DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
REGION 1

FY04 ENVIRONMENTAL CONTAMINANTS PROGRAM

OFF-REFUGE INVESTIGATIONS SUB-ACTIVITY

Interim Report FY 2004

NV - Assessment of Metals Exposure to Aquatic Biota from Historic Mine Sites in the Western Great Basin

Project ID: 1130-1F41
(metalminebiota_IR_2004.wpd)

by

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II. INTRODUCTION

II.A. Background and Justification

Current and historic mining operations represent significant threats to aquatic systems in Nevada and elsewhere in the western United States (National Research Council 1999). For example, Moore et al. (1991) found that arsenic, cadmium, copper, and zinc remained elevated in sediment up to 25 km down stream of the contaminant source even though metal concentrations in solution decreased within a few kilometers down stream of the mine drainage input. Locally, metals mobilized from an abandoned mine site in the Santa Rosa Mountains in Humboldt County, Nevada have contaminated sediments at distance at least 3 km downstream of the mine site and may extend as much as 8 km downstream of the site (Earth Technology Corporation 1991). Data collected in the Humboldt River watershed by the U.S. Environmental Protection Agency's Regional Environmental Monitoring and Assessment Program (REMAP) in 1998 revealed concentrations in sediment, at sites associated with mining activities, exceeded adverse effect levels suggested by Long and Morgan (1991) for several metals including arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc (Higgins and Hall, in prep). In addition, many historic mine sites had milling operations which used mercury in amalgamation processes to extract precious metals from ores. Large losses of mercury occurred in this process and from mercury mining itself, releasing mercury into the environment through discarded mill tailings and effluents. Adverse effects of mercury in aquatic systems are well established (Zilloux et al. 1993). Similarly, adverse impacts of mercury-contaminated drainages from historic milling operations have been well documented. Sampling of stream sediments down-gradient of mill tailings at Castle Peak Mine located in Storey County, Nevada revealed total mercury concentrations ranging up to 8,400 ng/g (ppb) dry weight (Nevada Bureau of Mines and Geology, unpubl. data). These concentrations exceed the potential for adverse biological effects suggested by Long and Morgan (1991).

Metals in drainage emanating from historic mine sites in the western Great Basin are likely impacting aquatic biota, including streams containing the threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) and the candidate species Columbia spotted frog *(Rana luteiventris*). Degradation of water quality has been identified as a principal threat to the Lahontan cutthroat trout (LCT) throughout its range (U.S. Fish and Wildlife Service 1994). However, degradation of water quality and habitats receiving historic mining drainage has never been adequately assessed or addressed in recovery planning efforts. There are several historic mining operations that are in existing Lahontan cutthroat trout (LCT) streams. However, the impact these historic mine drainages may have on LCT populations is unknown.

II.B. Scientific Objectives

The purpose of this proposed investigation is to identify and characterize the nature and extent of impacts to aquatic organisms and communities from metals in drainage emanating from current and historic mine sites. Specific objectives of the investigation include: 1) identification of aquatic habitats that both receive drainage from suspected contaminated mine sites and provide habitat to trust resources of the Fish and Wildlife Service, and 2) assessment of sediment and food chain contamination to determine the potential for adverse effects to aquatic organisms, populations, and communities. This investigation will require three years to complete and consist of three phases. Phase One will be collection of existing geological, hydrological, biological data, and historical information at sites identified as receiving drainage from sites that are known to contain elevated metals in water or sediment and contain trust resources of the Fish and Wildlife Service. This will be accomplished by obtaining data from the U.S. Geological Survey, Bureau of Land Management, Nevada Bureau of Mines and Geology, and U.S. Forest Service and incorporating the data into a Geographic Information System (GIS). Phase Two will involve the collection of sediment, invertebrate, and fish samples from aquatic habitats at five impacted and one control site. Samples will be analyzed to identify sites where excessive metal exposures to aquatic biota are occurring and compared to known literature values for chronic and acute exposures. The final phase will consist of data analysis and report preparation

II.C. Management Action(s)

