibilities of IDEQ and all other agencies involved in the mine-specific regulatory approach. Specify aspects of the NTCRA for which agencies are responsible and aspects for which mine owners are responsible. Explain the purpose of the "initial agreements" and "subsequent agreements" and the legal standing of these agreements.

Response: The MOU is part of the administrative record and is available for review upon request. In general, it assigns each Lead Agency the administrative responsibility for all aspects of the NTCRA process for their designated sites with a concurrence role assigned to designated Support Agencies. Mine owners are responsible for conducting investigations, alternative analysis and removal activities under the regulatory oversight of the Agencies, and all deliverables require Agency review and approval. As stated, initial mine-specific administrative orders cover the SI and EE/CA process, and subsequent agreements will be

required for implementing the Agency-selected removal actions. Five of the projected fifteen initial site-specific agreements have been executed; five more are in the negotiation process; and the remaining five are in various stages of development.

3.2 COMPLIANCE WITH ARARs

Pg. 8, par. 4: Will the removal actions actually be conducted under the authority of CERCLA, or will the requirements of CERCLA simply being used as guidance? The first paragraph under Section 3.1 indicates that the NTCRA process is simply a model for conducting site-specific investigations and response actions, but the first sentence of this paragraph indicates that the removal actions are being conducted under the regulatory authority of CERCLA. Please clarify the regulatory authority for the removal actions.

Response: The Federal Agencies have cited their CERCLA authorities in all agreements and the EPA has assigned CERCLA docket numbers to the executed agreements. The Department has cited their State authorities and has accepted Lead Agency responsibilities at designated sites with DOJ concurrence. It is our intent that the removal actions be conducted under CERCLA authority and in a manner consistent with CERCLA and the NCP. The NTCRA process is the model that has been selected for addressing the response actions as opposed to other approaches such as RI/FS, TCRA, etc.

Pg. 8, par. 4 through pg. 9, par. 3: The discussion of applicable or relevant and appropriate requirements was considered by IDEQ to be important enough to warrant a separate section heading, and yet it is unclear from the discussion why it is so important. Please be specific regarding the importance of ARARs.

Response: The ARAR process can be complex for an OSC that is dealing with multiple Interagency programs and jurisdictions. The Department felt it was important to reemphasize the compliance aspects and interpretation of ARARs to support consistent applications.

Pg. 9, par. 3: Doesn't IDEQ have the authority to do more than "***encourage*** on-site compliance with substantive requirements and chemical-specific ARARs, particularly with respect to State and Federal numeric standards for surface water and groundwater." Isn't it the responsibility of IDEQ to ***enforce*** State standards?

Response: CERCLA does allow for waivers and variances of criteria under special circumstances, particularly within the site boundaries. Since the Lead Agencies do have authority to grant these, we have specifically used the term "encourage" in the text.

Pg. 9, par. 3: The second sentence, "Chemical, location and action-specific ARAR lists should be requested from Support Agency [*sic*] project managers by the designated Lead Agency [*sic*] during the site-specific SI process for final OSC/RPM determination of site-specific ARARs and consideration of applicable off-site administrative requirements," is nonsensical, the abbreviation SI has not been mentioned or defined, and the abbreviation OSC/RPM (i.e., on-scene coordinator/remedial project manager) has not been mentioned or defined. It appears that this sentence has been borrowed from a technical guidance document without any consideration for how this guidance will be used to clean up contaminants emanating from phosphate mine sites. Instead of discussing ARARs in vague terminology, please define the ARARs that pertain to the particular situation that this plan is intended to address, i.e., phosphate mine sites. Also, please identify the support and lead agencies that will be involved in the mine clean ups.

Response: The abbreviations SI, OSC and RPM have been added to the list of acronyms. The ARAR process is a site-specific requirement and will be conducted at the appropriate time. Lead agencies are identified in the revised plan in response to an earlier comment.

3.3 SITE INVESTIGATION

Pg. 10, paragraph continued from pg. 9: This paragraph indicates that IDEQ is fully aware that the conclusions of the area-wide human health and ecological risk assessment were based on at least one false assumption. In the fifth sentence of this paragraph, IDEQ states that "Previous groundwater studies could not be conducted effectively on an area wide scale and were deferred to site-specific actions." But IDEQ did not explain this fact in the area-wide human health and ecological risk assessment; the agency simply treated groundwater as a *de minimus* exposure pathway, and concluded that "There is a low probability of significant human health effects in the region based on …existing exposure pathways" (refer to Appendix A of these comments). The correct approach would have been to exclude groundwater from the human health conceptual site model because there were no data with which to evaluate this exposure pathway. An addendum explaining this error should be inserted in all copies of the *Final Area Wide Human Health and Ecological Risk Assessment, Selenium Project, Southeast Idaho Phosphate Mining Resource Area, December 2002*, and distributed to all recipients of the document.

Response: Groundwater was considered "de minimus" on a regional scale based on the information collected prior to the risk assessment. Contrary to GYC's comment, this did not consist of "no data" and cannot be characterized as a "false assumption" unless GYC is aware of a human health exposure to contaminated groundwater that is currently occurring. We addressed this issue in additional detail during an earlier response.

Pg. 10, paragraph continued from pg. 9: This paragraph highlights the problems that permeate the area-wide approach IDEQ adopted for a) assessing human health and ecological risks, and b) developing a risk management plan based on the area-wide risk assessment. The agency states that "Mine-specific activities [will] include a comprehensive evaluation of all site surface water locations and groundwater resources" and "…characterization of the nature and extent of on-site and off-site impacts in soils, sediments, vegetation and other applicable media for the identification of COCs." In other words, information critical for performing an area-wide risk assessment (i.e., the sources of contaminants, the primary pathways for transporting contaminants away from mine sites, and the extent of on-site and off-site contamination) is not yet available, and will not be available until the site-specific investigations have been completed. And yet IDEQ has already concluded that "regional human health and population-level ecological risks are unlikely..." It is irresponsible of IDEQ to convey this message to the public, and to base further actions on these conclusions when, based on the amount of information currently available, these conclusions are at best, premature.

Response: The Department has concluded that there is an adequate amount of data available to reach reasonable regional and population-level conclusions. Mine-specific delineation and characterization efforts will be targeted at identifying any further localized impacts and defining the boundaries of impacted areas to support removal actions. This level of detail is not required for a regional assessment using conservative assumptions.

Pg. 10, par. 1: This paragraph is somewhat misleading. According to information available through the U.S. Department of Energy web site at http://tis.eh.doe.gov/oepa/guidance/cercla/ntc-removals.pdf, a removal site evaluation (RSE) approval memorandum is prepared to document that the site meets the NCP criteria for initiating an NTCRA removal. An EE/CA approval document is prepared following completion of the EE/CA and public involvement, in order to document the removal action decision.

Response: The Agencies have already determined the need for site-specific SI's to occur based on the findings of the Area Wide Investigation and language of the MOU. The EE/CA Approval Memorandum will be the next deliverable to be developed by the OSCs.

Pg. 10, par. 1: Does the phrase, "management approval" in the third sentence refer to approval by management of mining companies?

Response: The phrase refers to Agency management for the assignment of funds and personnel. This activity has greater implications for sites that must draw on funding from Superfund accounts.

3.4 ENGINEERING EVALUATION/COST ANALYSIS

Pg. 10, par. 2: Is preparation of the EE/CA actually a collaborative process among mine owners and designated agencies, as indicated in the first sentence, or do designated agencies have some oversight authority and responsibility?

Response: Under the agreements, all Company activities are subject to Lead Agency oversight and approval, and Support Agency concurrence. All deliverables from the Companies are submitted in draft form for Lead and Support Agency review and comment prior to final publication. The EE/CA will be subject to formal public comment prior to the selection of final removal action alternatives.

Pg. 10, par. 2: Please include a table showing the designated agencies for each mine site and mine owner or operator.

Response: Corrected in response to an earlier comment.

Pg. 10, par. 2: The third sentence states that an EE/CA "may" be performed at each site. Shouldn't an EE/CA be *required* for each site?

Response: At least one EE/CA will be published for each mine site. The term "may" is used to allow some flexibility. For instance, a presumptive remedy may be selected for application in

addressing particular conditions at other for which a subsequent EE/CA may not be required. This language also refers to performing separate EE/CAs to expedite interim or final corrective actions for different media or conditions at an individual mine instead of waiting for a single cumulative EE/CA.

Pg. 10, par. 2: Please explain a) what is meant by "phased" EE/CA activities, and b) why IDEQ believes it is appropriate or necessary to introduce the possibility of performing phased EE/CA in the management plan.

Response: The subject of phased EE/CAs has already been discussed between the Intergaency representatives to address conditions that may warrant a presumptive remedy or an interim action while designing or implementing a final remedy. Since this document is targeted at Lead and Support Agency representatives responsible for the removal action implementation, it is appropriate to identify this alternative approach.

Pg. 10, par. 3: Please be specific regarding the number of alternatives that will be considered for the EE/CA process. "Alternatives" indicates a minimum of two possibilities; "only a limited number" could be interpreted as a maximum of two possibilities. Will "no action" be considered a viable alternative? Is it correct to interpret "qualified technology" as being synonymous with "appropriate and effective technology"?

Response: The EE/CA process does not specify a required number of alternatives but it would be our intent to consider three or four viable alternatives, if available. In every objective decision making process, a "no action" alternative is included to allow a cost/benefit evaluation. The alternatives considered in the NTCRA process may be limited to reasonable solutions and do not need to include options that are clearly impractical. Finally, the Department does not have a problem with the GYC's interpretation of qualified technology, and has revised the text accordingly.

Pg. 11, paragraph continued from pg. 10: Please define the term, "presumptive remedies," and give examples of the types of presumptive remedies that "…may be established for certain conditions that may further streamline subsequent EE/CA processes at other sites and eliminate the need for additional alternative analysis in addressing that particular issue."

Response: A presumptive remedy is one that, upon approval of the Agencies, can be applied under similar conditions without further evaluation. The Department does not want to speculate on potential presumptive remedies prior to consideration by the other Agencies.

3.5 DECISION CRITERIA/ACTION MEMORANDUM

Pg. 11: Change the title of this section to "Decision Criteria for Selecting a Recommended Alternative," or "Determination of the Final Recommended Alternative."

Response: Title revised to "Removal Action Decision Criteria".

Pg. 11, par. 1, 2, 3, and 4: These paragraphs describe the criteria that must be addressed in the EE/CA for each alternative considered, and provide the basis for selecting a preferred or recommended alternative. So please change “alternatives” to “alternative” in the first sentence of paragraph 1.

Response: The final decision may consist of one or more of the considered alternatives, or any combination thereof.

Pg. 11, par. 4: Please define the term, “sensitivity analysis,” and explain what is meant by “Sensitivity analysis can be included for areas of uncertainty.”

Response: A sensitivity analysis determines the parameters with the greatest level of impact on outcomes. Cost evaluations can be heavily affected if significant levels of uncertainty are associated with the most sensitive parameters or assumptions, for instance, not knowing the volume of materials subject to an excavation alternative. The cost analysis may include discussion of the sensitivity of these uncertainties on the calculated estimates.

3.6 IMPLEMENTATION PHASE

Pg. 12, par. 1: Please define the term, “site closeout,” and explain the process of “site closeout.”

Response: Site closeout is one of the final stages of the implementation phase, and the procedures will be specific to each Agency with consultation from their designated legal counsels, as specified in the referenced EPA guidance manual. At a minimum, there will be a determination by the OSC that the removal action is complete, post removal site controls and/or monitoring may be established, and a periodic site review schedule may be developed. The AOC notice of completion letter will be issued and any remaining financial obligations resolved. The OSC may also be requested to submit a report summarizing the removal action for the EPA’s Regional Response Team as part of the closeout process.

4.0 RISK MANAGEMENT GUIDANCE

4.1 PURPOSE AND APPLICABILITY

Pg. 12, par. 2: Please explain how the risk management plan will “assist the designated Lead Agencies [*sic*] and mining companies in identifying areas of concern, selecting appropriate corrective actions, and focusing resources in a consistent manner.” Does the phrase, “areas of concern” refer to a list of contaminants, an approach to characterizing spatial contamination, liability, etc.? Does IDEQ have personnel with the expertise to assist mines in selecting appropriate corrective actions? Whose resources and what types of resources need to be “focused”?

Response: The risk management plan provides action levels for the list of contaminants of concern that can be used to define impacted areas for various media, and may assist in selecting appropriate corrective actions that can achieve these concentrations. The

Department believes responsible resource management and cost effective solutions should be a integral part of any environmental project, and efforts should be focused on areas that provide the greatest benefit. IDEQ, as well as our MOU partners, have personnel with extensive experience in mining, remediation and specialized skills such as toxicology, hydrology, water treatment, etc. to assist the mines in selecting appropriate removal action alternatives.

Pg. 12, par. 3: Please specify the subject of risk management, i.e., contaminants associated with phosphate mining. For example, the first sentence should state that, "The IDEQ's risk management goals and objectives, and proposed action levels are designed to identify **[natural resources impacted by contaminants associated with phosphate mining and to control releases of contaminants from mine sites**].

Response: The text has been revised.

Pg. 12, par. 2: Doesn't the plan pertain to current, as well as historic, mining areas?

Response: See earlier response to this question.

4.2 REMEDIAL ACTION GOALS AND OBJECTIVES

General Comments

Please do not introduce yet another acronym. The phrases, "remedial action goal," and "remedial action objective," are not so unwieldy as to require abbreviation. It is much simpler for the reader to understand and remember "Remedial Action Goal 1: Protect Southeast Idaho's Surface Water Resources," than "RAG 1: Protect Southeast Idaho's Surface Water Resources."

Response: For accuracy, the Department has changed the terminology to removal action goals and objectives, and will retract the use of acronyms, as requested.

Pg. 13, par. 1: The first sentence is inaccurate and gives the reader an incorrect impression of the extent of risk management addressed by this document. On page 12, paragraph 3, IDEQ states that its "risk management goals and objectives, and proposed action levels are designed to identify highly impacted zones…deemed to present an unacceptable risk to ecological receptors. The Agency used subpopulation-level risks as an appropriate measure for determining the need for corrective action involving ongoing releases and discharges…" Thus, IDEQ is not addressing population-level ecological risks or human health risks. Please be consistent and explicit when describing the scope of the risk management plan.

Response: The reviewer should be aware that subpopulation-level risk management is a more stringent approach and is, therefore, protective of the ecological populations. Human health risks are also addressed by several of the remedial action objectives, particularly groundwater protection and residential development restrictions.

Pg. 13, par. 1: Shouldn't the word, "jurisdiction" in the second sentence be replaced with "authority"? And if the remedial action goals correspond to Federal and State regulations, doesn't the plan have more regulatory authority than indicated in the statement that appears on page 12, paragraph 2, which states that "The plan serves only as a guidance document for the designated lead agencies…"

Response: Terminology corrected. The removal action goals do correspond to underlying regulations but do not limit the discretionary authority of a lead agency under CERCLA. The State's role, as defined by the Area Wide scope of work, was to publish a risk management plan that would serve as discretionary guidance.

Pg. 13, par. 2: The first sentence, which states that the remedial action objectives consist of …goals for protecting human health and/or the environment is not consistent with IDEQ's statement on page 12, paragraph 3, that its "risk management goals and objectives, and proposed action levels are designed to identify highly impacted zones…deemed to present an unacceptable risk to ecological receptors. The Agency used subpopulation-level risks as an appropriate measure for determining the need for corrective action involving ongoing releases and discharges…" Please be consistent and explicit when describing the scope of risk management plan.

Response: See previous response to same comment.

Pg. 13, par. 3: The first sentence is incorrect. Idaho's water quality standards were revised May 3, 2003, and now list numeric criteria for toxic substances. Refer to *IDAPA 58.01.02.210.01.* Please revise section heading 4.2.1.1 to reflect Idaho's current standards.

Response: The heading of 4.2.1.1 is still accurate since the lower standard, the CCC of 5 ppb, applies to both regulations. The text referring to the previous incorporation of the National Toxics Rule has been revised throughout the plan.

Pg. 14, par. 1: Why weren't all of the streams discussed on page 14 included in the discussion on page 6 of streams recommended by IDEQ for § 303(d) listing? Conversely, why weren't Dry Valley and Chicken Creeks, which were described on page 6 as persistently exceeding water quality criteria, mentioned on page 14? And why aren't the streams discussed on both these pages listed in Idaho's draft *2002-03 Integrated 303(d)/305(d) Report*, which was released June 4, 2003? Please eliminate the inconsistencies that occur within the plan and between the plan and the draft 303(d) list, as illustrated by Table 2.

Response: The 303(d) listings are currently under review by the Department's Water Program representatives and will be addressed accordingly.

Pg. 14, par. 1: Please define "episodic" and "persistent," and explain how IDEQ relates the frequency of criteria exceedances with acute and chronic criteria. If "episodic" exceedances of the criteria maximum concentration of 18 µg/L selenium have occurred in Sage, Georgetown, Montpelier Creeks, these streams should be added to the § 303(d) list.

Response: Surface water concentrations vary seasonally and annually. Many of the streams may exhibit exceedances of the CCC for a brief period of time in response to Spring runoff but are within compliance levels the majority of the year. We have referred to these as episodic occurrences and we are not aware of CMC exceedances in these cases. Other streams have been identified as exceeding criteria throughout the majority of the year and are referred to as persistent. All streams with persistent exceedances have been recommended for 303(d) listing while the others are still in evaluation based on observed data, sampling protocol requirements.

Pg. 14, par. 1: Is IDEQ incorrectly associating episodic exceedances with the criterion intended to protect against chronic toxicity, and persistent exceedances with the criterion intended to protect against acute toxicity? In toxicology, “acute” and “chronic” refer to duration of exposure, onset of effects, and duration of effects. Acute toxicity occurs when an organism is exposed to a relatively high concentration of chemical sufficient to produce adverse effects within hours or days of exposure. The adverse effects are frequently severe (i.e., death) and occur rapidly after the onset of exposure. The criteria maximum concentration (CMC) of 18 µg/L is intended to protect aquatic organisms from infrequent or, to use IDEQ’s terminology, “episodic” exposures to acutely toxic concentrations of selenium. Chronic toxicity occurs when an organism is exposed to a relatively low concentration of chemical that is sufficient to produce adverse effects such as impaired reproduction or cancer following an extended period of exposure. The adverse effects may be severe, but they occur long after the organism was initially exposed to the contaminant and/or after a relatively long period of exposure to concentrations that are not great enough to cause acute effects. The criteria continuous concentration (CCC) of 5 µg/L is intended to protect aquatic organisms from continuous, or to use IDEQ’s terminology, “persistent” exposure to chronically toxic concentrations of selenium. Based on the intent of continuous and maximum criteria, the following guidelines should be followed for 303(d) listing:

1. If concentrations of selenium equal or exceed 5 µg/L episodically, but never equal or exceed 18 µg/L, IDEQ must make a judgment regarding the number of exceedances that constitute a violation of water quality standards. IDEQ must monitor concentrations on a frequent and regular basis until enough data have been collected to make an informed decision regarding the number of exceedances that constitute a violation.

2. If concentrations of selenium equal or exceed 5 µg/L persistently, but never or only episodically equal or exceed 18 µg/L, the stream should be listed for violating the criteria continuous concentration of 5 µg/L.

3. If concentrations of selenium equal or exceed 18 µg/L episodically, IDEQ must make a judgment regarding the number of exceedances that constitute a violation of water quality standards. IDEQ must monitor concentrations on a frequent and regular basis until enough data have been collected to make an informed decision regarding the number of exceedances that constitute a violation.

4. If concentrations of selenium equal or exceed 18 µg/L persistently, the stream should be listed for violating the criteria continuous concentration of 5 µg/L and the criteria maximum concentration of 18 µg/L.

But streams that IDEQ acknowledges exceed criteria on an episodic basis (i.e., Sage, Georgetown, and Montpelier Creeks) were not recommended for § 303(d)-listing; two streams that IDEQ acknowledges exceed criteria on a persistent basis (i.e., East Mill and Maybe Creeks) were recommended for listing based on exceedances of the criteria maximum concentration but not the criteria continuous concentration, and two streams that were recommended for listing based on exceedances of the criteria continuous concentration (i.e., Dry Valley and Chicken Creeks) were not acknowledged by IDEQ as exceeding criteria on either an episodic or persistent basis. The latter circumstance may have been an oversight, but please explain the other two inconsistencies.

Response: Please refer to the previous response concerning the Department's use of episodic and persistent terminology. However, this descriptive text has nothing to do with the actual listing process, as inferred in GYC's comments. CCC listings require four-day average concentrations in a three year period, which have not been documented for several of the streams mentioned.

East Mill and Maybe Creek have exhibited a one-hour average CMC exceedance in a three-year period and are both eligible for impaired stream listing based on those findings. The other four streams have exhibited two exceedances of a four-day average CCC concentration in a three-year period and are eligible for impaired stream listing based on that data.

Table 2. A comparison of streams recommended by IDEQ for § 303(d) listing, streams IDEQ claims exceed numeric criteria for selenium and mining-related trace metals, and streams listed for selenium in Idaho's draft *2002-03 Integrated 303(d)/305(b) Report* released June 2003.

	Streams Recommended by IDEQ for § 303(d) Listing (Page 6 of Risk Management Plan)		Streams Identified by IDEQ as Exceeding Numeric Criteria for Selenium and Mining-Related Trace Metals (Page 14 of Risk Management Plan)		Streams Listed for Selenium Contamination in *Idaho's 2002-03 Integrated 303(d)/305(b) Report* (Draft, June 2003)
Subbasin	**Stream**	**Basis for Listing: Criterion Exceeded**	**Stream**	**Frequency of Exceedances**	**Stream**
Blackfoot	East Mill Creek	CMC[1]: 18 µg/L	East Mill Creek	Persistent	Listed as *Upper Mill Canyon* and *Lower Mill Canyon*
Blackfoot	Maybe Creek	CMC: 18 µg/L	Maybe Creek	Persistent	
Blackfoot	Dry Valley Creek	CCC[2]: 5 µg/L	Dry Valley Creek	Not specified	
Blackfoot	Spring Creek	CCC: 5 µg/L	Spring Creek	Persistent	Listed as *Lower Spring Creek*
Salt	Pole Canyon Creek	CCC: 5 µg/L	Pole Canyon Creek	Persistent	
Blackfoot	Chicken Creek	CCC: 5 µg/L	Chicken Creek	Not specified	Listed, but not for selenium
Salt			Sage Creek	Episodic	
Bear			Georgetown	Episodic	
Bear			Montpelier	Episodic	

[1]Criteria maximum concentration (CMC)
[2]Criteria continuous concentration (CCC)

In an effort to understand the approach IDEQ used to determine which streams should be § 303(d)-listed for selenium, the results of stream water samples collected and analyzed for selenium from 1997 through 2002 were compiled. These results were obtained from area-wide investigation reports prepared by Montgomery Watson and Tetra Tech EMI (available at http://giscenter.isu.edu/research/techpg/selenium/selenium.htm), from IDEQ's response to a public information request submitted by the Greater Yellowstone Coalition on July 2, 1999, and from a report published by the U.S. Geological Survey (Hamilton, et al. 2002). The number of samples collected annually, the number of samples that contained concentrations of selenium in excess of numeric criteria, and the number of samples that contained at least 1 µg/L selenium are shown each of the four subbasins (i.e., hydrologic cataloging units) in the resource area in Table 3. Analyses of duplicate samples and analyses of split samples were not included.

According to numbers shown in the table, the level of sampling effort has been extremely variable both spatially (i.e., among subbasins) and temporally (i.e., over time). The spatial variability is obviously a function of the number of mines located in each subbasin and the corresponding potential for stream contamination. Several currently operating mines are located in the Blackfoot River subbasin, but only one mine is operating in each of the other subbasins. However, reasons for the limited temporal sampling in the Bear River, Portneuf River, and Salt River subbasins are not apparent, and should be explained by IDEQ. Furthermore, the statement that "no exceedances have been documented in the Portneuf River in the vicinity of Gay Mine," is misleading because it gives the reader the impression that sampling has been conducted regularly when in fact, the results of only six samples have been reported from any of the streams in this subbasin since 1998. In fact, only two samples were collected from the Portneuf River and analyzed for selenium, and these samples were collected in 1998 (Table 3). If IDEQ based its statement regarding the lack of detection of selenium in the Portneuf River on data other than that available in the area-wide reports, please list the data or provide a reference for the data in the plan. Also, please explain the reasons for the spatial and temporal variation in sampling effort among subbasins.

Table 3. The number of samples collected annually, the number of samples that contained concentrations of selenium in excess of numeric criteria, and the number of samples that contained at least 1 µg/L selenium in each of the four subbasins in the resource area.

Subbasin	Number of results ≥ to the continuous or maximum criterion for selenium[1] Number of samples analyzed for selenium (Number of samples with concentrations ≥ 1 µg/L selenium in parentheses)						
	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**Total**
Bear River	0/0	1/8 (1)	0/4 (2)	2/4	0/9	0/6	3/31 (3)
Blackfoot River	6/18 (6)	13/68 (26)	19/81 (50)	40/57 (21)	14/72 (37)	12/13 (13)	104/309 (153)

Portneuf River	0/0	0/12 (1)	0/3 (1)	0/3 (1)	0/0	0/0	0/18 (3)
Salt River	3/5 (5)	1/20 (5)	2/8 (4)	1/7 (3)	1/30 (11)	2/7 (2)	10/77 (30)

[1] The criterion continuous concentration (CCC) is 5 µg/L selenium; the criterion maximum concentration (CMC) is 18 µg/L selenium (*IDAPA 58.01.02.210)*. Duplicate and laboratory split samples were not included in any of the sample totals.

It is important to note that the data summarized in Table 3 include analyses of samples collected from stream locations designated as "background" or "unimpacted by mining." Nevertheless, approximately half of the samples collected from the Blackfoot River subbasin contained at least 1 µg/L selenium and more than one-third of the samples exceeded numeric criteria for selenium. Almost 39 percent of the samples collected from the Salt River subbasin contained at least 1 µg/L selenium, and 13 percent of the samples exceeded numeric criteria for selenium.

More detailed summaries of the numbers of exceedances of selenium criteria in various streams verify that IDEQ has not thoroughly nor consistently reviewed the data available to it for the purpose of determining which streams should be § 303(d)-listed for impairment by selenium contamination. In fact, the logic used by IDEQ for listing streams that contain concentrations of selenium in excess of water quality standards defies analysis. This is evidenced by a comparison of analytical data for streams a) recommended by IDEQ for § 303(d)-listing, or b) identified by IDEQ in the management plan as exceeding water quality criteria for selenium and other mining-related metals on an episodic basis (Table 4), with analytical data for streams in which concentrations of selenium have frequently been detected (Table 5). One hundred percent of the samples collected from East Mill, Maybe, Pole Canyon, and Chicken Creeks exceeded the criterion continuous concentration (CCC) of 5 µg/L selenium, and one hundred percent of the samples collected from Maybe and Pole Canyon Creeks exceeded the criterion maximum concentration of 18 µg/L selenium. But according to IDEQ's draft *2002-03 Integrated 303(d)/305(b) Report*, released June 2003, the only streams listed for selenium are Upper Mill Creek and Lower Mill Creek (i.e., East Mill Creek) and Lower Spring

Table 4. Selenium concentrations in streams recommended by IDEQ for § 303(d) listing[1], and streams characterized by IDEQ as exceeding water quality criteria for selenium and other mining-related metals on an episodic basis[2].

Stream	Subbasin	Number of results ≥ to the continuous or maximum criterion for selenium[3] / Number of samples analyzed for selenium (Range of concentrations detected; all values rounded to next higher whole number)						
		1997	1998	1999	2000	2001	2002	Total
East Mill Creek	Blackfoot	1/1 (34 µg/L)	3/3 (32 – 260 µg/L)	1/1 (19 µg/L)	3/3 (15 – 400 µg/L)	9/9 (14 – 130 µg/L)	0/0	17/17
Maybe Creek	Blackfoot	1/1 (47 µg/L)	0/0	0/0	0/0	2/2 (1,140 µg/L)	0/0	3/3
Dry Valley Creek	Blackfoot	1/2 (1 – 14 µg/L)	1/2 (BDL[4] – 56 µg/L)	6/13 (1 – 280 µg/L)	4/4 (8 – 87 µg/L)	0/0	0/0	12/21
Spring Creek	Blackfoot	0/1 (3 µg/L)	0/0	1/3 (BDL – 46 µg/L)	1/2 (BDL – 28 µg/L)	2/9 (6 – 13 µg/L)	3/3 (68 – 72 µg/L)	7/18
Pole Canyon Creek	Salt	3/3 (566 – 612 µg/L)	0/0	2/2 (2,300 -2,400 µg/L)	0/0	0/0	0/0	5/5
Chicken Creek	Blackfoot	1/1 (6 µg/L)	0/0	3/3 (25 – 45 µg/L)	0/0	0/0	0/0	4/4
Sage Creek and North & South Forks	Salt	0/2 (3 µg/L)	1/12 (BDL – 41 µg/L)	0/5 (BDL – 3 µg/L)	1/6 (BDL – 8 µg/L)	1/18 (BDL – 5 µg/L)	2/7 (1 – 5 µg/L)	5/50
Georgetown Creek	Bear	0/0	1/3 (BDL – 7 µg/L)	0/2 (2 – 4 µg/L)	2/2 (7 – 18 µg/L)	0/3 (2 µg/L)	0/3 (2 µg/L)	3/13
Montpelier Creek below mining	Bear	0/0	0/0	0/0	0/0	0/3 (BDL – 3 µg/L)	0/3 (2 µg/L)	0/6

[1]East Mill, Maybe, Dry Valley, Spring, Pole Canyon, and Chicken Creeks.
[2]Sage, Georgetown, and Montpelier Creeks.
[3]The criterion continuous concentration (CCC) is 5 µg/L selenium; the criterion maximum concentration (CMC) is 18 µg/L selenium (*IDAPA 58.01.02.210)*. Duplicate and laboratory split samples were not included in any of the sample totals.
[4]Analytical values less than zero (i.e., negative values) are reported as below detection limit (BDL).

Table 5. Selenium concentrations in streams that were not recommended by IDEQ for § 303(d) listing.

Stream	Subbasin	Number of results ≥ to the continuous or maximum criterion for selenium[1] / Number of samples analyzed for selenium (Range of concentrations detected; all values rounded to next higher whole number)						
		1997	1998	1999	2000	2001	2002	Total
Blackfoot River upstream of Blackfoot Reservoir	Blackfoot	0/8 (2 – 3 µg/L)	7/14 (1 - 12 µg/L)	8/31 (BDL[2] – 19 µg/L)	7/15 (1 – 7 µg/L)	0/9 (1 – 3 µg/L)	9/9 (5 – 10 µg/L)	31/86
Goodheart Creek	Blackfoot	2/2 (7 – 15 µg/L)	0/0	0/0	0/0	1/2 (BDL – 3 µg/L)	0/0	3/4
No Name Creek below mining (near Rasmussen Creek)	Blackfoot	0/0	0/1 (3 µg/L)	1/2 (BDL – 6 µg/L)	1/1 (7 µg/L)	0/1 (2 µg/L)	0/0	2/5
State Land Creek	Blackfoot	0/0	1/2 (<<1 – 29 µg/L)	0/1 (1 µg/L)	3/4 (1 – 16 µg/L)	0/3 (1 – 3 µg/L)	0/0	4/10
Wooley Valley Creek	Blackfoot	0/0	0/0	0/1 (2 µg/L)	1/2 (2 – 98 µg/L)	0/3 (BDL – 1 µg/L)	0/0	1/6
Bakers Creek	Portneuf	0/0	0/1 (4 µg/L)	0/1 (4 µg/L)	0/0	0/0	0/0	0/2

[1] The criterion continuous concentration (CCC) is 5 µg/L selenium; the criterion maximum concentration (CMC) is 18 µg/L selenium (*IDAPA 58.01.02.210)*. Duplicate and laboratory split samples were not included in any of the sample totals.
[2] Analytical values less than zero (i.e., negative values) are reported as below detection limit (BDL).

Creek (i.e., Spring Creek); Maybe, Pole Canyon, and Chicken Creeks are not listed for selenium or other metals. Three streams were identified by IDEQ as "exceeding water quality criteria for selenium and other mining-related metals on an episodic basis" on the basis of selenium criteria exceedances in zero percent of the samples from Montpelier Creek, 10 percent of the samples from Sage Creek, and 23 percent of the samples from Georgetown Creek (Table 4). But IDEQ did not identify an additional five streams as "exceeding water quality criteria for selenium and other mining-related metals on an episodic basis" despite exceedances of selenium criteria in 36 percent of the samples from the Bear River above the reservoir, exceedances in 75 percent of the samples from Goodheart Creek, exceedances in 40 percent of the samples from No Name Creek, exceedances in 40 percent of the samples from State Land Creek, and exceedances in 17 percent of the samples from Wooley Valley Creek (Table 5). Selenium occurred in both samples of water collected from Bakers Creek, but Baker Creek was not sampled again during any of the area wide studies. Please explain why *all* the streams shown in Tables 4 and 5 were not included in IDEQ's draft *2002-03 Integrated 303(d)/305(b) Report*, released June 2003. Also, please explain why the Blackfoot River, in which concentrations of selenium in excess of the criterion continuous concentration have consistently been detected, and in which concentrations of selenium in excess of the criterion maximum concentration have been detected, is not listed as water quality impaired on Idaho's draft *2002-03 Integrated 303(d)/305(b) Report.*

Response: As stated in earlier responses, the regulatory definition of a CCC violation consists of two four-day average sample exceedances in a three- year period. Prior to 2001, there were no samples collected using the appropriate regulatory protocols. IDEQ instituted the required sampling protocols in our independent efforts upon assuming the Lead Agency role in 2000.

The reviewer's percentage comparisons have no regulatory or statistical significance, and the data interpretations are inaccurate. All recent surface water sampling efforts have been conducted during peak runoff periods that are known to represent the annual maximum observed concentration. A percentage approach results in skewing data comparisons because of the heavy weighting on peak concentrations, and it ignores the temporal effects that occur seasonally or annually. These types of comparisons cannot be done for the purpose of 303(d) listing.

The tabulated values selected by the reviewer have little validity for presenting any sound arguments. The number of streams exceeding 1 ppb selenium has little significance when natural background levels can be twice that value. The 9 of 9 exceedances reported in Table 5 for the Upper Blackfoot River in 2002 does not represent 9 separate samples but 3 sets of individual aliquots for four-day averaging at 3 different locations along the River during the same period.

Similarly, the reviewer mentions 75% of the Goodheart Creek samples exceed criteria but the Goodheart Creek samples are spaced four years apart and would not constitute a violation even if proper protocols had been used. A similar comparison can be made for the other streams in Table 5.

Finally, the early area wide sampling efforts targeted major stream segments to evaluate sub basin impacts, which accounts for the spatial variability observed. They were also seasonally spaced to evaluate temporal variations. The Department used this approach in 2000, and reverted to annual Spring sampling events in subsequent years after confirming that peak selenium concentrations in the streams occur during the annual runoff period. Observed concentrations at comparable locations were higher during the 97 and 98 sampling

events than they have been since, which has been attributed to the annual precipitation totals and supports the Department's recommendation that site-specific monitoring should continue until an average precipitation year can be evaluated for potential surface water releases. The fact that the early Portneuf River basin samples did not exhibit any exceedances during this same period legitimizes the statement in the text, even though sampling has been limited. The Portneuf River basin streams are projected for additional sampling during the Gay Mine site-specific investigation.

The Department's water program representatives are continuing to review the 303(d) list data and GYC's comments, and will make the final determination on any required revisions. The 303(d) process is a biennial evaluation and additional streams will be listed, as required.

Pg. 14, par. 2: The first sentence specifies that mine-specific actions should mitigate "historic source areas." But the second sentence states that water quality exceedances can be traced to a few "operable units," which was interpreted to mean "operating mine units." Why does IDEQ refer throughout the document to "historic" mines, "historic" sources of contamination, etc., when the focus of the risk management plan is historic *and* currently operating mines?

Response: The focus of the risk management plan is historic sites that are subject to CERCLA actions. The term "operable units" was used to refer to individual mine features that serve as release sources such as the waste rock piles. The text has been modified to remove any connotations toward "operating" mines.

Pg. 14, par. 2: This paragraph is full of vague, imprecise terminology that seems to be intended to diminish and/or obscure the impact of the remedial action objective. The "observed episodic exceedances…related to loading in lower order stream segments" should more accurately be described as "violations of Idaho's State water quality standards… caused by selenium contamination of water bodies designated for protection of cold water aquatic life and salmonid spawning. The fact that the highest concentrations of selenium have been detected in low-order streams is irrelevant.

Response: Stream order is relevant to the risk management process and in evaluating the breadth of regional impacts occurring due to discovered releases. Higher order streams typically support greater numbers of aquatic species. The regulatory definition of water quality violations has been addressed in earlier responses.

Pg. 14, par. 2: The sentence, "The Agency believes focused remedial efforts in these targeted areas would eliminate a significant portion of the observed surface water concerns as well as transport effects such as fluvial/sediment depositions, adjacent riparian zone accumulations, and uptake in aquatic flora/fauna," is gobbledygook. Please use simple, direct language to state that IDEQ intends to ensure that contamination of surface waters by selenium and other potentially toxic metals produced by phosphate mining will be stopped in order to protect stream water quality, stream substrates, stream riparian areas, and the plants and animals that are dependent on those resources for their survival.

Response: The Department chose to address this issue in fate and transport terminology.

Pg. 14, par. 2: Please explain exactly what is meant by “a more protective sediment action level.” First, please explain why IDEQ believed it was necessary to “include a more protective sediment action level” when the “proposed action levels for regulated waters are based on the regulatory criteria” (i.e., State water quality standards). Second, how did IDEQ determine that the sediment action level was more protective than the water quality standard? And third, which resources or beneficial uses are “more protected” by the sediment action level than by water quality criteria?

Response: There are no regulated levels for sediment in the water quality rules. Regulated waters are protected for aquatic life. Therefore, the Department chose sediment benchmarks that are also protective of aquatic life as the appropriate action levels to be applied in these regulated areas. These action levels are more protective than the sediment action levels that were developed for areas that do not support aquatic life.

Pg. 15, paragraph continued from page 14: If IDEQ is promoting development of best management practices for phosphate mining to control and reduce the release of potentially toxic metals, including selenium, shouldn’t it do more than “*Encourage* verification monitoring at the earliest *practical* time” to demonstrate the effectiveness of such practices? Shouldn’t IDEQ provide guidelines for assessing and monitoring best management practices? If that is not within IDEQ’s purview, which agency is responsible for such oversight?

Response: Best management practices apply to operating mines, which are under the jurisdiction and approval of the land management agencies. The Department does provide monitoring requirements for operational mines as part of the 401 certification process when mine plans are initially reviewed. However, operational monitoring plans no longer apply once a site is inactive.

Pg. 15, paragraph continued from pg. 14: What is the process for documenting BMPs, submitting them for review, and having them accepted. Which agencies “review and accept” BMPs? If the Idaho Department of Lands (IDL) is responsible for administrative rulemaking relative to BMPs, why isn’t this agency involved in developing the risk management objectives and goals? Does IDEQ have any authority to direct the activities of IDL? If it does not, what is the point of IDEQ developing remedial activity objectives over which it has no authority?

Response: The Department is responsible for environmental protection, including remedial activities at the inactive mine sites. IDL is responsible for mine administration under IDAPA 20.03.02 Rules Governing Exploration and Surface Mining in Idaho, including the use of BMPs at active facilities that are protective water quality. The IDL has participated in the Interagency technical support activities and is aware of the Department’s recommendation to adopt effective BMPs once they are established and demonstrated.

Pg. 15, par. 2: What is the expected outcome of the effort to catalog new and modified BMPs? How will the list be used? Does IDEQ have authority to review and approve or disapprove the BMPs being catalogued? Will IDEQ review the BMPs for effectiveness for protecting ground and surface water from degradation caused by contamination with potentially toxic metals produced by phosphate mining?

Response: We would expect a catalog of new and modified BMPs to provide a range of alternatives for effective BMPs that could be integrated into future mine plans, and to provide a level of confidence that future mining activities are being designed to avoid the selenium releases associated with past operations. The Department will be involved in reviewing the effectiveness of new practices in protecting surface and ground water but not necessarily on an approval basis. The land management agencies retain the authority to permit and approve mine plans that utilize BMPs.

Pg. 15, par. 2: Please provide references for the statement, "Phosphate mining is projected to continue in the region for 100+ [*sic*] years…"

Response: This generalized statement is made based on rough projections of phosphate reserves and various comments from mining representatives, and is not attributable to any specific reference. The text has been modified to provide a less definitive estimate.

Pg. 15, par. 2: A "long-term perspective" regarding environmental protection is justified by the concentrations of selenium that have already been documented in surface waters in the phosphate resource area, even if phosphate mining were to be discontinued. Selenium is a persistent contaminant. It may be transferred from one environmental compartment such as the water column of a stream to another compartment such as the stream sediment, but it will persist for varying lengths of time depending on a variety of abiotic and biotic factors. It may be years before concentrations of selenium and other metals produced by phosphate mining today are detected in drinking water supplies distant from sources of contamination. Long-term monitoring should include groundwater monitoring as well as surface water monitoring.

Response: Monitoring requirements will be developed at the appropriate time based on site-specific findings.

Pg. 15, par. 2: The "Area Wide Investigation" cannot contemplate anything. Please cite references for documents containing information on proposed monitoring.

Response: Comment noted. See the Area Wide Investigation Scope of Work for general monitoring discussions.

Pg. 15, par. 2: In the third sentence, please clarify what IDEQ considers "longer term," and define the "similar issues" IDEQ is trying to avoid in the future.

Response: If considered in context, an objective reader would conclude that "longer term" refers to greater than three to five years. "Similar issues", referring to observed selenium releases, should not need further clarification.