The Environmental Contaminants staff of the Nevada Fish and Wildlife Office (NFWO) is currently involved in the Abandoned Mine Land Environmental Task Force (AMLETF), a multi-agency coalition designed to achieve mitigation of water quality problems from abandoned mine lands (AML) on Federal lands in Nevada. The AMLTF received $2.2 million from the U.S. Army Corps of Engineers for planning efforts in characterization studies and planning of abandoned mine sites. The U.S. Forest service is also coordinating efforts to characterize contamination concerns and prioritize clean up activities at historic mine sites using for removal actions funding under Section 106 of the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA). **The purpose of this proposed investigation is to collect information on impacts to aquatic biota and their habitats that support fish and wildlife from metals exposure at historic mine sites. The information provided will be used by the AMLETF and USFS to develop cleanup strategies to reduce environmental impacts and prioritize future mitigation activities that would reduce threats to trust resources of the Department of the Interior including fish and wildlife and their habitat. The proposed study would also provide information to guide listed trout recovery efforts and identification of measures to preclude listing of other aquatic species. Information generated through the proposed investigation would be used during Clean Water Act triennial reviews to evaluate and, if necessary modify water quality standards (via Section 7 consultation) to ensure adequate protection of listed species. The information would also be used during Section 7 consultations for various development and land use projects, such as mine development projects and grazing allotment reviews.**

III. METHODS

III.A. Data Collection and Analysis

Thirty-three sites have been identified by the AMLETF as potentially impacting ground or surface water and needing some type of reclamation action in the near future (State of Nevada Interagency Abandoned Mine Land Environmental Taskforce 1999). Using information from the AMLETF and USFS, USFWS selected five of these sites which support trust resources, and has documented contaminant concerns most likely to affect fish and wildlife and their habitat (Table 1). One control site that does not have any known mining influences was also included. The proposed investigation will assess exposure to metals originating from these historic mine sites and characterize effects to aquatic invertebrates and fish emanating from drainage at these sites.

Table 1. Selected study locations for data collection with known contamination and U.S. Fish and Wildlife trust resources.

Study Location	Stream	Location	Trust Resource(s)	Known Contaminant Concerns	Reference(s)
Austin Gold Venture	Birch Creek	Lander Co., NV	Lahontan cutthroat trout, Columbia spotted frog	copper, iron, manganese, nickel, pH, selenium, sulfate, total suspended solids,	Resource Concepts, Inc., 1996.
Colorado Hill	Monitor Creek	Alpine Co., CA	Lahontan cutthroat trout	antimony, arsenic, cadmium, copper, mercury, lead, pH, silver, zinc	Science Applications International Corporation, 2001.
American Beauty	Long Canyon	Elko Co., NV	Lahontan cutthroat trout, Columbia spotted frog	antimony, cadmium, mercury, lead, silver, pH	Higgins and Hall, in prep.
Buckskin National	North Fork Little Humboldt	Humboldt Co., NV	Lahontan cutthroat trout	arsenic, cyanide, selenium, lead, iron, mercury, pH	Earth Technology Corporation, 1991; Higgins and Hall, in prep.
National	Eight-mile Creek	Humboldt Co., NV	Lahontan cutthroat trout	copper, iron, zinc, pH	U.S. Fish and Wildlife correspondence, April, 2000.
Control Site	Hunter Creek	Washoe Co., NV	Lahontan cutthroat trout	none	

The investigation would include several tasks, including: 1) determination of metals and trace elements in water, sediment, aquatic benthic invertebrates, and fish tissues; 2) aquatic invertebrate community assessment; 3) fish community assessment; and 4) fish health assessment. This data would be compared with data from threshold values determined in other investigations on toxicity of water, sediment, and diet to fish and invertebrates. Concentrations of metals and trace elements in biota would be compared to effect levels in aquatic biota and fish determined in previous investigations.

Sampling sites at the study locations would include: 1) immediately below tailings influence; 2) an area not to exceed 800 m downstream of tailings influence; and 3) an area not to exceed 1.5 km downstream of tailings influence. Biota in these environments are fairly restricted due to limited water availability and those collected would be localized organisms that do not migrate to other sampling sites. Field data collection would be conducted during the early summer when access is available to high elevation sites, water availability is most likely, and biological activity is at a maximum. The locations of sampling sites would be obtained and recorded using global position system methodology. A summary and cost breakdown of samples to be collected for metals and trace element analyses is provided in Table 2.

Table 2. Summary of samples to be collected for chemical analysis for this investigation and associated costs.

Matrix	Number of Samples	Analytical Cost/Sample (if applicable)	Total Analytical Cost/Matrix (if applicable)
Water (metals scan)	20	$240	$4,800
Sediment (metals scan)	18	$254	$4,572
Aquatic Invertebrates (metals scan)	18	$274	$4,932
Fish- whole body (metals scan)	18	$274	$4,932
Fish- muscle (metals scan)	6	$274	$1,644
Fish- gill (metals scan)	6	$274	$1,644
Fish- liver (metals scan)	6	$274	$1,644
Total	**92**		**$24,168**

1) Water Chemistry

Water quality parameters measured at each sampling site would include temperature, dissolved oxygen (DO), pH, specific conductance, salinity, and turbidity. All water quality parameters would be measured using a Hydrolab DataSonde 4a multiprobe unit and calibrated before each use. Temperature would be checked and calibrated using a hand held NIST-certified thermometer. The DO meter would be calibrated accordingly to elevation and water temperature. pH measurements would be calibrated using appropriate pH buffers. Specific conductance measurements would be calibrated using a reference solution of 1,000 microsiemens per millimeter. Turbidity measurements would be calibrated using a reference solution of 0.1 NTU's.

Biota of streams receiving acid drainage can be adversely affected by exposure to metals via multiple exposure routes (Besser et al. 2001). Toxic effects can result from short-term exposures to metal-contaminated stream water in affected habitats (Henry et al. 1999). In addition, several studies have demonstrated that salmon and trout species will avoid copper and zinc concentrations that are much lower than concentrations that would normally be lethal under similar water quality conditions (Saunders and Sprague 1967; Sprague 1964; Sprague 1967). To evaluate water chemistry in identified aquatic habitats, one composite sample would be collected at each of the three sampling sites within each of the six study locations for a total of 18 water samples in FY 2003. Water samples for metal analyses would be collected in certified clean 500 ml polypropylene bottles. Samples would be collected from mid-stream, mid-water column depth, while facing in an upstream direction by immersing a closed bottle then opening under water. Each sample bottle would be rinsed three times using the above collection technique prior to collection of the sample. Rinsate would be disposed of down stream of the sample collection site. Samples for dissolved metals analyses would be filtered through 0.45 µm acetate filter into appropriate bottles. These bottles would be rinsed at least twice with filtered water prior to sample collection. Samples for metal/trace element will be acidified to pH $\leq$ 2.0, stored on ice in the field, and refrigerated within 6 hours following collection. One field blank and one filtration blank, each consisting of deionized water exposed to sample collection and processing conditions, would be collected. These blanks would be treated as individual samples and submitted for metal and trace element analysis. No preservatives would be added to water samples.

2) Sediment Chemistry

Elevated metals in sediments can pose a long-term threat to aquatic organisms (McIntosh 1991). Sediments, which may contain concentrations of contaminants that are orders of magnitude greater than in the overlying water column, act as a sink and a source of contaminants (Harrahy and Clements 1997). To evaluate sediment contamination in identified aquatic habitats, one composite sample would be collected at each of the three sampling sites within each of the six study locations for a total of 18 sediment samples in FY 2003. Each sample would consist of 10 sediment core samples collected within a 10 m radius of the central sampling point. Samples of shallow sediment would be collected with a Wildco model number 2422 H12 core sampler. Only the top three cm of the core would be included in

the sample. Subsamples of sediment would be thoroughly mixed in a stainless steel bowl. Approximately 75 g of composited sediment would be placed in certified clean 60 ml acid-washed glass containers with a teflon-lined closure. Samples would be stored on ice in the field and frozen within 10 hours following collection. The core sampler would be washed with a brush and site water between each core sample. Prior to use at each collection site, all remaining collection and processing equipment would be washed with a brush and mild detergent-deionized water solution, rinsed with 10 % nitric acid, and triple-rinsed with deionized water. Between subsample collections at each site, the collection equipment would be washed with a brush and rinsed with site water.

3) Food Chain Contamination

Several studies have associated elevated metals concentrations in sediment with elevated metal concentrations in benthic organisms (Moore et al. 1991; Ingersoll et al. 1994; Besser et al. 1996). Benthic organisms are important components of aquatic food chains, and dietary exposure is an important pathway of metal exposure in fish. In some cases, exposure to metals in diet caused greater adverse effects than exposure to metals in solution (Woodward et al. 1994). Diets contaminated by metals associated with acidic drainage were associated with reduced growth, and reduced survival of trout (Woodward et al. 1994). To assess impacts to fish and wildlife from food chain contamination, invertebrates would be collected using procedures described by Hoffman et al. (1990) and Tuttle et al. (1996). Benthic invertebrates would be collected to determine their accumulation of metals and trace elements and the potential for food chain transfer of contaminants. One composite sample would be collected at each the three sampling sites at each study locations for a total of 18 invertebrate samples. If possible, a benthic invertebrates representing similar feeding guilds would be collected. Upon collection, invertebrates and debris would be sieved using an 800µm mesh screen and placed in a pre-cleaned stainless steel pan containing water from the site. A minimum of five grams of selected invertebrates would be separated from debris and non-target invertebrates and placed into certified clean 60 ml glass containers with Teflon lined enclosures. Samples would be stored on ice in the field and frozen within 10 hours of collection until submitted for chemical analysis.