Pg. 15, par. 2: Are the authors of this report aware of IDEQ's beneficial use reconnaissance project (BURP) sampling program and water body assessment protocol for assessing the status of beneficial uses in surface waters? It seems appropriate for IDEQ to use the BURP protocol to monitor streams in the resource area on an annual basis, and to supplement the BURP sampling with sampling for chemicals of concern on at least a monthly basis, especially in streams in which exceedances of Idaho's water quality standards have been documented. If IDEQ does not have the financial resources to implement sampling, can't IDEQ require the mines responsible for contamination to pay for the costs of monitoring by IDEQ?

Response: The AWI staff has worked with the BURP crew in previous efforts, including those used to collect critical data for the risk assessment in 2000. BURP sampling is not conducted on a monthly basis, does not include any analytical sample collection, and most streams are only visited periodically (every 3-5 years). Specific monitoring requirements will be determined at a later date and will, most likely, be conducted by the responsible parties, in lieu of additional Agency obligations.

Pg. 15, par. 3: Does the sentence, "There is a clear correlation in area wide data sets between observed concentrations, loading, areal exceedances and the annual precipitation levels" refer to the findings of the *Final 2002 supplement to 2001 total maximum daily load baseline monitoring report*? If so, provide a reference. Is this true for all contaminants?

Response: This document is previously referenced in the plan. The correlation discussion applies primarily to selenium, which is considered the primary hazard driver, and to a lesser degree for the other COCs.

Pg. 15, par. 2: The following comments pertain to the statement, "While we hope the lower water year data has helped to focus on the most persistent release pathways, the Agency recommends resampling efforts for surface water sources at each mine during the first average precipitation cycle following initiation of site-specific activities." First, please clarify the subjects of "sources" and "activities." Is it correct to assume the author was referring to "sources of surface water contamination" and "site-specific activities to reduce the production and release of mining-associated pollutants"? Second, according to the *Final 2002 supplement to 2001 total maximum daily load baseline monitoring report, November 2002,* "Results suggest that surface water selenium concentrations appear to be influenced by yearly fluctuations in snow water equivalent. The greatest selenium concentrations were observed when snow water equivalent and percent of normal snow water equivalent were greatest at time of sample collection." Therefore, it is unlikely that "lower water year data has helped to focus on the most persistent release pathways" because it is probable, based on the findings of the 2002 report, that release pathways (i.e., sources of contamination) would not even be detectable in low water years. Furthermore, as stated on page 27 of the 2002 report, "the May selenium concentrations in 1998 and 1999 may be most representative of selenium concentrations associated with snowmelt following an average snow year." And yet the data used by Tetra Tech to perform the risk assessment and to calculate the action levels presented in this plan were collected in 2001. Clearly, both Tetra Tech and IDEQ were aware that using data from 2001 would very likely underestimate the extent and magnitude of the selenium contamination problem in the resource area. Third, sampling of sources of surface water contamination should continue on a regular basis until a specified concentration is achieved and until concentrations in surface waters no longer exceed some fraction of the surface water criteria.

Response: Release pathways at seeps, springs and in site runoff have been detectable throughout the low water years, contrary to GYC's assertion. It is logical to assume that the existing pathways that have been identified would account for a significant portion of the loading observed in 1998 when they would have exhibited greater flow and loading characteristics during a wetter year. The Department acknowledges the potential for the discovery of additional pathways during higher precipitation periods but implying that the current pathways have no contribution and only other sources account for the 98 observances is ludicrous.

The area wide risk assessment did consider the effects of a normal precipitation year in the risk estimates using the 1998 data. Since the water column presents such a small portion of the exposure dose as compared to the less variable media such as sediments, soils and vegetation, the estimates were not greatly affected. The risk management approach is also not affected because the action levels are based on concentrations to be achieved, not the observed starting concentrations in impacted areas.

Finally, monitoring for CERCLA actions will continue in areas above background until evidence of releases and/or impacts are shown not to exist. Background levels are used to distinguish the potential for releases from historic mine sites and represent a fractional value of the numeric criteria for selenium.

Pg. 16, par. 1: It is incorrect for IDEQ to state that the effects of "elevated levels of selenium in virtually every environmental media and species of wildlife tested" have not been observed. Two human health advisories cautioning against the consumption of elk and fish are clearly "observations of adverse effects." At the meeting of the Selenium Area Wide Advisory Committee on April 29, 2003, Jeff Jones of the USFS stated that in 1980, the IDFG found adult and year-one-aged trout in Maybe Canyon Creek, indicating the presence of a self-sustaining population. During a survey in 2002, neither adult nor year-one-aged trout were found, indicating that trout no longer occupy Maybe Canyon Creek. Although the absence of trout has not been conclusively linked to selenium contamination, no effort has been made to rule out the possibility that selenium toxicity eradicated the trout population in Maybe Canyon Creek, Mill Canyon Creek, Pole Canyon Creek, or any of the other streams in which concentrations of selenium known to cause chronic toxicity have been documented. In other words, efforts to actively determine whether "adverse effects" have occurred have not been made by IDEQ or any other participants in the area-wide investigations. As previously explained, the authors of this plan incorrectly state on page 4 that USGS and Fish and Wildlife Service scientists conducted studies that "support the conclusion that population-level ecological effects are unlikely." And the results of studies conducted by scientists at the University of Idaho have not been released by their authors for peer review and, as a matter of scientific integrity, should not be cited in the plan until they have been made available for public and scientific review.

Response: The Department stated that after six years of investigation, the observed effects have been limited, not that effects have not been observed. Human health consumption advisories are precautionary steps, they do not constitute "observations of adverse effects" nor do they necessarily indicate levels that are harmful to the individual animals. Similarly, the fact that trout no longer inhabit Maybe Creek may be related to the beaver ponds or intermittent conditions that now exist at the site during low water. The Department has not

made a concerted effort to determine the level of adverse effects in impacted areas because it is not necessary in pursuing corrective actions. But individuals and organizations that are espousing the significant toxicological effects being caused throughout the region by phosphate mining are being disingenuous and misleading because they too have failed to identify solid scientific evidence of adverse effects in areas other than those already identified by the AWI. The subject of non-peer reviewed reports was addressed in an earlier response.

Pg. 16, par. 1: Why does IDEQ attempt to diminish the importance of mortalities observed among livestock? Grazing and livestock watering are beneficial uses of the resource area that have clearly been impaired. The effects on livestock should have been enumerated in the human health and ecological risk assessment prepared by Tetra Tech for IDEQ, and should also be enumerated by IDEQ in the risk management plan. These are effects that have been documented in mammals, regardless of whether the mammals are wild or domestic. These effects also have occurred because of ecological processes that have caused the transport, uptake, and accumulation of selenium in water and plants. These effects include, but are probably not limited to 1) the deaths by euthanasia of six horses in 1996 due to selenium toxicosis, 2) the deaths of 60 sheep in 1999 from selenium toxicosis after grazing on selenium-contaminated forage, 3) the deaths of 150 to 160 sheep in 2001 due to selenium toxicosis after consumption of selenium-contaminated spring water, and 4) the deaths of more than 327 sheep in 2003 due to selenium toxicosis after grazing on selenium-contaminated forage. Please list the types of evidence that IDEQ requires in order to acknowledge that adverse ecological effects have been observed as a result of phosphate mining, and explain why IDEQ does not consider the incidents presented in this paragraph to constitute observations of ecological effects.

Response: Domestic animals are not considered ecological receptors because they are directly managed by human activity and their risks are determined by the practices employed by their handlers. The EPA and FWS specifically requested the removal of livestock from our original draft conceptual site model and ecological risk assessment work plan on this basis. Grazers have been informed of the risks associated with grazing the waste rock dumps and immediate vicinity and, on many occasions, have chosen to assume this risk even through incidents of trespass. The Department has not ignored the livestock issue, which is discussed in Removal Action Objective 3.1. and, at the land management agencies' request, we have agreed to lower the proposed vegetation action level to 5 ppm to be consistent with their reclamation goal for grazing use.

Pg. 16, par. 2: Please provide a reference or references to support the statement made in the first paragraph, and please use references that are available in the peer-reviewed scientific literature whenever possible. Reference 29 is apparently the written results of a speciation study and could be posted on the Internet and made accessible through the *Idaho Selenium Map Service* web page. Reference 30 is a verbal communication, so it is unlikely that there is any documentation to support it.

Response: Both references refer to evaluations done as part of academic research, not part of the Area Wide Investigation. We have specifically limited website postings to technical reports produced under the AWI process to avoid screening requirements and accusations of bias in determining the appropriate documents for posting. The Department has no reason to believe

that the referenced results are not accurate since it simply involves laboratory analysis, does not contradict expected geochemical processes, and does not involve a level of interpretation that would typically require peer review. For additional information, we suggest that GYC contact the institutions that conducted the analysis.

Pg. 16, par. 2: Please provide references for the claim that "the resource area environment exhibits highly alkaline and oxidizing ambient conditions." According to data reported in the area-wide human health and ecological risk assessment, most surface waters had alkalinity values ranging from 170 to 220 mg/L as $CaCO_3$, and pH values ranging from 7.5 to 8.5 units. Alkalinity values for soil samples were not reported, but pH values ranged from 4.2 to 7.7, with most values ranging from 6 to 7. None of these parameters indicate particularly alkaline surface water or soil conditions. And "oxidizing conditions" are a function of exposure to air. Most surface waters and upper layers of soils are oxidizing environments whereas the anoxic soils of wetlands are reducing environments.

Response: Alkaline conditions refer to any water with a pH greater than 7, and the carbonate levels observed in the region do fall into the classification for hard water. The term "highly" may be arguably subjective and will be removed the statement. However, oxidizing conditions are not limited solely to a function of exposure to air; oxidation can occur through numerous chemical reaction processes. These conditions are important because they explain the dominant presence of selenate vs. selenite in surface water pathways.

Pg. 16, par. 2: Speculation on the part of IDEQ regarding the chemical speciation of selenium and its relation to observed effects appears to be an attempt by IDEQ to bolster its claim that population-level ecological effects have not occurred and are not likely to occur in the resource area. According to Amacher et al. (2001)[3], the *mobility* of total selenium is a function of exposure to an oxidizing environment, and "to minimize Se oxidation and mobility during material handling it would be best to stockpile overburden soils in a dry environment, to not expose waste rock at the surface of the dumps, and to use topsoils and subsoils with the lowest Se concentrations to cap waste dumps." Furthermore, the authors concluded their report by stating that "Data are needed on the mineral forms and associations (e.g., sorbed to iron oxides) and chemical species (e.g., selenide (Se(-II)), elemental (Se(0)), selenite (Se(IV)), and selenate (Se(VI))) of Se in the sedimentary deposits, soils, and sediments in southeastern Idaho to provide a more accurate assessment of the mobility, bioaccumulation potential, and fate of Se in the environment. Methods are now available to provide data on the solid phase speciation of Se in soils and sediments…" Thus, it appears that data are not available to support IDEQ's speculations about selenium speciation and toxicity.

Response: This conclusion refers to "sedimentary deposits, soils and sediments" not surface water conditions and release pathways. GYC's cited reference is dated 2001, the speciation study information provided by the Department is dated 2002.

[3]Amacher, M.C., J.R. Herring, and L.L. Stillings. 2001. Total recoverable selenium and other elements by HNO_3 and $HClO_4$ digestion and other soil characterization data from Wooley Valley units 3 and 4 waste rock dumps and dairy syncline lease area soils, southeast Idaho. U.S. Geological Survey Open-File Report 01-69, USDA-FS, Rocky Mountain Research Station, Logan, UT.

Pg. 16, par. 2: Again, it is unclear what types of "observable effects" IDEQ claims are absent in the resource area. Hopefully, it will not be necessary for an ecological catastrophe comparable to that which occurred at Kesterson National Wildlife Refuge in California to occur in Idaho in order for IDEQ to exert its authority and protect environmental resources from contamination associated with phosphate mining.

Response: As stated in an earlier response, the Department has not made a claim that observable effects are absent in the Resource Area; we just dispute GYC's implications that these conditions are representative of a significant part of the Resource Area. A review of the differences in the ecological conditions, number of receptors and ubiquitous contamination levels at Kesterson National Wildlife Refuge and Southeast Idaho may explain why a comparable catastrophe is unlikely.

Pg. 16, par. 3: The areas in which high concentrations of selenium have been identified are in the vicinity of some currently operating mines, not just "historic" releases.

Response: See earlier response on "historic" sites.

Pg. 16, par. 4: Please make the references for elk tissue data available for review by posting the information on the *Idaho Selenium Map Service* web page.

Response: Elk data are available on the referenced website in IMA's 1999 regional report.

Pg. 16, par. 4: A statistically significant inverse correlation between concentrations of selenium in elk liver and the distance of harvested elk from the nearest mine indicates that elk are foraging in fairly limited areas, and therefore may be as susceptible as domestic livestock to consumption of high-selenium forage or high-selenium water.

Response: The Department has already acknowledged consumption of seleniforous forage by elk populations. However, the distances for elk home ranges are well established and being free ranging animals, the risk would not be considered to be as great as to domestic animals that may be restricted to grazing particular areas. The elk data collected in the Resource Area over a two-year period also indicates that the elk population is not exhibiting any tissue or liver concentrations that are reaching literature-reported risk threshold levels.

Pg. 17, paragraph continued from pg. 16: Please give a reference for the "typically reported background levels" of selenium in small mammals.

Response: See reference 35 cited in the same paragraph.

Pg. 17, par. 1: In the first sentence, explain that the egg selenium values are for birds, not fish, amphibians, or other egg-producing organisms. Are the concentrations referenced for dry weight or wet weight of tissue?

Response: Corrected.

Pg. 17, par. 1: Based on the references cited, IDEQ appears to be biased in favor of the work conducted by Fairbrother, Brix, Toll, McKay and Adams although other perspectives have been published in the peer-reviewed literature. Please explain why IDEQ cites these authors instead of Hamilton, Lemly, Skorupa or other researchers who have published extensively on the subject of the environmental effects of selenium.

Response: The Department is not being biased toward any particular researcher. There is clearly a debate in the scientific community over the application of selenium thresholds that were developed for some of the earlier researched sites. The Department does have some concern that the authors cited by GYC consistently encourage the use of site-specific information but, more often than not, default to effects levels derived from more sensitive sites, such as closed system lakes and wildlife refuges, for their independent evaluations without any acknowledgement of a change of conditions. Most of the recommended threshold levels developed by these authors were developed many years ago and have been summarized by Lemly in reference #35. Regardless of more recent research and publications with differing conclusions, the GYC-cited researcher's views and threshold recommendations have remained substantially unchanged and do not require separate citations for subsequent repetitions of those conclusions. The Department has tried to stay objective and recognize there are differing technical opinions without endorsing one over the other. We have also pointed out the presence of threshold exceedances regardless of which set of researcher's thresholds are used. Our action levels are based on dose equations using referenced toxicological data, and do not heavily rely on the threshold effects levels observed in secondary media that are subject to the majority of the pending scientific debate.

Pg. 17, par. 1: What point is IDEQ attempting to make with this paragraph?

Response: Contrary to GYC's previous assertions, this paragraph acknowledges the presence of concentrations in excess of thresholds at which the Department does expect effects to occur.

Pg. 17, par. 2: What point is IDEQ attempting to make with this paragraph? The higher concentrations of selenium in wild fish compared to laboratory-exposed cutthroat trout indicate that selenium has accumulated to levels in fish in the wild that may be difficult to simulate in the laboratory, calling into question the relevance of the laboratory study.

Response: See previous response.

Pg. 17, par. 3: Please refer to previous comments regarding inaccuracy of the phrases "the approximate five percent of the resource area impacted" and "historic releases."

Response: Please refer to previous responses on these issues.

Pg. 17, par. 3: What is the subject of the phrase, "…the Agency has concluded that there are concentrations that clearly present unacceptable risks to subpopulations"? Selenium? How do the data presented on pages 16 and 17 support IDEQ's claim that subpopulations, but not populations, are susceptible to unacceptable risks due to exposure to selenium?

Response: Selenium is the primary hazard driver but other COCs are included in the action levels. The data presented applies to findings in localized areas (subpopulations) while the area wide risk assessment provided the evaluation of population level risks.

Pg. 18, par. 1: How do risk-based action levels compare to levels that could be achieved by best available control technologies?

Response: The Department cannot provide a reasonable response to this open-ended question; the reviewer needs to be more specific when referring to best available control technology.

Pg. 18, par. 1: Please provide a reference for the claim that "Aquatic receptors are considered the most sensitive to selenium and related heavy metal releases."

Response: See reference #35 and the numerous publications by the authors cited in GYC's earlier comments.

Pg. 18, par. 2: For the purpose of applying proposed action levels, how can IDEQ justify distinguishing between waters "clearly intended to support aquatic life" and waters that "are not intended to support aquatic life." Birds and other animals using these waters for drinking water, food, and habitat cannot distinguish between waters that are intended to support aquatic life and waters that are not intended to support aquatic life.

Response: Waters that support aquatic life have action levels based on that receptor group. Waters that do not support aquatic life have action levels based on drinking water and habitat for other target species.

Pg. 18, par. 2: The last sentence states that the proposed action levels for unregulated surface waters are based on ingestion by a terrestrial receptor and don't consider pathways that include plant uptake and bioaccumulation of contaminants by plants or invertebrates. Based on the results of the study conducted by Skorupa, et al. (2002)[4], this approach will severely underestimate the concentrations of selenium to which water birds and other consumers of invertebrates are potentially exposed. The first conclusion of the report prepared by these researchers was as follows:

> Wetlands and impoundments that provide potential breeding habitat for water birds and that contain 50 µg/L selenium or more during the egg-laying season for birds are relatively common in Idaho's phosphoria region. Many of these wetlands are vernal wetlands (present only during the spring) which previous water sampling surveys appear to have completely neglected in favor of sampling rivers, streams, and perennial impoundments… Because waterborne Se concentrations are highest in vernal melt and run-off, and decline substantially by fall…, vernal wetlands may often provide the

[4]Skorupa, J., S. Detwiler, and R. Brassfield. 2002. Reconnaissance survey of selenium in water and avian eggs at selected sites within the phosphate mining region near Soda Springs, Idaho, May-June, 1999. U.S. Fish and Wildlife Service, Sacramento, CA.

> highest risk habitats for breeding water birds. The highest Se concentration (nearly 800 ppm, dry wgt.) ever reported for a sample of aquatic invertebrates…was found at one such vernal wetland during this survey… It is strongly recommended that a more extensive and detailed survey of vernal wetlands in Idaho's phosphoria region be conducted as soon as possible. The general lack of data for such vernal wetlands constitutes a critical data gap that could profoundly influence the outcome of regional risk assessments.

Response: Wetlands and impoundments in the vicinity of mining activities are not a predominant condition; this is a semi-arid region. However, wetland identification is included in the site-specific activities. Plant uptake and invertebrate ingestion pathways were considered in the development of action levels and hazard quotient estimates.

Pg. 18, par. 3: The first sentence states that overburden piles "were intended to be permitted disposal units." Are they in fact permitted disposal units, and if they are, what's the significance of this classification? Why exclude consideration of the ecological effects of waste rock simply because of jurisdictional issues"? Waste rock is the major source of contaminants in the resource area.

Response: The Department did not exclude consideration of the ecological effects of waste rock; risk assessment dose equations included this pathway. We excluded the application of action levels to waste rock because they are permitted disposal units that were intended to contain highly mineralized material. Constituent concentrations in waste rock are highly elevated; this is not a new discovery and would have been recognized in the original permitting processes. However, direct risks from waste rock materials are limited to incidental ingestion and provide a relatively small contribution to overall cumulative risks. The Department believes it is legitimate to address releases, vegetative cover and other pathways emanating from the piles, but requiring the remediation of the waste rock itself would be equivalent to digging up a sanitary landfill because you suddenly realized it has trash in it. Source controls can be implemented without applying soil action levels to waste rock materials.

Pg. 18, par. 3: IDEQ identifies reclaimed vegetation, "seeps, springs, wetlands, drainage basins, pit lakes, ponds and other site features and off-site areas that exhibit elevated concentrations" as areas of concern for action level application. How do these features differ from unregulated surface waters, and how will IDEQ address them using action levels?

Response: The Department has agreed to address non-regulated surface waters based on functional use. Please refer to the response foreword for discussion on this issue.

Pg. 19, par. 1: If exceedances of the action levels will, in practice, simply to trigger an engineering evaluation/cost analysis, will IDEQ require that monitoring be conducted on a regular basis in order to detect exceedances in order to identify the need for conducting an EA/CA?

Response: Monitoring action levels are included in the risk management plan. CERCLA activities are designed to address releases that are identified during this process.

Pg. 19, section 4.2.2.2 subtitle, and par. 2: What is the subject of "wildlife exposures"; selenium and other metals associated with phosphate mining, or contaminated surface water, groundwater, and forage?

Response: The subject of "wildlife exposures" is selenium and related metals at levels in media that may be associated with unacceptable risks..

Pg. 19, par. 2: Livestock deaths due to consumption of high concentrations of selenium in forage in 1999, 2001, and 2003 indicate that the current reclamation seed mixes are not protecting grazing animals. What plant species were consumed by livestock that suffered selenium toxicosis? Were the plants native or introduced? Do wildlife consume these plants as readily as other types of available forage?

Response: The cited concentration does refer to the concentration of selenium in forage. A number of plant species are consumed by livestock; the MOU agencies' initial concern was the presence of alfalfa in seed mixes because of it's uptake levels and deep root zones. Seed mixes were modified to reduce or exclude alfalfa in future applications. However, the 2003 sheep deaths appear to have been caused by the consumption of curly cup gumweed and a native aster species resulting from natural invasion of highly disturbed soils near the foot of a waste rock pile. The concentrations in the gumweed samples ranged over 200 ppm and the aster was over 30 times higher. The sheep were observed consuming these plants, which are at levels that would account for the severe acute effects. Additional vegetative surveys are being conducted by Forest Service botanists and Company contractors to determine the prevalence of native species invasions on other historic waste rock units.

Pg. 19, par. 2: Reference 41 should be reference 40.

Response: Corrected.

Pg. 19, par. 2: Does the concentration of "5 mg/kg dw" refer to the concentration of selenium in forage? Please provide a reference for the claim that grazing levels of 5 mg/kg selenium (dw) is protective for foraging wildlife, and explain which species of wildlife are included in the protected group.

Response: A number of references are provided in Section 4.2.3.1 regarding veterinarian recommended forage levels for domestic animals. These levels assume constant concentrations through the life cycle of the receptor. Wildlife exposures would be less due to their ability to range freely.

Pg. 19, par. 3: Shouldn't research into hydrologic controls also be directed at reducing groundwater contamination?

Response: This section discusses BMPs that effect wildlife; groundwater is not expected to be a significant route of exposure. RAO 4.2 addresses BMPs to prevent groundwater contamination.

Pg. 19, par.2: Can't IDEQ do more than "discourage" future development of wetland or riparian habitats using selenium-contaminated waters? Can't IDEQ *prohibit* development of wetlands and riparian habitats using selenium-contaminated waters? And can't IDEQ require mine operators to take measures to prevent wildlife from utilizing wetlands that have already been created using selenium-contaminated water?

Response: As previously stated, the Department is involved in addressing releases from historic mines and does not administer the operation of future mines. In many areas, riparian habitat has developed naturally and not through the efforts of mine operators. The Department will encourage future BMPs that control this natural progression. Additionally, the CERCLA process can require activities that limit wetland use if unacceptable risks are identified.

Pg. 19, par. 3: Please provide examples of the types of best management practices IDEQ envisions for minimizing future wildlife exposures to selenium-contaminated surface water, groundwater, and forage.

Response: A number of modified BMPs are already in use at the active mines such as chert/soil caps, covers and growth media on waste rock piles to eliminate bioavailable selenium in the root zone and prevent selenium uptake in forage, sequestered cell design for shales to eliminate contact and oxidation of selenium in runoff and infiltration paths, designed infiltration channels that divert water through the dump and to groundwater by creating a clean path of least resistance for channelizing infiltration, modified seed mixes, drainage/sedimentation ponds placed off of the waste rock piles, and others that will have a direct effect on potential wildlife exposures.

Pg. 19, per. 3: Please refer to previous comments regarding how best management practices are documented, reviewed and adopted.

Response: Ultimately, new BMPs will require some type of demonstration through confirmatory sampling. Since many of the BMPs involve reclamation or construction techniques, the required monitoring will have to be conducted at an appropriate time in the future. The land management agencies will review the BMPs for effectiveness and decide when and how to apply them in future mine plans. For the State, the IDL may incorporate some specific BMP guidance in the mining regulations through the administrative rule making process, if so desired. The current regulations include a subsection specific to the phosphate mining industry.

Pg. 20, par. 1: The statement, "The Agency supports phosphate mining in Southeast Idaho" indicates that IDEQ has a bias in favor of phosphate mining regardless of the environmental consequences. This bias should be stated in the introduction of the document so the reader is aware that it is IDEQ's policy and that it may influence IDEQ's approach to environmental regulation. And contrary to the statement that IDEQ "believes other beneficial uses of the area *should* be maintained or restored after mineral extraction activities," isn't it IDEQ's responsibility as the State of Idaho's environmental protection agency to use all of its authority to *ensure* that beneficial uses are maintained or restored?

Response: The fact that the Department supports mining does not imply that we relinquish our responsibilities to protect the environment. Mining is an important industry in Idaho, and risk management includes considerations of socioeconomic issues. The Department believes it is important to clarify that our goal is to address the existing environmental conditions and ensure environmentally-responsible natural resource use, not put the mining industry out of business. The intent of other stakeholders and interested parties is not always as clear.

In terms of beneficial uses, the Department has the regulatory responsibility to ensure specific beneficial uses are maintained and restored, specifically recreation and aquatic life for surface water, and drinking water resources for groundwater. There are a number of other beneficial uses that fall into the jurisdiction of our MOU partners such as grazing, logging, traditional or cultural use and others. These are the types of uses that fall outside DEQ's authority and "should" be maintained or restored after mineral extraction activities.

Pg. 20, par 2: Which agency is responsible for "administration of reclamation activities and grazing management," and why isn't this agency participating in development of the risk management plan?

Response: IDL has State responsibility for these activities, and the Forest Service and BLM have Federal responsibility. All of the land management agencies are participating in Interagency technical support and risk management planning. IDEQ has been designated as the Lead Agency for publishing the Area Wide Risk Management Plan..

Pg. 20, par. 2: If livestock losses are only partially attributable to selenium exposures, what are the other factors to which these losses have been attributed? Please provide references for these claims.

Response: Many of the histology reports and toxicity conclusions regarding previous livestock losses introduced the possibility of other contributing stressors such as toxic plants, significant temperature changes, herding practices, etc. This is probably due to inconclusive tissue and organ selenium concentrations often observed in the evaluated carcasses. However, the most recent sheep death incident also showed relatively low tissue concentration, which may indicate that the acute effects were so sudden, the animal did not have time to metabolize selenium to the same levels associated with chronic poisonings. Most of the histology efforts were conducted by Dr. Patricia Talcott, DVM, University of Idaho and reports should be requested through that institution.

Pg. 20, par. 3: Please explain what constitutes a "short grazing period."

Response: The Department will defer any definition of appropriate grazing periods to the veterinarians and grazing management agencies with expertise in this area.

Pg. 20, par. 3: Please provide references for the studies that “seem to indicate higher levels of selenium are tolerable.”

Response: See reference #6 for results of the Henry Mine Steer study, and reference #42 for literature search findings pertaining to grazing.

Pg. 20, par. 3: Reference 43 is essentially hearsay. Have the data collected during the “Henry Mine steer studies” been published or made available for peer review? Please provide the results of these studies on the *Idaho Selenium Map Service* web page.

Response: See previous response. The report is on the website.

Pg. 20, par. 3: What is the basis for the Forest Service reclamation goal, and is the goal published in the *Caribou-Targhee Forest Plan*?

Response: The reclamation goal is based on veterinarian recommendations and is included in recent mine plans. The Department is not familiar with the content of the recent Forest Plan and would refer GYC to Forest Service representatives.

Pg. 21, par. 1: If the remedial action objective is “to eliminate livestock losses,” why has IDEQ developed action levels that “are slightly higher than recommended domestic livestock levels…based solely on terrestrial wildlife receptor exposures”?

Response: The action levels have been modified. See response foreword.

Pg. 21, par. 1: Delineation and mapping of concentrations of selenium in plants is a good recommendation. Will this occur during the site investigation?

Response: That is the Department's intent although this may become a grazing management agency activity, if so desired. However, due to the observed heterogeneity of the vegetation samples, mapping may be based strictly on areas exceeding the action levels and not on a concentration gradient basis.

Pg. 21, par. 2: Reference 45 is another verbal communication. Hasn't IDEQ researched the scientific literature well enough to provide references to published reports or journal articles to substantiate its claims?

Response: This is an Interagency communication based on EPA concerns and not a published report. It has nothing to do with the Department's level of research.

Pg. 22, paragraph continued from pg. 21: IDEQ states that it is unlikely residential development would occur on reclaimed waste rock piles despite the fact that reclaimed phosphate mine areas in Florida have been opened to residential development, and despite the fact that reclaimed areas on Tribal lands can be allocated to Tribal members. So based on information presented by IDEQ, it may be unlikely that residential development would occur in the near future, but it is possible that it could eventually occur.

Response: If this was not a possibility, however remote, the Department would not have provided a removal action objective addressing it.

Pg. 22, par. 1: What is the definition of "a presumptive remedy," and will these means to prevent future residential development be identified during the site investigation?

Response: A presumptive remedy is one that is accepted by all of the Agencies and does not require additional analyses. All remedies are determined during the EE/CA phase, not site investigation.

Pg. 22, par. 2: Is it accurate to state that IDAPA 58.01.11 "*encourages* mining activity in Idaho by allowing temporary on-site groundwater impacts during the period of active mining but require compliance with groundwater numeric criteria upon completion of the mining operations"? If so, please provide references to the specific paragraphs in IDAPA 58.01.11 that could in any way be interpreted as encouraging mining activity by allowing groundwater contamination (i.e., "temporary groundwater impact"). It is very difficult, if not impossible to "temporarily" contaminate groundwater with selenium or any other mining-associated pollutant. Furthermore, in most cases where groundwater contamination has occurred, the burden of bringing the impacted site into compliance with numeric criteria is borne by the public.

Response: The text has been changed to more accurately depict the regulatory intent of this provision. Temporary groundwater impacts are allowed during active mining, and are unavoidable if mining activities occur below the static water level.

Pg. 22, par. 2: Please provide the data that have been reviewed that "have not indicated any significant regional impacts to date."

Response: All of the area wide data to date supports this statement.

Pg. 22, par. 2: The last sentence of this paragraph confirms that it was inappropriate to consider groundwater a *de minimus* exposure pathway in the area-wide human health risk assessment conducted by Tetra Tech EM for IDEQ. There was no basis for designating groundwater a *de minimus* exposure pathway if "groundwater in the vicinity of most of the subject mine sites and potential sources [had] not been previously characterized due to the scale of conducting this type of evaluation on an area wide basis."

Response: There is no information indicating the presence of groundwater impacts near any human receptors. Data has been reviewed for public water supplies, on-site wells and a selected number of domestic wells representing groundwater users closest to mining activities. A health consultation has also been published reaching the same conclusion. Refer to earlier response.

Pg. 22, par. 3: The first sentence again confirms that it was inappropriate to consider groundwater a *de minimus* exposure pathway in the area-wide human health risk assessment conducted by Tetra Tech EMI for IDEQ. There was no basis for designating groundwater a *de* *minimus* exposure pathway if "Hydrogeologic evaluations were previously deferred to the site investigation phase of the mine-specific actions." Why wasn't this clearly stated in the human health and ecological risk assessment?

Response: The basis for considering groundwater a de minimus pathway is discussed in the risk assessment.

Pg. 22, paragraph continued from pg. 22: What are the proposed action levels for monitoring and correcting contamination in groundwater?

Response: The action level for continued monitoring is 5 ug/L and the EE/CA action level is 50 ug/L with a caveat that earlier actions may be required for confirmed degradation trends.

Pg. 22, paragraph continued from pg. 22: Please replace "may" with "will" in the last sentence so that the sentence will read, "serious degradation trends *will* require early actions … prior to reaching action level concentrations."

Response: The Department will determine the need for early actions on a case-by-case basis dependent on trend data and risks.

Pg. 22, par. 1: Please give examples of BMPs that could be implemented to protect groundwater. If IDAPA 58.01.11 contains the groundwater quality standards for Idaho, is IDL the appropriate agency for ensuring that BMPs to protect groundwater are incorporated into state regulations through the rulemaking process?

Response: BMP examples were provided in an earlier response. BMP language in the mining rules primarily address the protection of surface water quality since that is the most vulnerable media. However, IDAPA 58.01.11 contains language that allows temporary groundwater impacts during active mining, implying groundwater protection is required at the conclusion of mining.

4.3 RISK BASED ACTION LEVELS

4.3.1 GENERAL

Pg. 23, Par. 1: The second sentence seems to be the first and only reference to "desired remedial target concentrations for the specified impacted media." Was this stated in the remedial goals and objectives? Please explain the logic for making remedial target concentrations equivalent to action levels. It seems intuitive that the remedial target concentrations should be lower than the action levels (i.e., some fraction of the action levels) to provide a margin of safety.

Response: Exceedances of action levels trigger the EE/CA process. Remedial target concentrations will be addressed in each removal action alternative that is developed. This will be a Lead Agency responsibility and the Department has stated its desire that the action

level concentrations be considered at this point. There is no rule regarding the relationship between action levels and remedial target concentrations.

Pg. 24, paragraph continued from pg. 23: Even though the focus of risk has shifted from human health or population-level effects to subpopulation effects, a conservative approach is still appropriate to ensure a high level of confidence in the methods used to develop the action levels.

Response: The Department considers its approach to be adequately conservative.

Pg. 24, paragraph continued from pg. 23: Please explain what IDEQ means by the term "risk-based concentration." It is used frequently throughout this document and the risk assessment document, but it not defined and its meaning, based on context, is vague. If it refers only to "subpopulation effects," its usage is too general. A risk-based concentration should be related to a measurable endpoint such as concentration of selenium in embryos, number of viable eggs produced, or number of offspring fledged. Please refer to Appendix A of these comments and the discussion of measurement endpoints in the Superfund risk assessment guidance documents published by the U.S. Environmental Protection Agency.

Response: Risk-based concentrations developed in the risk management process consist of exposure point concentrations for various media used in dose models. These are measurable values and also the most direct path to address in a removal action process. The models also used toxicity reference values that are based on reproductive success.

Pg. 24, par. 1: What evidence did IDEQ consider in its "weight of evidence" approach? This is the second reference in the document to a "weight of evidence" approach, but the evidence is not presented or discussed.

Response: Weight of evidence considers other information besides modeling including area wide observations, direct measurement of biotic tissue from various species, discussions in literature, associated research, etc. Other lines of evidence are presented throughout the plan.

Pg. 24, par. 1: As explained in Appendix A of these comments, the conclusions made by IDEQ that "human health and population-level effects are unlikely" were based on flawed assumptions, and should therefore be withdrawn. To base a risk management plan on a flawed risk assessment only magnifies the problems that will result from the inadequate effort IDEQ has made in addressing the problem of contamination from phosphate mining.

Response: The Department does not agree with GYC's characterizations regarding the risk assessment or the risk management plan. Many of GYC's comments focus on the style and structure of the guidance document and have no bearing on the Department's technical conclusions or approach. The Department has responsibility for risk management decision-making and will continue with this process accordingly.

4.3.2 DEVELOPMENT APPROACH

The explanation of methods used to develop action levels is confusing and inadequate, and there are no references cited to indicate that the methods used were consistent with current and accepted practices. The first two paragraphs regarding selection of media contain several nonsensical sentences, making the entire discussion incomprehensible. Technical jargon used in the text and appendices such as "deterministic and probabilistic risk calculations," NOAEL, HQ, PEL, censored data, detected data, background, and impacted are not explained or defined. The contents of the appendices are not prefaced with explanatory text, and they are not self-explanatory. Tables in the main text and appendices are untitled or have been given titles that do not explain the contents, and most tables contain abbreviations and jargon that are undefined. There is no explanation of how calculations were performed (i.e., using functions in an Excel spreadsheet, a commercial software program, or a software program written specifically for this project by IDEQ). There are no references provided for the criteria cited from the Netherlands. The explanation given for citing criteria established by the Netherlands, i.e., they are "often cited as a good regulatory reference," is inadequate. The following comments address other specific problems with Section 4.3, but do not address all of the problems that should be corrected:

Response: A separate attachment has been included in the final plan to provide additional detail on the methods and models used to develop action levels. A glossary and list of acronyms has also been included to clarify some of the "technical jargon", however, the language used in the text is appropriate to the target audience of the guidance document.

- The first paragraph of Section 4.3.2 is nonsensical.

Response: Rewritten.

- The explanation of how and why media were selected is incomprehensible.

Response: Corrected.

- The statement on page 25 that "Waste rock piles were not considered subject to removal action levels because they were permitted disposal units clearly intended to retain highly mineralized materials," needs to be discussed in greater detail because waste rock piles obviously do not retain highly mineralized materials. This is the central issue regarding contamination in the phosphate mining area.

Response: There is a significant difference in addressing releases from waste rock piles and making the waste rock itself subject to removal action.

- The claim by IDEQ that "elevated concentrations observed in these secondary media [aquatic plants, benthic macroinvertebrates, bird eggs, small mammals, fish and terrestrial invertebrates] should be proportionally reduced through achieving action level concentrations for the others" proves that IDEQ does not understand and has not considered the potential for bioaccumulation of selenium and other contaminants. This is an overly simplistic approach to biologically complex materials. Because this is a fundamental issue regarding the risks of selenium contamination, it appears that IDEQ is not competent to carry out the task of developing a risk management plan for phosphate mining.

Response: On the contrary, bioaccumulation is a function of the dose concentration as well as depuration mechanisms of the receptor. If this were not the case, there would be identical tissue concentrations in every individual of a sampled population regardless of the selenium exposure point concentrations in their environment. The fact that lower secondary media

concentrations would be associated with lower primary media concentrations is evident just through comparison of the variance in the data throughout the region.

- The phrase "some level of degradation above background," which is used to explain the first type of action level on page 25, is undefined and therefore meaningless.

Response: Corrected

- How does the first type of action level differ from the second type? They both seem to be based on numeric criteria contained in Idaho's standards for drinking water (maximum contaminant levels) and surface water (criteria continuous concentration).

Response: The first type of action level triggers continued monitoring of specified media, the second triggers removal action processes.

- "Groundwater media" is nonsensical; groundwater *is* the medium.

Response: Corrected

- The sentence, "The final action level type were risk-based concentrations requiring EE/CA consideration based on exposure to terrestrial subpopulation receptors" is nonsensical.

Response: Corrected

- What are the species listed in Table 4.1 surrogates for?

Response: As stated in the table, they are surrogates for other species in the Resource Area that fall into the referenced feeding guilds. Surrogate species are selected in each type of feeding guild based on available toxicological reference information to represent other species in the guild so individual assessments are not required for every one of the thousands of species that may be present in the study area.

- The sentence, "The terrestrial target receptors selected were intended to represent the wide spectrum of communities and feeding guilds that reside in habitats associated with impacted areas and that could be exposed to elevated media concentrations as shown in Table 4-1" is nonsensical.

Response: Corrected

- "Surrogate species were selected…to represent similar species-types" is nonsensical.

Response: Corrected

- Which of the species shown in Table 4-1 served as surrogates for species that actually reside in the resource area?

Response: All of the surrogate species represent feeding guilds that reside in the Resource Area.

- Pg. 25, par. 3: Although the "terrestrial target receptors" were intended to represent a wide spectrum of communities, there were no fish, macroinvertebrates, or amphibians included in the list of receptors. This despite IDEQ's own pronouncement on page 18 of the plan that "Aquatic receptors are considered the most sensitive to selenium and related heavy metal releases…" Therefore, the list of receptors does not "represent a wide spectrum of communities and feeding guilds," except among birds. The list of receptors also does not take into consideration State species of concern or federally endangered and threatened species.

Response: Risks to aquatic species are evaluated through direct measurement and comparison to threshold values, and action levels were established through criteria already developed for the protection of aquatic life. T&E species were previously identified in the AWI efforts and were represented by appropriate surrogate species during the risk assessment efforts.

- Pg. 25, paragraph continued from pg. 26: It is not appropriate to eliminate deer mice and meadow voles from the list of receptors simply because they have small home ranges. Were they eliminated because their small home ranges make them more susceptible to the effects of contamination?

Response: Elimination of mice and voles as risk indicators was a risk management decision within the authority of the Department. Small rodent populations are ubiquitous to Southeast Idaho and do not warrant the commitment of extensive resources to prevent minor subpopulation effects. Their small home ranges, which can be less than one fifth of an acre, do make them more susceptible to risks and interject a significant bias in determining sensitive species thresholds, even though the overall rodent population would see no effect.

- Pg. 27, par. 1: Please provide references that support the statement made in the first sentence.

Response: References are provided for numerous reports that contain area wide vegetation data that support this statement.

- Pg. 27, par. 3: The sentence, "On balance, the IDEQ believes the aforementioned methods and assumptions present offsetting effects that have little effect on our final conclusions," is nonsensical.

Response: Corrected

- Provide the justification for selection of the species shown in Table 4.2.

Response: Species were selected based on available toxicological reference information.

- Why are only four target species listed for selenium in Table 4.2 (mallard duck, robin, vole, and mink), when HQ values are given for all receptor species in the table on page 28?

Response: Table 4.2 provided only the most sensitive species. This table was subsequently determined to be noncontributory to the risk management approach and was removed from the plan.

- Table 4-3: The title, "Hazard Quotient Model Uncertainty Analysis" does not explain the content of the table to the reader.

Response: The title is sufficient for those familiar with uncertainty analysis.

- Table 4-3: The statement that "The Area Wide Risk Assessment did not identify any significant synergistic relationships in which project COCs preferentially targeted the same organs or had the same toxicological effects on receptors," is nonsensical. Please check the definition of "synergistic." Furthermore, the risk assessment could not have identified significant synergistic effects because it wasn't designed to identify synergistic effects.

Response: In risk assessment, synergistic effects are those in which two or more constituents cause cumulative effects that are greater than their sum. For this to happen, the constituents must target the same organs or have the same toxicological effect. The risk assessment effort did include research on any reported synergistic effects and no significant findings were identified.