Inorganic contaminants may accumulate in different organs and tissues in higher trophic level animals. For example, aluminum may collect on gills, and a variety of metals may accumulate in livers and muscle of fish. Therefore, a variety of fish tissues are needed to assess accumulation and to evaluate the potential to adversely affect fish. Three samples of whole body would be collected along with one composite sample of muscle, gill, and liver tissue at each study location. Whole fish would be analyzed to enable comparison of concentrations associated with adverse effects in other published studies. Whole body samples would consist of a minimum of three similar sized individuals. All fish samples would be placed in chemically clean glass jars with teflon lined lids in the field, placed on ice in the field, and frozen upon return to NFWO until chemical analysis.

4) Assessment of Fish Health and Condition

Environmental stress can affect growth rate and general condition of fish. Condition factors, such as Fulton's condition factor, provide a relative measure of nutritional state or "well being" of individual fish and populations (Anderson and Gutreuter 1983). Such factors may also be used to compare relative condition of populations and to monitor environmental change over time (Ney 1993). Additionally, degraded environmental conditions and a variety of environmental contaminants have been associated with effects to fish health. Such effects may include increased susceptibility to disease, increased parasitism, and teratogenic deformities.

To assess the fish health and general condition, up to 50 fish of each species from each site would be measured, weighed, and assessed for indicators of disease, parasites, and external anomalies. Fish to be assessed would be selected at random. Length and weight data would be used to calculate Fulton's condition factor for each fish and the species for each stream. Methods described in Anderson and Gutreuter (1983) would be used. Examination of external condition of fish would be adapted from procedures provided in Meyer and Barclay (1990) and methods of external fish condition assessment provided in Foott (1990) and Goede and Barton (1987). Fish species, length, weight, and any abnormalities would be recorded on a separate form for each site. All fish, with the exception of trout collected for chemical analyses, would be released back to the stream from which they were collected.

Regression analysis would be used to examine relationships between contaminant concentrations in sediment and biological samples. Species occurrence among sites would be evaluated using chi-square analysis. One-way analysis of variance would be used to examine differences between water quality parameters, species richness, and metal concentrations among sites in a given study area.

5) Aquatic Invertebrate and Fish Community Assessment

Aquatic invertebrate community composition and structure will be determined at all study locations to assess impacts from metal contamination. Aquatic invertebrates will be collected using consistent effort in three aquatic habitat types (pool, riffle, and glide) using methods described by Cuffney et al. (1993). Invertebrates will be preserved in the field with 70% ethyl alcohol and returned to NFWO to be enumerated and identified to family level. Data collected from samples will be used to detect four population metrics that include; percent mean composition, taxa richness, taxa heterogeneity, and taxa evenness using methods described in Newman (1995).

Environmental stress and habitat quality can also affect aquatic community structure. Index of Biological Integrity methodologies were developed to provide a reproducible method for assessing stream fish community condition (Miller et al.1988; Plafkin et al. 1989). This methodology uses up to 12 metrics related to fish community taxonomic and trophic structure, fish abundance, and general health, to assess the relative condition of stream fish communities. If electrofishing and fish condition data acquired through this limited investigation prove adequate (i.e., if all representative habitats are sampled and sufficient numbers of fish are

captured in each sampling location), each stream will be scored using Index of Biological Integrity methodologies.

III.B. Proposed Schedule of Milestones

All sediment, invertebrate, and fish samples would be conducted in June and July. A draft report of findings would be completed within 90 days from receipt of analytical results. A final report would be completed within 60 days following receipt comments from report reviewers and distributed to the AMLTF and USFS. The NFWO would maintain communication with collaborators throughout the course of the investigation. Management recommendations would be developed in conjunction with the AMLTF and USFS.

IV. INTERIM REPORT

IV.A. Results to Date

Background information was compiled in FY2003 and FY2004 for most sites along with water and sediment quality data which is briefly summarized below.

- U.S. Environmental Protection Agency (EPA) conducted fieldwork at the American Beauty Mine and released a Draft Preliminary Assessment/Site Inspection Report in February, 2003 which documented releases of aluminum, copper, and selenium into the aquatic environment. NFWO will be assisting EPA and the South Fork Band Te-Moak Tribe in Summer 2004 to install water quality monitoring equipment that will monthly provide analytical data for the constituents of concern.

- Analytical data for sediment and water was collected in FY2004 at the Colorado Hill mine site as part of an Engineering Evaluation/Cost Analysis initiated by USFS in 2002. In addition, macroinvertebrate community data was collected by the USFS in FY2004 to compliment and increase baseline data to be collected by the Service.

- The Austin Gold Venture mine site had water samples collected by the USFS in 2002 for analysis of sulfides and other constituents. However, analysis of water samples have not been conducted as of yet.

- The Buckskin National Mine was approved in 2003 for additional funding by USFS for hazardous material removal and will be collecting water and sediment samples in the North Fork Little Humboldt River in Summer 2003. NFWO personnel will assist in collection of those samples with the USFS in the Summer 2004. Analytical results from sampling conducted in FY2003 are still pending.

The NFWO, along with technical assistance of the USGS Western Fisheries Research Office, has compiled a Geographic Information System (GIS) database incorporating background data on hydrology, geology, abandoned mine activities at each site. In addition, analytical data on water, sediment, and biota samples previously collected has been incorporated into GIS.database for these sites.

All fieldwork activities for the NFWO portions of this investigation that include water, sediment, macroinvertebrate and fish samples are currently being carried out during Summer 2004.

IV.B. Significant changes to Previous Proposal

The sample site of 8-mile Creek had to be removed from the investigation as a result of heavy impacts to the existing LCT population due to drastically reduced flows from an extended drought period. San Juan Creek, located in the Monitor Range, has been added to the investigation to replace 8-mile Creek. San Juan Creek has a resident population of LCT and contains three former mine sites that existed prior to the early 1900's.

V. REFERENCES

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VI. ROLES, RESPONSIBILITIES, AND PARTNERSHIPS

VI.A. Roles and Responsibilities

The Environmental Contaminants staff of the NFWO would be responsible for all aspects of the investigation. Results would be provided to Federal and State agency personnel involved in the Abandoned Mine Land Environmental Task Force. Management recommendations resulting from information provided by this investigation would be developed in conjunction with the "watershed approach" for characterization and mitigation conducted by the AMLETF (Attachment 1) and CERCLA 106 removal activities conducted by USFS.

VI.B. Partnerships

The AMLETF, consisting of Federal and State agencies, have a Memorandum of Understanding (MOU) for addressing the issue of environmental contamination from abandoned mine sites by identifying and reclaiming sites (Attachment 2). Agencies involved in this process are: Bureau of Land Management Nevada State Office, U.S. Forest Service Humboldt-Toiyabe National Forest, Nevada Bureau of Mines and Geology, Nevada Division of Environmental Protection, Nevada Division of Minerals, and the U.S. Fish and Wildlife Service. The AMLETF received 2 million in funding from the U.S. Army Corps of Engineers to address assessment and reclamation activities at abandoned sites for 2003. To that end, the AMLETF will provide a minimum $100,000 for reclamation activities at the American Beauty site if identified by the USFWS investigation as impacting fish and wildlife resources. By making minimal investment in terms of fieldwork and analytical costs, the Service will be able to facilitate site cleanup through funding provided by our partners in the AMLETF. The USFS received $50,000 in funding to assist the USFWS in conducting fieldwork and provide analytical support for the and National Buckskin and National sites. In addition, the USFS will assist the USFWS in fieldwork at the Colorado Hill and Austin Gold Venture sites for a total in-kind service estimate of $24,000. The Nevada Division of Wildlife has committed to assisting with the fieldwork portion of this investigation at the Buckskin site for a total in-kind service estimate of $2,000. The Western Fisheries Research Office of the U.S. Geological Survey will assist in the development of the GIS database portion of this investigation for an in-kind service estimate of $6,000.