- According to Table 4-4, the concentration of selenium in groundwater might be allowed to reach 50 µg/L before a remedial action is triggered. This concentration is equivalent to the maximum contaminant level (MCL) for selenium in drinking water. According to the USEPA, "The MCL has been set at 0.05 ppm because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water" (reference: http://www.epa.gov/safewater/contaminants/dw_contamfs/selenium.html). What is IDEQ's rationale for allowing mining operations to contaminate groundwater, the drinking water source for persons living in the resource area, to a concentration equivalent to the MCL? If the groundwater becomes contaminated with concentrations even slightly exceeding this concentration, the burden will be placed on public drinking water suppliers to reduce the concentration of selenium to the MCL. This approach indicates negligence on the part of IDEQ regarding its responsibility to implement the following policies, which are stated in *IDAPA 58.01.11 – Ground Water Quality*: "The policy of the state of Idaho is that existing and projected future beneficial uses of ground water shall be maintained and protected, and degradation that would impair existing and projected future beneficial uses of ground water and interconnected surface water shall not be allowed, …to prevent contamination of ground water from all regulated and nonregulated sources of contamination to the maximum extent practical, and …to protect ground water and allow for the extraction of minerals above and within ground water" (paragraphs 006.02, 006.05, and 006.06, respectively).

Data collected by Montgomery Watson in 1998 indicate that selenium contamination of groundwater had already occurred at several sites (Table 6), with concentrations ranging from 3.5 µg/L to 29 µg/L. If additional sampling after 1998 was performed, it was not reported in the area-wide investigation documents. Why hasn't groundwater monitoring been performed as part of the area-wide investigation, and how does IDEQ intend to ensure that it is performed in the future? Furthermore, how can IDEQ justify an action level equivalent to the MCL when there are apparently very little data available regarding the natural background concentrations of selenium in groundwater in the resource area?

Table 6. Excerpt of Table D.7, "Selenium results from 1998 water, sediment, and fish sampling" from the *Final1998 Regional Investigation Report, Southeast Idaho Phosphate Resource Area Selenium Project, December 1999,* showing concentrations of selenium in groundwater collected from various wells in the resource area.

Well	Station	Selenium (mg/L)[1] May 1998 Sample	Selenium (mg/L)[1] September 1998 Sample
W001	FMC Office Well	*0.00088* [2]	*0.00095* [2]
PW002	Huntzeker Well	*0.00087*	*0.00038*
PW003	Upper Dry Valley Stock Well #1	*-0.000018*	*0.0001*[3]
PW004	Upper Dry Valley Stock Well #2	**0.0083** [3]	**0.0081** [3]
PW005	Upper Dry Valley Stock Well #3	**0.0054**	**0.0050**
PW006	Rasmussen Ridge Mine Dust Control Well #1	*0.00080*	*0.00020*
PW007	Rasmussen Ridge Mine Dust Control Well #2	*0.0013*	*0.0000064*
PW008	Rasmussen Ridge Mine Shop/Office Well	**0.0035**	*0.00064*
PW009	Rasmussen Ridge Mine Wash Plant Well #1	*0.00037*	*0.00085*
PW010	Rasmussen Ridge Mine Wash Plant Well #2	well does not exist	well does not exist
PW011	Rasmussen Ridge Mine Wash Plant Well #3	*0.00029*	well broken
PW012	Rasmussen Ridge Mine Wash Plant Well #4	*0.00036*	*0.0010*
PW013	Rasmussen Ridge Mine Wash Plant Well #5	**0.033**	*0.00077*
PW014	Rasmussen Ridge Mine House Well	*0.00095*	*0.00029*
PW015	Rasmussen Ridge Mine Laboratory Well	*0.0013*	*0.00038*
PW016	Conda Mine Water Supply Well #11	**0.029**	**0.027**
PW017	Smoky Canyon Mine Potable Supply Well	**0.022**	**0.024**
PW018	Smoky Canyon Mine Industrial Supply Well	well not in use	well not in use
PW019	Enoch Valley Shop/Office Well	*0.0014*	**0.0014**
PW020	Enoch Valley Mine Dust Control Well	*0.00070*	**0.0015**

[1]Data adjusted, in the sequence presented here, for lab blanks, lab-standards slope, field blanks, and matrix-spike slope; mean reported for stations with replicate samples.
[2]95% upper confidence limit of the 95th percentile of blank results is 0.0015 mg/L for spring water, 0.0013 mg/L for fall water, 0.22 mg/kg for sediment, and 0.096 mg/kg for fish; results not exceeding their corresponding value (those italicized) are not discernibly different from a blank.
[3]95% upper confidence limit of the 95th percentile of blank results is 0.0015 mg/L for spring water, 0.0013 mg/L for fall water, 0.22 mg/kg for sediment, and 0.096 mg/kg for fish; results exceeding their corresponding value (those bolded) are discernibly greater than a blank.

The *1999 Interim Investigation Data Report,* prepared by Montgomery Watson, contained a review of compliance monitoring data for the community drinking water systems at Soda Springs and Fort Hall. The four water-supply wells used at Fort Hall had never been tested for selenium. Formation Spring and Ledger Spring, the water-supply sources used at Soda Springs had been tested for selenium 16 and 13 times, respectively, from 1972 to 1999. All concentrations in samples taken from Formation Spring were below detection limits, whereas 5 µg/L selenium were detected in Ledger Spring in June 1993 and 16 µg/L selenium were detected in January 1996. Additional water quality data for groundwater throughout Idaho is available from the Idaho Department of Water Resources and U.S. Geological Survey. It would be appropriate for IDEQ to compile available data and use this information to adjust groundwater action levels for selenium and other chemicals of concern to some fraction of the maximum contaminant levels for drinking water.

Response: Table 4.3 provides the MCL as the action level for groundwater because that is the legal numeric criteria. However, the table also contains a footnote that provides for early actions in the case of significant groundwater degradation trends. Any such action will require a site-specific decision dependent on background and trend data, observed concentrations, proposed site actions, aquifer characteristics and local receptors. This process is not amenable to some preset fraction of the MCL or else the regulations would contain a similar provision.

- The tables shown under the subsections describing metal-specific action levels (e.g., the tables on pages 28 and 29) are not numbered or titled.

Response: Corrected

- In the table shown on page 28 and in all similar tables, add columns that indicate the origin of the action level (i.e., drinking water maximum contaminant level, criteria maximum concentration for surface water, etc.).

Response: That information is already contained in the text and in Table 4-3.

- Even after reading the text several times, it is not apparent how IDEQ established an action level of 1.6 µg/L selenium for "continued surface water monitoring," an action level of 201 µg/L selenium for "non-regulated surface water," or any of the action levels for sediment, soils, or vegetation shown in the table on page 28.

Response: See Attachment 1 for further explanation.

- How many samples collected over what period of time will be required to trigger either monitoring or performance of an EE/CA?

Response: Monitoring should be continued until a normal water year can be assessed for additional potential release paths. Any sample exceeding the action level indicates the presence of an active release or impact, and that area should be considered in the EE/CA process.

- Explain the distinction between the phrases "triggers EE/CA consideration" (page 25, paragraph 2) and "perform an EE/CA"?

Response: There is no distinction; triggering and performing an engineering evaluation/cost analysis is the same thing.

- Because the hazard quotient (HQ) has not been defined, and its significance has not been explained, the table on page 29, and paragraph 3 on page 29 are essentially meaningless to the reader.

Response: See Glossary

In summary, this section of the plan was not in a form that was ready to be released for public comment. This portion of the document should be thoroughly edited for grammar, style, and content, and the description of methods used to calculate action levels should be presented in sufficient detail to allow others to reproduce the values calculated by IDEQ.

The approach used in both the area-wide risk assessment and risk management plan was to extrapolate the results of sampling conducted in a relatively small portion of the phosphate mining area to the entire phosphate mining area. Appendix C of the plan shows the summary statistics for the data used to calculate action levels, including lists of the sample sizes analyzed. For a monitoring study such as this, sample size generally indicates the number of sampling locations included in the analysis. But in this case, IDEQ used data sets that included multiple samples collected from single sampling sites, duplicate analyses, and split-sample analyses performed for quality assurance and quality control. For the data reviewed, this approach grossly underestimated the concentration of selenium used in the calculations of action levels. For example, Table C-10 of Appendix C of the plan shows that 66 samples of surface water were analyzed for selenium, and only 41 samples contained detectable concentrations of selenium. In fact, as shown in Table 7 below, the 66 samples included multiple samples collected at the same

Table 7. Concentrations of Selenium in Surface Water Samples (source: file entitled, *A-8 Imp Regulated Surface Water*).

SITE	STATION	STATION NAME	SAMPLE ID	SELENIUM (µg/L)	AVERAGE SELENIUM	DL[1] (µg/L)

					FOR SITE (µg/L)	
1	ANGTT010	Angus Creek (mouth)	SW-ANGTT010-101	BDL		1.00
1	ANGTT010	Angus Creek (mouth)	SW-ANGTT010-102	BDL	BDL	1.00
2	BFDTT008	Blackfoot River above Dry Valley Cr	SW-BFDTT008-101	2.10		1.00
2	BFDTT008	Blackfoot River above Dry Valley Cr	SW-BFDTT008-102	1.60		1.00
2	BFDTT008	Blackfoot River above Dry Valley Cr	SW-BFDTT008-103	1.70	1.80	1.00
3	BFNTT009	Blackfoot River above Narrows	SW-BFNTT009-101	1.60		1.00
3	BFNTT009	Blackfoot River above Narrows	SW-BFNTT009-102	1.30		1.00
3	BFNTT009	Blackfoot River above Narrows	SW-BFNTT009-103	1.00	1.30	1.00
4	BFUTT015	Blackfoot River at upper bridge	SW-BFUTT015-101	2.50		1.00
4	BFUTT015	Blackfoot River at upper bridge	SW-BFUTT015-102	1.70		1.00
4	BFUTT015	Blackfoot River at upper bridge	SW-BFUTT015-103	1.10	1.77	1.00
5	DCMTT028	Deer Creek (mouth)	SW-DCMTT028-101	1.20		1.00
5	DCMTT028	Deer Creek (mouth)	SW-DCMTT028-102	BDL		1.00
5	DCMTT028	Deer Creek (mouth)	SW-DCMTT028-103	1.60	1.40	1.00
6	EMCTT043	East Mill Creek	EMCTT043	36.00	36.00	1.00
7	EMCTT017	East Mill Creek above split	SW-EMCTT017-101	130.00		1.00
7	EMCTT017	East Mill Creek above split	SW-EMCTT017-102	91.00		1.00
7	EMCTT017	East Mill Creek above split	SW-EMCTT017-103	22.00	81.00	1.00
8	EMCNTT045	East Mill Creek North (wetland area)	EMCNTT045	38.00	38.00	1.00
9	GTCTT032	Georgetown Creek	SW-GTCTT032-101	1.90		1.00
9	GTCTT032	Georgetown Creek	SW-GTCTT032-102	1.50		1.00
9	GTCTT032	Georgetown Creek	SW-GTCTT032-103	2.00	1.80	1.00
10	GHCTT006	Goodheart Creek	SW-GHCTT006-101	3.20		1.00
10	GHCTT006	Goodheart Creek	SW-GHCTT006-102	BDL	3.20	1.00
11	LBFTT001	Little Blackfoot River	SW-LBFTT001-101	BDL		1.00
11	LBFTT001	Little Blackfoot River	SW-LBFTT001-102	BDL		1.00
11	LBFTT001	Little Blackfoot River	SW-LBFTT001-103	2.10	2.10	1.00
12	LSCTT040	Lower Sage Creek	LSCTT040	4.00	4.00	1.00
13	MCTT044	Maybe Creek	MCTT044	1140.00	1140.00	50.00
14	MACTT011	Middle Angus Creek	SW-MACTT011-101	BDL		1.00
14	MACTT011	Middle Angus Creek	SW-MACTT011-102	BDL		1.00
15	MACTT011	Middle Angus Creek	SW-MACTT011-103	BDL	BDL	1.00
16	MCBTT031	Montpelier Creek below mining	SW-MCBTT031-101	1.30		1.00
16	MCBTT031	Montpelier Creek below mining	SW-MCBTT031-102	BDL		1.00
16	MCBTT031	Montpelier Creek below mining	SW-MCBTT031-103	3.30	2.30	1.00
17	NNBTT012	No Name Creek below mining	SW-NNBTT012-101	1.70	1.70	1.00
18	RASTT014	Rasmussen Creek above Angus Creek	SW-RASTT014-101	BDL		1.00
18	RASTT014	Rasmussen Creek above Angus Creek	SW-RASTT014-102	BDL		1.00
18	RASTT014	Rasmussen Creek above Angus Creek	SW-RASTT014-103	BDL	BDL	1.00
19	SCMTT026	Sage Creek (mouth)	SW-SCMTT026-101	3.20		1.00
19	SCMTT026	Sage Creek (mouth)	SW-SCMTT026-102	2.30		1.00
19	SCMTT026	Sage Creek (mouth)	SW-SCMTT026-103	5.10	3.53	1.00
20	SCBTT025	Sage Creek below mining	SW-SCBTT025-101	BDL		1.00
20	SCBTT025	Sage Creek below mining	SW-SCBTT025-102	BDL		1.00
20	SCBTT025	Sage Creek below mining	SW-SCBTT025-103	BDL	BDL	1.00
21	SCPTT027	Sage Creek below Pole Creek	SW-SCPTT027-102	BDL		1.00
21	SCPTT027	Sage Creek below Pole Creek	SW-SCPTT027-103	1.20	1.20	1.00
22	SMBTT020	Smoky Creek below mining	SW-SMBTT020-101	BDL		1.00
22	SMBTT020	Smoky Creek below mining	SW-SMBTT020-102	BDL		1.00

22	SMBTT020	Smoky Creek below mining	SW-SMBTT020-103	BDL	BDL	1.00
23	SSBTT022	South Fork Sage Creek below mining	SW-SSBTT022-101	BDL		1.00
23	SSBTT022	South Fork Sage Creek below mining	SW-SSBTT022-102	1.20		1.00
23	SSBTT022	South Fork Sage Creek below mining	SW-SSBTT022-103	2.20	1.70	1.00
24	SPRTT016	Spring Creek (mouth)	SW-SPRTT016-101	13.00		1.00
24	SPRTT016	Spring Creek (mouth)	SW-SPRTT016-102	5.70		1.00
24	SPRTT016	Spring Creek (mouth)	SW-SPRTT016-103	1.00	6.57	1.00
25	SCBETT046	Spring Creek below East Mill Creek	SCBETT046	3.00	3.00	1.00
26	SLCTT002	Stateland Creek	SW-SLCTT002-101	2.50		1.00
26	SLCTT002	Stateland Creek	SW-SLCTT002-102	1.30		1.00
26	SLCTT002	Stateland Creek	SW-SLCTT002-103	2.20	2.00	1.00
27	TRATT003	Trail Creek near mouth	SW-TRATT003-101	BDL		1.00
27	TRATT003	Trail Creek near mouth	SW-TRATT003-102	BDL		1.00
27	TRATT003	Trail Creek near mouth	SW-TRATT003-103	BDL	BDL	1.00
28	WVCTT007	Wooley Valley Cr at Blackfoot R Rd	SW-WVCTT007-102	1.30		1.00
28	WVCTT007	Wooley Valley Cr at Blackfoot R Rd	SW-WVCTT007-103	1.40		1.00
28	WVCTT007	Wooley Valley Cr at Blackfoot R Rd	SW-WVCTT007-201	BDL	1.35	1.00

[1]Detection Limit

sites at different times. The multiple samples were generally low (i.e., less than 5 µg/L), so when these samples were included in the data set used to calculate an average, the average and median values were skewed downward. It's possible that IDEQ took the multiple samples into consideration, but it is not apparent from the information provided, and cannot be determined without guessing how the data were manipulated. But for analyses of selenium in surface water, only 28 sites were actually sampled, not 66 as implied in Table C-10, and only 21 sites showed detectable concentrations of selenium, not 41 as implied in Table C-10. Using untransformed data, the mean concentration of selenium for 21 sites was 65 µg/L, compared to a mean of 9.2 µg/L shown in Table C-10; the minimum concentration of selenium detected was 1.2 µg/L, compared to a concentration of 1.0 µg/L shown in Table C-10; and the maximum concentration of selenium detected was 1140 µg/L, which was identical to the concentration shown in Table C-10.

Response: It is true that 28 surface water sites were sampled, however, the commenter has misinterpreted the reported data, which does not contain QA samples such as splits or duplicate samples. The surface water samples reported were collected during June, July and September of 2001 to assess seasonal variations and to represent not only maximum concentrations observed during Spring runoff but the annual average to which receptors are chronically exposed. Therefore, multiple samples from the same location represent temporal variations and are appropriate for use as statistically independent values.

The data for selenium in riparian soil illustrates the improper use of replicate samples, laboratory split sample analyses, and laboratory duplicate analyses as data points for the calculation of action levels. As shown in Table 8 below, only 11 impacted sites were sampled and only eight background sites were sampled, as compared to 21 samples shown in Table C-10 and 20 samples shown in Table C-9.

The improper analyses of data indicates that IDEQ does neither grasps the basic elements of an environmental monitoring study nor understands the appropriate use of quality control data. Despite the hundreds of risk calculations made by IDEQ in order to derive the action levels, the results are not valid and should not be applied in the manner in which IDEQ intends. The approach may not be entirely inappropriate, although it is not explained in sufficient detail to

Table 8. Concentrations of selenium in riparian soil samples collected in 2001 (source: files entitled, *Appendix J_MW_Soil* and *Appendix_ E_TtEMI_Ripplant*).

Station Name	Sample ID	Site Number and Type	Date Collected	Sample Type	Selenium (mg/kg)	DL[1] (mg/kg)
Angus Cr, below Upper Angus Cr Res	082801SSS T130-1	1 Impacted	08/28/01	Same site/triplicate	1.3	0.04
Angus Cr, below Upper Angus Cr Res	082801SSS T130-2	1 Impacted	08/28/01	Same site/triplicate	2.5	0.04
Angus Cr, below Upper Angus Cr Res	082801SSS T130-3	1 Impacted	08/28/01	Same site/triplicate; split or triplicate analytical run	1.7	0.04
Angus Cr, below Upper Angus Cr Res	082801SSS T130-3	1 Impacted	08/28/01	Same site/triplicate; split or triplicate analytical run	1.7	0.04
Angus Cr, below Upper Angus Cr Res	082801SSS T130-3	1 Impacted	08/28/01	Same site/triplicate; split or triplicate analytical run	1.7	0.04
Blackfoot River Upstream of Wooley Range Ridge Creek	082501SSS T026-1	2 Impacted	08/25/01	Same site/triplicate	1.5	0.04
Blackfoot River Upstream of Wooley Range Ridge Creek	082501SSS T026-2	2 Impacted	08/25/01	Same site/triplicate	1	0.04
Blackfoot River Upstream of Wooley Range Ridge Creek	082501SSS T026-3	2 Impacted	08/25/01	Same site/triplicate	3.6	0.04
Blackfoot River Wildlife Management Area	SL-008	3 Impacted	06/15/01		0.92	0.04
Blackfoot River Wildlife Management Area (003)	SL-003	4 Impacted	06/14/01		0.88	0.04
Blackfoot River Wildlife Management Area (004)	SL-004	5 Impacted	06/14/01		1	0.04
Diamond Creek	SL-007	1 Background	06/15/01		0.43	0.04
Diamond Creek Upstream of Kendall Creek	083101SSS T153-1	2 Background	08/31/01	Same site/triplicate	0.97	0.04
Diamond Creek Upstream of Kendall Creek	083101SSS T153-2	2 Background	08/31/01	Same site/triplicate	1.00	0.04
Diamond Creek Upstream of Kendall Creek	083101SSS T153-3	2 Background	08/31/01	Same site/triplicate	0.93	0.04
East Mill Creek At Fish Sampling Reach	090101SSS T227-1	6 Impacted	09/01/01	Same site/triplicate	4.7	0.04
East Mill Creek At Fish Sampling Reach	090101SSS T227-2	6 Impacted	09/01/01	Same site/triplicate	4.4	0.04
East Mill Creek At Fish Sampling Reach	090101SSS T227-3	6 Impacted	09/01/01	Same site/triplicate	29	0.04
Little Blackfoot River Upstream of Reese Creek	090801SSS T049-1	3 Background	09/08/01	Same site/triplicate; split or triplicate analytical run	1.30	0.04
Little Blackfoot River Upstream of Reese Creek	090801SSS T049-1	3 Background	09/08/01	Same site/triplicate; split or triplicate analytical run	0.60	0.04
Little Blackfoot River Upstream of	090801SSS	3 Background	09/08/01	Same site/triplicate; split or	1.30	0.04

Reese Creek	T049-1			triplicate analytical run		
Little Blackfoot River Upstream of Reese Creek	090801SSS T049-2	3 Background	09/08/01	Same site/triplicate	1.30	0.04
Little Blackfoot River Upstream of Reese Creek	090801SSS T049-3	3 Background	09/08/01	Same site/triplicate	1.20	0.04
Lower Mill Creek Canyon	SL-005	7 Impacted	06/15/01		6.6	0.04
Meadow Creek, above Blackfoot Reservoir	090801SSS T235-03	4 Background	09/08/01	Same site/triplicate	0.77	0.04
Meadow Creek, above Blackfoot Reservoir	090801SSS T235-2	4 Background	09/08/01	Same site/triplicate	0.41	0.04
Meadow Creek, above Blackfoot Reservoir	090801SSS T253-1	4 Background	09/08/01	Same site/triplicate; sample ID number 253 is a transpositon of site ID number 235	0.36	0.04
Mill Creek (East)	SL-006	8 Impacted	06/15/01		0.99	0.04
No Name Creek above mining	SL-009	5 Background	06/15/01		1.00	0.04
No Name Creek above mining	SL-010	6 Background	06/15/01		0.75	0.04
No Name Creek above mining	SL-011	7 Background	06/15/01		0.58	0.04
Rasmussen Mine Unit 4 Site (001)	SL-001	9 Impacted	06/14/01		2.4	0.04
Rasmussen Mine Unit 4 Site (002)	SL-002	10 Impacted	06/14/01		150	0.04
Timber Creek, above Diamond Creek	090301SSS T237-1	8 Background	09/03/01	Same site/triplicate	1.00	0.04
Timber Creek, above Diamond Creek	090301SSS T237-2	8 Background	09/03/01	Same site/triplicate	2.30	0.04
Timber Creek, above Diamond Creek	090301SSS T237-3	8 Background	09/03/01	Same site/triplicate; split or triplicate analytical run	1.40	0.04
Timber Creek, above Diamond Creek	090301SSS T237-3	8 Background	09/03/01	Same site/triplicate; split or triplicate analytical run	1.20	0.04
Timber Creek, above Diamond Creek	090301SSS T237-3	8 Background	09/03/01	Same site/triplicate; split or triplicate analytical run	1.30	0.04
Trail Creek Upstream of Blackfoot River	090801SSS T076-1	11 Impacted	09/08/01	Same site/triplicate	1.3	0.04
Trail Creek Upstream of Blackfoot River	090801SSS T076-2	11 Impacted	09/09/01	Same site/triplicate	1.5	0.04
Trail Creek Upstream of Blackfoot River	090801SSS T076-3	11 Impacted	09/10/01	Same site/triplicate	1.7	0.04

[1]Detection Limit

evaluate. But calculation of action levels in the manner attempted by IDEQ would more closely approximate true conditions in the phosphate mining area if the values were calculated using the much larger set of data that will eventually be produced by the site investigations.

Response: As discussed in the previous response, IDEQ believes the commenter has misinterpreted the data set, which does not include QA samples such as duplicates or splits. The soil data is a composite set of samples collected in conjunction with plant, small mammal and invertebrate tissue sampling used in the risk assessment. Multiple samples were collected over relatively large areas to represent spatial variations. Therefore, the independent use of

each sample as a discrete statistical sample is appropriate, and is actually more likely to be conservatively biased because of IDEQ's site selection criteria for evaluating impacted sites.

We do agree that the number of riparian soil sampling sites is limited and additional data would be desirable. However, our risk management decisions must be made in a timely manner and our action levels are based on acceptable receptor dose estimates not on the existing soil concentrations in the impacted areas. Site-specific investigations will continue to assess soils in riparian zones for implementation of the action level screening process.

Appendix A

Review of the
Final Area Wide Human Health and Ecological Risk Assessment, Selenium Project, Southeast Idaho Phosphate Mining Resource Area, December 2002

Sheryl Hill

Aquatic Ecosystems Biologist

805 Sonja Ave η Idaho Falls, ID 83402 η (208) 529-9148 η *sherylhill@cableone.net*

April 28, 2003

Mr. Marv Hoyt
Greater Yellowstone Coalition, Inc.
162 North Woodruff Avenue
Idaho Falls, ID 83401-4335

Reference: *Final Area Wide Human Health and Ecological Risk Assessment, Selenium Project, Southeast Idaho Phosphate Mining Resource Area, December 2002*; letter dated March 11, 2003 from Marv Hoyt, Greater Yellowstone Coalition to Rick Clegg, Idaho Department of Environmental Quality; and response from Rick Clegg to Marv Hoyt, dated March 14, 2003.

Dear Marv:

In response to our discussion on March 7, I have continued to review the risk assessment document referenced above (hereafter referred to as "the document"). But instead of reviewing the document for the purpose of writing a summary, I have reviewed it from the perspective of whether the assessment was performed in a manner that could achieve the objectives stated on page ES-3 of the document:

> The Area Wide Human Health Risk Assessment (AWHHRA) and the Area Wide Ecological Risk Assessment (AWERA) are intended to evaluate baseline risks to human receptors using regional resources and to assess the potential for population-level risks to ecological receptors in the region, respectively. Subsequent mine-specific investigations will be conducted under regulatory oversight to comprehensively identify and control localized sources, releases and exposures at each mine site, and to select and implement remedial activities. The regional risk assessment results will provide supplemental information to support regulatory risk management decision-making processes resulting from site-specific activities.

I have concluded that the basic assumptions used to conduct the area-wide human health and ecological risk assessments were fundamentally flawed, the document cannot and should not be used by IDEQ as a basis for risk management decisions, and the conclusions regarding unlikely effects to human health and population-level ecological risks should be retracted by IDEQ. My reasons for these conclusions are enumerated below, and supporting documentation is attached.

Response: The Department has limited our responses on Attachment A comments to the primary point of contention as provided by the GYC reviewer in bold type. GYC's comments

on the risk assessment were submitted to the IDEQ eight months after the formal public comment period. It would be unfair to the stakeholders and other interested parties that prioritized their time and abided by the original comment period schedule constraints for the Department to spend an inordinate amount of time responding to GYC's comments on a document that had already been finalized. However, it is important that the Department correct any misrepresentations that are contained in the reviewer's comments regarding our previous efforts.

1. **The conclusion presented on page ES-1 of the document that "[t]here is a low probability of significant human health effects in the region based on current conditions, existing exposure pathways, and observed concentrations of chemicals," is based on a flawed model of exposure. The *human health conceptual site model* shown in Figure 3 of the assessment document designated ingestion of groundwater by humans a *de minimus* (*i.e.*, negligible) route of exposure to contaminants, thereby excluding exposure via this route from quantitative evaluation during the assessment process. By designating ingestion of groundwater by humans a *de minimus* route of exposure to contaminants, the model fails to consider a) the deaths of approximately 160 sheep in 2001 following ingestion of selenium-contaminated water from a spring, and b) approximately 6,000 people living in or near the resource area who obtain their drinking water from an aquifer that underlies large portions of resource area. Because the conclusion that human health risks are unlikely was based on an incomplete exposure model, the conclusion should be retracted by IDEQ to avoid misleading risk managers and members of the public who might reasonably assume that exposure via groundwater was considered in the human health risk assessment process.**

Response: The GYC reviewer's characterization of regional groundwater exposure is inaccurate and misrepresentative. The Department classified groundwater as a de minimus route of exposure for human health risks only after extensive review of data that included sampling results from numerous on-site wells at the mines, public drinking water supplies from local springs and aquifers, and selected domestic wells representing residences in the immediate vicinity of mining operations. None of these sources indicated any groundwater concentrations that approached the Maximum Contaminant Level for drinking water or presented a risk to human health. On September 19, 2001, the US Department of Health and Human Services published a health consultation entitled "Evaluation of Selenium in Groundwater; Southeast Idaho Phosphate Resource Area" that concluded there is "no apparent public health hazard from drinking and/or using groundwater" in the region.

The reference to the 2001 sheep deaths attempts to sensationalize individual incidents that are not representative of overall regional conditions. The contaminated spring water encountered by the sheep was immediately downgradient and adjacent to an existing waste rock pile at the Conda mine site and hardly qualifies as transport in an impacted aquifer. This area is much closer to contaminant source materials than any permanent residences in the Resource Area and cannot be considered representative of waters found in drinking water supplies for human health exposures.

The Department is requiring further groundwater characterizations to be conducted as part of the mine-specific investigations to evaluate localized conditions. However, our

conclusions regarding the absence of regional groundwater impacts for human exposure are still considered valid.

Conclusive evidence exists that shallow groundwater in the resource area is contaminated with concentrations of selenium sufficient to cause toxicity to mammals. On June 15, 2001, approximately 160 sheep died after ingesting spring water contaminated with a toxic concentration of selenium (*Idaho State Journal*, July 24, 2001). The contaminated spring was located on "private grazing land located downhill from a reclaimed phosphate mine northeast of Soda Springs" (*Idaho State Journal*, July 24, 2001). Selenium was apparently released from sources at the mine site, percolated through the soil into groundwater, was transported away from the mine site in groundwater, then re-emerged outside the mine site at the ground surface as spring water. Based on this scenario alone, it is not possible to regard groundwater a *de minimus* route of human exposure to contaminants.

Not only was a documented incident of mammalian mortality involving ingestion of groundwater ignored in the risk assessment process, all potential transport mechanisms and pathways for chemicals originating at mine sites were not identified in the text of the risk assessment document or in the illustration of the human health conceptual site model. In the discussion of "fate and transport" of chemicals of potential concern (COPC) in section 4.1, page 19 of the document, percolation from waste rock piles to groundwater and surface water is addressed in a general context in the following four sentences:

> Precipitation can percolate through the waste rock piles and carry chemicals into the groundwater, or they may be released directly to surface water through seeps, springs, or french (*sic*) drains in the waste piles. Even though the Resource Area is relatively arid, percolation is one of the major transport mechanisms. Chemicals may be carried into the groundwater, but **based on current information, they do not appear to create a significant problem in the Resource Area.** However, any chemicals dissolved in groundwater may be carried along until exiting into a stream, lake, or wetland.

I could not find any information in the assessment document, either in the form of groundwater monitoring data or a discussion of groundwater hydrology, to support the statement highlighted above in bold type. In fact, the sheep mortalities documented in 2001 contradict this statement. Nevertheless, this statement was the only explanation I could find for treating groundwater as a *de minimus* exposure pathway in the human health conceptual site model.

Although ingestion of surface water was considered a complete exposure pathway for humans, I could find no information in the document to indicate that springs were considered "surface water" for the purpose of sampling for contaminants. This is an important oversight given the evidence that mammals have already succumbed to selenium toxicosis within the resource area after consuming contaminated spring water. The above excerpt from the assessment document, "…chemicals dissolved in groundwater may be carried along until exiting into a stream, lake, or wetland," is correct but incomplete. As was apparently the case in the incident involving sheep mortality, chemicals dissolved in groundwater also may be carried along until exiting at the ground surface as springs. It seems reasonable that people entering the resource area for recreational hunting and fishing or for medicinal and religious purposes, or who engage in a subsistence lifestyle in the area, would ingest water from springs as frequently, if not more frequently, as they would ingest water from surface streams. And yet this exposure route was apparently not considered in the model and could not have been evaluated quantitatively because water samples from springs were not collected and analyzed as part of the risk assessment process.

Another inconsistency in the human health risk assessment involves secondary sources of chemicals weathered and leached from waste rock. Although the human health conceptual site model shows groundwater contamination occurring via leaching of chemicals from surface and subsurface soil followed by percolation from the soil to groundwater, it fails to show leaching of contaminants from tailings and/or tailings ponds or other water impoundments located at mine sites. Such features are shown in Figure 7 of the document, which was created using the digital database reported in the U.S. Geological Survey Open-File Report 01-142 authored by J.D. Causey and P.R. Moyle in 2001. According to this report, tailings or tailings ponds occupy 44 hectares (*i.e.*, approximately 109 acres) at three inactive mines. Because of the high rate of evaporation in the resource area, it is reasonable to assume that these ponds would concentrate contaminants leached from waste rock. The ponds would also be an important secondary source of groundwater contamination because contaminated water would infiltrate the soil beneath the pond, eventually contaminating groundwater beneath the pond.

Finally, according to *Nitrates in Ground Water, a Continuing Issue for Idaho Citizens*, published by IDEQ in 2001, the aquifer beneath portions of Caribou and Bear Lake Counties within the resource area serves as the drinking water source for 5,942 people. This aquifer has already been designated a degraded groundwater-quality area by IDEQ due to nitrate contamination. Because nitrate has already contaminated this aquifer, it is reasonable to assume that the aquifer is vulnerable to contamination by chemicals originating at phosphate mining sites. Furthermore, because the aquifer is a known drinking water source, it should have a) been identified in the risk assessment as a resource value to be protected, and b) been evaluated as an exposure pathway for risks to human health.

2. **The risk assessment guidance documents developed by the U.S. Environmental Protection Agency (USEPA) for the federal Superfund program, which were cited as guidance for the area-wide risk assessment, were not intended to be used for an area the size of the phosphate mining resource area. This fact is acknowledged on page 97 of the document, where the authors state that the USEPA guidance documents were developed to evaluate "single waste sites of relatively limited aerial (*sic*) extent." According to Causey and Moyle (2001), the areas of 19 mines in the resource area range from less than one-tenth of one square mile to 7.4 square miles, whereas the entire resource area is approximately 2,500 square miles. Although the authors state on page ES-3 that the purpose of performing an area-wide assessment was to "…identify any regional public health or wildlife population impacts requiring immediate action," the process actually seems to have reduced the**

likelihood of identifying such impacts because the results of small numbers of analytical samples were averaged over disproportionately large areas. By citing USEPA guidance without qualification, the authors give the reader the false impression that the assessments have been performed according to accepted guidelines and standards for risk assessment.

Response: The Department conducted the Area Wide Risk Assessment in accordance with USEPA guidance and standard industry practices. The primary objectives of the risk assessment were to evaluate the presence of regional public health and population-level ecological risks. Ecological populations occur over a large area, not on "single waste sites of relatively limited areal extent". Therefore, area weighting was used to appropriately develop regional exposure point concentrations for population-level assessment. This approach was not used for human health considerations, which were assessed on an individual exposure basis.

The Department concluded that regional public health and population-level ecological risks were unlikely based on current conditions. But the assessment did indicate that unacceptable risks were likely for ecological subpopulations in localized impacted areas. We believe that these conclusions are intuitive through an open-minded review of the data and area wide conditions.

Consider the Phosphate Mining Resource Area is 2,500 square miles including orphan mine site areas north of Bear Lake, or ~1,000 square miles using the smallest perimeter needed to enclose the 15 major mines subject to this investigative process. Out of the 1,000 square mile (640,000 acres) area encompassing the major historic and active mines, approximately 5,000 acres consists of impacted vegetation from previously reclaimed waste rock dumps, or less than 1%. Similarly, less than 5% of the stream segments present in the Resource Area exhibit concentrations, even on a periodic basis, that exceed water quality criteria intended to be protective of aquatic life. Even under the assumption that a percentage of the wildlife in these localized areas may experience toxicological effects, this would not translate to impacts that would be significant on a population-level basis. The Department believes the data collected to date clearly supports our conclusions concerning regional public health and population-level ecological risks. Nevertheless, the Department's risk management approach does require the mining companies to address localized areas of impact caused by mining releases and in excess of action level concentrations representing unacceptable subpopulation level risks.

The greatest liberties taken by the authors with USEPA guidance was in regard to calculation of area wide average concentrations (AWACs) of contaminants for use as exposure point concentrations (EPCs). I could find no published guidance to indicate that calculating area-wide average concentrations of chemicals using concentrations measured at sites designated both "impacted" and "background" (or "unimpacted"), as described in Appendix C of the document, is an acceptable method of determining exposure point concentrations. Although the authors might argue that averaging contaminant concentrations over a given area is a means of modeling EPCs, and that USEPA guidance permits modeling, this particular approach is inappropriate for a variety of biological and statistical reasons.

It was not possible to thoroughly review the methods used to calculate area-wide average concentrations of contaminants because I could not find a succinct summary of the necessary data, including the following: numbers and corresponding analytical concentrations of samples from impacted and background sites; lengths of stream reaches; numbers of stream reaches; and exposure areas used to calculate soil, plant, small mammal, and terrestrial invertebrate concentrations. But because of information contained in tables in Appendix C, it was apparent that area-wide averaging tended to obscure relatively high concentrations of a contaminant. For example, Table C-2 shows that the concentration of selenium in surface water in the impacted area of the Salt River watershed was 4 µg/L, which was 80 percent of the chronic criterion for aquatic life. The concentration in the unimpacted area was 0.720 µg/L, which was less than 15 percent of the chronic criterion. Because the selenium-impacted area was only 0.2 percent of the entire area, and the selenium-unimpacted area was 0.93 percent of the entire area, the area-wide average concentration of selenium was calculated to be 0.723 µg/L. In another example taken from Table C-28, concentrations of selenium in soil ranged from 1.21 to 7.26 µg/g in the impacted areas of the Blackfoot River watershed, and 1.0 µg/g in the unimpacted area. Because the unimpacted area was 98.3 percent of the area contributing to the average concentration, the area-wide average concentration of selenium in soil was 2.62 µg/g. This concentration exceeded the criterion of 0.81 µg/g cited in Table 7-1 of the document.

It is not necessary to understand how an AWAC or EPC is used in the assessment process to understand that area-wide averaging of contaminant concentrations can seriously underestimate the risks of exposure to chemicals by susceptible organisms. Consider the circumstances that resulted in sheep mortality. The concentration of selenium in the spring from which the sheep drank was sufficient to cause acute mortality. But if this concentration had been averaged with the concentrations of selenium in springs that were not contaminated with selenium, the result would probably have been less than the threshold concentration for toxicity, indicating that a risk of toxicity did not exist. Furthermore, selenium is a contaminant that accumulates in organisms and in food webs. This property of selenium is a key factor in any assessment of its ecological risks, but the implications of area-wide averaging of selenium concentrations on biological concentration and accumulation were not addressed.

3. **The massive size of the document probably will give most readers, especially those unfamiliar with USEPA risk assessment guidance documents, the false impression that the document *must* contain a thorough and state-of-the-art assessment of human health and ecological risks within the phosphate mining resource area. Unfortunately, the document does not incorporate current knowledge of population-level risks to fish. For this reason alone, the conclusion stated on page ES-1 that there is "…a low probability population level impacts to regional wildlife…" should be retracted by IDEQ.**

   Response: This statement is misrepresentative and shows a general lack of knowledge concerning risk assessment procedures. Aquatic receptors, such as fish, are not evaluated using USEPA risk assessment models; they are independently assessed through direct tissue measurement and comparison with toxicological benchmarks. Contrary to the commenter's implications, this evaluation for aquatic species was also conducted during

the Department's risk assessment effort and was reported as inconclusive because "current knowledge" on population-level risks to fish is a matter of significant scientific debate.

However, both State and Federal law prescribe numeric criteria for the protection of aquatic life. As stated earlier, less than 5% of the regional streams exhibit concentrations in excess of these criteria, which would indicate a low probability for population-level effects. Nevertheless, the Department has established action levels for mine-specific activities to achieve these numeric goals for all stream segments in the Resource Area.

In Mr. Clegg's response to your letter of inquiry, both of which are referenced above, he explains that the document is "…massive and complex…" and that "[r]isk calculations are technically challenging and require a high level of scientific documentation to establish their validity and justify particular receptor models and approaches." While I believe that editing and careful review of content could have reduced both the volume and apparent complexity of the document[1], I agree with Mr. Clegg that risk assessment and characterization require a high level of scientific documentation, though not necessarily in terms of quantity, but in terms of quality and relevance. Because I could not possibly review all of the human health and ecological information provided for all potential contaminants of concern, I focused on reviewing the "ecological toxicity profile" for selenium, which was provided in Appendix F. Selenium is the chemical of particular concern in this assessment, and the chemical which has already been documented to occur in plants and surface water in the resource area in concentrations sufficient to kill horses and sheep.

It was apparent from reading the ecological toxicity profile for selenium that the preparer was not familiar with current environmental toxicology literature or recent revisions of federal water quality criteria. Only five original references were cited, and these dated from 1960 to 1992. In 1999, the USEPA published a notice of intent to revise aquatic life criteria for a variety of chemicals, including selenium (Federal Register, October 29, 1999, volume 69, number 209). The notice informed the public that a list of references available to the USEPA for developing or revising aquatic life criteria for selenium was (and is) available on the Office of Science and Technologies home page at http://epa.gov/waterscience/criteria/selenium/selref.html. An adequate search for relevant literature should have uncovered this list, which contains more than 1,000 references. While I am not suggesting that the assessment document should have contained all of these references, I am suggesting that a review of this list would have directed the preparer to current and relevant publications regarding the environmental effects of selenium that are essential to any current review of selenium. The ecological toxicity profile of selenium should have included the following papers published by A.D. Lemly after 1992:

Lemly, A.D. 1993. Guidelines for evaluating selenium data from aquatic monitoring and assessment studies. Environ. Monitor. Assess. 28(1):83-100.

Lemly, A.D. 1993. Metabolic stress during winter increases the toxicity of selenium to fish. Aquat. Toxicol. (Amsterdam) 27(1-2):133-158.

[1] Attachment A contains specific comments regarding content and editorial errors that I compiled during an initial effort to review and summarize the assessment document. These comments were originally submitted to the Greater Yellowstone Coalition on March 7.

Lemly, A.D. 1993. Teratogenic effects of selenium in natural populations of freshwater fish. Ecotoxicol. Environ. Safety 26(2):181-204.