VII. BUDGET					
EXPENDITURES	**Year 1 FY 2003**	**Year 2 FY 2004**	**Year 3 FY 2005**	**Year 4 FY 2006**	**All Years**
Field Operations					
Personnel - Background Data	$9,800.00	$0.00	$0.00	$0.00	$9,800.00
Personnel - Fieldwork	$0.00	$21,800.00	$0.00	$0.00	$21,800.00
Personnel - Data Analysis	$0.00	$0.00	$9,800.00	$0.00	$9,800.00
Personnel - Report Writing	$0.00	$0.00	$9,800.00	$0.00	$9,800.00
Travel	$0.00	$900.00	$0.00	$0.00	$900.00
Supplies	$0.00	$0.00	$0.00	$0.00	$0.00
Equipment	$0.00	$500.00	$0.00	$0.00	$500.00
Non-PACF Analytical	$0.00	$0.00	$0.00	$0.00	$0.00
Other (specify)*	$0.00	$0.00	$0.00	$0.00	$0.00
Operational Subtotal	$9,800.00	$23,200.00	$19,600.00	$0.00	$52,600.00
PACF Funding					
Analytical Subtotal	$0.00	24,168.00	$0.00	0.00	$24,168.00
TOTAL FUNDING	$9,800.00	$47,368.00	$19,600.00	0.00	$76,768.00

*Specific expenditures such as Regional Office overhead, cooperative agreements, etc., should be identified by adding the appropriate number of rows to the table.

VIII. REVIEW AND APPROVAL

Submitted by: _____ Date: _____
Contaminant Specialist, Field Office

Reviewed by: **N/A** Date: _____
Refuge Manager, (required for On-Refuge Investigations)

Reviewed by: _____ Date: _____
Assistant Field Supervisor- Ecological Services

Reviewed by: _____ Date: _____
Environmental Contaminants Coordinator

Approved by: _____ Date: _____
Regional Director

Scientific Peer Review Form (4/2002)

1. Is the experimental design well thought out and scientifically valid? Please comment:

Yes. This investigation will evaluate various environmental media potentially contaminated that may serve as a pathway to trust resource receptors. In addition to accumulation and potential magnification in receptors, this investigation will evaluate overall community and population health.

2. Is there a good probability of achieving the objectives of the investigation? Please comment:
Yes. The selected approach is appropriate to achieve the state objectives of this investigation.

3. Does the investigation integrate current information with accepted methodologies to close data gaps, and establish a cause and effect relationship? Please comment:
Yes, by looking at the pathways, receptors and overall community and population health of the aquatic organisms, the cause of any observed impacts should be able to be identified.

4. Are the costs well researched, clearly spelled out and defensible? Please comment:

Yes, see table in test.

5. Commensurate with investigation objectives, does the proposal describe or cite scientifically acceptable operating procedures that include QA/QC sufficient to ensure the integrity of the data? Please comment:

Yes. PACF will provide analytical QA/QC. Appropriate methods have been selected for the biological sampling (see literature cited).

Please check one of the following:

__X_ Proposal is acceptable *as is* ___ Minor revisions required ___ Major revisions required
(no changes required)

PROPOSAL TITLE Assessment of Metals Exposure to Aquatic Biota from Historic Mine Sites in the western Great Basin
REVIEWER* Scott Sobiech TITLE SUPV F&W Biologist DATE 5/29/02

***If peer reviewer is anonymous, EC coordinator should indicate such and initial the signature line.**

2003 National Criteria Score Sheet

TITLE: Assessment of Metals Exposure to Aquatic Biota from Historic Mine Sites in the western Great Basin

PROJECT I.D.: New REGION: 1 RANK: _____ TARGET STATES: NV, CA

Pass/Fail Criteria

The investigation proposal ***DOES*** ___ ***DOES NOT*** ___ pass the minimum required standards of the Environmental Contaminants Program.

Yes/No Proposal clearly identifies (1) an environmental problem related to anthropogenic contaminants and (2) site-specific management actions designed to resolve that problem. If not, explain:

Yes/No The proposal clearly identifies a level of biological impacts that must be investigated. Abiotic only sampling is clearly linked to an established threshold level of concern. If not, explain:

Yes/No At least one substantive peer review has been conducted and is attached. The proposal has been revised as appropriate. If not, explain:

Yes/No The required surnames have been obtained. If not, explain:

Ranking Criteria

For the above referenced proposal, determine a score for each of the following criteria in accordance with the criteria definitions described in Chapter 5 of the investigations manual. Identify the location of the text that supports the score. If you disagree with a score previously provided, explain why.

*A. Threats to resources are **DOCUMENTED (20 pts) or SUSPECTED (15 pts)**.*

Field Office Supporting Text (**in bold**): Section II.A, ¶ 1 Score: 20
Section III.A, ¶ 1

Regional Office Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

Reviewer Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

*B. Management actions are **DIRECT (15 pts)** or **INDIRECT (10 pts)**.*

Field Office Supporting Text (**in bold**): Section II.C., ¶ 1 Score: 15

Regional Office Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

Reviewer Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

*C.1. The scope or complexity of impacts being addressed by the investigation is **LOW (3 pts), MODERATE (5 pts), or HIGH (7 pts)**.*

Field Office Supporting Text (**in bold**): Section III.A., ¶ 2 Score: 7

Regional Office Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

Reviewer Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

*C.2. The most severe type of biological impact addressed by the investigation is an **INDICATOR OF ADVERSE EFFECTS (4 pts) or ACTUAL ADVERSE EFFECTS (7 pts)**.*

Field Office Supporting Text (**in bold**): Section III.A., ¶ 5,6,7 Score: 7

Regional Office Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

Reviewer Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

*C.3. Source of the contaminant **IS (3 pts) or IS NOT (0 pts)** sufficiently addressed.*

Field Office Supporting Text (**in bold**): Section II.A., ¶ 1 Score: 3

Regional Office Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

Reviewer Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

*C.4. Pathway of the contaminant **IS (3 pts) or IS NOT (0 pts)** sufficiently addressed.*

Field Office Supporting Text (**in bold**): Section __II.A.__, ¶ __1__ Score: __3__

Regional Office Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

Reviewer Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

D. Final regional rank order is ___ of ___ proposals submitted. Score: _____

E1. Regional Performance Score Score: _____

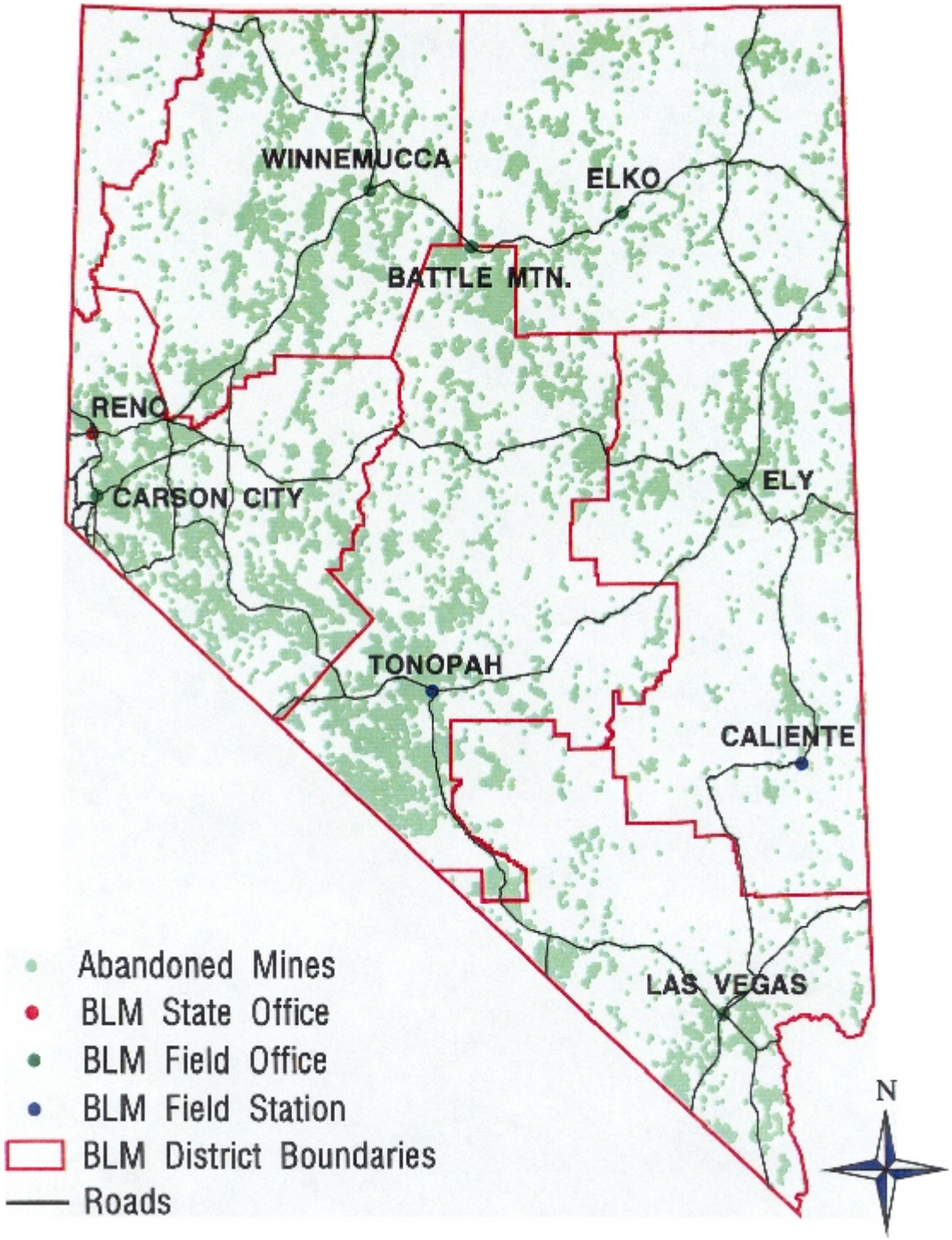
E2. Total Partnership Effort
Field Office Supporting Text: Section __VI.B.__, ¶ __1__ Score: __10__