Lemly, A.D. 1995. A protocol for aquatic hazard assessment of selenium. Ecotoxicol. Environ. Safety 32(3):280-288.

Lemly, A.D. 1996. Assessing the toxic threat of selenium to fish and aquatic birds. Environ. Monitor. Assess. 43(1):19-35.

Lemly, A.D. 1996. Winter stress syndrome: an important consideration for hazard assessment of aquatic pollutants. Ecotoxicol. Environ. Safety. 34(3):223-227.

Lemly, A.D. 1997. Ecosystem recovery following selenium contamination in a freshwater reservoir. Ecotoxicol. Environ. Safety. 36(3):275-281.

Lemly, A.D. 1997. A teratogenic deformity index for evaluating impacts of selenium on fish populations. Ecotoxicol. Environ. Safety. 37:259-266.

Lemly, A.D. 1997. Environmental implications of excessive selenium: A review. Biomed. Environ. Sci. 10(4):415-435.

Lemly, A.D. 1998. A position paper on selenium in ecotoxicology: a procedure for deriving site-specific water quality criteria. Ecotoxicol. Environ. Safety. 39:1-9.

An ecological review of selenium toxicity prepared now should also contain information from the document entitled, *National Recommended Water Quality Criteria: 2002,* published by the USEPA Office of Water, in November 2002 (EPA-822-R-02-047), and the following papers published by Lemly in 2002:

Lemly, A.D. 2002. Selenium transport and bioaccumulation in aquatic ecosystems: apropsal for water quality criteria based on hydrologic units. Ecotoxicol. Environ. Safety. 42:150-156.

Lemly, A.D. 2002. A procedure for setting environmentally safe total maximum daily loads (TMDLs) for selenium. Ecotoxicol. Environ. Safety. 52:123-127.

Lemly, A.D. 2002. Symptoms and implications of selenium toxicity in fish: the Belews Lake case example. Aquatic Toxicology. 57:39-49.

The last paper is especially important to an ecological risk assessment for selenium because it documents the process by which 19 of 20 species of fish were extirpated from a freshwater lake in only 20 years. The lake was contaminated by selenium in wastewater from a coal-fired power plant in the mid-1970s, but the author cites phosphate mining as a threat that might be sufficient to cause similar widespread and unforeseen impacts on fish populations similar to those documented in his study.

Because selenium is the primary chemical of interest in the resource area, it is unlikely that the ecological profiles for other chemicals of concern were any more thorough or current. The importance of ecological toxicity profiles is especially evident when identifying appropriate assessment endpoints and measurement endpoints, as described in the 1997 USEPA guidance document, *Ecological Risk Assessment for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA 540-R-97-006). Unfortunately, the authors of the area wide assessment did not adhere to this guidance when developing the assessment endpoints shown in Table 7-2. In all cases, the assessment endpoint for various receptors was stated in similar, general terms (*i.e.*., "protection…from toxic effects of metals resulting from mining activities") that would not make it possible to identify "…appropriate measures of effect and exposure and ultimately the design of the site investigation" (USEPA 1997, page 3-10).

4. **The manner in which IDEQ intends to use the area-wide risk assessment document is not consistent with the principles of risk assessment, risk management, and the interface between the two processes, as described in documents published by the USEPA for human health and ecological risk assessment at Superfund sites.[2] Furthermore, instead of developing an area-wide risk assessment based on cumulative information provided by risk assessments performed at individual mine sites, Mr. Clegg states that the results of the area-wide assessment will be used as "…the basis for continuing mine-specific investigative and remedial efforts." And because, as Mr. Clegg notes, the area-wide risk assessment has concluded that "…human health and population ecological risk effects are unlikely…," the continuing mine-specific investigative and remedial efforts will apparently proceed without concern for human health and population-level ecological risks.**

Response: Risk management decisions are based on the risk assessment findings but also consider other factors such as regulatory policy, socioeconomic impacts and area wide conditions. A risk assessment is a technical document, not a decision document, and the principles used by the Department for risk assessment and risk management are not only consistent with USEPA guidance, but have been conducted in collaboration with the Interagency Technical Group, which includes EPA representatives.

The subsequent mine-specific activities will be implemented by the assigned Lead and Support Agencies using the Area Wide risk management plan as "discretionary" guidance for their site-specific risk management decision-making. This process allows additional scientific information, relevant data and regulatory changes to be considered prior to selection of final remedies. The plan also specifically requires updated risk assessment activities to be conducted for any issues that are unique to an individual site and were not considered in the area wide risk assessment process including human health concerns.

In your letter dated March 11, you asked Mr. Clegg, "…exactly how will this document be used in respect to cleaning up contaminated phosphate mine sites, specifically, contaminated water, soils, vegetation and so forth?" Mr. Clegg responded in part by stating, "[i]t is

[2] Some of these principles are explained in excerpts from ***Guidelines for Ecological Risk Assessment*** (EPA/630/R-95/002F, April 1998), which are shown in Attachment B.

important to note that it is a scientific analysis to be used by regulators as a technical reference in future planning and not an Agency decision document." Although Mr. Clegg emphasizes that the assessment document is not being used as a *regulatory* decision document, he fails to acknowledge that it is already being used to make practical decisions that will shape site-specific remediation, and possibly the design and operation of mine sites that have yet to be developed. The following statement indicates that IDEQ has used the risk assessment document as the basis for decisions regarding the focus of continuing mine-specific investigations and remediation efforts; a focus that appears to exclude consideration of human health and population-level ecological risks.

> While the assessment concludes that human health and population-level ecological risk effects are unlikely, it clearly indicates that aquatic, riparian and subpopulation ecological risks are still of concern. This provides the basis for continuing mine-specific investigative and remedial efforts.

According to USEPA guidance, "…risk assessments are designed and conducted to provide information to risk managers about the potential adverse effects of different management decisions," and the "…risk assessment process has several features that contribute to effective environmental decision making" (Attachment B). One of these features is an iterative process that allows new information to be incorporated in the risk assessment as it becomes available, thereby constantly updating and improving environmental decision making (Attachment B). Mr. Clegg's comments regarding the risk assessment document indicate that it will be treated by IDEQ as a reference document, and will not be updated and changed as new information becomes available. Furthermore, if new information becomes available that indicates initial conclusions regarding human health and population-level ecological risks were incorrect, there appears to be no mechanism for updating the risk assessment document to incorporate the information and revise its conclusions.

Mr. Clegg also states in his letter of March 14 that the risk assessment document "provides the technical basis for many of our required risk management decisions." However, the following excerpt from the same letter seems to diminish the importance of the risk assessment document while emphasizing the importance of the area-wide management plan.

> The Agency is currently drafting an *Area Wide Risk Management Plan* (RMP) that establishes Remedial Action Goals and Objectives, and risk-based action levels for soils, sediments, surface water, groundwater and vegetation for each of the contaminants of concern. It is intended to provide guidance to the designated Lead Agency representatives for their site-specific risk management decision-making needs, and to summarize the removal action process and decision criteria to be applied at each of the mine-sites (*sic*) identified in previous AWI [Area Wide Investigation].

In other words, IDEQ personnel will use the risk management plan, not the risk assessments, for guidance regarding risk management decisions at specific mine sites.

> This would be a reasonable approach except that Mr. Clegg also notes that the management plan will contain "risk-based" action levels, though he does explain how those will be derived. It is also interesting to note that Mr. Clegg included groundwater among the media for which action levels would be established, despite the fact that groundwater was not considered quantitatively in the assessment of human health risks. What source of information will IDEQ use to establish "risk-based" action levels for groundwater in the resource area?

I want to conclude these comments by acknowledging the complexity of a project that attempts to assess the human health and ecological risks of phosphate mining, and the enormous difficulty of producing a comprehensive assessment document. I recognize that a tremendous amount of effort was expended in producing the risk assessment document, and unfortunately, many elements that were performed correctly were overshadowed by elements that were not. Thank you for giving me the opportunity to provide comments on this very interesting process; I hope you find these comments useful.

Sincerely,

Sheryl Hill

IMA Comments on IDEQ's Final Draft Area Wide Risk Management Plan
Selenium Project, Southeast Idaho Phosphate Mining Resource Area
April 2003

Prepared by the IMA Se Committee
July 3, 2003

General Comments

1. The IMA thanks the IDEQ for making certain interpretations clear. First, we appreciate the clear statement of the finding of the agency's risk assessment throughout the document; e.g.:

   "The risk assessment concluded that regional human health risks and population-level ecological risks are unlikely…." (p. 3, 2nd ¶ of Section 2.1.)

   "[Residential use of waste rock piles or fish diets exclusively limited to a few impacted first order streams] were considered highly unlikely based on area land use and regional observations…." (pp. 3–4, 2nd ¶ of Section 2.1.)

   "[The agency's] designated contaminants of concern…from the risk assessment process consisted of…selenium and cadmium…being identified as the primary regional hazard drivers." (p. 5, 3rd ¶ on page.)

   IMA agrees with these statements of findings.

   Second, we appreciate acknowledgement of the potential utility of industry's pilot-scale demonstrations of new BMPs:

   "BMPs demonstrated to be effective should be documented and submitted to the land management agencies for review and acceptance. Upon approval, effective BMPs should be adopted…." (p. 15, final ¶ of p. 14, final 2 sentences.)

   The phosphate mining companies represented by IMA will continue, upon our own initiative, to develop, evaluate, and implement effective BMPs. We continue to stress that BMP effectiveness may vary significantly depending on site-specific variables. BMPs should continue to be evaluated, adopted, and applied on a site-by-site, case-by-case basis.

   Finally, we appreciate the agency's pragmatism with regard to the interpretation of perceived impacts associated with mining:

   "Waste rock pile soils were not considered subject to removal action levels because they were permitted disposal units clearly intended to retain highly mineralized materials." (p. 24, Section 4.3.2, 2nd ¶, 3rd sentence.)

Response: IDEQ appreciates IMA's comments and continued cooperation in resolving the selenium issues in Southeast Idaho. We also recognize your efforts in developing new BMPs for current and future mining operations, and understand the need for applying BMPs based on individual site conditions. However, we also expect the BMP shortcomings at historic sites to be corrected, as well as their resulting impacts. We believe the BMP requirements for mining operations, as provided under State rules and regulations, are

unequivocal in terms of maintaining BMPs that prevent releases of hazardous substances and protect the environment.

2. While IMA appreciates the significant effort in developing the Final Draft Area Wide Risk Management Plan (Draft RMP) and the need to be concise in writing such a document, we feel there are too many omissions in references, tables, and explanations as well as a lack of discussion of the applied logic and science behind the conclusions and decisions expressed. Examples of this general comment can be found in the accompanying Specific Comments (including numbers 11, 14, 15, 20, 27, 30, 36, 39, 40, 41, 42, 43, 44, and 46). It is anticipated that a final risk management plan will have a significant impact on the phosphate mining companies in southeastern Idaho as result of the cost of monitoring, changes in operational practices, and possible mitigative measures. As such, it is imperative that we understand the potential impacts of the revised draft risk management plan on our businesses and the reasons behind those impacts. In our opinion, this is not possible given the way the draft plan is currently written and supported.

Response: The IDEQ will try to clarify our recommended approach as we respond to your specific comments. However, many of the site-specific approaches and requirements are dependent on Lead Agency decisions that are not subject to IDEQ authority. The risk management plan is a discretionary guidance document intended to provide some consistency in risk management decision-making by supporting regional goals and objectives, however, it does not override the authorities of other Agencies.

3. The Executive Summary describes four goals of the agency as related to the Draft RMP. The second goal of the agency is "to protect wildlife and habitat in the resource area through reduced exposures in areas exceeding risk-based action levels…." It is apparent from Section 4.3.2 that certain of the action levels (e.g., the surface water monitoring action level for selenium and the sediment remedial action level for selenium) are based on *background* selenium concentrations. These action levels are not risk-based; rather, they are exposure-based. The regional-specific field and laboratory ecological studies conducted in cutthroat trout, birds, and elk within the Phosphate Resource Area demonstrate that exposures to selenium, an essential nutrient, do not necessarily equate to risk. Neither the agency's risk assessment report nor this Draft RMP take the results of these high quality studies into account. The IMA has previously expressed this concern in comments dated June 2002 and April 2003 on both the draft and final versions, respectively, of the agency's risk assessment report. Failure of the risk assessment report and this Draft RMP to consider the results of these field and laboratory validation studies, in preference for predictive risk assessment results that are far less reliable, demonstrates that these documents are both incomplete and premature. The University of Idaho professors who were the principal investigators for these studies have made sufficient progress toward publishing their results in peer-reviewed journals that their reports to IMA can now be released. Attached to these comments are reports written by the following professors:

   - *"Analysis of Selenium Levels in Bird Eggs and Assessment of the Effects of Selenium on Avian Reproduction in Southeast Idaho",* Dr. John T. Ratti—a report documenting all of the ornithological work completed through 2001;

   - *"Population-Level Assessment Models for Red-Winged Blackbird and American Robin Metapopulations in Southeast Idaho",* Dr. Edward O. Garton—a report documenting the population-level risk assessments conducted for the red-winged blackbird and the American robin;

- *"Annual Report – Genetic Variation Amoung Cutthroat Trout (Oncorhynchus clarki) in the Blackfoot River, Idaho",* Dr. Madison S. Powell—a report documenting the genetics study completed for the Yellowstone cutthroat trout used in Dr. Hardy's work (this report has been submitted previously, but is included here for completeness);

- *"Final Report – Effects of Dietary Selenium on Cutthroat Trout (Oncorhynchus clarki) Growth and Reproductive Performance",* Dr. Ronald W. Hardy—a report documenting the egg-viability, Se-feeding, and Se-depuration studies performed in the Yellowstone cutthroat trout;

- *"An Evaluation of the Effects of Selenium on Elk, Mule Deer, and Moose in Southeastern Idaho,"* Mr. Lonn Kuck (IDFG, retired)—a report documenting effects of mining on big-game species; and

- *"The Management of Big Game Populations, Their Habitat, and Selenium in Southeast Idaho,"* Mr. Lonn Kuck (IDFG, retired)—a report discussing potential removal alternatives for mitigating any such effects.

Response: The referenced publications provide no new scientific information with regards to the dose-based risk models used in the risk assessment or risk management plan. For the most part, they are either population-level or single-species studies that fail to assess risks in the specific areas impacted by previous and ongoing mining releases for which the IMA are responsible. While the IDEQ believes these studies do have scientific value, the application of these studies in assessing subpopulation effects for other sensitive species, feeding guilds or habitats impacted by mining releases are limited.

4. The "Summary and Conclusions" section of the Draft RMP states that the proposed risk-based action levels will "result in compliance with regulatory criteria without imposing overly conservative requirements." However, the action levels presented are highly conservative and are based on inadequately documented methods and assumptions as described in our General Comment No. 2, above. Based on a comparison of proposed action levels for cadmium and selenium in surface water to concentrations of these constituents measured at 217 stream sampling stations located downstream from at least one phosphate mine, 78% of such stations would require continued monitoring or removal of surface water. The same assessment for 29 background stream sampling stations in the region (i.e., stations located upstream from any phosphate mine) shows that 37% of these stations would also require action. A similar assessment for sediment at 181 downstream stations indicates that 50% of such streams would require action; of 19 upstream stations, 16% require action. Such requirements on a regional basis contradict the conclusion of the agency's risk assessment report (i.e., that regional human health and population-level ecological risks are not anticipated) and are overly burdensome to the phosphate mining industry in Southeastern Idaho.

Response: The risk-based action levels developed by the IDEQ are difficult to classify as overly conservative when compared to literature-referenced toxicity thresholds and benchmarks. The values represent concentrations the Department believes to have a reasonable likelihood of causing significant chronic or acute effects for sensitive species in impacted areas with the realization that some minor toxicological effects may still occur that these levels. The Department also disagrees with the argument that action level concentrations should be related to the percentage of exceedances at downstream locations impacted by mining as opposed to the risk presented by those

releases. For the compliance-based action level for regulated surface water, the concentration is an enforceable regulatory criteria that is not subject to interpretation.

With regards to monitoring action levels, the purpose of the site-specific investigation effort is to identify and control unauthorized mining releases and resulting impacts from historic sources. The site-specific monitoring efforts are, therefore, targeted at identifying past and ongoing releases. Concentrations exceeding typical background values may be indicative of potential releases and warrant further monitoring to establish trends prior to their elimination as a source. The Department used the maximum concentrations from the regional background data set to estimate upper percentile values and establish monitoring action levels. To date, this data has been fairly representative of the background data sets collected during recent interim site-specific sampling efforts. If widely varying results are observed at any particular site during subsequent investigations, the Lead Agency does the authority to make appropriate adjustments.

5. The IMA has many questions regarding how the agency's Draft RMP will be implemented with respect to regional monitoring. For example, the agency states that it is appropriate to conduct "continued regional monitoring of aquatic populations and water quality." It is apparent to IMA that such regional monitoring would require considerable effort as described in General Comment No. 4, above. Who will be responsible for the regional monitoring effort and how will it be implemented? How will the continued regional monitoring effort be integrated with the mine-specific work? How often will regional monitoring be performed, and how long will it be required? In addition, IMA has specific questions about technical assumptions and calculations used to derive monitoring levels in the Draft RMP.

   The agency can well appreciate the cost of an extensive monitoring program and the potential impact on IMA companies. Given the apparent need for regional monitoring and anticipated monitoring that will result from site-specific investigations, there may be considerable overlap between regional monitoring and site-specific monitoring. There appears to be an opportunity to evaluate the overall monitoring needs and to strategize ways to minimize monitoring costs. Based on these and other questions, the IMA requests a meeting(s) with the IDEQ and cooperating agencies to further discuss the monitoring strategy and address IMA's specific questions and concerns regarding the regional monitoring.

Response: The IDEQ cannot provide a high level of specificity regarding potential regional monitoring requirements prior to completion of site-specific actions. Regional monitoring activities are mandated under Task 4 of the Area Wide Scope of Work to determine the level of success of site-specific remediation projects. Subtasks include identifying long-term trend monitoring sites and frequency of monitoring for all media, and are covered under the existing cost recovery agreement. In addition, the removal action process includes provisions for post removal monitoring at individual sites. It would be the Department's intent to integrate these activities to the extent possible to avoid duplication of monitoring efforts.

However, the long-term regional monitoring requirements should not be confused with the risk management plan monitoring action levels that apply to individual site investigations. The purpose of the risk management plan action levels is to focus short term monitoring on areas that may indicate the presence of individual mine release pathways. We expect this monitoring activity to consist only of the number of events required to confidently establish trends and conclusions regarding the potential release and source of observed constituents. This effort must also evaluate conditions during an annual average precipitation cycle prior to eliminating a potential release pathway from future consideration.

The IDEQ and Interagency representatives will meet with IMA prior to implementing a regional monitoring plan, however, this plan will not be developed until the site-specific removal action process is underway.

6. There is substantial new risk assessment work presented in the Draft RMP that was not included in the area-wide risk assessment report. Given that risk assessment should be kept distinct and separate from risk management, all new risk assessment components—assumptions, calculations, and interpretations—should be withdrawn from this Draft RMP and presented in a separate risk assessment report. This would allow thorough documentation of assumptions and equations used to allow readers to reproduce results, which is not possible as currently presented.

Response: No new risk assessment work was presented in the plan; risk estimates were developed to verify hazard quotient levels that occur through achieving the proposed action levels. These are hypothetical estimates and are considered to be risk management supporting calculations. However, in response to several concerns from other reviewers, we have provided a separate Attachment 1 to further document the methods and models used in our efforts.

7. Given the above-described limitations in the Draft RMP and the concerns expressed in General Comments 2, 3, 4, 5 and 6, the IMA cannot accept the Draft RMP until such time as the Agency clarifies the methods and assumptions used to calculate action levels and addresses our questions regarding implementation of the Draft RMP. We strongly urge the agency to convene a public RMP workshop with IMA to clarify the methods used to calculate action levels, and to address specific concerns regarding how the Draft RMP will be implemented. Furthermore, as environmental groups have requested that a cumulative effects analysis be performed, the RMP workshop forum could be used to perform such an analysis.

Response: The risk management plan has been revised to address the major concerns of commenter's, particularly, Interagency representatives for whom the plan is intended. Views expressed from a number of different commenters are diametrically opposed and would not be resolved through the use of a workshop. The public comment period is intended to provide a forum for inquiries and clarification, not an IMA endorsement. There are other stakeholders with opposing views to IMA that also have problems accepting the current plan because they believe it is not conservative enough. The IDEQ and our Interagency partners have remained objective in our evaluations, and believe the resulting plan presents a fair and balanced risk management approach for addressing the selenium issues.

Specific Comments

1. p. i, 1st paragraph, final sentence. Given that work being undertaken by the member companies of the IMA Se Committee is being performed under CERCLA consent agreements entered into by the agencies pursuant to their removal action authority under that statute, care should be taken—throughout this and other documents—to avoid use of such terms as "remedy" and "remedial," as they are terms of art under CERCLA that refer to remedial action authority, which is somewhat different than removal action authority.

Response: Comment noted. In this case, we expect the removal actions to result in final remedies that also meet reclamation goals for relinquishment and land management agency acceptance. We have avoided the use of the term "remedial investigation", which does invoke a specific CERCLA meaning. The term "remedial", when used, refers to potential remediation methods that may be employed in the implementation of the removal action process.

2. p. i, 2nd paragraph, final sentence. IMA understands that only 1 to 2% of the land in the Southeast Idaho Phosphate Resource Area is affected by phosphate mining. Given that off-site transport occurs via streams, and given that streams are, on the scale of the Resource Area, line sources of impact, not significant areal sources, IMA is puzzled as to how one can justify the claim of 5% of the Area being impacted. We believe it to be much less on an areal basis.

Response: We have typically referred to the cumulative area of impact to be less than 5% as a conservative estimate. We have not completed site-specific investigation activities so we have not attempted to be more accurate. However, most of the impacted streams are expected to have impacted peripheral vegetation, which does haves an areal component. We also expect the SI work will discover additional wetland and riparian zone impacts, and irrigation effects that will increase IMA's estimate of 1-2%.

3. p. i, 2nd paragraph, final sentence. The language in CERCLA regulations (the NCP, 40 CFR §300) that covers ecological risk assessment is very brief and is clearly population-level language:

    "Environmental evaluations shall be performed to assess threats to the environment, especially sensitive habitats and critical habitats of species protected under the Endangered Species Act." (40 CFR §300.430[e][2][i][G].)

    Furthermore, relevant USEPA policy principle for ecological risk management decision making is population focused:

    "Superfund's goal is to reduce ecological risks to levels that will result in the recovery and maintenance of healthy local populations and communities of biota." (USEPA, 1999, *Issuance of Final Guidance: Ecological Risk Assessment and Risk Management Principles for Superfund Sites*, OSWER Directive 9285.7-28P, Washington, DC.)

    What are IDEQ's rationale and authority for determining that subpopulation risk is an appropriate assessment endpoint?

    Response: The IDEQ disagrees that only population risks are regulated under CERCLA. The phrase "threats to the environment" does not imply that only population-level evaluations are mandated, and would argue that the Blackfoot Watershed is considered a sensitive habitat when it comes to selenium contamination. Additionally, the term "communities of biota" applies equally to ecological subpopulations. CERCLA removal actions are specifically defined to include the cleanup or removal of released hazardous substances from the environment.

    Regarding the regulatory authority for addressing releases on a subpopulation basis, the IMA has a statutory obligation to maintain BMP's at mining sites that prevent the release of hazardous constituents to the environment without any regard to risks. Second, State surface water and groundwater rules include anti-degradation clauses that authorize IDEQ to take action on any active release of contaminants to these resources. Third, historic mine releases are currently responsible for a significant number of ongoing violations of the Clean Water Act and State Water Quality Rules in streams adjacent to past mining operations. Lastly, the current conditions of the historic sites have failed to meet the reclamation goals approved in the associated mine plans by restoring unrestricted beneficial uses such as grazing. None of these regulatory or permitting obligations introduce population-level risks as a condition of compliance.

The Department is attempting to provide sound and balanced risk management expectations by addressing localized environmental impacts from historic mining operations using subpopulation risks. Our existing authorities for the protection of the environment could easily be interpreted in a manner that would require areas impacted by unauthorized releases to be returned to their original background levels, if so desired.

4. p. ii, 1st full paragraph, 2nd sentence. The first removal action goal (incorrectly labeled a remedial action goal) is to achieve compliance with surface water regulatory criteria. The goal of a risk management plan is to manage risk, not to manage compliance. With regard to Se in surface water, ample regional-specific evidence is available demonstrating that the state's coldwater biota standard, which is adopted from USEPA's chronic water quality criterion, is overly protective. The USEPA's criterion is based on effects observed in a warmwater species, the bluegill, dwelling in an industrial wastewater pond in the lowlands of the Southeastern US. Not surprisingly, the same effects have not been observed in a native coldwater species, the cutthroat trout, dwelling in montane streams in southeastern Idaho.

Response: IDEQ's risk management plan includes action levels that have been derived from various methods including consideration of background levels to evaluate potential releases, adoption of probable effects levels for single media thresholds, risk-based calculations using dose models, and existing regulatory criteria. These are all appropriate methods under USEPA guidance for establishing action levels for CERCLA removal actions, and it is equally appropriate to provide this information as part of the regional risk management plan.

The IDEQ is obligated to enforce existing water quality standards and the IMA is obligated to comply regardless of the basis for development. The existing criteria involves cold water biota, which encompasses an entire community, not just cutthroat trout. Many scientific literature references suggest that cold water biota, as a whole, may be more sensitive to selenium contamination than warm water species. Based on the limited availability of scientific studies regarding the effects of selenium contamination on coldwater biota, it is premature to conclude that the current criteria is overly protective. This may account for the fact that after four years of extensive technical review, the USEPA has yet to propose a rule change for the existing criteria.

5. p. ii, 1st full paragraph, 3rd sentence. The second removal action goal (incorrectly labeled a remedial action goal) is to reduce exposures. The goal of a risk management plan, again, is to manage risk, not to manage exposure. It is apparent from subsequent portions of the Draft RMP (e.g., Section 4.3.2) that certain of the action levels (e.g., the surface water monitoring action level for selenium and the sediment remedial action level for selenium) are based on *background* selenium concentrations. These action levels are not risk-based; rather, they are exposure-based criteria. Results of the site-specific field biological studies conducted in cutthroat trout, birds and elk within the Phosphate Resource Area (attached to these comments) demonstrate that regional exposures to selenium, an essential nutrient, do not equate to risk.

Response: The IDEQ provided an earlier response regarding the previous studies and their failure to assess risk in impacted areas. Surface water monitoring action levels are based on background levels because they are designed to identify existing release pathways, not risks. The sediment action levels were not based on background, they defaulted to background values because the intended risk-based concentrations were lower than maximum observed background levels. Finally, one of the only ways to manage risk is to manage exposure, therefore, the second removal action goal is considered appropriate.

6. p. ii, 1st full paragraph, penultimate sentence. The third removal action goal (incorrectly labeled a remedial action goal) is to protect multiple beneficial uses. Again, any such goal set forth in a

risk management plan needs to show a direct link to risk management, not beneficial use management.

Response: This is an inaccurate statement based on the commenter's judgement; there are no specified rules on what a risk management document must contain. Similarly, removal action goals do not require any link to risk, they identify the areas of concern resulting from a release or threat of release. In this instance, beneficial uses such as grazing have been impaired by past mining activities.

7. p. ii, 1st full paragraph, final sentence. The fourth removal action goal (incorrectly labeled a remedial action goal) is to protect regional groundwater from "any local groundwater contamination." A RAG set forth in the Draft RMP needs to be directly linked to the management of human or environmental risk associated with phosphate mining, not merely management of any and all sources of contamination (some may be unrelated to phosphate mining; some may not pose a risk).

Response: Once again, removal action goals do not need to be linked to health risk. Groundwater is a protected resource. IMA does not have the legal right or permitted authority to release hazardous substances or impact regional resources regardless of risk levels.

8. p. ii, 2nd full paragraph. According to this paragraph, the agency has developed a set of risk-based action levels that trigger continued monitoring of regulated surface water or groundwater locations that exceed background. As described in Specific Comment No. 5, above, a number of the proposed action levels are exposure-based rather than risk-based. The intent of a risk management plan under CERCLA is to reduce *risk*, not exposure. As described in General Comment No. 3, site-specific field biological studies conducted within the Phosphate Resource Area demonstrate that exposures to an essential nutrient such as selenium do not equate to risk.

Response: Comment noted. The text has been revised to more clearly describe the basis for the different action levels. The IDEQ also objects to the extensive use of the "essential nutrient" phrase. Impacted area concentrations clearly exceed recommended nutrient intake levels for targeted receptors.

9. p. ii, final paragraph, 1st sentence. Given that this is a risk management plan, risk-based action levels should be triggered by risk, not merely by exceedances of background or regulatory criteria.

Response: The IDEQ disagrees. IMA is obligated to identify the releases originating from their past operations and to comply with State and Federal law regardless of risks.

10. p. iii, 1st paragraph, 2nd sentence. Risk management action levels are not needed to identify areas that are not in compliance with regulatory criteria—nothing works better for compliance management than the regulatory criteria in question. Risk management action levels are not needed to identify areas that are subject to ongoing releases—comparison to background conditions does that. And, identification of upper percentile areas of impact serves no purpose. Risk management action levels should identify areas that pose an unacceptable degree of risk to human health or the environment.

Response: Criteria- and background-based action levels are provided specifically for those purposes and will be referenced accordingly. The risk-based action levels developed by IDEQ do represent concentrations that are considered to pose unacceptable subpopulation-level risks. The

term "upper percentile areas of impact" refers to areas that will be addressed through the application of the action levels.

11. p. iii, 2nd paragraph, 3rd sentence. What is the purpose of substituting regional maximum observations in surface water and vegetation for Cr, Ni, and V rather than the actual observations in future risk assessments? The use of actual observations should be, without question, preferred.

Response: If surface water and vegetation sampling for Cr, Ni and V are eliminated for site-specific investigations, as recommended, then there will be no "actual" observations. If supplemental risk assessment activities are required that include these elements, then an estimated exposure point concentration will be required. Using the maximum observed regional concentration provides a conservative estimate for these values.

12. p. iii, 2nd paragraph, final 2 sentences. Sampling of surface water stations during a year of high runoff is something that can be readily accommodated within the context of a long-term monitoring program.

Response: The IDEQ considers this a site-specific requirement for completing a final evaluation of potential release pathways at each individual mine.

13. p. iii, final paragraph, 2nd sentence. Action levels set forth in a risk management plan should result in an elimination of unacceptable levels of risk to human health or the environment.

Response: The Agency expects removal actions triggered by action levels to also achieve compliance with ARARS and the elimination of unauthorized releases.

14. p. 3, Section 2.1, 1st paragraph, 3rd sentence. Please define "modified subsistence lifestyle." Also, please estimate how many individuals within the Resource Area are living such a lifestyle or are expected to be in the future.

Response: The modified subsistence lifestyle scenario was defined in the previous human health risk assessment document. EPA risk guidance requires risk evaluations to consider any potential future use. This scenario was not identified as a critical factor in the area wide risk management approach.

15. p. 3, Section 2.1, 2nd paragraph, 1st sentence. Given that the regional risk assessment found that regional risks to human health or the environment are unlikely, why is there a need for a regional risk management plan?

Response: The area wide investigation confirmed the presence of releases throughout the Resource Area, and the regional risk assessment indicated the likelihood for localized impacts and subpopulation risks across the region. Regional goals and objectives are intended to provide some consistency between various Agencies and Companies in risk management decision-making at the individual sites.

16. p. 4, Section 2.1, 1st paragraph on page, 1st sentence. Screening calculations merely identify contaminants, receptors, and exposure pathways that may be of potential concern; they do not provide an acceptable measure of risk.

Response: Tier I results clearly demonstrated the presence of localized risks in highly impacted areas due to significant exceedances of accepted toxicological thresholds and benchmarks.

17. p. 4, Section 2.1, 1st paragraph, on page, final 3 sentences. No study has ever been designed or implemented for the Resource Area to quantify the percentage of area impacted. Thus, all statements regarding 5% of the Area posing a risk or 25% of the upper Blackfoot River basin exceeding criteria need to be rephrased. All sampling done to date has, from a perspective of attempting to provide an answer to the question the authors are posing, been biased toward locations that are likely to be affected. For example, upon conclusion of all mine-specific characterization efforts, all streams below mines will be sampled. Only a relative few streams above the mines will be sampled to provide a measure of background conditions. In reality, however, there are far more background streams that won't ever be sampled because no one has made it a goal to quantify the percentage of a given basin that is affected. If one wanted to, one would assume background conditions for streams that are not located downstream of any phosphate mine, sum the lengths of all such streams and compare the summed length to the summed length of all stream segments below mines that are known to be elevated. As no one has undertaken such a task, care should be taken not to characterize results quantitatively in the manner done here. The estimates provided here should be upper bound estimates at best.

Response: The IDEQ did not select these estimates arbitrarily. We approximated the ratios of impacted and unimpacted surface area and stream lengths using reasonable assumptions for peripheral impacts and upgradient streams expected to exhibit background conditions. We have also consistently referred to the 5% approximation of impacted area as an upper bound estimate through the qualification of "less than". Similarly, the 25% description of Upper Blackfoot River watershed exceedances is also a reasonable estimate based on IMA's 1998 data in which a significant number of lower order streams and the entire main stem of the Upper Blackfoot River exceeded water quality criteria. The purpose of this statement is to illustrate the absence of ubiquitous contamination and any further refinement of this upper bound estimate will require completion of site-specific investigations.

18. p. 4, Section 2.2, 1st paragraph. The IMA has identified molybdenum in vegetation at levels of concern; however, molybdenum is positively correlated with and not as extensive of a concern as selenium.

Response: Comment noted.

19. p. 5, Section 2.2, 1st paragraph on page, 1st sentence. The difference between the IMA's and IDEQ's process of developing a list of target analytes was not so much in the IDEQ's list of candidate analytes being longer (23 vs. 17 [once molybdenum is taken into consideration]), rather it was in the IDEQ's sources of input being broader (IMA's sources were limited to USFS data from Maybe Creek and FMC data on Dry Valley Creek). What should be emphasized here is that two organizations using somewhat different approaches and information sources and operating independently and several years apart came to virtually identical conclusions in regard to contaminant identification.

Response: Comment noted.

20. p. 5, Section 2.2, 2nd paragraph. Are other HQ's calculated beyond those presented in the first tier of the risk assessment? If not, how are "background comparisons, frequency of detection, EPA's preliminary remediation goals [and], literature-referenced human health and ecological screening criteria" considered in the screening process? If so, how are these new HQ's calculated? Also, as the risk assessment proved, there is no risk with cobalt; therefore why is it included?

Response: HQ's were calculated for each Tier of the risk assessment. The other referenced considerations were used to screen initial area wide data as described in the previous document. Cobalt and Ra-226 were separately screened through subsequent processes because of Intergaency concerns and the lack of data during the risk assessment screening process.

21. p. 6, Section 2.3, 1st paragraph, penultimate sentence. While it is, without question, IDEQ's job to enforce compliance with the state's water quality standards, the department, in the interest of honest disclosure, should be pointing out that the coldwater standard for selenium (1) is based on a warm water species that does not occur in the Resource Area, and (2) on the basis of regional-specific studies done by the University of Idaho and state of the science as documented by USEPA's criterion revision process, is not representative of, and is overly conservative for, the native coldwater species present.

Response: While we acknowledge the fact that the current standards are based on a different set of conditions, the applicability of the criteria for coldwater species is still a matter of scientific debate. We do not agree that regional-specific studies have demonstrated that the criteria are overly conservative. The only scientific study done was the feeding trial for cutthroat trout. This single species laboratory study failed to achieve actual tissue concentrations observed in native fish within impacted areas and did not consider other potential routes of exposure. The coldwater biota standard is intended to protect the entire aquatic community not a single fish species. Nevertheless, this standard is the current criteria under State and Federal law, and IDEQ is obligated to enforce compliance.

22. p. 6, Section 2.3, 2nd paragraph, final sentence. Again, in the interest of open disclosure, the new CMC proposed by the USEPA's criterion revision process should be mentioned.

Response; Comment noted. It should also be mentioned that IDAPA 58.01.02 was revised in May 2003 and the State CMC has been lowered to 18 ug/L.

23. p. 7, Section 2.3, 2nd paragraph on page. The acute risk assessment performed to estimate the risk associated with elk liver ingestion shows the chance of someone in the elk-liver-eating population that hunts the area to get nausea from the exposure to elevated Se to be 0.1%. The toxicological endpoint is nausea. We don't recall diarrhea ever being a symptom of acute selenosis mentioned in the literature surveyed during the acute toxicity assessment.

Response: Our recollection was the endpoint in in the consumption advisory was referred to as gastrointestinal effects, which we may have incorrectly assumed to include diarrhea.

24. p. 7, Section 2.3, final paragraph on page. Please point out that even if someone wanted to use East Mill Creek extensively as a supply of fish for food they'd become quickly disappointed due to the small size and consequent low productivity of the stream. One would be hard pressed to obtain a single meal from the stream even once a year.

Response: We have heard a number of different reports regarding fish in East Mill Creek and are reluctant to provide any conclusions regarding fish size and availability. We do agree that subsistence-level use of East Mill Creek is unlikely based on observations over the past several years but accept the precautionary consumption advisory issued by IDHW.

25. p. 8–12, Section 3.0. There's no need to outline the NTCRA process within a risk management plan. Also, another reminder not to confound the situation by using remedial authority language to characterize a removal authority program.

Response: This document is intended to be a discretionary guidance document for the other Agencies and it was considered appropriate to outline the NTCRA process for their benefit.

26. p. 9, Section 3.2, 1st paragraph on page, final sentence. TBCs are not ARARs.

Response: Comment noted.

27. p. 9, Section 3.2, 2nd paragraph on page, final 2 sentences. "Site" should be defined as the mine lease in question plus any area outside the lease determined to have contamination posing an unacceptable risk due to constituents released from the lease.

Response: The definition of "Site" will be established in the site-specific CERCLA orders.

28. pp. 16–17, Section 4.2.2. It is neither good science nor good policy to focus exclusively on extreme values, which is what the repeated discussion of maximum observations does. The whole of a data set, not just a single value from each data set, should be summarized.

Response: Justification for maximum concentration comparisons was provided in the text.

29. p. 17, Section 4.2.2, 2nd ¶ on page, final sentence. In addition to the whole-body fish selenium water quality criterion that is being proposed by USEPA, the genus-specific value pertinent to cutthroat trout, which is far higher, should be given. The genus mean chronic value (GMCV) for salmonids is given as 11.64 ug/g (dry wt.).

Response: The DEQ does not believe this information is particularly relevant to the current plan and will not cite any proposed values without reviewing the specific reference. To our knowledge, this criterion has not been published in the Federal Register as a proposed EPA rule, however, we have seen reports of considerable criticism of this approach during the preliminary technical review process. It should also be noted that a number of whole-body fish tissue results reported by the IMA for impacted streams are still in excess of this value.

30. p. 17, Section 4.2.2, 3rd ¶ on page, final sentence. What evidence does the agency have—other than an invalid interpretation of Tier I screening calculations—to support the conclusion that there are unacceptable risks to ecological subpopulations? Tier I calculations are to be used for screening only; they are not valid for use in risk characterization, except to evaluate upper bound (i.e., worst-case) risks. In the event that Tier I calculations suggest a possible impact, the Tier I methods and assumptions should be refined prior to making any conclusions about risk.

Response: There are regional data available that indicate localized selenium concentrations are in excess of virtually every abiotic threshold and biotic risk indicator value that has been proposed by any researcher in selenium science. As evidence, these significantly elevated levels of selenium have been found in impacted areas for fish, bird eggs, amphibians, macroinvertebrates, invertebrates, small mammals, domestic livestock, terrestrial and emergent vegetation, wetland soils, surface water, sediment and so on. To continue to refute the presence of subpopulation risks not only damages IMA's credibility with the Agencies, but makes other stakeholders question IMA's stated commitment to be accountable and responsible for the impacts caused by past mining practices.

31. p. 18, Section 4.2.2.1. Reduction of selenium to lowest practicable levels could result in a significant adverse environmental impact, given that Se is an essential nutrient and that the Resource Area, with the exception of Phosphoria outcrops, is selenium-deficient.

Response: The lowest practicable level is in accordance with the proposed action levels and is not zero. The concentrations required for nutrient purposes are much lower than those present due to unauthorized mining releases.

32. p. 19, Section 4.2.2.2, 1st ¶. The USFS's topsoil salvage guidelines are technically flawed. There is no need for such guidelines because the likelihood of native seleniferous topsoil from the Phosphoria Formation supporting toxic stands of seleniferous vegetation is virtually nill (see Dolan et al., 2003, *Selenium in the topsoil: A response to "Guidelines for the Salvage of Topsoil Used to Reclaim and Provide a Seed Bed for Phosphate Mine Reclamation"*, NW Forest Soils Council, Kent, WA).

Response: The IDEQ is not responsible for reclamation guidelines or topsoil salvage. However, this current interim guideline was referenced in regards to the stated reclaimed vegetation goals.

33. p. 19, Section 4.2.2.2, 1st ¶. The USFS's vegetation reclamation guideline is technically superior to a strict level of 5 mg/kg dw. This is because the USFS specifies a three-prong guideline that links a selenium concentration in plants to a percentile in the concentration distribution: the 50th percentile shall not exceed 5 mg/kg dw, the 95th percentile shall not exceed 10 mg/kg dw, and the 99.5th percentile shall not exceed 20 mg/kg dw. This specific guideline seems consistent with majority expert opinion. We recommend, however, that the third prong of the guideline be dropped. This is because it is prohibitively expensive to monitor compliance at the 99.5th percentile—e.g., one would need to collect and analyze approximately 600 samples to document compliance at such a high-end percentile with a statistical degree of confidence. The use of the first two prongs is adequate and will require the collection of no more than 59 samples to demonstrate compliance at the 95th percentile.