Regional Office Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

Reviewer Supporting Text: Section _____, ¶ _____ Score: _____
Explanation (if scores differ):

General Reviewer Comments:

Figure 1. Abandoned/Historic Mine Sites Within Nevada



ATTACHMENT 1.

AN INTERAGENCY RISK-BASED WATERSHED APPROACH TO MITIGATING POLLUTION FROM ABANDONED MINES ON FEDERAL LANDS

ISSUE STATEMENT

Polluted runoff from abandoned mines on Federal lands represents a serious water resource and land management problem. Reclaiming all lands impacted by mining will be an enormously expensive task. T'his is especially true for Federal land managers such as the Bureau of Land Management and the U.S. Forest Service that manage lands in the western U.S. with hundreds of thousands of mining sites. Identifying and reclaiming every site where mining has occurred could take decades and consume billions of dollars. Recent studies, however, estimate that less than one percent of such sites severely impact water quality. An alternative approach to site-by-site remediation is to identify and remediate those sites within a watershed that most substantially impact water quality.

PROPOSED APPROACH

The 'watershed approach" is a collaborative effort to mitigate pollution from abandoned mine lands (AMLs). An interagency task force of Federal land management agencies (Bureau of Land Management, National Park Service and U.S. Forest Service) and the Interior science bureaus (U.S. Geological Survey and staff of the former Bureau of Mines) has developed a risk-based watershed approach to achieve mitigation of water quality problems from AMLs on Federal lands. The watershed approach will foster collaborative work across Federal and State government administrative boundaries, facilitate a solution to the problem of mixed ownership of sites within watersheds, address important problem sites first, and greatly reduce the total cost of mitigation compared to cleaning up every mine site.

The watershed approach:

1) Is an interagency/interdepartmental effort that focuses on cooperation among Federal land managers in partnership with the science bureaus.
2) Allows Federal land managers to demonstrate "good faith" at a reasonable level of effort and expense over the near future, with full awareness of the potential burden of AML cleanup on the public.
3) Establishes an interagency group that would coordinate Federal efforts to prioritize, watershed by watershed, specific water bodies within each state that are affected by discharges from AMLs.
4) Allows cleanup to proceed on a risk-based priority, addressing priority sites first.
5) Requires Federal land managers to utilize appropriate management and control practices based on the identified risk on the specific site.

Major Stages of the Watershed Approach

The watershed approach to AML remediation consists of four major stages: 1) Statewide Analysis and Watershed Prioritization; 2) Watershed Characterization; 3) Site Characterization and Mitigation; and 4) Monitoring. Each of the agencies' participating on the team will concentrate its efforts at those stages of the approach where it has legal responsibilities and (or) where its capabilities contribute the greatest benefit to the AML remediation process. These stages are described on page 4. The respective roles of the land management agencies and the science bureaus are described on pages 4-6. These roles reflect the strengths of each agency and its contribution to the total multi-agency effort.

The interagency task force proposes to test this watershed approach with two prototype activities in the States of Colorado and Montana These states were chosen based on several criteria including: the interest and participation of State officials; availability of existing data on are bodies, mining history, ANIL sites, and water quality; Federal land patterns; and mitigation work already in progress.

MAJOR STAGES IN WATERSHED APPROACH TO MITIGATING POLLUTED RUNOFF FROM AMLs

Stage 1. Statewide Analysis of Watershed Priorities

- Establish ranking criteria
- Risk/benefit analysis
- Watershed ranking

Stage 2. Watershed Characterization

In priority watershed(s):

- Sample and assess contribution to risk
- Develop mitigation alternatives
- Analyze costs and benefits of achieving water quality

Stage 3. Site Characterization and Mitigation

- Select sites and engineering options
- Implement site mitigation actions
- Evaluate effectiveness

Stage 4. Monitoring

- Implement monitoring plan
- Adjust mitigation activities as necessary

ATTACHMENT 2.