Response: The IDEQ has expressed concern over the current monitoring methodology. We have specified a vegetation action level of 5 ppm based on a mean value, which also allows for sample variance. The current methodology actually allows an upper bound mean value of approximately 8 ppm and does not meet the stated goal. The land management agencies have committed to correcting the methodology for future applications.

34. p. 19, Section 4.2.2.2, 2nd ¶, final sentence. IMA has seen no evidence of biomagnification of selenium in the Resource Area (see Narloch et al., 2002, *Selenium disposition in a cold water ecosystem: Biological uptake and trophic transfer*, SETAC, Salt Lake City, UT).

Response: Biomagnification is apparent in the initial trophic levels but we agree this is not a universal occurrence and we have revised the text accordingly.

35. p. 20, Section 4.2.3.1, final ¶. The NRC has published a maximum tolerable concentration for all livestock species of 2 mg/kg for selenium.

Response: Comment noted. We have selected 5 mg/kg as our action level based on predominant veterinarian recommendations. We also recognize the fact that the vegetation in impacted areas is not intended to be the sole source of forage throughout the life of the livestock receptor, therefore, 5 ppm is considered protective.

36. p. 21, Section 4.2.3.2, 1st ¶. Where has a risk assessment for ^{226}Ra been presented? Any such assessment would have to, by necessity, account for background levels, and background levels of ^{226}Ra in the Phosphoria Formation are naturally elevated above what is typically seen in other geological units. Since mining doesn't create additional ^{226}Ra, nor does it mobilize ^{226}Ra, ^{226}Ra should not be a problem from a regulatory risk perspective.

Response: The Ra-226 risk analysis was done as part of an independent Interagency effort that was reported to the IMA. The analysis indicated minimal risks from waste rock Ra-226 levels to recreational users, however, elevated risks were evident in a residential scenario on waste rock materials, resulting in the proposed restriction for this use scenario. We agree that mining does not create Ra-226, but it does bring source material to the surface where it becomes a new exposure route that may not have previously occurred in that area under natural conditions. The limited outcrop concentrations from other locations do not necessarily represent the site-specific background condition for all surface areas selected for former waste rock pile construction.

37. p. 21, Sec 4.2.3.1, 1st paragraph on page, last sentence. The USFS vegetation reclamation goal recommendation is not referenced. According to the Dry Valley Mine – South Extension Project EIS and other documentation supplied by the USFS, the reclamation vegetation goal is thus:

    1. Fifty (50) percent of vegetation measured over the surface of the reclaimed mine area must contain selenium concentrations less than 5.0 mg/kg selenium dry weight;

    2. Forty-five (45) percent of vegetation measured over the surface of the reclaimed mine area may contain selenium concentrations ranging between 5 mg/kg and 10 mg/kg selenium dry weight;

    3. No more than 5 percent of vegetation measured over the surface of the reclaimed mine area may contain selenium concentrations greater than 10 mg/kg selenium dry weight and no more than 0.5 percent of the vegetation measured over the surface of the reclaimed mine area shall exceed 20 mg/kg selenium dry weight.

    4. For all vegetation sampling conducted, USFS and BLM require that samples be representative and sampling be completed in accordance with agency approved recognized sample collection procedures, laboratory practices, sample preparation, and sample analysis procedures.

    5. FMC will implement a supplementary vegetation sampling program in reclaimed areas where soil/growth medium are used for reclamation that test 1.0 mg/kg total selenium. The supplemental program would be determined by the site-specific reclamation team (USFS, BLM, and FMC).

    Since other sources seem to recommend 5 mg/kg selenium in vegetation as a regional grazing level, we suggest a compromise of a two-pronged guideline where less than 50% of the reclaimed vegetation must be below 5 ppm dw Se and less than 5% must be below 10 ppm dw Se. The third prong of the USFS guideline would require sampling in order of hundreds of samples to achieve statistical confidence.

    Response: The vegetation goal is intended to provide forage that averages 5 ppm; the upper bound of this guideline does not achieve that. We have recommended to the land management agencies that the concentrations for each tier be adjusted to achieve an upper bound of 5 ppm,

as intended by the reclamation goal, or that the guideline be changed to a simple mean value using a statistically significant number of random samples from individual operational units.

38. p. 25, Section 4.3.2, 2nd paragraph. This paragraph states that three types of action levels were developed by the agency for purposes of risk management. The first type of action level indicates "a need for continued monitoring by exhibiting some level of degradation above background." This is clearly an anti-degradation policy and the IMA is unaware of a legal basis for such a policy in the State of Idaho for media such as surface water or sediment. The conclusions of the area-wide risk assessment and site-specific field biological studies conducted in cutthroat trout, birds and elk within the Phosphate Resource Area do not support the assumption that environmental concentrations of selenium and other trace minerals above background pose a significant risk to public health or ecological receptors. A requirement for monitoring of a natural trace mineral, such as selenium, because media concentrations exceed background is unsupported by the agency's own conclusions which state that "…regional human health risks and population-level ecological risks are unlikely…" (p. 3, 2nd ¶ of Section 2.1). We question the procedural basis for action levels that require substantial regional monitoring when a regional risk has been demonstrated not to exist.

Response: The Idaho surface water quality rules do contain an antidegradation provision. However, the monitoring action level is not intended to quantify risk, it is intended to identify conditions that may be symptomatic of unauthorized releases coming from individual sources. IMA's obligation to eliminate such releases is not based on risk, it is an ongoing BMP requirement under State surface mining rules. Furthermore, this is not a regional monitoring requirement, it is a site-specific monitoring requirement for characterization and delineation of each mine site during the site investigation phase.

39. p. 25, Section 4.3.2, 3rd paragraph. This paragraph describes the third type of action level, risk-based concentrations requiring EE/CA consideration based on exposure to terrestrial subpopulation receptors. Text indicates that action levels were developed for eleven ecological receptors. The reason for evaluating many of these receptors is unclear. Only a few receptors (e.g., the song sparrow, mallard and eastern cottontail) exhibited HQ estimates significantly above background HQs in the area-wide risk assessment. It would seem reasonable to identify the most sensitive ecological receptors for a given trace mineral and medium based on results of the risk assessment, and derive action levels based on these receptors. Again, there appears to be a discontinuity between the results of the area-wide risk assessment and methods used to derive action levels in the Draft RMP.

Response: Exposure within the Resource Area occurs from multiple sources and areas. The target receptors represent the most important components of the various feeding guilds that comprise the terrestrial ecosystem in the Resource Area. Therefore, IDEQ chose to disclose the HQ results for all species evaluated to provide an overall perspective on the effects of the proposed action levels at various trophic levels and feeding guilds. This approach clearly identifies the most sensitive receptor groups for each constituent and media, and provides a balanced perspective for risk managers to use in making their decisions.

40. p. 26 and 27, Section 4.3.2. Text on these pages states that three phases of risk evaluation were performed for the Draft RMP as follows: (1) deterministic and probabilistic risk calculations using impacted area data, (2) calculation of single medium action levels, and (3) calculation of HQ estimates using the action levels derived in Step 2 as inputs to the original stochastic models. While IMA appreciates the attempt at innovation, none of the risk calculations described in Step 1

were included in the Draft RMP. Therefore, it is impossible to evaluate the validity of the methods and conclusions of this step.

Response: The text has been revised and a separate attachment has been provided to describe the risk management supporting calculations.

41. p. 26, Section 4.3.2, 2nd paragraph. This paragraph needs clarification and includes risk assessment concepts not previously addressed in the area-wide risk assessment. Therefore, considerably more explanation is needed to define concepts such as "No Observed Adverse Effect Level (NOAEL) hazard quotient" and "Low Observed Adverse Effect Level (LOAEL) hazard quotient". Text should explain why different target HQ levels were used to calculate single medium concentrations, and why HQ target levels were different between NOAEL-based calculations and LOAEL-based calculations.

Response: LOAELs have been removed from the RMP since they have no impact on the selection of actions levels and only create confusion. Action level procedures are described in Attachment 1.

42. Section 4.3.2, Table 4-2. This table contains extensive summary results from Steps 1 and 2 of the action level development process that are not sufficiently explained. The nature of the information being presented in Table 4-2 was not immediately apparent IMA's risk assessment contractor, and we question whether non-technical individuals can even begin to understand the information presented. A risk management plan should provide *summary* risk information and be much more understandable to those parties it is designed to regulate, as well as non-technical government representatives and members of the public.

Response: Table 4-2 was provided to illustrate the Department's level of effort but did not contribute to the final outcomes. Therefore, this table has been removed from the revised document.

43. p. 26, Section 4.3.2, 2nd paragraph, last sentence. The explanation regarding the negative numbers that appear in Table 4-2 does not make sense. Back-calculated media concentrations can be very low values, in a direction approaching zero, but they cannot be negative numbers. A more likely explanation for the negative values is that there is a technical flaw in the model that was used to generate NOAEL- and LOAEL-based media concentrations. Since these calculations were not presented in the Draft RMP, it is not possible for IMA to assess the potential reasons for these negative media concentrations.

Response: Back-calculated values can result in negative numbers when using multi-media exposure models. In this case, an acceptable exposure point concentration (EPC) for a single media was calculated by assuming that an HQ of 1 was an acceptable risk level and the EPCs for all other media were set at the statistically calculated concentrations for impacted areas. Negative numbers resulted in some cases because the dose from the other media concentrations exceeded an HQ of 1 without any contribution from the media for which the acceptable concentration level was being derived. However, as stated in the previous response, this empirical effort did not contribute to the final action level outcome so the related discussions have been removed from the text.

44. p. 26, Section 4.3.2, 3rd paragraph, 1st sentence. Probable flaws in the model used in Step 1 of the action level development process renders subsequent steps of this process meaningless. For example, the conclusion "it became evident that for most receptors, one or two primary exposure pathways drove the dose equation results" is unsubstantiated based on the information presented in the Draft RMP. While it is true that exposures are typically dominated by one or two exposure

pathways, total exposures are not typically dominated by the pathways (i.e., incidental ingestion of soil, surface water and sediment) that were selected by the agency to derive single medium action levels. Implicit in the Agency's decision to exclude food-chain pathways in action level development is the assertion that dietary uptake is a relatively minor exposure pathway in the case of total selenium uptake. This assumption in the case of selenium is in direct conflict with the extensive published literature indicating that food-chain transfer and dietary uptake of selenium are the overriding determinants of risk to wildlife. In the absence of any documentation in the Draft RMP to support this decision, the single medium risk-based action levels developed in Step 2 (and summarized in Table 4-2) are unsubstantiated.

Response: As indicated, Step 1 of the action level development process reported in the draft document did not ultimately affect the subsequent calculations. Therefore, this step was deleted from the final text and the other calculations are described in Attachment 1. The exposure pathway contributions are not only controlled by ingestion percentage but also dose concentration, which is why soil, sediment and water play an important role. Dietary uptake is also considered by the action level for vegetation, however, other food chain items such as prey, invertebrates, emergent vegetation, etc. are not readily controlled through the removal action process so abiotic media are used to reduce transfer and uptake in these secondary media. Reducing concentrations in soil, water and sediment will cause an overall reduction in the food web.

45. p. 26, Section 4.3.2, 3rd paragraph, last sentence. This sentence indicates that risk-based single medium action levels were derived using NOAEL-based toxicity values "due to the wide range of disparity between NOAEL and LOAEL concentrations, often as much as three orders of magnitude." The NOAEL is the exposure level (i.e., dose) at which no ecological impacts are anticipated. The LOAEL corresponds to the lowest exposure level at which ecological impacts are anticipated. It should be understood that the NOAEL is an artifact of toxicological study design. That is, a range of doses (often covering several orders of magnitude) is tested and the highest dose at which no effect is observed is termed the NOAEL. Alternately, the lowest dose at which an adverse effect is observed is identified as the LOAEL. The 'true' NOAEL resides somewhere between the 'observed' NOAEL and the LOAEL exposure. If the NOAEL and LOAEL toxicity values that were used to generate risk-based single media action levels differ by up to three orders of magnitude, then the resulting action levels are potentially biased low by up to three orders of magnitude. This considerable level of uncertainty in the proposed action levels should be disclosed before industry spends precious resources on future monitoring or remediation activities.

Response: It should be noted that the "true" LOAEL also lies somewhere below it's published value. Standard industry risk assessment/management practices typically utilize the NOAEL as the appropriate threshold risk value (TRV) and this approach is discussed throughout the document. One of the reasons a mean hazard quotient of 20 was deemed acceptable by the Department was due to the use of the NOAEL as the TRV.

46. p. 27, Section 4.3.2, 3rd paragraph, 1st sentence. Text indicates that Step 3 of the action level development process included calculation of ecological hazard estimates based upon derived abiotic media (i.e., surface water, sediment and soil) action levels, and field measured concentrations for biotic media (e.g., riparian vegetation, aquatic vegetation, aquatic invertebrates, terrestrial invertebrates and fish) collected from impacted areas. Please explain the underlying rationale for the assumption that abiotic media concentrations in compliance with action levels for unregulated areas are collocated with impacted biotic media. If trace mineral concentrations in abiotic media within unregulated areas are present at or below corresponding

action levels, wouldn't biotic media concentrations also be lower than levels currently measured in impacted areas?

Response: The main reason for not providing an estimated reduction in abiotic media is the absence of any credible procedure for calculating values. Since, the action levels do not require a zero concentration outcome, some Se bioaccumulation will still occur in impacted areas. There's also the possibility that many of the abiotic media will act as reservoirs and store selenium even after action levels are achieved. For instance, how long does it take emergent or aquatic vegetation to depurate existing selenium concentrations? It is the IDEQ's intent that proportional reductions will occur, which is another reason we accepted higher hazard quotients than typically practiced.

47. p. 37, Section 5.0, 3rd paragraph. Text states, "In deriving risk-based action levels, over 1,500 separate deterministic and 1,000 separate probabilistic risk calculations were performed to derive action levels that achieve the risk management goals." Aside from the fact that many of these calculations were probably not necessary (please refer to Specific Comment No. 39), the risk-based action levels presented in the Draft RMP are based upon unconventional and undocumented methods. Furthermore, in the case of the selenium action levels for surface water and sediment, the agency abandoned risk-based calculations altogether in preference to *background* levels. As a result of this decision, concentrations of trace minerals in environmental media at concentrations above background will trigger considerable action (i.e., monitoring or removal action). Due to these, and other, limitations described herein, the action levels described in the Draft RMP are currently unacceptable to industry.

Response: The removal action levels represent concentrations that the Department has concluded to either be in violation of existing environmental standards or present unacceptable subpopulation level risks. Discussions of models and methods used in the risk management supporting calculations are contained in Attachment 1. Background levels are used only to identify potential release pathways for further monitoring or for default values where calculated risk thresholds are below background levels.

48. Appendix B. It appears that in vanadium and some of the media for zinc the LOAEL and NOAEL differ by a factor of 10. This seems somewhat suspect. These calculations may need to be checked. Also for soil selenium the lowest value for the NOAEL (10.4) is higher than the LOAEL (6.16) how can this be?

Response: The LOAEL and NOAEL reference values for avian receptors (Navy 1998) for zinc are based on the same study and differ by an uncertainty factor of 10. Therefore, the zinc calculations are correct. The same situation occurs for vanadium in mammals (Sample 1996). As previously stated, all LOAEL information has been removed from the RMP since action levels are based on NOAELs.

49. Appendix C. Table C-2 documents the basis of the body weight distribution for the raccoon that was used in stochastic risk calculations for this receptor. Text in Table C-2 states, "No data was available on the SD of the body weight distribution for the raccoon. Schacher and Pelton (1978) reported body weight data on the muskrat in Tennessee. The mean body weight for both male and females was 1,274 grams with an average SD of +/- 50.1 grams. Therefore, the SD for the raccoon body weight distribution is extrapolated from data on the muskrat and scaled based on mean body weights. This results in a SD of +/- 263 grams." Please note that the value of 50.1 grams cited in *Wildlife Exposure Factors Handbook* (USEPA, 1993) is a standard *error*, not a standard deviation. Given that the sample size is not specified, the standard deviation is unknown. These statistics have different meaning and can not be used interchangeably. The

substitution of a standard error for a standard deviation will result in a calculation that is overly confident (i.e., uncertainties are underestimated). Consequently, all stochastic risk calculations performed for the raccoon are erroneous. More broadly, all of the calculations are erroneous in that they are only partially stochastic. It appears that the only variable stochasticized are body weight and environmental chemical concentrations. All other exposure parameters are erroneously assumed to be an absolutely certain function of body weight. This has the effect of underestimating uncertainty and thereby generating overly confident results.

Response: The commenter is correct that it is a standard error and not a standard deviation reported in EPA 1993. IDEQ understands that these parameters are not totally interchangeable, however, in the absence of the SD, the Department believes the use of the SE is an acceptable substitute and within the uncertainty range normally associated with risk estimates. Similarly, the IDEQ agrees that while body weight and ingestion rates are strongly correlated, the relationship is not absolute. The Department accepts the additional uncertainty and believes the information generated adequately supports our risk management process.

50. Appendix D. The range of stochastic risk estimates for ecological receptors is far narrower than those typically observed for environmental risk estimates. Selenium HQ estimates presented in Table D-8 for the raccoon ranged from 4.31 to 6.78 (i.e., less than a factor of two difference). This implies extremely tight ranges for the distributions of individual input parameters. Such tight distributions may result from selectivity in the information used to construct these distributions and/or overconfidence in our knowledge concerning these parameters.

Response: Comment noted.

Rick Clegg
IDEQ Soda Springs Satellite Office
15 W. Center
Soda Springs, ID 83276

July 17, 2003

Fax: 208-547-3989

Re: Area Wide Investigation, Southeast Idaho Phosphate Mining Resource Area — "DEQ Seeks Comments on Draft Plan to Address Localized Selenium Risks"
[**Public Comment Draft, Area Wide Risk Management Plan: Remedial Action Goals and Objectives, and Risk-Based Action Levels for Addressing Releases from Historic Phosphate Mining Operations in Southeast Idaho.**]

Dear Mr. Clegg:

As stated during our telephone conversation, on July 7, 2003, Porgans & Associates (P&A) expressed its intent to submit written comment on the ***Area Wide Risk Management Plan: Remedial Action Goals and Objectives, and Risk-Based Action Levels for Addressing Releases from Historic Phosphate Mining Operations in Southeast Idaho****,* which are contained herein. However, for the record, it is important that P&A reiterate longstanding and yet to be resolved issues pertinent to the inherent shortcomings previously expressed about the recently completed <u>Area Wide Risk Assessment Investigation, Idaho Phosphate Mining Resource Area</u>[1] and the intrinsic IDEQ/IMA conflict of interests and self-serving polices that place both public trust and private resources at greater risk. The following is a brief synopsis of concerns about the findings of Area Wide Risk Management Plan: Remedial Action Goals and Objectives, and Risk-Based Action Levels for Addressing Releases from Historic Phosphate Mining Operations in Southeast Idaho and related reports so far:

❶ The **scope and breadth** of the Area Wide report is still an issue of contention. The premise upon which the findings are based, the data collection techniques, the observations, and the purported outcomes raise doubts about the level of confidence that can be placed in the reported conclusions. Based solely upon the "research" and observational efforts, under IDEQ's tutelage the "Area Wide threat" attributable to toxic mine waste dump contamination appears to be a "dead issue," which, on the surface, is incongruent with reality-based events (body counts) and bona fide evidence.

❷ The widespread discrepancies associated with the level of risks determined by IDEQ et al and those revealed by USFWS and USGS that mine waste rock dump contaminants pose a threat to public trust and private resources are extremely disconcerting and unsettling.[2] Unfortunately, the only time it becomes an issue is when a disaster surfaces, such as the recent death of 327 sheep at the Conda Mine waste dumps. When then does the death-by-selenium cease to be an anomaly and is recognized as a continuing trend? Each time a massive die-off occurs, IDEQ et al re-institutes the moving-target syndrome.

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[1] Porgans & Associates letter to Rick Clegg, Department of Environmental Quality, Soda Springs, ID., Re: ***Synopses of Comments and Concerns Pertinent to the Selenium Project: Southeast Idaho Phosphate Resource Area, Draft Area Wide Human Health and Ecological Risk Assessment and Related Documents***, July 11 , 2002.

[2] Porgans & Associates letter to James Blair, Bureau of Land Management, Pocatello Field Office, Pocatello, ID., ***Wells Canyon Exploration EA Scoping, Re: Comment to Notice of Scoping — Wells Canyon Phosphate Exploration Project(Within Federal Phosphate Lease I-01440*****,** December 12,2002**.**

❸ In all the years that IDEQ, IMA, MW, UI and other of its consultants have been conducting research in the field, according to your own admission, they have yet to find any dead species of fish and/or wildlife whose death could be linked (via an autopsy) to selenium poisoning. Furthermore, there was an apparent failure to detect the presence of high levels of selenium in gestation by various species. Conversely. other entities have not only found dead species, but have also confirmed their deaths to selenium poisoning. Fortuitously, if it were not for the independent field work conducted in southeast Idaho by USFWS' Dr. Skorupa et al (8-days in the field) the public would have never known of the high-levels of selenium in the aquatic food chain and birds at the pit ponds and wetlands associated with the waste dumps.[3] Dr. Skorupa's research was not funded or initiated by IDEQ et al. It was the result of the initiative taken by USFWS, USGS and P&A. (For more detailed information, please refer to the written comments previously submitted to IDEQ et al by P&A.)

The aforementioned were, to some extent, stated in P&A's July 11, 2002, comments to IDEQ pertinent to the draft "*Area-Wide Human Health and Ecological Risk Assessment*", and I quote:

> *There is no question that a great deal of time and resources have been expended by the Idaho Mining Association (IMA) and the State of Idaho on the selenium "research" effort. However, P&A views the sheer expenditure of time and resources as a relative variable, the value of which is dependent upon the confidence that can be placed on quantifying and qualifying the level of commitment and objectivity inherent within the scope and breadth of the research effort. Unfortunately, the collective effort of the IMA, the Idaho Department of Environmental Quality (IDEQ), Montgomery Watson (MW) and the University of Idaho (U of I), indicate that to date, the research effort has been skewed, flawed and misleading. To its credit Tetra Tech EM Inc.,* ***has attempted to salvage the "research" effort; however, it would be an understatement to say that it has its hands full.*** *It is also worth noting that MW is* ***no longer the lead misinterpreter of data;*** *that position appears to have been passed on to the U of I.*
>
> *It is axiomatic that a comprehensive analysis requires a comprehensive commitment to identifying, quantifying and qualifying all of the relative issues pertinent to the Area Wide Human Health and Ecological Risk Assessment in an unbiased and objective manner.* ***P&A respectfully submits that after having reviewed IDEQ's report and related documents, and considering our years of involvement monitoring the "progress" of this project, it is blatantly apparent the proponents have failed categorically to identify, quantify and/or qualify selenium impacts and risks in the Area Wide Human Health and Ecological Risk.*** *Therefore, it would be a real challenge for P&A to attempt to address all of the deficiencies and/or intrinsic shortcomings in the DRAFT Area Wide Human Health and Ecological Risk Assessment and related documents.. Albeit, P&A will focus its comments on the fundamental flaws inherent within the research effort, which*

[3] Joseph Skorupa et al, USFWS, Sacramento office, *Reconnaissance Survey of Selenium in Water and Avian Eggs at Selected Sites Within the Phosphate Mining Region Near Soda Springs, Idaho, May-June 1999*, Aug. 2002.

includes, but is not limited to the summary and (pre) conclusions asserted by IDEQ et al.[4]

IDEQ's Response, Was Non-Responsive, Evasive, and Misleading:

"It is interesting that P&A credits Tetra Tech with "salvaging" the research effort when in fact they are IDEQ's prime contractor and have been conducting their efforts under our direction, including development of the risk assessment. Once again, P&A's quote states: *"To its credit Tetra Tech EM Inc.,* ***has attempted to salvage the "research" effort; however, it would be an understatement to say that it has its hands full.*"** IDEQ's "response" is a misstatement and an abuse of the English language. "....*attempted to salvage*...." and "....*credits Tetra Tech with `salvaging' the research effort* ...." are without question dissimilar. The extent and breadth of the dissimilarities are blatantly evident by the very next paragraph of P&A's July 11, 2002, comment letter, which reads as follows:

> ***P&A respectfully submits that after having reviewed IDEQ's report and related documents, and considering our years of involvement monitoring the "progress" of this project, it is blatantly apparent the proponents have failed categorically to identify, quantify and/or qualify selenium impacts and risks in the Area Wide Human Health and Ecological Risk.***

Even if one was to give IDEQ's respondent the benefit of the doubt, relative to his/her inability to distinguish the difference between attempted to salvage the research effort and credits Tetra Tech with salvaging the research effort, had he or she read the following paragraph and was competent to comprehend the aforementioned quoted statement, he or she should have realized that "attempted" denotes were not successful and/or failed. It is not P&A's intention to overemphasize the comprehension abilities of the respondent to this issue, rather to emphasize that this misinterpretation is symptomatic of the fundamental longstanding shortcomings inherent in the IDEQ et al "research" effort, data collection and non "responsiveness."

Specific Comments to the Area Wide Risk Management Plan: Remedial Action Goals and Objectives, and Risk-Based Action Levels for Addressing Releases from Historic Phosphate Mining Operations in Southeast Idaho Report:

> *The Idaho Department of Environmental Quality was designated as the Lead Agency for the Area Wide Investigation in July 2000 through formal agreements with Federal, Tribal and Agencies, and the mining companies that comprise the Idaho Mining Association Selenium Committee. The agreements contain an Area Wide Investigation Scope of Work that requires the Agency to develop an Area Wide Risk Management Plan among other tasks. The risk management plan is intended to provide guidance to other Lead Support Agencies, an mining companies in focusing limited resources, identifying areas of concern, minimizing future risk assessment needs and assisting in mine-specific risk management decision making in an consistent manner. However, the plan is strictly advisory in nature. All mine-specific decision-making is at the discretion of the Lead Agency with consultation from Support Land Trust Agency representatives in accordance with site-specific*

4 P&A's letter to Rick Clegg, Department of Environmental Quality, Soda Springs, ID., Re: ***Synopses of Comments and Concerns Pertinent to the Selenium Project: Southeast Idaho Phosphate Resource Area, Draft Area Wide Human Health and Ecological Risk Assessment and Related Documents***, July 11 , 2002, p. 2.

goals and conditions. This plan contains a brief summary of Area Wide activities performed to date, a synopsis of the mine-specific approach to be conducted under the non-time critical removal action process, in comprehensive discussion of risk management issues including Area Wide remedial action goals and objectives, and development of risk-based action levels. (P. i, paragraph 1.)

*The Agency recently published the Final Area Wide Risk Assessment which **concluded that regional human health and population-level ecological risks are unlikely based on current observed conditions.** However, the assessment indicated that ecological subpopulation risks might occur in localized areas impacted by historic mining operations and ongoing releases. These areas comprise less than **5% of the overall** Resource Area but the Agency has concluded that subpopulation risks are an appropriate measure for prioritizing and addressing existing impacts and ongoing releases.* (P. i, paragraph 2.)

*The Agency has developed a set of regional remedial action goals and objectives intended to achieve compliance with existing environmental regulations and to address areas of unacceptable risks. **The first goal** is to protect surface water resources in Southeast Idaho through achieving compliance with Federal and State regulatory criteria, developing and demonstrating effects best management practices for future mining operations, and conducting long-term monitoring to determine the effectiveness of implemented actions and to provide early warning of further degradation issues should they occur. **The second goal** is to protect wildlife and habitat in the resource area through reduced exposure in areas exceeding risk-based action levels, and development and demonstration of modified best management practices and reclamation procedures. **The third goal** is to maintain and protect other multiple beneficial uses of the resource area through effective grazing management practices and land use restrictions preventing future residential development of designated mining waste units. And **the last goal** is to protect regional ground water sources by characterizing and responding to any local ground water contamination, and developing and demonstrating effective best management practices to prevent future ground water impacts.* (P. ii, para. 1.)

On the surface, the goals and objectives are admirable; nevertheless, their actual implementation appears to be problematic. As stated during our telephone conversation, P&A has yet to receive quantifiable data that reveals the actual reality-based levels of risks attributable to historic mining waste dump sites, be it area or regional wide. **Contrary to your understanding**, USGS has not conducted a comprehensive analysis of waste dump volumes or more importantly, the levels of contaminants contained in the waste dumps and/or the ongoing level of risk they pose to the environment. (Please refer to page six, line 43.) Without having a fundamental understanding of the scope and breadth of the problem, it is invariably problematic that the problem will not be **reasonably** resolved. In the absence of such fundamental and critical data, the real cost and most viable solutions to achieve the stated goals and objective may be significantly impaired as a result of your limited perspective resources. If one takes into account the "limited resources" spent to date on "independent research" and the prioritization of past disbursements, it could be construed that IDEQ is setting itself up for the ultimate failure. Please do not misconstrue the exemplification of this particular fundamental shortcoming in the Area Wide effort. It is not P&A's intention to overemphasize the "limited resources" flaw and/or the myriad of other flaws in the so-called analysis conducted to date. P&A's prior correspondences have expanded on many other fundamental flaws inherit in IDEQ et al's efforts. Albeit, on the positive side, let's not write the whole thing off as a waste, fundamentals are out there for the taking and/or implementation.[5] I am sure that if IDEQ et

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to [5] Porgans & Associates – Status Report — *Impact Assessment Evaluation and Review of Potential Mitigation Measures Ameliorate Environmental Effects of Selenium Mobilization, Contamination and Poisoning of* al expressed a sincere interest in addressing fundamental issues, the federal agencies would accommodate its request. If P&A can be of further assistance, please advise us accordingly.

Subject: Selenium and Idaho Phosphate Mining — Dr. Skorupa's Email Comments to Sheryl Hill:

As you will see from reading the report I'm mailing to you, the Reconnaissance Survey that I conducted with Dr. Steven Detwiler (currently working for the S.F. Bay Institute) and Mr. Robert Brassfield (currently working for the U.S. Forest Service in Stevensville, Montana) led me to conclude that ... "... the hottest sampling sites discovered during this brief survey of the Idaho phosphoria region were hotter than the hottest sampling sites discovered during approximately a decade of sampling across ten states for the NIWQP [National Irrigation Water Quality Program]. However, the potential for damage to avian populations depends not only on how contaminated (hot) a site is, but also on how attractive it is to breeding water birds. What made Kesterson Reservoir such a large scale catastrophy was that it was highly contaminated AND it attracted thousands of breeding water birds each spring. This brief survey did not discover any sites that were suspected of exposing inordinately high numbers of breeding water birds. Although this survey was not designed to census bird numbers, the authors gained a qualitative impression that none of the sites surveyed supported more than a few hundred breeding water birds, and most of the sites surveyed probably supported substantially fewer breeding water birds." [see p. 78 of report] In general coffee shop terms, during our survey we had no difficulty finding birds nesting at very contaminated wetlands, ponds, reservoirs, etc. The eggs of those birds had very high selenium concentrations; 77% of 74 samples had selenium levels above 10 ppm (roughly the toxicity threshold for laboratory mallards). However, except for a couple of reservoirs, the individual

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Livestock on Private and Public Grazing Lands located within the Southeast Idaho Phosphate Mining Resource Area, April 2002.

Porgans & Associates, *Phosphate Mining in the Northwest United States, Selenium Mobilization-Contamination-Poisoning, an Unknown Risk or a Government Sanctioned Time Bomb?* June 2000.

Porgans & Associates *letters to the U.S. Fish & Wildlife Service, Sacramento, California Office, U.S. Bureau of Land Management, Boise, Idaho Office, U.S. Forest Service, Pocatello, Idaho Office, U.S. Geological Survey, Menlo Park, California Office, Project – Phosphate Mining in the Northwestern Phosphate Field — Selenium Mobilization, Contamination and Poisoning — Potential Threat to Private and Public Trust Resources, Subject: State Government, Idaho Mining Association and Their Respective Consultants' Research and Findings are Rife with a Litany of Conjecture and Ambiguities that are Diametric to the Research and Findings of the U.S. Fish and Wildlife Service and the U.S. Geological Survey, which are in Need of Immediate Clarification and Reconciliation, July 11, 2002.*

sites we sampled were generally small in area (ponds and puddles) and supported only a few breeding birds each. Thus, while some of the sites we sampled present a very high potential risk for poisoning breeding water birds, that high potential for risk was not being realized on a massive scale at the sites we visited (I think this must be the conclusion that the consultants are referencing). To be fair, the consultants should also cite the caveats presented in our report. Mainly, that it was our opinion that there are probably many, many, more locations presenting a risk to birds than we had the time to investigate. Especially vernal, ephemeral wetlands that none of the field surveys before ours ever sampled in any manner (such as for water, sediment, invertebrates, birds, etc.); and as far as I am aware, no survey after ours has done so either. ***Our primary recommendation, was to point out the critical need for additional sampling, i.e., to point out the obvious, that in just a matter of a few days of fieldwork we had found enough evidence of risk that a much more extensive RISK-TARGETED survey was warranted and should be a highest priority****. The University of Idaho/IMA avian study was plenty extensive, but it was not RISK-TARGETED. It did not seek specifically to find contaminated sites and systematically evaluate such sites. Nonetheless, based on our very limited RISK-TARGETED survey, the PROVISIONAL conclusion supported was that the realized risk to birds should generally be considered relatively low if the conditions during Spring of 1999 were reasonably representative of long-term conditions. Ideally though, you would want to do what we did for several breeding seasons to get an idea of year-to-year variability in conditions, and you would want to do it much more extensively to get a more comprehensive picture because even though individual sites each attracted relatively small numbers of birds, if you have enough sites out there then the issue of cumulative effects might become the controlling factor for a risk assessment. That's why it was concluded in our report that.... "The general lack of data for such vernal wetlands constitutes a critical data gap that could profoundly influence the outcome of regional risk assessments." [see p. 79 of report]. To sum it up, we found a bunch of "loaded guns" with a minimal number of targets in harm's way of any individual "gun". However, until more work is done on a RISK-TARGETED basis, we don't really know how many "loaded guns" in total are out there and what the cumulative number of targets in harm's way is or how that number varies from year-to-year. One final perspective. Literally, my team spent only 8 days in the field (4 days in May, 4 days in June; 1999) and in that short time we managed to discover an American Coot egg with more selenium (80 ppm) in it than ever found anywhere else in the U.S. even though American Coots have been extensively sampled for more than a decade, across 10 different western states, at places identified as the worst selenium sites those states have to offer. We managed to discover aquatic invertebrates with the highest level of selenium (788 ppm) ever reported from much more intensive and extensive sampling across the western U.S. We managed to discover a significant salamander die-off (more than 250 carcasses visible from our vantage point) which has subsequently been diagnosed as selenium toxicosis by the National Wildlife Health lab, and to my knowledge the 120 ppm Se in the salamander tails reported by that lab (independent of the lab doing the other analyses cited above) is also a record high for selenium concentrations in any salamander tissue. We found dead white pelicans and dead beaver (on the shores of a reservoir that we also obtained a deformed coot embryo from) that were not the result of predation, but whose cause of death we could not determine.* ***We found all of those extraordinary results at separate locations (some separated by more than 50 miles), it wasn't just one or even two nasty locations in one localized area accounting for everything. To me those findings seem like a lot from just 8 days of sampling and begs to have the question asked, what would we find in 30 days, or 60 days, or one year, or three years of RISK-TARGETED searching. I also find it odd that we found all that in 8***

days on a $7,000 budget, yet years of work by IMA-funded studies with six-figure budgets have not resulted in much, if any, evidence for adverse ecological effects. Either my team was inconceivably lucky (or is that unlucky?), or other studies were not very well focused on seeking out those places in the landscape, and those biota within those places, that most needed examination from a RISK-TARGETED perspective. In my professional opinion, it would be foolhardy to strongly support or strongly dispute any particular regional risk assessment "outcome" until substantially more RISK-TARGETED biological sampling is completed. It is simply premature to do so. [Emphasis added.] *Best Regards, Joe Joseph Skorupa, PhD Senior Biologist Division of Environmental Contaminants U.S. Fish and Wildlife Service 2800 Cottage Way, Rm. W-2605 Sacramento, CA 95825 Ph: 916-414-6593 FAX: 916-414-6713* [Dr. Skorupa sent P&A a copy of the email he sent to Ms. Hill.]

Note: The following comments were made by P&A to Rick Clegg, Department of Environmental Quality on July 11, 2002, Re: Synopses of Comments and Concerns Pertinent to the Selenium Project: Southeast Idaho Phosphate Resource Area, Draft Area Wide Human Health and Ecological Risk Assessment and Related Documents. The reason for this reiteration is due to the fact that "responses" came from a unanimous source, which are assumed to be from IDEQ, although the response came back in the content of P&A's letter to IDEQ. **The responses were judgmental, personal and conflict with the sources of quoted information cited by P&A, which was generated via the IDEQ consortium. The "responses" were disconcerting, disrespectful and egregious. Please refrain from such conduct in the future.**

Volumes of Waste Ore, Toxic Constituents, Level of Risk Yet to Be Fully Disclosed or Evaluated:

P&A has made contact with the responsible government agencies to ascertain whether or not they have specific detailed information/data on the volume of waste rock that has been stockpiled within the Conda mine area and/or any of the other inactive and/or active mine sites. In addition, P&A requested data pertinent to the characterization of toxic chemical constituents contained within the waste rock, and finally, the level of risk that the toxic materials may pose to the environment, which includes all of the client's respective concerns. **Simply stated, the government does not have substantive answers to any of the aforementioned questions. Furthermore, the government conceded to the fact that it has been extremely difficult for it even to obtain information regarding the shear volume of waste at or around the mine sites, because the mining companies contend that is proprietary information. P&A learned that the USGS did collect a "small number of samples" of the waste rock/materials at a number of the dump sites; however, that information is limited in value.**

USGS Reports States Limited Samples do not Constitute Characterization of Mine Wastes:

The following quotations are excerpts from a recently published USGS report entitled: **Open-File Report 01-411, 2001**, *Chemical Composition of Samples from Waste Rock Dumps and Other Mining-Related Features at Selected Phosphate Mines in Southeastern Idaho, Western Wyoming, and Northern Utah:*

> *This report provides chemical analyses for 31 samples collected from various phosphate mine sites in southeastern Idaho (25), northern Utah (2), and western Wyoming (4). The sampling efforts was undertaken as a reconnaissance and does not constitute a characterization of mine wastes. Twenty-five samples were collected from waste rock dumps, 2 from stockpiles, and 1 each from slag, tailings, mill shale, and an outcrop. All samples were analyzed for a suite of major, minor, and trace elements. Although the analytical data set for 31 samples is too small for detailed statistical analysis, a summary of general observations is made.*
>
> *Element concentrations vary considerably because of the differing rock types collected over a wide*

geographic area. For the 25 waste rock dump samples, concentrations of arsenic, antimony, thallium, chromium, copper, nickel, and vanadium are moderately elevated, ranging from 1.5 to 5.6 times those of average world-wide shale, the average concentration of four elements are significantly elevated compared to their average abundance in average world-wide shale – selenium (x 77), cadmium (x 172), molybdenum (x 19), and zinc (x 12). A sample of slag, a product of high-temperature processing, collected from an inactive elemental phosphorous plant at the Georgetown Canyon mine contains the highest concentration for 17 elements - silver, cobalt, chromium, copper, europium, iron, gallium, manganese, molybdenum, niobium, nickel, phosphorus, thorium, titanium, vanadium, ytterbium, and zirconium – and the lowest concentration for 17 others – aluminum, carbon, calcium, cadmium, mercury, potassium, lanthanum, lithium, magnesium, sodium, sulfur, scandium, selenium, strontium, thallium, yttrium, and zinc. Highly contrasting geochemical signatures occur for two samples collected from the same waste-rock dump at the Waterloo mine near Montpelier, ID illustrating the heterogenous nature waste dump rocks.[6]

USGS Open-File Report 01-142 Ranks Conda Mine as Number 2 in Total Area of Disturbed Surface:

This report provides a description of data and processes used to produce a spatial database that delineates-related features in areas of historic and active phosphate mining in the core of the southeastern Idaho phosphate resource area. The ***data have varying degrees of accuracy*** *and attribution detail. Classification of area by types of mining-related activity at active mines is generally detailed; however, the spatial coverage* ***does not differentiate mining-related surface disturbance features at many of the closed or inactive mines****.*

[6] USGS, **Open-File Report 01-411,** *Chemical Composition of Samples from Waste Rock Dumps and Other Mining-Related Features at Selected Phosphate Mines in Southeastern Idaho, Western Wyoming, and Northern Utah,* 2001, p. 4.

Nineteen phosphate mine sites are included in the study. A total of 5,728 hc (14,154 ac [acres] *), or more than 57 km^2 (22 mi^2), of phosphate mining-related surface disturbance are documented in the spatial coverage of the core of the southeast Idaho phosphate resource area. The study includes 4 active mines – Dry Valley, Enoch Valley, Ramussen Ridge, and Smoky Canyon – and 15 historic phosphate mines – Ballard, Champ, Conda, Diamond Gulch, Gay, Georgetown – and Canyon Henry, Home Canyon, Lanes Creek, Maybe Canyon, Mountain Fuel, Trail Canyon, Rattlesnake Canyon, Waterloo, and Wooley Valley. Spatial data on the inactive historic mines is relatively up-to-date; however, spatially described areas for active mines are based on digital maps prepared in early 1999.* ***The inactive Gay mine has the largest total area of disturbance 1,917 hc (4,736 ac) or about 19 km^2 (7.4 mi^2). It encompasses over three times the disturbance area of the next largest mine, the Conda mine with 607 hc (1,504 ac****) and it is nearly four times the area of Smoky Canyon mine, the largest of the active mines with 497 hc (1,228 ac).*[7]

Comment No. 4: P&A views this lack of critical data as extremely disconcerting, because it is precisely this type of data that is essential to quantifying and qualifying the levels of risk of selenium mobilization and contamination throughout the watersheds, which would vary depending on the prevailing hydrological conditions. It is P&A's position that it is imperative for the government and the mining industry to provide this crucial data. It is precisely this type of data that will enable the "responsible parties" to establish the real level of risk attributable to phosphate mining and selenium contamination/mobilization/poisoning.

Excerpts from Technical Memorandum, IDEQ, Selenium Project Officer, May 15, 2002:

C. RAG 3.0: Maintain and Protect the Multiple Beneficial Use of the Phosphate Resource Area.

The Agency supports phosphate mining in Southeast Idaho but believes the other beneficial uses in the area should also be preserved. The region is primarily comprised of public lands and is extensively used for recreation, grazing and other purposes. Many of the concerns addressed in the first two Area Wide Remedial Action Goals will concurrently support this goal by reducing wildlife effects for fishers and hunters, reversing existing surface water degradation for recreational campers/hikers, and developing effective BMP's to minimize future ecological impacts in the region. However, livestock grazing is one of the primary beneficial uses of the resource area and should be addressed in the Remedial Action Objectives.

1. ***RAO 3.1: Minimize livestock grazing losses associated with exposure to selenium-***

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[7] J. Douglas Causey and Phillip R. Moyle, Western U.S. Phosphate Project, *USGS Open-File Report 01-142Digital database of mining-related features at selected historic and active phosphate mines, Bannock, Bear Lake, Bingham, and Caribou Counties, Idaho*, 2001, p. 4.

impacted areas in Southeast Idaho through effective grazing management.

The IDEQ is not the implementing agency for grazing management issues. However, it would be irresponsible to avoid discussion of this issue in the Remedial Action Goals. Furthermore, livestock losses attributable to selenium exposures have continued to occur on a nearly annual basis since the inception of the area wide investigation efforts.

The Agency considers continued livestock grazing losses of the magnitude observed in the past to be unacceptable . It appears that the efforts to delineate elevated vegetation boundaries or to define specific regional criteria for different domestic species has been limited and inconclusive. To effectively prevent similar incidents in the future, site-specific actions should provide detailed delineation and mapping of vegetation concentrations in on-site and off-site impacted areas for dissemination to regional grazers and management agencies.[8]

Comment No. 5: It is encouraging to know that *"The Agency considers continued livestock grazing losses of the magnitude observed in the past to be unacceptable .* However, it is equally disconcerting that the efforts to delineate boundaries and to define criteria has been limited and inconclusive (i.e., ***It appears that the efforts to delineate elevated vegetation boundaries or to define specific regional criteria for different domestic species has been limited and inconclusive.)*** On numerous occasions P&A has raised these concerns to the respective federal agencies, and implores IDEQ to fully assess and address these issues in its final report.

1. RAO 2.1 Reduce or control existing exposure to regional wildlife from historic mining activities to the lowest practicable levels.

The Agency suggest that practicable responses should be taken to reduce or control unnecessary wildlife subpopulation exposures in selected areas using NCP alternative selenium criteria. Critical areas should be determined based on subpopulation densities, migration routes, areas of impact and exposure pathways to get the greatest benefit from committed resources. The former practice of increasing forage productivity on reclaimed sites has inadvertently resulted in providing an enhanced pathway for wildlife exposure. All reclaimed waste rock piles are exhibiting vegetation concentrations well in excess of the typical 5mg/kg grazing recommendations. Many of the seeps, springs, and related riparian

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[8] Richard L. Clegg, P.E., IDEQ Selenium Project Officer to Administrative Record for the Selenium Area Wide Investigation, Subject: *IDEQ Risk Management Statement: Area Wide Remediation Goals and Objectives for Selenium Impacts from Historic Mining Operations in Southeast Idaho*, May 15, 2002, p. 7 of 9.

> *zones, drainage basins, pit lakes and other site features also provide uncontrolled wildlife exposure to concentrated levels of selenium. Proposed BMPs do not eliminate similar exposure pathways at future sites. Therefore, the Agency suggest addressing a selected portion of the historic operation area to remedial activities to help offset the cumulative exposures that will result from increased reclamation of future mining operations.*
>
> *A critical evaluation should be performed at each mine site to identify practicable methods to reduce or control existing wildlife exposure paths. .....* [9]

Comment No. 6: The terms and definition of "controlling existing exposures to lowest practicable levels" need to be better defined. P&A also has some reservations regarding the following statement, which the Agency also needs to clarify: "....*the Agency suggest addressing a selected portion of the historic operation area to remedial activities to help offset the cumulative exposures that will result from increased reclamation of future mining operations*."

Comment No. 7: In the absence of having quantified and/or qualified the volumes of existing waste ore and their inherent levels of contaminations and related risks, **it is imperative that the Agency provides the criteria for its selection of sites, the extent of the sites to be used for remedial activities; otherwise, the Agency's action could be viewed as being made in a vacuum.**

D. RAG 4.0: Protect Regional Groundwater Resources

IDAPA 58.01.11 Groundwater Quality Rule provides the groundwater standards for the State of Idaho. These regulations encourage mining activity in Idaho by allowing temporary on-site groundwater impacts during period of active mining but requires compliance with groundwater numeric criteria upon completion of the mining operations. The Agency is aware of observed groundwater exceedances in several localized springs as well as monitoring wells bordering some impacted riparian areas. Review of available local water supply records and sampling of a minimal number of private and domestic wells in the area have not indicated any significant regional impacts to date. ***However, groundwater in the vicinity of most of the subject mine sites has yet to be characterized.*** (Emphasis added.)

RAO 4.1: Identify, characterize and respond to potential groundwater contamination sources in the phosphate mining resource area. *The IDEQ has recommended that the hydrological conditions at each site be properly characterized to assess potential impacts to groundwater resources. The evaluation should include the local aquifer systems including the on- and off-site*

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[9] *Ibid.*, p. 6 of 9.

springs recharged by site precipitation.[10]

Comment No. 8: P&A finds it very disconcerting that the Agency and its affiliates, have yet to conduct the evaluation referenced above. Whether or not this was an intentional and/or unintentional oversight, is reflective of P&A's fundamental concerns regarding the scope and depth of the initial investigations upon which the **no-risk scenario was predicated.**

IDEQ New Release, May 23, 2002:

DEQ [Agency's conclusions] *conducted regional risk evaluations as part of an area-wide investigation into the nature and extent of potential selenium contamination. The study considered the impacts of releases of selenium and other trace metals from historic mining activities on recreational hunters and fishers, modify subsistence life styles, Native American exposure scenarios, and various ecological target receptors.*

[10] *Ibid*., p. 8 of 9.

> *The Draft Risk Assessment document* ***indicates negligible human health risks from selenium****, which is naturally occurring, and other trace metals. In addition, it* ***concludes that population-level ecological risks are unlikely based on current area-wide observances, although the potential for localized effects is possible for some species.***[11] [Emphasis added.]

IDEQ's ***Draft, Area Wide Human Health and Ecological Risk Assessment*****, Summary and Conclusions:**

> *The IDEQ has prepared the Area Wide Remediation Goals and Objectives contained herein in accordance with the requirements of the Area Wide Investigation Interagency MOU and the AOC with the involved mining companies. These goals and objectives provide regional guidance for subsequent site-specific actions but do not obligate Lead Agencies in managing their sites outside their discretion. The State site managers will use the stated goals and objectives incorporate regional issues into State-led site-specific activities. The regulatory standards, evolving science and Agency-accepted findings from relevant studies/research.*

[11] Idaho Department of Environmental Quality, News Release, ***DEQ seeks comments on draft documents pertaining to impacts of selenium releases in southeast Idaho***, May 23, 2002, p. 1.

> *The Agency supports the phosphate mining industry in Southeast Idaho and recognizes their continued commitment to improve practices and responsible resource management.* ***IDEQ also understands that the environmental conditions observed in the Phosphate Mining Resource Area are not a result of negligence or intent on the part of the companies or land management agencies, but simply a lack of sufficient science for predicting the future effects of past mining practices.*** [Emphasis added.] *The observed environmental and ecological conditions are such that focused investigation and carefully targeted site-specific responses at historic sites will not only prevent further degradation of natural resources, but may result in a reversal of current surface water impacts and wildlife effects. Furthermore, continued development and improvements in the phosphate industry best management practices will ensure the future protection of Southeast Idaho's ecological and water resources, and the* ***longevity of the industry.***[12]

Note: End of July 11, 2002, comments to Mr. Clegg.

Recap of Unresolved Concerns and Issues that Limit P&A's Ability to Provide Meaningful Input and/or Comments:

- IDEQ's Lead Agency Status Remains Problematic; among other reasons, it is a Mining Dominated Consortium.

- IDEQ continues to Fail to Response to Public Comments in a Meaningful and Sincere Manner

- With Limited Exceptions, "Data" and "Unpublished Studies" have been IMA Funded

- Thrust of IDEQ et al Research Effort has been to Focus on Selective Non-Risk Target Areas

- IDEQ's Propensity to Utilize Problem/Issue Avoidance Protocols — Each New Document Reinforces the NO PROBLEM CONCLUSION

- Data Misinterpretation Tactics - Lack of Data Does Not Appear to Be an Issue to IDEQ Et Al.

- The Method for Determining 5% as the Area of Concern Remains Enigmatic (AKA a numbers racket).

- Multiple Use Range Management Utilization of the UI's Livestock Death-Defying Model (Feed livestock selenium until they have a near-death experience, then move the animals to another grazing area)

- Non-Scientific Procedures, i.e., Sample to Population Ratio Skewed, which is Essential for Determining Levels of Risk and Area of Impact Effects

- Lab Splits Used as Data Points!!! Skewing Population Level Conclusion – Not enough Samples for a Statisitically

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12 *Ibid*., p. 9 of 9.

Based Conclusion Concerning Population Level Effect.

Failure to Provide Quantifiable and Qualifiable Data to Establish "Real Level of Risk"

Recommendations:

❶ Start Over and Appoint a non-Bias Lead Agency — Have the Research Effort be conducted in Accordance with Scientific Principles and Protocols

❷ A risk-targeted survey on which to based risk analysis. This type of survey should be a priority issue, and needs to be conducted by a non-biased third party.

❸ Stop Misleading the Public — Fulfill Your Public Trust Responsibilities

Closing Comments: It would be disingenuous not to acknowledge the vast sums of money, time, and resources expended to date by the respective agencies and the IMA in their **selective** "Area Wide Investigation/Assessment." Albeit, after years of studies and millions of dollars of expenditures, critical information regarding the real-levels of risks of selenium mobilization, contamination and poisoning remains relatively unknown. The collective failure to implement viable remediation solution to minimize and/or abate the human-induced disposal catastrophe in Southeast Idaho is deplorable. Conversely, IDEQ and its mining associates/consultants have retained their focus on the *non compos mentis* "management/assessment" scenario; i.e., if no apparent problem surfaces (no recorded/reported death and/or destruction linked to the waste dumps and/or selenium poisoning) IDEQ et al can keep a lid on the magnitude of the problem, and continue employing the avoidance- based-evasion program; i.e., don't cap the waste dumps, limit the scope of the research effort to safe havens, and continue to conduct business as usual. There is a saying "down under" which goes something like this: "If you find that you've dug yourself into a hole – stop digging." Ironically, the IMA's prosperity (predominantly on public lands with insidiously cheap lease rates) is derived from digging; therefore, that limits their option to conducting business as ususal. IDEQ's approach has all the prescripts of an "OZ-Wellian" rerun. Although this "yellow-brick road" script "appeared" successful in Kansas, P&A is hopeful, albeit not overly optimistic, that it will not fly in Idaho.

Request for Information: Please provide P&A with a detailed list of sources of funding for IDEQ's research to date. In addition, during our July 7th conversation, you mentioned that you had received the report IDEQ sent to P&A as being refused. P&A did not refuse that report, and if you have any documentation that states that P&A signed any form to that effect, please provide us with it, as we will initiate a formal complaint against FedEX for making such a false claim. The fact is that P&A specifically requested that you either send the report via United Parcel Service or via U.S. Mail, which IDEQ failed to do. P&A obtained a photocopy of the report on its own from a federal agency; however, for our records we would appreciate a bound copy from your office. Thank you for the extension of time to submit these comments. Please enter them into the record accordingly.

Respectfully,

Patrick Porgans

PP:sp fnl: 1 idhoareawidecommentsjuly03final.win.cor

cc: Interested Parties

STATE OF IDAHO

DEPARTMENT OF ENVIRONMENTAL QUALITY

15 West Center • Soda Springs, Idaho 83204-3202 • (208) 547-1940

Dirk Kempthorne, Governor
C. Stephen Allred, Director

February 27, 2004

Mr. Patrick Porgans
Patrick Porgans & Associates, Inc.
P.O. Box 1713
W. Sacramento, CA 95691

RE: Response to Comments on IDEQ's Draft Area Wide Risk Management Plan

Dear Mr. Porgans,

We appreciate Patrick Porgans and Associates, Inc. (P&A) continued interest in the selenium issues in Southeast Idaho and the comments submitted during the formal public comment period on our draft *Area Wide Risk Management Plan* dated May 2003. At your request, our responses have been submitted under separate letterhead and specifically reference the associated blocks of text from your comment letter.

Opening Paragraph:

In the first paragraph and throughout your document, you refer to an intrinsic IDEQ/IMA conflict of interest without any basis for that claim. The Department refutes any implication that IMA has had a role in the Agency's decision-making process other than through the same formal processes afforded to the other stakeholders and interested parties. The technical conclusions and risk management decisions made on this project have been the product of IDEQ and Interagency collaboration without any political influence from the IMA.

During the draft risk assessment review process, P&A made similar accusations and solicited feedback from several of the assigned Interagency (USFWS, USFS, BLM) Technical Group project managers regarding IDEQ's published findings and potential conflicts of interest. These Federal Agency representatives, who are most familiar with the project and regulatory process to date, endorsed our published technical findings, confirmed the collaborative nature of our efforts, and discredited any implication of conflicts of interest with the IMA in the performance of our technical activities or regulatory duties. Your continued insistence on this point of contention indicates a preconceived bias and raises concern as to the level of objectivity given to your review process.

Items 1-3, Page 1-2:

P&A has provided a brief synopsis of concerns regarding IDEQ's findings in the Risk Management Plan in three introductory bullet items. Generally speaking, they include the scope and breadth of the area wide report, the apparent discrepancies between IDEQ's findings and those of selected USFWS and USGS researchers, and the fact that we stated we've not found any dead species during our studies that have been confirmed to have been caused solely from selenium poisoning. We will briefly touch on each of these issues and elaborate in greater detail in response to some of P&A's subsequent comments.

Concerning the scope and breadth of the Area Wide report, P&A claims that under IDEQ's tutelage the "Area Wide threat" attributable to waste dump contamination appears to be a "dead issue". This characterization is contrary to the Department's regulatory position and ignores the entire premise of the Risk Management Plan. The Department has clearly indicated that elevated risks do occur in the phosphate mining resource area from previous and ongoing releases from waste rock dumps at individual mine sites. The plan supports our combined Interagency endeavors to address resulting impacts and eliminate releases from these sources by applying consistent "Area Wide" removal action goals, objectives and action levels. It appears the main point of confusion is P&A's perception that appropriate regulatory action may not occur due to IDEQ's risk assessment conclusion that regional population-level ecological risks are unlikely to occur in the resource area based on current conditions. We believe our "population-level" risk conclusion is scientifically valid and should be intuitive to anyone who objectively reviews the area wide data and conditions. Nevertheless, the risk management plan requires actions to be taken on a subpopulation risk basis targeting individual releases and impacted zones at each site; therefore, the disputed conclusion has little effect on the projected regulatory actions. We will provide further discussion of this issue in our subsequent responses.

The second item mentions discrepancies between IDEQ's risk findings and those of several selected researchers from the USFWS and USGS. It is the Departments position that our findings and the findings reported by these individuals are not diametrically opposed, as implied. The risk-targeted survey conducted by USFWS focused on "worst case" areas identified by the Area Wide Investigation efforts. Site selection was not random but consisted of ranking and surveying sites with the highest selenium concentrations found in the Resource Area and working down the list until they ran out of funds. It is not surprising that the risk targeted survey provided indications of toxicological effects. These same areas exceed IDEQ's proposed action levels presented in our risk management plan and would also be considered areas of unacceptable subpopulation-level risks under our approach.

These researchers have stated that they believe it is premature to conclude that "population-level" effects are unlikely, although their own observations support this preliminary conclusion. The Department would expect nothing less from good scientific researchers with little need or regulatory obligation to reach any conclusion on this matter. However, the IDEQ and our Interagency counterparts do not have the luxury of speculation and indefinite scientific studies in reaching reasonable conclusions and regulatory decisions necessary to continue progress in resolving the selenium issues. Pure scientific research and regulatory decision-making processes have different methods, goals and levels of certainty. The fact that these researchers required three years to publish documents for relatively minor surveys illustrates the differences in our priorities and sense of urgency regarding these issues.

The last bullet item criticizes the Department's investigative efforts because of our honest and accurate admission to P&A that the Area Wide investigations to date had failed to find any dead species of fish or wildlife that were conclusively found to be the sole result of selenium poisoning, even though we acknowledged the possibility of this occurrence. This was a simple statement of fact based on our review of histology and autopsy reports for the regional livestock incidents, sampling results and case studies for the mass amphibian loss, all of which consistently interject the possibility of other contributing stressors such as disease, age, toxic plants, climatic changes, etc. P&A inaccurately reports that other entities have found dead species of animals confirmed to be the result of selenium poisoning, which the Department will challenge in subsequent responses. P&A also falsely credits public awareness of high levels of selenium in the aquatic food chain and birds to these third-party entities. In fact, elevated levels of selenium in fish tissue and bird eggs were reported as part of the Area Wide Investigation in several 1999 and 2000 regional investigation reports that are publicly available on the Southeast Idaho Selenium Information Project website. These fish tissue results, developed as part of the Area Wide Investigation, provided the information used by the State in the issuance of the fish consumption advisory for East Mill Creek. The results from the P&A-cited USFWS research efforts were not published until fall of 2002.

Text from Line 11, Page 2 to Line 18, Page 3:

This section goes back to discussions regarding your July 2002 comments on the draft *Area Wide Human Health and Ecological Risk Assessment*. Apparently P&A feels we were non-responsive, evasive and misleading, which is clearly your prerogative. We were not trying to be misleading in our responses to your comments but making the point that P&A was incorrectly portraying the Area Wide Investigation as a collective effort of the IMA, DEQ and U of I with Tetra Tech as some sort of independent third party. When in fact, Tetra Tech is DEQ's prime contractor and was carrying out their efforts under our direction. DEQ did not direct any of the previous activities of IMA, MW or U of I, and we conducted an independent and objective evaluation of the quality of their developed data prior to scoping our independent investigative efforts as lead agency.

We also were not being non-responsive or evasive in our responses by disagreeing with your statement that we failed to identify, quantify and qualify the selenium impacts and risks in the area wide risk assessment. The Department concluded that the available data was adequate for making reasonable area wide conclusions and modeling regional risks. We still believe our risk assessment approach was valid and that it supports the stated conclusions.

Text from Line 19, Page 3 to Line 24, Page 8:

P&A's apparent disregard for cost effective investigations and solutions illustrates the Department's need to ensure the project is conducted in a manner that focuses the limited resources of all involved parties. The term "limited resources" refers to investments by the Agencies, Companies, taxpayers and others involved in these activities with regards to their time, manpower, organizational commitments and financial outlays; but it does not imply insignificant expenditures that are being put forth by any of these entities in resolving the selenium issues. As the lead Agency, it is our obligation that we conduct these efforts in a responsible manner, and that we don't collect irrelevant data just for the sake of research or third party consent. Contrary to P&A's claims, the USGS has done extensive investigation in the Resource Area and that data has been supplemented by additional samples collected during the Area Wide Investigation. Waste rock samples collected in the region exhibit a significant amount of heterogeneity, even within each individual waste rock pile. However, the range of variable concentrations found in waste rock is adequately known for estimating purposes and a statistically significant sample population has been collected. Further efforts to define the exact composition of each waste rock pile are unnecessary, impractical and unjustifiable. Similarly, the boundaries of the disturbed and reclaimed areas, as well as pit and dump areas have also been accurately mapped by the USGS and are very distinct even through visual observation. P&A's desire to know the exact volume of each pile is not a critical data need for designing remedial actions, although, reasonable estimates could be made just by using USGS's digital mapping results which are also available on the SISP website. For all practical purposes, the Department considers the waste rock dumps to be an infinite source for selenium for the foreseeable future. Therefore, source control and remedial methods need to be focused on preventing releases from these units and mitigating impacts that have occurred from past releases. Unless P&A endorses attenuation or removal of existing dumps as possible removal action alternatives, both of which are considered impractical by the Agencies, a mass balance approach requiring estimates of material or contaminant volumes is not critical to the success of remedial efforts.

This section of the P&A's comment letter also introduces the e-mail comments from Dr. Joseph Skorupa of the USFWS to Ms. Sheryl Hill, a contractor retained by the Greater Yellowstone Coalition to comment on the Risk Management Plan. We will preface our remarks on this communication by stating that we have great respect for Dr. Skorupa and his efforts in selenium science over the years. He and his associate researchers have contributed a great amount to the breadth of scientific research regarding this complex constituent and its potential toxicological effects. However, we are somewhat troubled by his less than accurate statements and unsupported conclusions regarding his regional findings during the risk-targeted survey. Not being privy to Ms. Hill's initial inquiries or the accuracy of her representations of our risk management plan, we have wondered if Dr. Skorupa was in a defensive posture in preparing his response because it was are somewhat different from those communicated to us through our Interagency representatives.

Since P&A used this communication as the basis for claiming that other entities had discovered dead species that were confirmed to be the sole result of selenium poisoning, we will provide a more critical review of these reported findings to demonstrate that their actual results are not widely different from what we reported to P&A. Dr. Skorupa reported seeing dead pelicans and a dead beaver on the shores of a reservoir from which he obtained a deformed coot embryo. There were no tissue samples collected from these individual animals and simply implying acute selenium poisoning as the cause of death without any corroborating evidence defies scientific method, and certainly does not rise to the level of confirmation.

Assuming the deformed coot embryo found in this same location is the one referenced in his report from the 1999 risk targeted survey, he fails to mention that this egg contained 12 ppm selenium on a dry weight basis, and in his own words, "would have to be considered, at most, a threshold level for teratogenesis in coots". He also states in this report that "due to the relatively mild nature of the abnormality, and the threshold level selenium exposure of the egg, this embryo," [along with the other deformed embryo identified in his risk targeted survey], "falls short of providing a clearly definitive case for selenium poisoning".

In his e-mail, he also mentions a significant salamander die off (250 carcasses) which has subsequently been diagnosed as selenium toxicosis by the National Wildlife Health lab. Again, this is somewhat misleading if you take the time to review the actual diagnostic services case report from the lab. The cause of illness and death in the Tiger salamanders from that site was concluded to be a combination of two diseases; chronic selenium poisoning and iridovirus infection. Only one of the 19 specimens submitted was confirmed to have selenosis based on a tail tissue concentration of 126 ppm. However, the report goes on to say in reference to this individual that “In most cases, a level of 126 ppm selenium in any tissue of any animal would be considered a toxic and lethal level, but even this conclusion is questionable because this animal also had widespread iridovirus infection”. Dr. Skorupa stresses in his response to commenters that the level of 120 ppm (dry weight) selenium in the salamander’s tail is a record high in any amphibians known to him, but the lab report clearly emphasizes the lack of available data on amphibians.

These few examples illustrate the difficulties in making any statements with regard to confirmed deaths by selenium poisoning, and support the earlier statements to P&A regarding our findings to date. Similarly, we disagree with Dr. Skorupa’s opinion that additional risk-targeted surveys are a critical need for reaching reasonable conclusions regarding population-level ecological impacts and proceeding with the removal action process. The risk targeted survey failed to provide any information regarding areas of unacceptable risks that are not already identified through the use of our proposed action levels.

The study area encompasses fifteen separate mines spread over 1,000 square miles, or 1,500 square miles if you include the inactive, historic mining areas south of the major mines. During the past several years, representative samples have been collected from: 1) nearly every major stream segment in the vicinity of mining operations, 2) waste rock piles and reclaimed vegetation at every mine, 3) water samples from every identified spring, pond and seep in the vicinity of the waste rock piles, and 4) targeted sampling for abiotic and biotic media in impacted and background areas representing the full spectrum of selenium concentrations that have been observed. This data has resulted in a very good picture of the regional conditions and ranges of concentrations we would expect to see in different media under varying conditions. The cumulative impacts represent a very low percentage of the overall ecological area, and consist of small, non-contiguous individual areas. This area is also bordered to the north and south by two large refuge areas that are not impacted by mining and provide a significant amount of the regional habitat for local avian populations. Population level ecological effects are typically measured in terms of a selected percentage of loss or toxicological effect on an overall regional population. We’ve concluded that this level of effect is unlikely based on the scattered and localized nature of the observed impacted areas in comparison with the availability of unimpacted areas in the overall resource area. We believe this to be a valid and intuitive conclusion based on area wide conditions and observations. While there may be some researchers who have been reluctant to make this final conclusion, none have contradicted it. Nonetheless, the Risk Management Plan addresses actual releases and subpopulation risks in impacted areas so differences of opinion on population-level conclusions have little effect on the actual removal action approach.

Line 25, Page 8 to Line 4, Page 11:

This section of the comment letter discusses specific removal action goals (RAG) and objectives (RAO) provided in the draft risk management plan. P&A’s comment number 5 refers to RAO 3.1 regarding grazing objectives, and questions the lack of previous delineation efforts for vegetation with elevated levels of selenium. Individual site delineation is a site-specific action and was never the intent of Area Wide investigation efforts. However, the area wide investigations did identify the presence of elevated vegetation concentrations on most of the historic waste rock piles and in areas of impacted waters. This type of approach is used for virtually every type of environmental investigation project. Early sampling activities are focused on macro-level evaluations that make conservative estimates and provide information on the overall study area. Subsequent investigations are designed from this information to delineate the exact nature and extent of contamination in observed or suspected areas. The Area Wide effort also established the vegetation action level required for mapping unacceptable risk concentrations.

Comment number 6 refers to RAO 2.1 regarding wildlife exposures. A number of changes to the risk management plan have been adopted in response to comments. Two of these, the lowering of the vegetation action level to 5 ppm and the requirement for functional use surveys by the Interagency representatives in the application of appropriate action levels for non-regulated surface waters, directly affect wildlife exposures. The text has been revised accordingly.

Comment number 7 reiterates P&A's position concerning the need for volume estimates for waste rock, ore and contaminants, and has been addressed by IDEQ in our earlier responses.

Comment number 8 refers to RAG 4.0 and RAO 4.1 regarding groundwater characterization efforts. Once again, characterization of local groundwater conditions near each mine is part of the site-specific investigation activities and is not practical at the scale of an Area Wide investigation. However, the area wide efforts did include sampling a significant number of the available on-site wells, reviewing all regional public water supply records and conducting limited sampling of domestic wells representing residences nearest to mining activities prior to making any regional human health risk conclusions.

Line 5, Page 11 to Line 3, Page 13:

This section of the response letter cites IDEQ's Draft Risk Assessment News Release of May 23, 2002 and the Summary and Conclusions from that document with no commentary, followed by lists entitled "Recap of Unresolved Concerns and Issues that limit P&A's Ability to Provide Meaningful Input and/or Comments" and "Recommendations". The lists consist of the following italicized bulleted statements expressing P&A's opinions followed by IDEQ's brief responses:

- *IDEQ's Lead Agency Status Remains Problematic; among other reasons, it is a Mining Dominated Consortium.*

We responded to this concern in our opening response. P&A has failed to provide any evidence of conflicts of interest in the performance of our regulatory duties.

- *IDEQ continues to Fail to Response to Public Comments in a Meaningful and Sincere Manner*

IDEQ provided responses to every comment received during the public comment period. Our failure to respond in a meaningful or sincere manner is a matter of P&A's opinion. An appropriate response does not require IDEQ to adopt P&A's positions.

- *With Limited Exceptions, "Data" and "Unpublished Studies" have been IMA Funded*

This is an irrelevant statement. Virtually all CERCLA-based actions are funded through cost recovery by the responsible parties as prescribed by law. This has nothing to do with the objectivity of the Agencies.

- *Thrust of IDEQ et al Research Effort has been to Focus on Selective Non-Risk Target Areas*

P&A has no basis for this claim. IDEQ has conducted representative sampling throughout the Resource Area and has provided separate data sets for impacted and unimpacted areas. The risk management plan is exclusively focused on areas exhibiting unacceptable risks.

- *IDEQ's Propensity to Utilize Problem/Issue Avoidance Protocols — Each New Document Reinforces the NO PROBLEM CONCLUSION*

This is a false statement. There are no IDEQ-published documents that conclude there are no problems. To the contrary, the risk management plan describes problem areas and adverse findings in detail.

- *Data Misinterpretation Tactics - Lack of Data Does Not Appear to Be an Issue to IDEQ Et Al.*

The area wide efforts have generated statistically significant levels of data for every media that has been assessed. The data is representative of spatial and temporal variations, and meets scientific principals and protocols.

- *The Method for Determining 5% as the Area of Concern Remains Enigmatic (AKA a numbers racket).*

Our method for this conservative estimate of cumulative areas of impact has been described repetitively. We would suggest that P&A conduct a similar exercise instead of refuting this claim without validation.

- *Multiple Use Range Management Utilization of the UI's Livestock Death-Defying Model (Feed livestock selenium until they have a near-death experience, then move the animals to another grazing area)*

IDEQ has no idea what this statement refers to. While UI's studies have been referenced in our reports for informational purposes, the Department has not relied on any of this research in reaching our independent risk conclusions.

- *Non-Scientific Procedures, i.e., Sample to Population Ratio Skewed, which is Essential for Determining Levels of Risk and Area of Impact Effects*

IDEQ and its contractor have abided by scientific principles and methods throughout the area wide efforts. We assume this specific comment refers to area-weighting for average exposure point concentrations, which is an acceptable practice for population level assessment.

- *Lab Splits Used as Data Points!!! Skewing Population Level Conclusion – Not enough Samples for a Statistically Based Conclusion Concerning Population Level Effect.*

Again, we are not sure what this point is specifically referring to. Statistically significant sample populations were available from the area wide investigations for our population-level assessment and conclusions.

- *Failure to Provide Quantifiable and Qualifiable Data to Establish "Real Level of Risk"*

Contrary to this statement, IDEQ's area wide risk assessment contained quantified risk estimates for every target species and identified route of exposure. The risk management plan provides quantified action levels for every constituent and primary media representing unacceptable subpopulation level risks.

Recommendations:

❶ *Start Over and Appoint a non-Bias Lead Agency — Have the Research Effort be conducted in Accordance with Scientific Principles and Protocols*

The Agency has addressed this issue in our previous comments. The bias appears to be on the part of the commenter and has little to do with actual fact. All the IDEQ's efforts have been conducted in accordance with scientific principles and protocols, and EPA guidance.

❷ *A risk-targeted survey on which to based risk analysis. This type of survey should be a priority issue, and needs to be conducted by a non-biased third party.*

The Agency previously addressed this issue. Risk targeted surveys may be good for conducting pure scientific research, but it is not necessary for our regulatory actions. The risk management plan already establishes action levels for areas presenting unacceptable risks; identifying toxicological effects in those same areas is redundant, non-cost effective and unnecessary.

❸ *Stop Misleading the Public — Fulfill Your Public Trust Responsibilities*

The Department is not being misleading and we are fulfilling our responsibilities in accordance with our regulatory authorities and processes. All of our efforts to date have been fully transparent; our goals and objectives are devoid of hidden agendas, are clearly and publicly stated, and our products have been subject to formal public review and comment processes.

Closing Comments:

The closing comments in P&A's letter are editorial in nature and do not demand a response from the IDEQ. We will close by offering our appreciation for P&A's continued interest and comments on the Risk Management Plan. The IDEQ believes our efforts have been scientifically valid and objective, and we regret P&A's lack of acceptance of the Area Wide Investigation findings and conclusions. Nevertheless, we will assure you that our regulatory efforts will result in addressing the selenium issues in Southeast Idaho in a manner that is protective to public health and the environment.

Respectfully,

Richard L. Clegg, P.E.
Selenium Project Officer

Shoshone Bannock Tribes
Selenium Program Manager
Christina Cutler
PO Box 306
Fort Hall, Idaho 83203

July 17, 2003

Idaho Department of Environmental Quality
Remedial Project Manager
Rick Clegg
15 West Center
Soda Springs, Idaho 83276

Re: Shoshone Bannock Tribes comments on the Area Wide Risk Management Plan

Dear Mr. Clegg,

Please find attached, the Shoshone Bannock Tribes comments on the Area Wide Risk Management Plan. Thank you for considering our comments. If you have any questions please feel free to contact me at 208-478-3907.

Sincerely,

Christina Cutler
Selenium Program Manager

w/attachments
cc: Marlin Fellows, Interim Land Use Director; file

Response: The Department appreciates the Tribes involvement and active collaboration in this effort. Your ongoing willingness to meet and discuss your concerns with DEQ representatives during the Area Wide efforts have been instrumental to the progress of the project. We look forward to our continued working relationship.

The Shoshone Bannock Tribes would like to thank DEQ for the opportunity to review and comment on the Area Wide Risk Management Plan, May 2003. Please find listed below our comments on this document. They are:

Section 2.3

A number of streams are identified and listed as being either acute or chronic. However, do to the fact that no sampling was conducted on the Fort Hall Indian Reservation, the tribes feel that these lists should be left open for additional considerations.

Response: Impaired stream status is reviewed by the Department on a biennial basis and does allow consideration of additional impaired streams as they are discovered.

4.2.1.1

The statement is made that “to date, no exceedances have been documented in the Portneuf River in the vicinity of the Gay Mine.” This statement is misleading, there has not been any sampling done on the Fort Hall Indian Reservation in relation to this report. Any samples taken from the Portneuf River are too far removed from the Gay Mine to accurately tie the two together. This statement should be removed from this report.

Response: There has been some historic surface water data collected at Fort Hall but the sentence has been modified to indicate the sampling activities “to date” have been limited. The site-specific investigation is intended to include a more comprehensive evaluation of the sub-basin around Gay Mine.

4.2.1.3

The recommendation stated “resampling efforts for surface water sources at each mine during the first average precipitation cycle…” “The first average” is too narrow of a window to determine that there will be no negative effects on the ecosystem or human health. The time frame should be extended.

Response: The Lead Agencies will establish monitoring programs as part of the site-specific actions and can tailor the monitoring frequency to their needs. The Department is merely emphasizing the fact that their efforts should include an evaluation of surface water conditions during an average precipitation cycle prior to eliminating surface water pathways as potential release routes.

4.2.2

“[H]unters, fishers, and recreational users”, please include Native American traditional and cultural users.

Response: Corrected.

4.2.3 Please include Native American traditional and cultural users.

Response: Corrected.

4.3.2.3

(Top of page 22) “Tribal land can be allocated to tribal members.” The land base at the Gay Mine has, in part, already been allocated to tribal members.

Response: Corrected.

5.0

On the top of page 38, it states that sampling should be conducted “during the seasonal runoff of the first average annual precipitation”. Once again, “the first average annual” will not provide adequate data to show that there will be no negative effects on the ecosystem or human health. The time frame should be extended.

Response: The Lead Agencies for the site-specific investigations are responsible for determining the appropriate sampling frequency for evaluating site conditions. The Department is recommending, at a minimum, the site investigation consider the presence of potential release pathways that may exist during an average precipitation cycle by collecting data at the next opportunity.

General Comments

The vegetation threshold seems to be high, based on the location and use of the land base as big game habitat and for livestock grazing. It is repeatedly stated that the thresholds will one day be adopted by state and federal agencies, the tribes would like to see the vegetation threshold reduced, so that when the thresholds are adopted the law will ensure the protection of big game habitat and livestock forage. Thus, providing protection of our ecosystem and aiding human health.

Response: At the request of our MOU partners, the Department has agreed to lower the vegetation action level for selenium to 5 ppm to be consistent with the land management agencies’ reclamation goal for domestic animal grazing use.

Once again, the Department appreciates the Tribes active involvement in this process, and we look forward to our continued working relationship.

U.S. Fish and Wildlife Service Comments on Idaho Department of Environmental Quality's Area Wide Risk Management Plan for the Southeast Idaho Selenium Project

General Comments

The Idaho Department of Environmental Quality's (Agency) decision to accept mean hazard quotients that would range into the 20's and would be the level of risk for receptors once action levels are achieved is not adequately supported in the document. The Plan states that the receptors that would experience this level of risk would only be subpopulations occurring within less than 5% of the overall area. The quantification of this level of effects is undefined and undetermined. From previous data collections in the resource area it is known that effects to migratory birds are occurring. The Migratory Bird Treaty Act prohibits the take (i.e. harm, harass, capture, kill) of migratory birds. We agree with the Agency that effects are likely occurring at a sub-population and not population level. However, the Service is concerned that adverse effects of contaminants, especially selenium, will continue to occur to fish and wildlife within the resource area if hazard quotients are accepted as proposed.

Response: Additional explanations of the hazard quotient calculations and Department's rationale have been included in the final plan. The Department has accepted mean hazard quotients in the 20s based on the conservatism of the model inputs and the limited exposure to subpopulations in the overall resource area. The models used to calculate the mean hazard quotients assume a site use factor of 100%, contaminant bioabsorption of 100%, conservative NOAEL-based reference values, all media concurrently exhibiting action level concentrations, and they do not provide for proportional reductions in secondary exposure pathways that may be achieved through initial reductions in action level media. The impacted areas represent a very small percentage of the overall area and if minor toxicological effects should occur in a low percentage of subpopulation-level receptors, it would not threaten the health of the overall resource area populations.

Similarly, the action level of 201 micrograms per liter (µg/L) of selenium for "non-regulated" surface waters will continue to allow releases to the environment via food chain pathway or direct ingestion. Clearly, since selenium concentrations in impacted areas are stated to have a mean range of 9.2 µg/L to 1140 µg/L, with a median of 255 µg/L, adverse effects are likely occurring to wildlife with in the resource area. If efforts are undertaken to regulate or reduce selenium levels from the mean of 255 µg/L selenium to 201 µg/L in non-regulated waters, the Service recommends the Agency encourage further reductions of concentrations to those of regulated waters. The proposed action level for regulated surface waters (5 µg/L) should be applied to all surface waters until a site-specific investigation can further quantify the potential effects on the environment and identify remedial actions to reduce or eliminate the exposure potential to receptors.

Response: Based on discussions with our MOU partners, the Department has agreed to include a requirement that the Interagency technical representatives conduct a qualitative functional use inventory of non-regulated surface water features to evaluate current use of each feature. The proposed action level of 201 ppb will apply to those that appear to serve solely as transient wildlife drinking water sources or migratory bird resting areas, an action level of 50 ppb will apply for units intended as domestic animal drinking water sources, and an action level of 5 ppb will apply for units identified as providing significant riparian, emergent or aquatic habitat that may support nesting waterfowl, or other sensitive species.

The terms historic, ongoing, and future should be clearly defined. The Plan relates action initiatives to remediate areas that have been impacted by "*historic"* mining and to prevent releases from *future* mining activities. It is not clear whether and how *current/ongoing* mining activities and releases will be addressed by the Management Plan. Section 2.3 states that the "risk management decisions are not intended to direct any of the permitted operational actions at active mining facilities" however, releases of elevated levels of selenium to the environment have occurred and are occurring, from active mine sites. There appears to be a gap in addressing the elevated levels of contaminants from current practices that are effecting the environment. The Plan should briefly discuss the extensive media sampling and data gathering that has been occurring at specific mine sites to assess the impacts to human health and the environment, which will lead to the development and implementation of remedial actions plans. Further, a brief discussion of regulations that are employed to address ongoing mining operations would assist the reader in understanding how mining is regulated and how the processes guiding the remedial actions relate to current oversight and regulatory authorities of the various agencies.

Response: A glossary has been added to the final plan for definition of terms. Additional discussion has been provided regarding the regulatory approach for active and inactive sites. In summary, the term "historic" refers to sites and operable units that had mining operations in the past and are now permanently inactive. It does not imply any cultural or archeological significance. The distinction is made in the text because the CERCLA process is specifically designed to address releases from this type of inactive site. Active and future mines refer to those that either are, or will be, operating and these are administered by the Land management Agencies under operating permits. CERCLA does not apply to these active areas although the Risk Management Plan does recommend continued efforts in developing and demonstrating effective best management practices for the facilities.

As you are aware, ARAR lists are being prepared by each of the involved Agencies regarding specific jurisdictions and requirements for the site-specific CERCLA actions. A base list is provided in Attachment 3. The Department is reluctant to further define the other Agencies' missions or jurisdictions in this plan since that is the responsibility of each Agency during the ARAR submittal process.

The terms population, sub-population and individual should be clearly defined. As currently written, the document is unclear as to whether use/definition of these terms is consistent with mandates under which agencies including the Service must evaluate the proposed actions.

Response: See Glossary.

Specific Comments

Executive Summary, fourth paragraph. The Service understands that a remedial action goal is to conduct long-term monitoring to determine the effectiveness of implemented action and to provide early warning of further degradation issues that may occur. The goals and objectives should clearly explain the actions that may be set in motion when monitoring indicates that degradation/impacts are occurring to human health or the environment. Monitoring provides useful information and should be conducted to determine effectiveness, but should/must be supported by pre-planned contingency measures that will be implemented, if necessary, or if effectiveness falls short of objectives/targets. We recommend that the goals and objectives of the Plan should closely relate the monitoring to the proposed action levels and the measures that will be implemented if results indicate degradation is occurring.

Response: The risk management plan provides "discretionary" guidance for the Lead and Support Agencies in implementation of site-specific actions. Site-specific monitoring programs will be established under that process but the Department does not have the jurisdiction to mandate the application of the proposed action levels to the other agencies. We have provided our recommended regional removal action goals and objectives, and action levels, which we believe to be appropriate for use in the Resource Area to allow a consistent approach in site-specific implementation. However, the jurisdiction, administration and enforcement tools used for monitoring and effectiveness determinations at each mine site depend on the Lead Agency authorities assigned in each site-specific Order.

With regards to the recommended long term monitoring goal, this is a proposed future activity and there is no plan written at this time. We would expect this action to occur after significant progress has been made in site-specific removal actions. The plan will specify actions to be taken based on monitoring results.

Section 2.1, paragraph 3. Clarify which Contaminants of Potential Environmental Concern (COPECs) are being referred to in this paragraph as exhibiting concentrations in excess of regulatory criteria or risk-based levels of concern (i.e. selenium and/or others).

Response: Corrected.

Section 2.1, last paragraph. We suggest changing the last sentence to the following: "Furthermore, supplemental mine-specific human health and/or ecological risk assessments and tailored contaminants of concern lists may be needed to evaluate any unique conditions *that may exist on individual sites but were* not considered under the Area Wide risk evaluations.

Response: Corrected.

Section 2.2, fourth paragraph, last sentence. Remove the word "future" from the sentence. The Agency's recommended COC list is for mine specific investigations that are both ongoing and those that will be occurring in the future.

Response: The term "future" is appropriately used because a different COC list was required for some of the previous site-specific interim investigations. Future applies to activities conducted after the final publication of the risk management plan.

Section 2.3, first paragraph, second sentence. Remove the word "future" from the sentence.

Response: Corrected.

Section 3.5, fourth paragraph. Clarify the phrase "sensitivity analysis" and how it is applied in risk analysis.

Response: Sensitivity analysis is used to determine model input parameters that have the most significant effect on outcomes. In this case, tornado plots were provided as part of the risk management plan describing model parameters affecting hazard quotient ranges. This information assisted in the final evaluation of the proposed action levels for the selected media.

Section 4.1, second paragraph. Clarify what are "highly impacted zones" versus other sites of contamination. This paragraph discusses "on-going releases" and "release pathways from historic mining areas". As stated in our general comments section the application of the proposed action levels identified in the Plan is unclear, and whether historic, ongoing/current, and future releases would be addressed under the proposed action levels.

Response: Highly impacted zones refer to areas with the likelihood to cause subpopulation level effects. The Department believes it would be a poor use of resources to conduct removal actions on areas that have been minimally impacted, such as those that may exceed background levels but do not exhibit concentrations associated with risk threshold values.

"Ongoing" releases refer to areas where the data shows constituents are continuing to migrate from source materials. Based on current information, ongoing releases appear to be limited to historic areas (inactive mines or inactive units at active sites) and have not been identified in active mining areas using modified BMPs. It is the Department's intent to eliminate any ongoing releases and address significant impacts from past releases.

DEQ has jurisdiction to perform regional monitoring and to respond to identified impacts and releases. However, current and future mining operations are permitted and administered under the jurisdiction of the land management agencies. Therefore, the Department cannot comment on whether the proposed action levels will be applied in

operational monitoring programs at those sites. The State does intend to use the action levels at all sites for which we have CERCLA Lead Agency authorities.

Section 4.2, first paragraph. Briefly describe/discuss which regional resources are "subject to protective measures" and those resources that are not subject to protection.

Response: This sentence refers to individual resources that are protected under specific regulations such as groundwater, surface water, etc. as opposed to media such as soil or waste rock that have no specified regulatory criteria. The text has been modified for clarity.

Section 4.2.2.2. The Service strongly supports the Agency's position of discouraging the development of wetland or riparian habitats using selenium or trace metal impacted waters due to biomagnification observed in these types of environments. We also strongly encourage the Agency to recommend clean-up and remediation of wetland or riparian systems that are currently being used or historically have been used to filter selenium and other contaminants in mining areas.

Response: Clean up and remediation decisions must be made on a site-specific basis and depend on the available alternatives. The Department will defer any specific remediation recommendations to the EE/CA process.

The Department appreciates FWS's comments and involvement in this process. We also want to thank you for your Agency representatives for assistance in reviewing and responding to specific RMP public comments involving FWS issues. We look forward to our continued collaborations on future selenium issues.

Water Resources Division
Western Region
345 Middlefield Road, MS 435
Menlo Park, CA 94025

July 7, 2003

TO: Rick Clegg, Idaho Department of Environmental Quality, Soda Springs, Idaho
FROM: Theresa Presser, U.S. Geological Survey, Water Resources Division, National Research Program, Menlo Park, California
SUBJECT: Technical comments on *Draft Area Wide Risk Management Plan for the Southeast Idaho Phosphate Mining Resource Area*, prepared by *Idaho Department of Environmental Quality*, Soda Springs, Idaho.

I appreciate the opportunity to comment on the *Area Wide Risk Management Plan (RMP) for the Southeast Idaho Phosphate Mining Resource Area* because of the U.S. Geological Survey's (USGS) continuing interest in understanding the biogeochemical processes associated with selenium (Se) contamination of aquatic ecosystems in areas of California and other western states. In this regard, a book entitled *Life Cycle of the Phosphoria Formation: From Deposition to the Post-Mining Environment* will be published by Elsevier in fall, 2003. This book was edited by James Hein of USGS and contains recent USGS research, including Se research, for the systems of the Phosphoria Formation of southeast Idaho.

Response: The Department appreciates USGS's comments and continued interest in this process. We enjoyed working with the USGS researchers and look forward to the publication of their research compilation regarding the Phosphoria Formation.

Introduction

The *Risk Management Plan* refers to conclusions of the *Final Area Wide Human Health and Ecological Risk Assessment* (IDEQ, December, 2002) as to the extent of risk (i.e., *ecological subpopulation risks might occur in localized areas impacted by historic mining operations and on-going releases,* page i). The assessment and plan are stipulated *as area-wide to address localized Se risks*. The *Risk Management Plan* identifies Se as the *primary hazard driver* for the area wide efforts (page 28). In terms of Se, the *Risk Management Plan* concludes that the proposed *Se action levels* (see below and RMP Tables 4.2 and 4.4) for water, sediment, soil, and terrestrial vegetation *adequately protect regional subpopulations and meet the Agency's risk management goals* (RMP page 28).

Media of concern or targeted action selenium (Se)	**Se action level**	Background mean/max	Impacted mean	Impacted Median	Impacted maximum	Target species
Surface water monitoring	**1.6 ppb**					
Surface water (CWA-regulated)	**5 ppb**	--/1.6	9.2	1.3	1,140	mallard mink
Surface water (non-regulated)*	**201 ppb**		251	**255**	2,200	mallard mink
Groundwater monitoring	**5 ppb**					human health
Groundwater**	**50 ppb**					human health
Sediments (regulated areas/aquatic life)	**2.6 ppm**	1.2/2.6	12.5	**3.4**	188	mallard
Sediments (terrestrial exposure) ***	**7.5 ppm**					?
Riparian/fluvial soils (regulated)	**NA**					---

Riparian/fluvial soils (non-regulated)	**5.2 ppm**	1.01/3.3	10.49	1.7	150	robin, vole
Vegetation****	**8.3 ppm**	0.24/0.75	7.72	2.5	39	sparrow

*subpopulation risks in impacted areas from avian/terrestrial surface water ingestion; **drinking water MCLs/human health exposure levels; remedial actions may be triggered at lower concentrations if confirmed degradation trends are observed; *** Sediments not supporting aquatic life; subpopulation risks in impacted areas from avian/terrestrial ingestion of forage; ****Based on subpopulation risks in impacted areas from avian/terrestrial ingestion of forage or maximum AWI background level; **ppb = μg Se/L; ppm = μg Se/g**.

Using the combined *Se action level* concentrations, calculated mean Se hazard quotients (HQ, 1.2 to 28.6) for selected target species all indicated potential risk (i.e., all were greater than one) to ecological receptors from Se. For example, the mean HQ for mallard was 4.2 and robin was 28.6 (page 29). Individual Se HQs ranged up to 70.4.

Response: As you are aware, hazard quotients are used to provide a relative measurement of risks as compared to levels that are assumed to present no risk based on laboratory studies. NOAEL-based HQs up to 10 are often accepted as protective of ecological populations, even though true effects levels lies somewhere between the theoretical NOAEL and LOAEL. In this case, the targeted receptors comprise subpopulations that may reside in impacted areas consisting of less than 5% of the overall area. If it is assumed that an entire population can sustain effects that may be associated with an HQ of 10, then a limited number of subpopulations in less than 5% of the overall area should be able to support somewhat greater HQ values without catastrophic consequences. The HQ model used by the Department contained a number of conservative inputs such as a 100% site use factor, 100% contaminant bioabsorption, and no allowance for associated reductions in secondary media exposure point concentrations that would result from reducing the primary media to action level concentrations. It also assumes that all media are simultaneously at the action level concentrations, which is an atypical, upper bound assumption. For these reasons, the Department concluded that the action levels are appropriately protective for our regional goals. While some minor toxicological effects may occur in a small percentage of the subpopulations, we would not expect those effects to rise to the level of regional population impacts.

General Comments

I understand that the *Risk Management Plan* is a document that addresses and responds to various regulatory requirements and agreements (e.g., Comprehensive Environmental Response, Compensation, and Liability Act, CERCLA; National Oil and Hazardous Substances Pollution Contingency Plan, NCP; and the non-time critical removal action process, NTCRA) in terms of developing risk assessments and implementing risk management practices. However, the generic approaches used for determining that risk have left out fundamental linkages necessary to derive adequate *Se action levels*. The analysis and conclusions of the *Risk Management Plan* do not recognize important aspects of Se bioaccumulation that serve as a basis for accurate assessment or prediction of environmental concentrations of Se in food webs and effects in predators. For example: 1) *Se action levels* are not given for prey tissue, predator tissue, or bird eggs; 2) risk to fish resources is not directly addressed; 3) neither the term nor concept of bioaccumulation appears in the text of the *Risk Management Plan*; 4) the term biomagnification has a sole entry (page 19) concerning discouragement of future development of wetlands because of Se biomagnification.

Response: The risk management plan provides the Department's recommendations for implementing removal actions at mine-specific CERCLA sites through targeting media that can be controlled with standard remediation and reclamation practices. Action levels were developed for sediment, surface water, vegetation and riparian soils because these are the primary media from which contaminants move into the food chain. While prey tissue, predator tissue and bird eggs may be good toxicological indicators for research; they are not directly amenable to removal action or treatment alternatives.

Additionally, the intrusive sampling methods required for tissue sampling could result in greater losses in small subpopulations than the potential effects associated with underestimating borderline risks.

The previous risk assessment did not rely on modeling to evaluate the impact of bioaccumulation on tissue concentrations in impacted areas. Direct measurement techniques were utilized to represent tissue concentrations for important trophic levels. The assessment did consider regional prey, predator and avian receptor risks based on analysis of selenium concentrations from each ingestion pathway including small mammals, invertebrates, vegetation, soils, sediments and water. The current action levels focus on reducing existing exposures in impacted areas to levels that are deemed to be acceptable by the Department.

Aquatic species, such as fish and amphibians, are not typically amenable to risk assessment models due to their complexity, variability and, in the case of amphibians, general lack of information. Therefore, available aquatic toxicity thresholds and benchmarks were used for comparative purposes. We accepted the use of the surface water criteria established by the Federal and State regulations as our action level since it is intended to be protective of aquatic populations and has remained as the criteria throughout the past 5 years of USEPA's technical review of selenium criteria.

Bioaccumulation and biomagnification issues were not addressed in the plan due to the use of direct measurement techniques by the Department for different trophic levels, media and ingestion sources, which would incorporate accumulative effects. Based on the regional data collected to date by numerous researchers, toxic effects and/or concentrations approaching toxic thresholds in biotic media such as fish tissue, bird eggs and livestock, appear to occur in areas that exceed IDEQ's proposed action levels.

Similarly, continuing incidences of deaths of lambs and ewes, and the acute nature of their deaths, in areas impacted by mining waste emphasize 1) the importance of understanding the biotransfer of Se through food webs (Skorupa, 1998; Luoma and Presser, 2000); and 2) the need for a cumulative effects analysis for impacted watersheds based on a selenium mass balance or budget for the environment (Presser and Piper, 1998). Food is the most important route of Se transfer to upper trophic level species and the choice of food, which varies widely among predator species, results in some trophic pathways being more efficient accumulators of Se than others (Luoma and Presser, 2000). For example, sturgeon, but not bass, are at risk in San Francisco Bay because clams are the food-of-choice for sturgeon and clams are efficient accumulators of Se in the estuary. Bass prefer a food web that does not include clams, and thus tissue concentrations in bass are within levels for protection of aquatic life. Concentrations of Se below 1 μg Se/L in water, along with other media guidelines, are proposed for protection the estuary (Luoma and Presser, 2000). Pathway bioaccumulation models for specific food webs are tools to link water and sediment concentrations to prediction of ecological effects. Therefore, several aspects of the *Risk Management Plan* need further documentation or analysis when developing *Se action levels* on which to base remedial actions. These additions include consideration of:

- Se bioaccumulation;
- Se mass balance as a means of quantifying important Se reservoirs and defining exposure on a watershed or regional basis; and
- biological effects from Se in vulnerable species residing in mining-affected watersheds

Response: The Department agrees that these are admirable research goals but we are also responsible for addressing the current impacts in a timely and responsible manner. At this time, we are basing our decisions on the most current information available to us, and area-specific data and observations. There is no evidence that toxicological effects are occurring at the extremely low concentrations reported in some of the published literature for more sensitive environments such as wildlife refuges and closed system lakes. Bioaccumulation has been considered through the use of direct measurement

techniques. The regional livestock incidents, to date, have occurred strictly in the vicinity of defined contamination source units, either on reclaimed waste rock dumps containing middle waste shales or on vegetation directly irrigated by waste rock dump runoff. These areas are clearly above our proposed action levels.

The Department would generally endorse a mass balance approach in this type of effort, but it is not considered feasible for this area due to the temporal variances observed in the data on both an annual and seasonal basis; the heterogeneity observed in the source materials and endpoint concentrations; and, the source units that, for all practical purposes, can be considered infinite in their supply of contaminants. However, our annual surface water sampling efforts have been focused on the spring runoff cycle during which peak concentrations and loads are observed, and would be considered a conservative database. We should also note the presence of transitory fish that migrate throughout the watershed and are not restricted to consistent or steady state exposures associated with closed system ponds, lakes or reservoirs. While these issues do create some uncertainties with regards to our decisions, we believe the weight of evidence from risk estimates and area-specific observations support our proposed action levels.

Several important exclusions that affect the scope of area-wide remedial actions also are noted in the *Risk Management Plan*. These exclusions are:

- ***Ponds that contain elevated Se but have been allowed to develop into riparian or wetland habitat*** (page 18). *The proposed action levels are based on terrestrial receptor ingestion through drinking water and incidental ingestion, and do not consider additional pathways presented by the introduction of aquatic plant and benthic invertebrate ingestion when more sensitive habitats are allowed to develop* (page 18).
- ***Waste rock soils*** *because the overburden piles were intended to be permitted disposal units* (page 18). *Waste rock pile soils were not considered subject to removal action levels because they were permitted disposal units clearly intended to retain highly mineralized materials (page 25). Additionally, the risk management decisions are not intended to direct any of the permitted operational actions at active mining facilities, although the knowledge gained may assist in the development of improve best management practice, as discussed in Section 2.4* (page 6).
- ***Deer mouse and meadow vole from the list of risk indicator species*** *because of their ubiquitous presence in the resource area and the resulting bias presented by their extremely small home range* (page 26).

Given that Se concentrations have been identified *that clearly present unacceptable risks to subpopulations of aquatic, terrestrial, and avian ecological receptors* (pages 17-18), constraints such as those represented above may preclude assessment of resident populations (i.e., species of potentially high impact) in areas of potentially high impact. Deletion of consideration of waste dumps as sources of pollution because they are permitted disposal areas appears to be regulatory considerations taken to the extreme. These areas are part of the environment and, as such, are part of regional watersheds that contribute Se, besides being areas of potentially high impact.

Response: The reviewer has misinterpreted the use and rationale for the Department's exclusions. Waste rock dumps were not excluded as sources of pollution, the Department has clearly stated that reclaimed vegetation, and surface and groundwater releases from waste rock dumps are subject to the removal action process. Additionally, waste rock dump soil concentrations are included in the cumulative risk calculations for incidental ingestion. However, the waste rock material, itself, is not subject to soil action levels because they are contained in permitted disposal units and incidental ingestion of soil is a relatively minor route of exposure. The materials in the waste rock piles have always been known to contain highly mineralized material which is the reason they are consolidated

and subject to best management practices. This fact was known by the land management agencies during all previous permitting processes and by the USGS when they were responsible for mineral extraction administration. To now regulate the surface of the dumps is equivalent to requiring a permitted landfill to excavate all of its contents because it is full of trash.

Similarly, the treatment ponds located on mine sites are specifically designed to prevent runoff and sedimentation in regulated streams, and are exempt from the Clean Water Act. To arbitrarily apply a standard for "aquatic protection" to these features defeats the purpose, which is to protect regulated surface waters. The Department has agreed to have the Interagency technical representatives conduct a qualitatively functional use survey of each pond, pit lake and other non-regulated surface water source to determine its primary use and exposure pathways. The proposed action level of 201 ppb will be applied for those units that appear only to provide a transitory wildlife drinking water or migratory bird resting source. An action level of 50 ppb will be applied for units intended as livestock watering areas. And an action level of 5 ppb will be applied for units with significant riparian development that may support waterfowl nesting or other sensitive species.

Finally, the elimination of mice and voles as subpopulation risk indicator species was a risk management decision. These species are ubiquitous to the region and minor effects in subpopulations will not threaten their existence in Southeast Idaho. Their home ranges are extremely small and present an unwarranted bias in risk calculations and remediation decision-making. It should also be noted, while mice and voles were eliminated from risk considerations during the action level development process, they were considered in terms of risks to higher trophic level consumers as prey, through direct measurement techniques during the previous risk assessment effort.

Without consideration of Se bioaccumulation and the ramifications of the above exclusions, the question remains of how recommended remedial actions, especially in terms of historic mines and on a watershed basis, will protect vulnerable species from Se toxicity. Effects may be localized (i.e., *high probability of significant risks to individual and/or subpopulation ecological receptors in localized areas*, page ES-8), but the specifics of food chain exposure, ecology, and hydrology would be necessary to determine whether cumulative effects will drive risk assessment. In view of these considerations, the data sets may not be adequate to define the major processes leading from Se loading through consumer organisms to predators in order to protect fish and wildlife and hence, to determine risk. Multiple-media guidelines, in combination, provide a feasible reference point for monitoring and assessment. The U.S. Department of the Interior has developed ecological risk guidelines for the protection of aquatic life (USDOI, National Irrigation Water Quality Program Report No. 3, Bureau of Reclamation, Denver, Colorado, 1998; http://www.usbr.gov/niwqp/guidelines.html). A linked or combined approach would include all considerations that cause systems to respond differently to Se contamination (Luoma and Presser, 2000). Given below are specific comments and some recommendations for systematic long-term monitoring to help understand the fate and effects of Se in response to management changes.

Response: We do consider our previous area wide efforts to comprise a multimedia evaluation. We evaluated cumulative effects on the basis of including all potential exposure routes in the action level hazard quotient calculations. Bioaccumulation factors are not necessary when using direct measurement of the varying trophic levels and opposed to modelled inputs. The specifics of food chain exposure, ecology and hydrology in impacted areas is good research information if exposures are intended to continue, but not necessarily important to remediation decision making since these factors are intended to change.

Specific Comments

Extent of impacted area

The *Risk Management Plan* makes reference to less than 5% of the overall Resource Area being impacted by historic mining operations and ongoing releases (RMP, page i). This less-than-5%-characterization of impacted area is also noted in the *Executive Summary* of the *Area Wide Human Health and Ecological Risk Assessment* (dated December 2002). The less-than-5%-characterization does not appear in the conclusions of the *Draft Area Wide Human Health and Ecological Risk Assessment* (dated April 2002), nor could documentation of the calculation of impacted areas be found in the text of either document. Until studies are completed or released to define and quantify *impacted area* in terms of ecology, hydrology, mining management practices and other relevant parameters, the extent of the area impacted by historic mining remains undocumented.

Response: The Department is comfortable with the "less than 5%" characterization as an upper bound estimate. This figure was easily arrived at through ratios of waste rock dump soil surfaces to overall phosphate mining resource area, stream segments exceeding water quality criteria in comparison to total subbasin stream lengths, and estimates of impacted reclaimed and riparian vegetation areas as compared to overall vegetative resources. A quick review of the USGS's digital mapping of the mine features in the phosphate mining resource area and our TMDL baseline studies will confirm the scale of potential impacts in comparison with overall resources.

Selenium Action Levels

Not considering the full sequence of interacting processes of Se food webs leaves in doubt the selection of critical media and the basis for adequately determining *Se action levels* for those critical media (Luoma and Presser, 2000). A mass balance approach (inputs, storage, fluxes between media, and outputs) that includes all ecosystem components (water, sediment and biota) would provide a complete regional exposure and risk portrayal for food webs that result in Se toxicity (Presser and Piper, 1998).

Response: The Department does not believe an accurate mass balance approach could be applied in this situation, and the cost/benefits of this additional level of research would not warrant the effort. The marginal differences in the proposed action levels and the literature referenced values, and their application at a subpopulation level, will not have a significant effect on increasing the overall protectiveness of regional populations.

The proposed *Se action levels* for regulated water and sediment are within the marginal risk category for protection of aquatic life when compared to UDSOI guidelines (USDOI, 1998). The *Se action level* for vegetation is within the marginal risk category for diet for aquatic life, above that recommended in forage by the U.S. Forest Service (< 5 ppm, RMP, page 21) and the Idaho State Veterinarian Office (5 ppm, regional grazing level, page 21), and within the chronic toxicity range for horses (5-40 ppm) and sheep (5-25 ppm) (Puls, 1994). Proposed *Se action levels* for unregulated water (201 ppb), soil (5.2 ppm), and sediment (7.5 ppm) are all within the substantive risk category when compared to USDOI guidelines. The Se concentration of 201 ppb for unregulated surface water is exceptional in that is 40-fold higher than that causing substantial risk to the environment. This *Se action level* is based on drinking water ingestion by avian and terrestrial receptors. Direct transfer of Se from solution to animals has been proven to be a small proportion of exposures (Luoma and Presser, 2000). Plans are not detailed in the *Risk Management Plan* for controlling wetland and riparian areas to eliminate exposure through food.

Response: We appreciate USGS's acknowledgement that the sediment and surface water action levels are within DOI's marginal risk levels. It should also be noted, the surface water action level is at

USEPA's criteria under the Clean Water Act and Idaho's criteria for the protection of cold water biota. The Department has agreed to lower it's vegetation action level of 8.3 ppm to 5 ppm to encompass the land management agencies' reclamation goal for domestic grazing use. We previously discussed the non-regulated water action level and believe it to be appropriate for units with limited wildlife drinking water exposure. As stated, "direct transfer of Se from solution to animals has been proven to be a small proportion of exposures" and this concentration is only 4 times higher than the human or domestic animal drinking water criteria, both of which assume sole source concentrations for the entire life of the receptor. Finally, it appears that while the DOI guidelines cite the need and importance for collecting site-specific information, the numeric values and threshold levels recommended in the National Irrigation Project document tend to default back to the most conservative values found in the published literature without recognizing that there may be areas with differing conditions and lesser effects. We do not dispute the findings of the studies that provide the basis for the more conservative values, however, there are a number of extenuating circumstances that often account for the seriousness of the observed effects in some those areas such as the presence of fish in closed systems with steady state exposures, or the presence of regionally-significant avian populations in a selenium impacted marsh environment. The Department is reluctant to apply the conservative risk thresholds developed in these sensitive environments to local conditions that are much different.

The *Proposed Se Action Levels* section (page 28) in the *Risk Management Plan concludes* that 1) many of the on-site ponds and areas of reclaimed vegetation will need to be addressed in the EE/CA process and 2) the sediment median exceeds the action level indicating over one-half of the impacted sediment data would trigger EE/CA consideration. However, the *Summary and Conclusions* section fails to follow-up with a substantive discussion of how these areas and media will be addressed through remedial actions.

In regards to aquatic food chains, the *Draft Area Wide Ecological Risk Assessment* states:

> *The Tier 1 and Tier 2 analyses only addressed terrestrial mammals and birds. To assess potential risks to aquatic receptors such as fish or benthic invertebrates comparisons were made to guidelines for surface water and sediment and reported tissue concentrations at which effects have been documented (page 133). Based on these comparisons the potential risk to aquatic receptors cannot be ruled out (page 144-145).*

The *Final Area Wide Ecological Risk Assessment* states (page ES-8):

> *The evaluation of risks to aquatic receptors is inconclusive due to the lack of scientific consensus and the diversity in outcomes of selenium-related studies. However, the concentrations for surface water, sediment, and fish tissue in impacted areas do exceed the conservative benchmarks published in referenced literature.*

Salamanders may be an example of a receptor at risk whose food web has not been fully evaluated. The *Draft Environmental Impact Statement for Agrium Conda Phosphate Operation's North Rasmussen Ridge Mine, Caribou County, Idaho* states (page 3-97):

> *Selenium poisoning has been confirmed in many salamanders at the Gay Mine at the Ft. Hall Indian Reservation (Idaho) and the nearby Smoky Canyon Mine, with concentrations in some individuals that are 10 to 100 times the normal level in animal tissue (USGS 2001a, 2001b). Viral infections found in salamanders at both sites in Idaho may also be linked to high selenium body burdens (USGS 2001a, 2001b).*

Besides these references, as noted above, several chapter of Hein (in press) contain information about concentrations of Se in food webs and potential impacts to fish and wildlife (Hamilton et al.; Mackowiak et al.; Presser et al.). Also see **General Comments** above for recommendations concerning data gaps and information needs, such as that for aquatic food webs.

Response: Action levels are established for surface water and sediment for the protection of aquatic species. The Interagency Agency Technical Group representatives will conduct a functional use survey for each surface water feature to determine the appropriate level of protection. Specific remedial actions are not discussed in the risk management plan because they have not yet been developed. The EE/CA process consists of developing and presenting alternatives for Agency consideration in achieving the removal action goals.

Total Maximum Daily Load (TMDL) Development

The Risk Management Plan (page 6) states:

> *Currently, there are six-impaired stream segments in the Resource Area proposed for Section 303(d) listing under the Clean Water Act for Se concentrations in excess of water quality standards, although sporadic exceedances of criteria have also been observed in other areas (22, 23). East Mill Creek and Maybe Creek have been recommended for listing based on exceedances of the Criteria Maximum Concentration (acute) of 20 ppb as provided in IDAPA 58.01.02. Dry Valley Creek, Spring Creek, Pole Canyon Creek and Chicken Creek have been recommended for listing based on persistent exceedances of the Criteria Continuous Concentration (chronic) as provided in IDAPA 58.01.02…*
>
> *…The Agency believes a formal TMDL process for the proposed selenium 303(d) listed streams would be a poor use of limited resources. However, the Agency does expect the source mines to either implement modified Best Management Practices that eliminate the migration of contaminants in accordance with Idaho's surface mining regulations and/or to conduct proactive remedial actions to repair impacted areas resulting from historic releases and will result in compliance with State and Federal water quality standards.*

Even though the concept of measurement of Se discharges on a watershed basis seems to have been discarded, a long-term assessment of Se discharges associated with the regional geology of Se-impacted areas would quantify reservoirs of Se and allows modeling of exposure and risk to fish and wildlife. The *Area Wide Ecological Risk Assessment* does include the concept of *more permanent reservoirs of chemicals for exposure to various receptors*:

> *Tier 3 analysis indicates that while large fluctuations in surface water concentrations may occur temporally, these variations are dampened because the most significant dose contributions are in non-transitory media that serves as reservoirs and do not vary at the same rate as surface water* (page ES-8).
>
> *The tier 3 analyses did not indicate a significant difference in risk when 1998 surface water data was used instead of 2001 data. The significantly higher concentration detected in 1998 did not create a significant additional risk because the major portion of the dose for all receptors comes from other media that are not transitory as surface water. These other media serve as a "sink" for the various COPECs that move with the surface water. The major effect of the surface water concentrations is to add COPECs into the other media, which serve as a more permanent reservoir of chemicals for exposure to the various receptors (page 145, Draft; page 153, Final).*

A required TMDL could be a first step in a watershed mass balance approach to define important reservoirs. Watershed discharges would address: 1) the geologic inventory of Se available as a source of influx and 2) natural drainage as a source of efflux, as part of a comprehensive approach to control environmental Se concentrations within environmentally protective ranges.

Response: The Department does not believe an accurate mass balance approach could by applied in these conditions or is necessary to resolve the current issues. The waste rock dumps serving as the source of contaminants are comprised of millions of tons of materials. Considering seasonal influxes are occurring in part per million concentrations, a geologic inventory would have to conclude an infinite source of contaminants over the foreseeable future, which dictates a source control approach to remedial actions. The elimination of these existing pathways would also result in the long-term reduction of concentrations in more permanent reservoirs such as aquatic plants, macroinvertebrates and other food chain media. We believe effective remedial methods can be designed based on the source data available through area wide efforts and subsequent site-specific investigations.

Alkaline-oxidizing environments.

Please provide a reference for the following statement (page 16):

> *In contrast to many of the selenium-impaired sites around the country, the resource area environment exhibits highly alkaline and oxidizing ambient conditions.*

Areas of the western United States causing Se contamination problems have been associated with alkaline-oxidizing environments since the 1940's when studies focused on the potential toxicity of seleniferous open-range plants and the risks posed to the western livestock industry (NRC, 1989; Presser et al., 1994). As a result, grazing was terminated on large areas of western rangeland. The most well known case of Se poisoning in a field environment was at Kesterson National Wildlife Refuge in the San Joaquin Valley of California (Presser and Ohlendorf, 1987). This case-study (the Kesterson Effect) served as a prototype to develop criteria for selecting study sites for the National Irrigation Water Quality Program (Presser et al., 1994). Among the six criteria contributing to Se contamination was an oxidized, alkaline environment that promotes the formation of selenate, the mobile form of Se (Presser, 1994). Selenate in agricultural subsurface wastewater (i.e., irrigation drainage) was efficiently reduced in associated wetlands used as disposal areas to cause teratogenesis and reproductive failure in populations of aquatic birds.

Response: This statement was intended in reference to surface water findings in the Resource Area and our perception of toxicological effects on fish from the review of Dr. Skorupa's "Selenium Poisoning of Fish and Wildlife in Nature: Lessons from Twelve Real-World Examples", which you have also listed as a reference. Of the twelve case studies examined, 5 represented selenite-dominant environments and 7 represented selenate-dominant environments. The selenite studies appeared to be more focused on fish effects, although they also discussed avian impacts, and concluded that selenite-dominant environments appeared more toxic than selenate-dominant environments. The presence of selenite would imply that these waters, which were considered to be more highly impaired, did not consist of highly alkaline and oxidizing ambient conditions but rather reducing environments. Nevertheless, the Department has revised this statement since it adds little to the context of the document.

If you have questions or if you need copies of referenced documents, please do not hesitate to call (Theresa Presser, 650-329-4512, tpresser@usgs.gov). Thank you again for the opportunity to comment on the *Draft Area Wide Risk Management Plan for the Southeast Idaho Phosphate Mining Resource Area*.

Response: Once again, the Department would like to thank the USGS for your interest participation in this project and your thoughtful review of the draft plan. We look forward to the publication of USGS's research compilation and hope to work with your staff again in the near future.

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ATTACHMENT 3

INTERAGENCY ARAR LISTS FOR MINE-SPECIFIC REMOVAL ACTIONS

Bureau of Land Management (BLM) Applicable or Relevant and Appropriate Requirements (ARARs) for the SE Idaho Area Wide Selenium Investigation and CERCLA Removal Actions.

Standard or Requirement	Citation	Applicable	Relevant and Appropriate	To be Considered	Description or Comments
Idaho State's Veterinarian's Office opinion on Selenium levels in forage.				X	Recommends a maximum of 5 ppm (dw) selenium in livestock forage.
National Drinking Water Standards and Safe Drinking Water Act	40 CFR 141	X			Establishes drinking water quality standards.
National Secondary Drinking Water Standards	40 CFR 143			X	Establishes non-enforceable drinking water standards.
Clean Water Act, Federal Water Quality Criteria	33 USC § 1251 et seq., 33 CFR 330 40 CFR 230 40 CFR 131	X			Defines water quality goals to protect said water's designated uses. Regulates disposal of dredge or fill material
Solid Waste Disposal Act as Amended by the Resource Conservation and Recovery Act of 1976	42 USC § 6901 et seq., 40 CFR 257, 40 CFR 261, 40 CFR 262,		X		Regulates the storage and handling and disposal of solid waste. Establishes procedures for listing and determining hazardous waste. Establishes standards for the generation of hazardous waste. Regulates transportation of hazardous waste.

Solid Waste Disposal Act as Amended by the Resource Conservation and Recovery Act of 1976 (Cont)	40 CFR 263 40 CFR 264, 40 CFR 265, 40 CFR 267,				Regulates the design, operation and maintenance of hazardous waste treatment, storage and disposal facilities. Establishes standards for TSD facilities during interim status. Establishes requirements for new hazardous waste land disposal facilities.
Clean Air Act	42 USC § 7409 et seq., 40 CFR 50	X			Establishes ambient air quality standards
Hazardous Materials Transportation Act	49 USC § 1801-1813 40 CFR 107, 171-177		X		Regulates transportation of hazardous waste.
Federal Insecticide, Fungicide and Rodenticide Act, as amended (FIFRA)	Public Law 92-516, 7 USC § 136		X		Applies if Herbicides are used.
Superfund Amendments and Reauthorization Act (SARA Title III)	42 USC § 11001 et seq.	X			Applies if Herbicides are used.
National Historic Preservation Act	16 USC § 470 , 40 CFR 6.301	X			Establishes procedures to preserve archaeological or historic sites.
The Archaeological and Historic Preservation Act	16 USC § 469, 40 CFR 6.301, 36 CFR 800	X			Establishes procedures to preserve archaeological or historic sites.
Executive Order 11988 Floodplain Management	40 CFR 6.302	X			Regulates construction in Floodplains

Executive Order 11990 Protection of Wetlands	40 CFR 6.302	X			Minimizes impacts to Wetlands
Wetlands Protection Act	40 CFR 6.302	X			Regulates impacts to wetlands.
Fish and Wildlife Coordination Act	16 USC § 661 et seq. 40 CFR 6.302	X			Regulates stream alterations and modifications to protect fish and other natural resources.
Mineral Leasing Act	30 USC § 181 et seq.,43 CFR 3500- 3599	X			Regulates discovery, mining, processing and reclamation on Federal phosphate leases.
The Federal Land Policy and Management Act of 1976, as amended (FLPMA)	43 USC §§ 1701- 1782	X			Regulates the management of public lands to protect scenic, historical, environmental, and scientific values.
Occupational Safety and Health Act	29 USC §§ 651-678	X			Regulates worker health and Safety. Also applies if herbicides are used.
Rivers and Harbors Act	33 USC § 401 et seq. 33 CFR 320-330	X			Regulates alteration of waterways.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARAR's)

All pertinent federal and State of Idaho ARARs will be complied with to the maximum extent practicable. The State of Idaho has been involved in the identification of ARARs through the development of the Area Wide Risk management Plan. The following table represents the list of federal and state ARARs for CERCLA removal actions.

Standard, Limitation, or Requirement Criteria	Citation	Description	Category
Safe Drinking Water Act	42 U.S.C. §§ 300f et seq.	Protection of public water systems and underground sources of drinking water	Applicable
National Primary Drinking Water Regulations	40 C.F.R. Part 141	Establishes health-based standards (MCLs) for public water systems	Applicable
National Secondary Drinking Water Regulations	40 C.F.R. Part 143	Establishes welfare-based standards (secondary MCLs) for public water systems	TBC
Clean Water Act	33 U.S.C. §§ 1251 et seq.	Water Pollution Prevention and Control	Applicable
Section 404 of the Clean Water Act	33 U.S.C. § 1344, 33 C.F.R. Parts 320 –330, 40 C.F.R. Part 230	Dredge or fill requirements	
Water Quality Standards	40 C.F.R. Part 131	Sets criteria for water quality based on toxicity to aquatic organisms and human health	Applicable
National Pollutant Discharge Elimination System (NPDES) Permit Regulations	40 CFR § 122 to 125		Applicable
Clean Air Act	42 U.S.C. § 7409		
Surface Mining Control and Reclamation Act	30 U.S.C. § 1201 30 C.F.R. Part 816 30 C.F.R. Part 784	Permanent program performance standards – surface mining activities. Minimum requirements for reclamation and operations.	Relevant and Appropriate
Resource Conservation and Recovery Act	42 U.S.C. §§ 6901 et seq. 40 C.F.R. Parts 260-268		
Archaeological and Historic Preservation Act	40 C.F.R. § 6.301	Data recovery and preservation activities.	Applicable
National Historic Preservation Act	16 U.S.C. §§ 470f, 36 C.F.R. Parts 60, 63	Section 106 of NHPA process balances needs of Federal undertaking with effects the undertaking may have on	Applicable

	and 800, 40 C.F.R. § 6.301	historic properties	
Historic Sites, Building and Antiquities Act	16 U.S.C. § 461		
Protection of Floodplains	40 C.F.R. § 6.302 and Appendix A		
Protection of Wetlands	40 C.F.R. § 6.302	Wetlands Protection: Executive Order 11990 requires agencies conducting certain activities to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.	
Rivers and Harbors Act	33 U.S.C. §§ 401 et seq. 33 C.F.R. Parts 320-330		
Migratory Bird Treaty Act	16 U.S.C. §§ 703 et seq.	Taking, killing, possessing migratory game unlawful	Applicable
Fish and Wildlife Coordination Act	16 U.S.C. § 661 40 C.F.R. § 6.302	Fish and wildlife protection: requires federal agencies involved in actions that will result in the control or structural modification of any natural stream or body of water for any purpose, to take action to protect the fish and wildlife resources that may be affected by the action.	
Bald Eagle Protection Act	16 U.S.C. § 668 50 C.F.R Part 22		
Endangered Species Act	16 U.S.C. §§ 1531 et seq. 50 C.F.R. Part 402 40 C.F.R. § 6.302	Requires consultation with Services charged with protecting listed species.	Applicable
American Indian Religious Freedom Act	42 U.S.C. §§1996 et seq.		
Native American Graves Protection and Repatriation Act	25 U.S.C. §§ 3001 et seq.		
Idaho Water Quality Standards	IDAPA 58.01.02	Water quality standards and wastewater treatment requirements, including: water quality criteria for aquatic life use designations (.250) Designations of surface waters found within Salmon Basin (.130) General surface water quality criteria (.200) Mixing zone policy (.060)	
Idaho Ground Water Quality Rule	IDAPA 58.01.11.200	Numerical and narrative standards that apply to all groundwater of the state	
Rules and Standards for Hazardous Waste	IDAPA 58.01.05		

Solid Waste Management Rules	IDAPA 58.01.06		
Idaho Classification and Protection of Wildlife Rule	IDAPA 13.01.06.300	Classifies fish and wildlife species; identifies species of special concern, and protection of wildlife species from taking and possessing.	
Preservation of Historical Sites	Idaho Statutes Title 67, Chapters 46 and 41		
Stream Channel Alteration Rules	IDAPA 37.03.07		
Rules for the Control of Air Pollution	IDAPA 58.01.01	Including .650 and .651	
Safety of Dams Rules	IDAPA 37.03.06	Guidance to establish acceptable standards for construction and to provide for safety evaluation of new or existing dams.	
Mine Tailings Impoundment Structure Rules	IDAPA 37.03.05	Applies to structures upon which construction, lift construction, enlargement, or alteration is underway on or after July 1, 1978. Establishes design criteria.	
Idaho Non-Point Source Management Plan			TBC
Idaho proposed rule change	Docket No. 58-0102-0103d (Ammonia)		Relevant and Appropriate
NOAA Freshwater Sediment Benchmarks	(Buchman 1999)		TBC
Considering Wetlands at CERCLA Sites Guidance (OSWER 9280.03, May 1994)			TBC
National Recommended Water Quality Criteria November 2002			Relevant and Appropriate

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The selected removal action will comply with those federal, state, and tribal requirements that are applicable or relevant and appropriate to the scope of the response action and that are listed in the above table or set forth in the text below.

The ARARs discussed below are under these categories:

- waste management,
- air quality,
- surface water quality,
- drinking water quality,
- Native American concerns and cultural resources protection,
- special status species,
- sensitive environments, and
- other requirements.

Guidance and other nonpromulgated materials to be considered (TBC) are described in the last subsection.

1 WASTE MANAGEMENT

Idaho Solid Waste Management Rules regulations, IDAPA 58.01.06. Idaho regulations define the siting, design, operational, and closure requirements for solid waste management facilities. “Tier II” and “Tier III” facilities include landfills for non-municipal solid wastes, with Tier III facilities generally for management of solid wastes where leachate or gas may be formed. These regulations explicitly do not apply to “waste dumps, . . . tailings and other materials uniquely associated with mineral extraction, beneficiation or processing operation” and thus are not applicable. However, Tier II non-municipal solid waste landfill requirements are relevant and appropriate to the design, operation, and closure of mine waste rock piles and tailings impoundments. Sections of Tier III non-municipal solid waste landfill requirements may be relevant and appropriate to the design, operation, and closure of tailings impoundment and waste rock piles that include principal threat materials (e.g., metal concentrates)

RCRA Subtitle C: Hazardous Waste Management; IDAPA 58.01.06. Pursuant to the RCRA Bevill Amendment, 40 U.S.C. § 6921(b)(3)(A), solid wastes from the extraction, beneficiation, and some processing of ores and minerals are excluded from the RCRA Subtitle C requirements for managing hazardous wastes. At the Site, such excluded wastes include waste rock, mill tailings, and metal concentrates. However, elements of Subtitle C may be relevant and appropriate to ensure the safe management of solid wastes identified as principal threat materials (e.g., metal concentrates.) RCRA Subtitle C elements that may be relevant and appropriate may include, for example, selected portions of the requirements for design and operation of a hazardous waste landfill, 40 CFR Part 264, Subpart N, IDAPA 58.01.05.009, and selected portions of the requirements for landfill closure and post-closure, 40 CFR Part 264, Subpart G, IDAPA 58.01.06.012-.013. For the management of RCRA hazardous wastes that are not Bevill-exempt, applicability of Subtitle C provisions depend on whether the wastes are managed within an Area of Contamination (AOC). 55 FR 8760 (Mar. 8, 1990). Applicable requirements of RCRA Subtitle C (or the state equivalent) may be satisfied by off-site disposal, consistent with the Off-Site Disposal Rule, 40 CFR § 300.440. RCRA Subtitle C also provides treatment standards for debris contaminated with hazardous waste ("hazardous debris"), 40 CFR § 268.45, IDAPA 16.01.05.011, although the lead agency may determine that such debris is no longer hazardous, consistent with 40 CFR § 261.3(f)(2), IDAPA 16.01.05. These requirements will be applicable for debris contaminated with hazardous waste that will be managed outside an AOC

RCRA Subtitle D: Criteria for Classification of Solid Waste Disposal Facilities and Practices, 40 CFR Part 257, Subpart A. These regulations are applicable for management and disposal of material generated by cleanup activity pursuant to the selected response action. Written for non-municipal non-hazardous waste disposal units, the regulations require that facilities in floodplains not restrict the flow of the base flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste; and not cause or contribute to the taking of any endangered or threatened species. Facilities must not cause a discharge of pollutants into waters of the U.S. that violates the requirements of the National Pollutant Discharge Elimination System and must not contaminate an underground drinking water source beyond the solid waste boundary.

Idaho Land Remediation Rules, IDAPA 58.01.18.027. The Idaho Land Remediation Rules are only applicable to persons who wish to enter voluntary remediation agreements with the State of Idaho. However, the Federal Agencies have concluded that the Institutional Controls provisions of these regulations may be relevant and appropriate for managing waste in locations at the Site where metals concentrations remain above risk or regulatory levels after remediation. These provisions describe a range of institutional controls, including legal use restrictions, that may be available in certain situations.

Idaho Exploration and Surface Mining regulations, IDAPA 20.03.02. These regulations apply to "surface mining operations," as defined to mean the activities performed in an area where minerals are extracted from the ground. "Minerals" include clay, stone, sand, gravel, "and any other similar, solid material or substance of commercial value to be excavated from natural deposits on or in the earth." IDAPA 20.03.02.010. Substantive requirements of these regulations apply to borrow sources for soil, gravel, and similar clean materials for areas requiring fill or barriers to underlying contamination. Provisions of IDAPA 20.03.02.140 are not mandatory, but may be relevant and appropriate to the placement and consolidation of contaminated material generated by cleanup activity pursuant to the selected removal action. Best management practices are listed for nonpoint source sediment control, clearing and grubbing, placement of topsoil conducive to the growth of vegetation, backfilling and grading, and erosion control.

2 AIR QUALITY

Clean Air Act regulations, *National Primary and Secondary Ambient Air Quality Standards (NAAQS)*, 40 CFR Part 50. These regulations are relevant and appropriate to soil removal operations which may generate fugitive emissions. NAAQS have been promulgated for fine and coarse particulates and for lead.

Idaho Rules for Control of Fugitive Dust, IDAPA 58.01.01.650-651. These regulations are applicable to soil removal operations which may generate fugitive emissions. They require that reasonable precautions be taken to prevent particulate matter from becoming airborne, including using water or chemicals to control dust; covering trucks for transporting materials, and promptly removing excavated materials.

Idaho Pollution Control regulations: Toxic Air Pollutants, IDAPA 58.01.01.585-586. These regulations provide screening emission levels and acceptable ambient concentrations (AAC) for designated noncarcinogens and for carcinogens. If a response action under CERCLA causes an emission exceeding the ACC, Best Available Control Technology (BACT) must be applied until the emission level falls below the AAC. IDAPA 58.01.01.16. These regulations are applicable to elements of the selected action having the potential for creating excessive air emissions. Actions will be carried out to minimize air emissions, and BACT will be applied if necessary to remain below acceptable ambient levels.

3 SURFACE WATER QUALITY

Clean Water Act Storm Water Multi-Sector General Permit for Industrial Activities. 65 FR 64746-64880 and 40 CFR 122.26**.** These regulations provide that discharges of storm water associated with "industrial activities" require an NPDES permit. "Industrial activities" include inactive mining facilities, hazardous waste treatment units, and RCRA Subtitle D landfills. The substantive requirements of the Storm Water Multi-Sector General Permit for Industrial Activities (Oct. 30, 2000) apply to elements of the response action that result in discharges of storm water. Best Management Practices (BMPs) must be used, and appropriate monitoring performed, to ensure that storm water runoff does not exceed state water quality standards. It is not an ARAR for seepage or mine drainage.

Clean Water Act Section 304-- Federal Ambient Water Quality, 71 FR 18935-18936 (April 12, 2001) and . Section 304(a)(1) of the Clean Water Act requires EPA to develop, publish, and revise criteria for water quality accurately reflecting the latest scientific knowledge. CERCLA Section 121(d)(2)(B)(i) provides that, "In determining whether or not any water quality criteria under the Clean Water Act is relevant and appropriate under the circumstances of the release or threatened release, the President shall consider the designated or potential use of the surface or groundwater, the environmental media affected, the purposes for which such criteria were developed, and the latest information available." In November, 2002, EPA notified the public of revised Ambient Water Quality Aquatic Life Criteria. These revised criteria are relevant and appropriate to point source discharges to surface water, where those point sources are established as part of the selected response action. These values are relevant and appropriate for the selected response action because they represent the latest scientific knowledge, as determined by EPA's Health and Ecological Criteria Division, Office of Science and Technology. They are also relevant and appropriate for the selected response action because these criteria were developed to better protect aquatic organisms such as bull trout, a threatened species. The selected response action will satisfy this ARAR by ensuring that point source discharges established by the response action do not cause exceedances of the Water Quality Criteria in receiving surface waters.

Idaho Water Quality Standards and Wastewater Treatment Requirements, IDAPA 58.01.02. Idaho water quality standards (WQS) for protection of human health and aquatic incorporate the National Toxics Rule (40 CFR 131.36) by reference for waters designated for aquatic life, recreation, and domestic water supply (Section 210). The Idaho WQS also include turbidity standards for protection of aquatic life (cold water biota) are also applicable (Section 250). The Idaho WQS that were submitted to EPA prior to May 30, 2000, and any changes adopted by Idaho and approved by EPA between May 30, 2000 and the date of this decision document, are applicable to point source discharges to Idaho surface water, where those point sources are established as part of the selected response action e.g., the discharge at Outfall 003. WQS that have been adopted by Idaho but not yet submitted to or approved by EPA, and are more stringent than the standards submitted to EPA prior to May 30, 2002, if any, are relevant and appropriate to point source discharges to Idaho surface water, where those point sources are established as part of the selected response action. Where Idaho WQS are applicable or relevant and appropriate to the selected response action, point source discharges established by the response action must not cause exceedances of WQS in the receiving water body. Effluent limits have been calculated and must be met at Outfall 003.

Idaho Stream Channel Alteration regulations, IDAPA 37.03.07. These regulations are applicable to any alteration of stream channels. “Alteration” means to change the natural shape of a stream channel, including by removing or placing any material or structures with potential to affect the flow within the channel. The substantive requirements of these regulations are applicable to elements of the selected response action with potential to affect stream flows. Substantive requirements include standards for placement of rock riprap and for construction of cofferdams and temporary stream crossings.

Clean Water Act, Section 404 - Dredge or Fill Requirements, 33 U.S.C. § 1344, 33 CFR Parts 320-330; 40 CFR Part 230. These requirements are applicable to work in or near navigable waters. They establish requirements that limit the discharge of dredged or fill material into navigable waters and associated wetlands. EPA guidelines for discharge of dredged or fill materials in 40 CFR Part 230 specify consideration of alternatives that have less adverse impacts and prohibit discharges that would result in exceedance of surface water quality standards, exceedance of toxic effluent standards, and jeopardy of threatened or endangered species. Special consideration required for “special aquatic sites” defined to include wetlands.

4 DRINKING WATER QUALITY

Safe Drinking Water Act, National Primary Drinking Water regulations, 42 U.S.C. § 300f, 40 CFR Part 141, IDAPA 58.01.08.050. These regulations are applicable to public drinking water systems and are relevant and appropriate to the provision of alternate water supplies and sources of drinking water. The regulations require that contaminant concentrations in drinking water fall below maximum contaminant levels (MCLs) and non-zero MCL goals (MCLGs). By final rule effective February 22, 2002, EPA lowered the MCL for arsenic from 0.05 mg/l to 0.01 mg/l. 66 FR 7061. While community water systems have until January 2006 to comply with the new MCL for arsenic, EPA has determined that the new MCL is relevant and appropriate presently for ensuring that drinking water is protective of human health.

5 NATIVE AMERICAN CONCERNS AND CULTURAL RESOURCES PROTECTION

Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. § 3001 et. seq. , 43 CFR Part 10. NAGPRA and implementing regulations are intended to protect Native American graves from desecration through the removal and trafficking of human remains and "cultural items" including funerary and sacred objects. To protect Native American burials and cultural items, the regulations require that if such items are inadvertently discovered during excavation, the excavation must cease and the affiliated tribes must be notified and consulted. This program is applicable to ground disturbing activities such as soil grading and removal.

American Indian Religious Freedom Act,42 U.S.C. § 1996 et seq.. This statute is applicable to soil excavation. It protects religious, ceremonial, and burial sites and the free practice of religions by Native American groups. If sacred sites are discovered in the course of soil disturbances, work will be stopped and the Tribes will be contacted. The statute has no implementing regulations; following the NAGPRA process should meet with the intent of the law.

National Historic Preservation Act (NHPA), 16 U.SC. § 470f, 36 CFR Parts 60, 63, and 800. The NHPA and implementing regulations require agencies to consider the possible effects on historic sites or structures of actions proposed for federal funding or approval. Historic sites or structures are those included on or eligible for the National Register of Historic Places, generally older than 50 years. If an agency finds a potential adverse effect on historic sites or structures, such agency must evaluate alternatives to "avoid, minimize, or mitigate" the impact, in consultation with the State Historic Preservation Office (SHPO). The NHPA and implementing regulations are applicable to selected remedial activities such as mill building demolition and soil excavation which could disturb historical sites or structures. In consultation with the SHPO, unavoidable impacts on historic sites or structures may be mitigated through such means as taking photographs and collecting historical records.

Archaeological Resources Protection Act (ARPA), 16 U.S.C. § 470aa et. seq.,, 43 CFR Part 7. ARPA and implementing regulations prohibit the unauthorized disturbance of archaeological resources on public and Indian lands. Archaeological resources are "any material remains of past human life and activities which are of archaeological interest," including pottery, baskets, tools, and human skeletal remains. The unauthorized removal of archaeological resources from public or

Indian lands is, and any archaeological investigations at a site must be conducted by a professional archaeologist. ARPA and implementing regulations are applicable for the conduct of any selected response action that may result in ground disturbance.

6 SPECIAL STATUS SPECIES

Endangered Species Act (ESA), 16 USC 1531 et. seq., 50 CFR Parts 17, 402. The ESA and implementing regulations make it unlawful to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” any federally-designated threatened or endangered species. The ESA and implementing regulations are applicable to activities of the selected response action that could affect federally-designated threatened or endangered species that may be present. Such species may include salmonids, bull trout, bald eagle, lynx, and gray wolf. Consistent with ESA Section 7, because federally-designated threatened or endangered species are identified in the vicinity of response action work, EPA is consulting with the National Oceanic and Atmospheric Administration, Fisheries Service, and the U.S. Fish and Wildlife Service to ensure that actions are conducted in a manner to minimize adverse habitat modification and is not likely to jeopardize the continued existence of such species.

Idaho Classification and Protection of Wildlife regulations, IDAPA 13.01.06. These regulations are relevant and appropriate to response actions that could affect wildlife species protected by the state, including species listed by state regulation as endangered, threatened, species of special concern, and protected nongame.

6.1 *Migratory Bird Treaty Act (MBTA),* 16 USC 703 et seq. The MBTA makes it unlawful to “hunt, take, capture, kill” or take various other actions adversely affecting a broad range of migratory birds, including tundra swans, hawks, falcons, songbirds, without prior approval by the U.S. Fish and Wildlife Service. (See 50 CFR 10.13 for the list of birds protected under the MBTA.) Under the MBTA, permits may be issued for take (e.g., for research) or killing of migratory birds (e.g., hunting licenses). The mortality of migratory birds due to ingestion of contaminated sediment is not a permitted take under the MBTA. The MBTA and its implementing regulations are relevant and appropriate for protecting migratory bird species identified. The selected response action will be carried out in a manner that avoids the taking or killing of protected migratory bird species, including individual birds or their nests or eggs.

7 SENSITIVE ENVIRONMENTS

Rivers and Harbors Act Section 10 regulations*,* 33 CFR Parts 320 through 330. These regulations are applicable to activities in or near navigable waters. They prohibit unauthorized obstruction or alteration of navigable waters.

Protection of Wetlands, Executive Order 11990; 40 CFR 6.302(a); 40 CFR Part 6, Appendix A. This executive order and regulations apply to response activities in wetlands. They require federal agencies to avoid adversely impacting wetlands, minimize wetland destruction, and preserve the value of wetlands.

Protection of Floodplains, Executive Order 11988, 40 CFR 6.302(b) and Appendix A. This executive order and implementing regulations are applicable to the remedial actions within the floodplain of affected streams and their tributaries. Federal agencies are required to evaluate the potential effects of actions that take place in floodplains and to avoid adverse impacts.

Idaho Lakes Protection Act regulations, IDAPA 20.03.04. These regulations are applicable to remedial work within the beds or waters of navigable lakes of the state. They require that the protection of property, navigation, fish and wildlife habitat, aquatic life, recreation, aesthetic beauty and water quality be given due consideration.

8 OTHER REQUIREMENTS

Hazardous Materials Transportation Act regulations, 49 CFR Parts 171-180. These regulations apply to the movement of contaminated materials along public highways and require packaging, documentation, and placarding appropriate to the materials being transported.

9 TO BE CONSIDERED (TBC's)

Responsibilities of Federal Agencies to Protect Migratory Birds, Executive Order 13186 (66 FR 3853, Jan. 17, 2001). This Executive Order encourages Federal Agencies to integrate migratory bird conservation principles into Agency plans and activities. Such efforts may include preventing or abating pollution for the benefit of migratory birds or restoring or designing migratory bird habitat. Substantive elements of this Executive Order are TBCs for the implementation of the selected response action.

Design and Construction of RCRA/CERCLA Final Covers, EPA/625/4-91/025, May 1991. This publication provides guidelines for the design and construction of these covers.

Best Management Practices for Soils Treatment Technologies (EPA OSWER, 1997). This TBC provides technologies for controlling cross-media transfer of contaminants during materials handling activities.

Considering Wetlands at CERCLA Sites, EPA OSWER 9280.03, 1994. This guidance is a TBC that discusses the consideration of potential impacts of response actions on wetlands at CERCLA sites.

Idaho Non-Point Source Management Plan, 1999. This plan is a TBC for response activities that disturb soils and sediments. The plan requires activities to be consistent with the state's goal of restoration, maintenance, and protection of the beneficial uses of both surface water and groundwater. Long-term goals include design and implementation of BMPs for surface water and groundwater.

State of Idaho Applicable Relevant and Appropriate Requirements (ARARs) and TBCs for the Southeast Idaho Phosphate Mining Resource Area CERCLA Activities

Applicable Requirements:

Potential ARARs	Citation	Description
Endangered Species (IDFG)	Idaho Code §36-201	Authorizes the naming of threatened or endangered wildlife/protected non-game species.

Location-specific ARAR deemed to be potentially applicable on the basis that given biota could be identified as endangered or threatened and in need of protection.

Protection of Animals and Birds (IDFG)	Idaho Code §36-1101 to 1103	Prohibits intentional disturbance or destruction of eggs or nests.

Location-specific ARAR deemed to be potentially applicable if remedial activities necessitate disruption of bird nests in forested, meadow or wetland areas.

Hazardous Waste Management Act of 1983	Idaho Code §36-4401	Authorizes rules for generation, collection, treatment, storage, disposal, and transport of hazardous waste consistent with RCRA. Requires a permit for treatment, storage, discharge, incineration, release, spilling, placement, or disposal of hazardous wastes. Establishes treatment requirements for certain wastes prior to disposal into or on land. Requires that manifested waste be treated, stored, or disposed of in a permitted facility.

Hazardous Waste Identification	IDAPA 58.01.05.005	Identifies characteristic and listed hazardous waste including: Cadmium 1.0 mg/l TCLP Chromium 5.0 mg/l TCLP Selenium 1.0 mg/l TCLP

Activity-specific ARAR potentially applicable for sampling, site characterization, management of purge water and remediation wastes

Hazardous Waste Generation	IDAPA 58.01.05.006	Rules for generators of hazardous waste. Purge water from any ground water sampling should be containerized and labeled as purge water until sampling results are received. Then appropriate disposal pathway can be determined.

Hazardous Waste Transportation	IDAPA 58.01.05.007	Rules for transporters of hazardous waste

Activity-specific ARAR potentially applicable if hazardous wastes are encountered.

Hazardous Waste Permits	IDAPA 58.01.05.006 and .012	Rules for hazardous waste permits

Hazardous Waste Disposal	IDAPA 58.01.05.011	Land disposal requirements

Hazardous Waste Management Act of 1983	1993 Session Law Ch. 291, Sections 1-8	Revises the definition of restricted hazardous waste. Deletes exemptions for certain mining wastes. Changes the process for the Board to identify hazardous wastes. Allows release of confidential information to safe guard public health and safety. Changes disposal fees.

Activity-specific ARARs should be reviewed for applicability to specific mine sites and proposed actions.

Idaho Department of Water Resources (IDWR)	Idaho Code §§42-1701 to 1721 and IDAPA 37.03.06	Regulates construction, enlargement, alteration, repair, maintenance, operation and removal of dams, reservoirs, mine tailings and impoundment structures including plan and specification review and inspections.

Activity-specific ARAR deemed to be applicable for mine tailings areas.

Idaho Department of Water Resources (IDWR)	Idaho Code §§42-3801-3813 and IDAPA 37.03.07	Requires a permit or compliance with "minimum stand" for alteration of stream channel to protect fish and wildlife habitat, aquatic fife, recreation, aesthetic beauty, or water quality. Authorizes the Board to adopt rules to set standards.

Activity-specific ARAR where there is a high potential for stream channel alteration, construction of berms, and impacts to surface water quality/quantity, this code is deemed to be potentially applicable for habitat protection and protection of water quality.

Water Quality Standards and Wastewater Treatment Requirements	IDAPA §58.01.02	Safeguards the quality of state waters and designates uses, which are to be protected.

Location-specific ARAR deemed to be potentially applicable.

Administrative Policy on Protection of waters of the State	IDAPA §58.01.02.050.02	Protects surface and ground water for beneficial uses.

A refinement by definition of the previous applicable component of the ARARs, which is deemed to be applicable.

Antidegradation Policy	IDAPA §58.01.02.051	Requires that existing water uses and water quality, high quality water and ORWs be maintained and protected.

A refinement by definition of the previous applicable components of the ARARs, which is deemed to be applicable.

Violation of Water Quality Standards	IDAPA §58.01.02.080	Prohibits discharges that violate water quality standards or injure beneficial uses. Allows the agency to authorize short-term exemptions.

Location-specific ARAR deemed to be applicable on the basis that discharges have the potential to injure beneficial uses.

Analytical Procedures	IDAPA §58.01.02.090	Establishes analytical procedures that must be used to determine compliance with water quality standards.

Activity-specific ARAR deemed to be applicable for the analytical procedures determining whether water quality standards are being met.

Surface Water Use Classifications	IDAPA §58.01.02.100	Establishes specific beneficial use designations for surface water, which in turn determine applicable standards.

Location-specific ARAR deemed to be applicable as this section establishes definitions for designations of surface waters in the state.

General Surface Water Use Designations	IDAPA §58.01.02.101	Establishes general surface water use designations for waters not otherwise classified.

A continuation of the previous applicable component of the ARARS.

Designated Uses	IDAPA §58.01.02.150 to 160	Designates uses for specific water bodies by hydrologic basin.

Location-specific ARAR deemed to be applicable for designated waters.

General Surface Water Quality Criteria	IDAPA §58.01.02.200	Establishes narrative water quality criteria for hazardous, deleterious and radioactive materials; floating, suspended or submerged matter; excess nutrients; oxygen-demanding materials-and sediment.

Location-specific ARAR deemed to be applicable on the basis of hazardous impacts to surface waters of the state. May be relevant and appropriate if remediation occurs, with a potential to influence sediment loads in surface waters.

General Surface Water Quality Criteria	IDAPA §58.01.02.200.04	Establishes water quality criteria for radioactive materials. MCL= Po-210 7.46 picoCuries/l

Chemical-specific ARAR commonly associated with phosphate mining.

General Surface Water Quality Criteria	IDAPA §58.01.02.210.1	Establishes water quality criteria (chronic) for toxic substances: Cadmium 1 ug/l Chromium (VI) 10 ug/l Chromium (III) 180 ug/l Nickel 160 ug/l Selenium 5 ug/l Zinc 105 ug/l

Chemical-specific ARAR deemed to be applicable in establishing surface water quality criteria.

Surface Water Quality Criteria for Use Classifications	IDAPA §58.01.02.250 to .253	Establishes numerical surface water quality criteria for beneficial use classifications.

Chemical-specific ARAR deemed to be applicable in establishing surface water quality criteria.

Ground Water Quality Standards	IDAPA §58.01.11.200	Protects groundwater for beneficial uses including potable water supplies, establishes use classifications and establishes water quality criteria for ground water. Primary Constituent Standards based on human health: Cadmium 0.005 mg/l Chromium 0.1 mg/l Copper 1.3 mg/l Selenium 0.05 mg/l Secondary Constituent Standards: Zinc 5.0 mg/l Provides temporary rule exemption during the time of active mineral extraction.

Chemical-specific ARAR deemed to be applicable where ground water may be utilized for uses defined in this section.

Non-point Source Discharges	IDAPA §58.01.02.350	Regulates non-point source discharges, designates approved BMWs and provides additional protection for ORW.

Activity-specific ARAR where mining wastes defined as non-point source may be potentially applicable.

Docket Number 16-0102-9403 As an Amendment to the Water Quality Standards and Wastewater Treatment Requirements	Effective Date 9/24/94	Establishes toxics criteria to surface water to replace the National Toxics Rule. Adds criteria for clean sediment pollution. Modifies criteria for chlorine and ammonia. Establishes procedures for variance and site-specific criteria.

Location-specific ARAR potentially applicable to toxics criteria for surface water.

Requirements for Water Quality Protection Under Rules and Regulations for Ore Processing and Cyanidation	IDAPA §58.01.13.200	Specifies minimum design and performance standards for containment capacity. Impounds, liners, water quality monitoring, disposal or abandonment of leached ore, seasonal closure and storage of cyanide compounds.

Activity-specific ARAR deemed applicable for performance standards, liners (if utilized), etc.

Fences in General (LEAs)	Idaho Code §§35-101 to 112	Establishes construction requirements, such as height and distance between posts, for all types of fences. Defines who is responsible for construction and maintenance of enclosure and partition fences.

Activity-specific ARAR if fencing is required to protect installment(s) associated with remediation, the section potentially addresses parameters for fence construction and maintenance.

Idaho Forest Practices Act (IDL)	Idaho Code §§38-1301 to 1314 and IDAPA 20.02.01 et seq.	Protects forest soil, air, water resources, wildlife and aquatic habitat. Rules establish minimum standards for forest practices, including reforestation, road construction, tree salvage and use of chemicals for growing trees. Requires agency notification before commencing a forest practice or converting forestland to other uses. Converted lands must have vegetative cover. Requires establishment of methods to control cumulative effects on watersheds and site-specific best management practices (BMPs).

Location-specific ARAR deemed applicable in the event remediation requires construction components.

Idaho Forest Practices Act (IDL)	1995 Session Law Ch. 352, Sec. 2-5 Idaho Code §38-1306 IDAPA 20.02.01 et seq.	Amends 1.C. § 38-1306 regarding notification of forest practice and adds new section 1306B regarding requirements for operating bonds.

Location-specific ARAR may be applicable if remediation requires construction, which could potentially impact habitat. The PRPs may be required to post bond(s).

Surface Mining (IDL)	Idaho Code §§47-1501 to 1519 and IDAPA 20.02.140	Establishes standards and authorizes rules for reclaiming lands affected by surface exploration and mining, including recontouring, erosion control and revegetation. Requires implementation of best management practices that prevent the release of hazardous or deleterious constituents, and protect surface water quality. The Land Board must approve all reclamation plans.

Activity-specific ARAR where surface mining wastes are already in existence, this section may fall into the realm of relevant and appropriate. If remediation is required, may have applicable components as they relate to contouring erosion control and revegetation.

Relevant and Appropriate Requirements:

Potential ARARs	Citation	Description
Water Pollution Abatement (DEQ)	Idaho Code §§39-3614 to 3621 and IDAPA 58.01.02.051 through .059	Provides for designation of Outstanding Resource Waters (ORWs). Prohibits new or modified non-point source activities that lower water quality in ORWs without use of approved ORW BNTS. Allows temporary activities that do not alter uses or character of a stream segment.

Location-specific ARAR deemed relevant and appropriate in prohibiting water quality degradation.

Water Pollution Abatement	1995 Session Law Ch. 352, Section 1 §§39-3601 to 39-3639	Repeals I.C § 38-1314 and I.C. §§39-3614 through 39-3621. Creates a new Chapter 36 regarding water quality, which protects surface water quality and establishes an environmental remediation fund.

Location-specific ARAR may contain relevant and appropriate components relative to protecting surface water.

Hazardous Substance Emergency Response Act (SERC)	Idaho Code §§39-7101 to 7115	Requires notification of a hazardous substance release. Requires development and implementation of the Hazardous Materials Incident Command Response Plan. Establishes liability for costs arising from a hazardous substance incident.

Activity-specific ARAR if a remediation activity required a hazardous constituent be collected and conveyed to a **TSDF**, this section could apply to transport of the constituent from the site especially if it is spilled en route.

Site Specific Surface Water Quality Criteria	IDAPA §58.01.02.275 to 280	Establishes surface water quality standards for water discharged from dams, reservoirs and hydroelectric facilities and for other named waters.

Activity-specific ARAR deemed relevant and appropriate as this ARAR sets for standards for designated surface waters.

Dredge and Placer Mining (IDL)	Idaho Code §§47-1301 to 1324 and IDAPA 20.03.01.040	Requires reclamation after mining and establishes narrative standards. Prohibits dredge mining on National Wild and Scenic Rivers. Includes specific requirements for restoration of disturbed lands. Authorizes rules.

Activity-specific ARAR may be relevant or appropriate for restoration activities.

To Be Considered:

To Be Considered Item	Citation	Description
Guidelines for Interpretation of Biological Effects of Selected Constituents in Biota, Water and Sediment	National Irrigation Water Quality Program Information Report No. 3, Nov 1998, DOI	Provides information on selenium effects and thresholds from other historical sites.

May be taken into consideration in interpretation of observed data and potential toxicological effects.

IDEQ Area Wide Risk Management Plan	Idaho Department of Environmental Quality, February 2004	Guidance document for regional removal action goals and objectives, and action levels.

Shall be taken into consideration for site-specific risk management needs.

Idaho Risk-Based Decision-Making for Remedial Action Guidance Document	Idaho Department of Environmental Quality, December 2003	Guidance document for risk-based decision-making using human health and transport models.

May be taken into consideration in areas where ecological risks are not a factor.

Idaho Forestry Act (IDL)	Idaho Code §§38-101 to 136 and IDAPA 20.02.01.070	Protects forest and watersheds, primarily by fire prevention and suppression. Establishes requirements for disposing of slash from land and for clearing rights of way.

May need to be taken into consideration if rights of way are at issue or if slash is generated as a result of remediation.

Docket Number 16-0102-9401 (Temp)	9/1/94	Established a site-specific variance from ambient water quality standards for the Kinross DeLamar Mining Company.

To be considered if site-specific variances are proposed for a particular location or source.

EASTERN IDAHO SUPERVISORY AREA
3563 Ririe Highway
Idaho Falls ID 83401
Phone (208) 525-7167
Fax (208) 525-7178
E-mail: cmorris@idl.state.id.us

IDAHO DEPARTMENT OF LANDS

WINSTON A WIGGINS, DIRECTOR
EQUAL OPPORTUNITY EMPLOYER

February 18, 2004

Department of Environmental Quality
Attn: Rick Clegg
15 West Center Street
Soda Springs, ID 83276

Dear Mr. Clegg:

The Idaho Department of Lands (IDL) concurs with Idaho Department of Environmental Qualities (IDEQ) Applicable or Relevant and Appropriate Requirements (ARAR) for the Area Wide Risk Management Plan: Removal Action Goals and Objectives, and Action Levels for Addressing Releases and Impacts form Historic Phosphate Mining Operations in Southeast Idaho.

IDL, although not on the MOU list for this plan, has been involved in its procedures and offered remarks to it. Furthermore, IDL values the opportunity to comment on these procedures.

Sincerely,

Christopher E. Morris
Minerals Resource Manager

CEM/cm

Shoshone Bannock Tribes Applicable Relevant and Appropriate Requirements (ARARs) for the Southeast Idaho Phosphate Mining Resource Area CERCLA Activities.

Applicable Requirements:

Potential ARARs	**Citation**	**Description**
Fort Bridger Treaty 1868	15 Stat 675	Established the Reservation as a "permanent home" for the signatory tribes. Established reserved off-reservation hunting, fishing and gathering rights to the tribes, these rights are exercised on public lands through out the state of Idaho.

Tribal Constitution and Bylaws 1936	Indian Reorganization Act of June 18, 1934 (48 Stat. 984) as amended by the act of June 15, 1935 (49 Stat. 378)	Established the policy and procedures for Fort Hall Business Council.

Fort Hall Water Rights Agreement 1994	WATR 02-S2 & WATR 02-S3	Established the Tribes right to adequate and clean, safe water.

Standard, Limitation, or Requirement Criteria	Citation	Description	Action, Contaminant or Location	Applicable / Relevant and Appropriate or To Be Considered
Action Specific Requirements				
Clean Water Act (CWA)	33 USC 1342 - 1344 40 CFR 122	Water pollution prevention and control for point source discharges	Action: On-site discharges of point-source water	Substantive requirements are applicable to on-site discharges of point-source water. State-delegated program so would defer to state requirements.
CWA: Section 404	33 CFR 323	Dredge or fill requirements. This regulation prohibits discharge of dredged or fill material into waters of the United States without a permit	Action: Dredging or filling wetlands	Substantive requirements are applicable for any on-site action that involves dredging or filling in a wetland
CWA: Storm Water Discharges	40 CFR 122.26	Water pollution prevention and control of storm water discharges	Action: On-site discharges of storm water during construction	Substantive requirements are applicable to on-site discharges of construction-related storm water. State-delegated program so would defer to state requirements.
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	7 USC 136(q)	Requirements for control of pesticides	Action: Storage, use, disposal, and transportation of pesticides	Not an ARAR unless pesticides are to be used during cleanup
Hazardous Materials Regulations	49 CFR 171 - 173 & 177 49 USC 1801 - 1813	The movement of hazardous materials on public roadways must be in accordance with placarding, packaging, documentation and other requirements of this regulation.	Action: Transportation	These regulations are applicable to the off-site transport of hazardous materials on public highways.
Migratory Bird Treaty Act	16 USC 703 et seq.	Taking, killing, possessing migratory game unlawful	Action	Applicable

Standard, Limitation, or Requirement Criteria	Citation	Description	Action, Contaminant or Location	Applicable / Relevant and Appropriate or To Be Considered
RCRA: Criteria for Municipal Solid Waste (MSW) Landfills	40 CFR 258.50-56	Requirements for engineered disposal facilities to ensure appropriate assessment, monitoring, and protection of groundwater.	Action: Post-removal ground-water monitoring	Relevant and Appropriate. Would defer to monitoring requirements in state-delegated solid waste or mined land reclamation program.
RCRA: Criteria for Municipal Solid Waste (MSW) Landfills	40 CFR 258.60(a)(1-3)	Closure criteria for capping MSW facilities.	Action: Capping	Relevant and Appropriate. Would defer to monitoring requirements in state-delegated solid waste or mined land reclamation program.
Resource Conservation and Recovery Act (RCRA): Land Disposal Restrictions	40 CFR 268	Establishes restrictions for land disposal of hazardous wastes	Action: Land Disposal	Not an ARAR because the material to be cleaned up is exempt from hazardous waste regulations
SDWA: Underground Injection Control Program	40 CFR 144	Regulates underground injection into certain classes of wells. Its purpose is to prevent contamination of ground water that may be a source of drinking water.	Action: Underground injection	Relevant and appropriate if underground injection is necessary for the cleanup.
Surface Mining Control and Reclamation Act (SMCRA)	30 USC 1201 - 1326 30 CFR 816 30 CFR 784	Permanent program performance standards - surface mining activities. Surface mining permit applications - minimum requirements for reclamation and operations plan	Action: Capping, run-on and run-off control, revegetation	Relevant and Appropriate. Would defer to state-delegated solid wate or mined land reclamation program requirements.
Contaminant Specific Requirements				
Clean Air Act National Primary and Secondary Ambient Air Quality Standards (NAAQS)	42 USC 7409 40 CFR 50	Establishes Air Quality Levels that protect public health	Contaminant: Fugitive Dust	Defer to the State of Idaho requirements for the control of fugitive dust
Clean Air Act - NESHAP's	40 CFR 61	The Environmental Protection Agency has promulgated standards for certain hazardous air pollutants from specific sources	Contaminant: Hazardous Air Pollutants.	Not an ARAR because no hazardous air pollutants likely to be encountered

Standard, Limitation, or Requirement Criteria	Citation	Description	Action, Contaminant or Location	Applicable / Relevant and Appropriate or To Be Considered
CWA: Water Quality Standards	40 CFR 131	Sets criteria for water quality based on toxicity to aquatic organisms and human health. Requires states to develop standards based on the criteria.	Contaminant: Various	Federal Ambient Water Quality Criteria are ARAR's only if there is no state or federal standard for Contaminants of Potential Concern (COPCs) identified by the IDEQ's Area Wide Investigation, or if there is a standard, but the Forest Service chooses to add an extra measure of protection and go beyond the standard to the criteria.
Emergency Planning & Community Right to Know Act	42 USC 11001 et seq.	Also known as Title III of Superfund Amendments and Reauthorization Act (SARA). Designated to help local communities protect public health, safety, and the environment from chemical hazards	Contaminant: Various	Not an ARAR
Pollution Prevention Act	42 USC 13101 & 13102 et seq.	Focused industry, government, and public attention on reducing the amount of pollution through cost-effective changes in production, operation, and raw materials use	Contaminant: Various	Not an ARAR
RCRA: List of Hazardous Wastes	40 CFR 261, Subpart C and D	Defines those solids wastes which are subject to regulation as hazardous wastes under 40 CFR Parts 262-265 and Parts 124, 270, and 271. The Bevill Exclusion at 40 CFR 261.4(b)(7) excludes solid waste from the extraction, beneficiation and processing of ores and minerals including phosphate rock from the definition of hazardous waste.	Contaminant: Various	RCRA hazardous waste regulations are not applicable - parts of the RCRA regulations may be relevant and appropriate and are discussed under the action and location specific requirements

Standard, Limitation, or Requirement Criteria	Citation	Description	Action, Contaminant or Location	Applicable / Relevant and Appropriate or To Be Considered
Safe Drinking Water Act (SDWA): National Primary Drinking Water Regulations	40 CFR 141	Establishes health-based standards (MCLs) for public water systems	Contaminant: Various	Relevant and appropriate if alternative involves the cleanup of groundwater. Would defer to standards established in state-delegated program.
SDWA: National Secondary Drinking Water Regulations	40 CFR 143	Establishes welfare-based standards (secondary MCLs) for public water systems	Contaminant	To Be Considered if removal involves groundwater cleanup. Would defer to standards established in state-delegated program.
Toxic Substances Control Act	15 USC 2601 et seq.	Enacted by Congress to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States	Contaminant: Listed Toxic Substances	Not an ARAR for phosphate mines since toxic substances not likely to be encountered.
Location Specific Requirements				
American Indian Religious Freedom Act	42 USC 1996 et seq.	To protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites	Location: Ceremonial sites and areas where sacred objects are located	Substantive requirements are applicable to on-site actions
Archaeological and Historic Preservation Act	40 CFR 6.301(c) 16 USC 469 et seq.	Data recovery and preservation activities	Location: Sites with significant scientific, prehistoric, historic, and archeological data	Substantive requirements are applicable to on-site actions
Archaeological Resources Protection Act	16 USC 470(aa-ii) 43 CFR 7	Steps must be taken to protect archaeological resources and sites that are on public and Indian lands and to preserve data	Location: Archeological resource sites	Substantive requirements are applicable to on-site actions

Standard, Limitation, or Requirement Criteria	Citation	Description	Action, Contaminant or Location	Applicable / Relevant and Appropriate or To Be Considered
Bald and Golden Eagle Protection Act	16 USC 668 et seq. 50 CFR 22	Prohibits any person from knowingly possessing or harming a bald or golden eagle, part of or complete nest, egg or part of Bald Eagle without being permitted to do so	Location: Eagle nesting sites	Substantive requirements are applicable to on-site actions
Caribou-Targhee Land Use Management Plan (National Forest Management Act)	16 USC 1601 - 1614 36 CFR 219	Establishes multiple use goals and objectives, forest-wide management requirements, and monitoring and evaluation requirements. Establishes direction so that future decisions affecting the Forest will include an interdisciplinary approach to achieve integrated consideration of physical, biological, economic and other sciences.	Location: Caribou-Targhee National Forest	Substantive requirements are applicable to on-site actions.
Endangered Species Act	7 USC 136 16 USC 460 16 USC 1531 et seq. 40 CFR 6.302 50 CFR 402	Federal Agencies are prohibited from jeopardizing T&E Species or adversely modifying habitats essential to their survival. Requires consultation with the Service charged with protecting listed species	Location: Critical habitat of an endangered or threatened species.	Substantive requirements are applicable to on-site actions.
Federal Land Policy and Management Act (FLPMA)	43 USC 1701 - 1785	Public lands and their resources are periodically and systematically inventoried and their present and future use is projected through a land use planning process, and that the land be managed for the use and protection of the land and its natural resources	Location: Primarily Federal lands administered by BLM	Not likely to be an ARAR for most land administered by the Forest Service.
Fish and Wildlife Coordination Act	16 USC 661 et seq. 16 USC 1531 - 1566 40 CFR 6.302(g)	Requires Federal agencies involved in actions that will result in the control or structural modification of any natural stream or body of water for any purpose, to take action to protect the fish and wildlife resources that may be affected by the action	Location: Streams and waterways	Substantive requirements are applicable to on-site actions.

Standard, Limitation, or Requirement Criteria	Citation	Description	Action, Contaminant or Location	Applicable / Relevant and Appropriate or To Be Considered
Hazardous and Solid Waste Regulations	40 CFR 264.18	Location standards and restrictions for hazardous waste treatment, storage, and disposal (TSD) facilities	Location: Fault zones, floodplains, salt domes, undergound mines, caves	Not applicable because we will not be siting a new TSD facility and the material we will be addressing is exempt from hazardous waste regulations. Location restrictions could be relevant and appropriate to any alternative that involves siting a new disposal facility.
Hazardous and Solid Waste Regulations Municipal Solid Waste Facilities	40 CFR 257.3(1-4)	Location standards and restrictions for solid waste disposal facilities	Location: Near surface water, groundwater, endangered species, or floodplains	Relevant and appropriate to any alternative that involves siting a new disposal facility
Hazardous and Solid Waste Regulations Municipal Solid Waste Facilities	40 CFR 258-10-15	Location standards and restrictions for municipal solid waste disposal facilities	Location: Wetlands, fault areas, seismic zones, unstable areas, or near airports	Relevant and appropriate to any alternative that involves siting a new disposal facility
Historic Sites Act	16 USC 461 - 467 40 CFR 6.301(a) 36 CFR 62	Requires Federal agencies to consider the existence and location of potential and existing National Natural Landmarks to avoid undesirable impacts on them.	Location: National Natural Landmarks	Substantive requirements are applicable to on-site actions

Standard, Limitation, or Requirement Criteria	Citation	Description	Action, Contaminant or Location	Applicable / Relevant and Appropriate or To Be Considered
National Historic Preservation Act National Historic Landmarks Act	16 USC 470 et seq., 36 CFR 60, 63, 65 & 800 40 CFR 6.301(b & c)	Section 106 of the NHPA process, balances needs of Federal undertaking with the effects the undertaking may have on historic properties. If historic properties or landmarks eligible for, or included in, the National Register of Historic Places exists within remediation areas, remediation activities must be designed to minimize the effect on such properties	Location: Historic Properties	Substantive requirements are applicable to on-site actions
Native American Graves Protection and Repatriation Act	25 USC 3001 et seq. 43 CFR 10	This pertains to the identification and appropriate disposition of human remains, funerary objects, sacred objects, or objects of cultural patrimony found on Federally controlled lands	Location: Native American Grave sites	Substantive requirements are applicable to on-site actions
Protection of Floodplains	40 CFR 6.302(b) 40 CFR 6 Appendix A Executive Order 11988	Requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the adverse impacts associated with direct and indirect development of a floodplain	Location: Floodplains	Substantive requirements are applicable to on-site actions
Protection of Wetlands	40 CFR 6.302(a) 40 CFR 6 Appendix A Executive Order 11990	Wetlands protection: Agencies conducting certain activities are required to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to not support construction in wetlands if a practical alternative exists	Location: Wetlands	Substantive requirements are applicable to on-site actions

U.S. Fish and Wildlife Service Authorities

Endangered Species Act (ESA) of 1973, as amended	16 U.S.C. 1531 *et seq*. 50 C.F.R. § 402.02.	The Act provides for the conservation of ecosystems upon which endangered and threatened species depend, both through Federal action and by encouraging the establishment of State programs.
Migratory Bird Treaty Act (MBTA) as amended	16 U.S.C. 703; Ch. 128; 40 Stat. 755.	Established a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this convention…for the protection of migratory birds…or any part, nest, or egg of any such bird"
Bald Eagle Protection Act of 1940 as amended	16 U.S.C. 668, 54 Stat. 250	Provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds.

ATTACHMENT 4

INTERAGENCY CONCURRENCE LETTERS