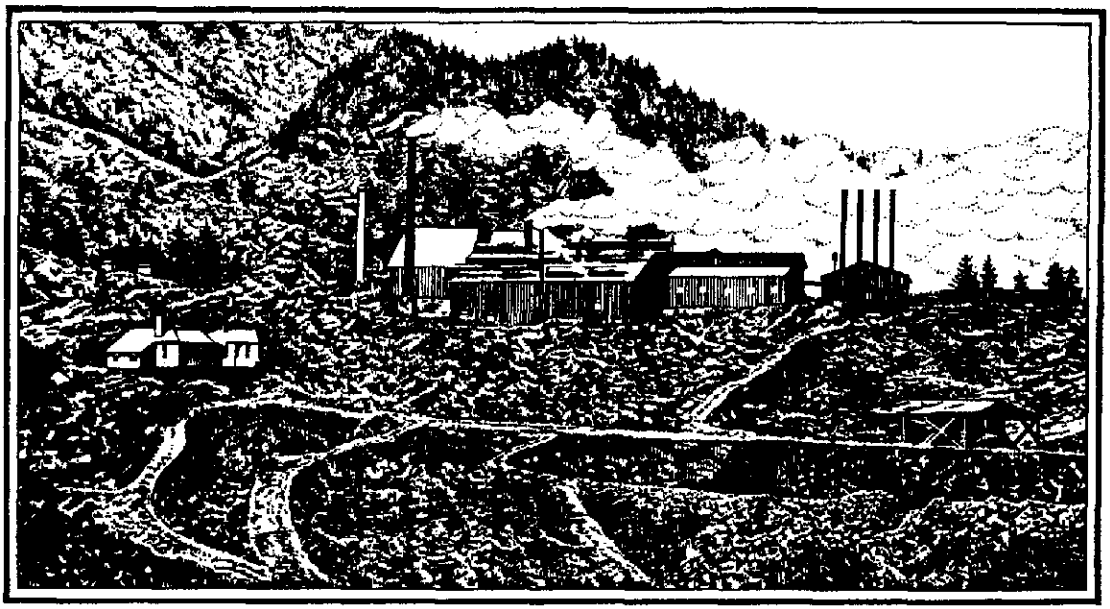
F1-075

PROPOSAL FOR
CALFED BAY-DELTA PROGRAM
1997 CATEGORY III

for

AFTERTHOUGHT MINE



Prepared by

SHN
CONSULTING ENGINEERS
& GEOLOGISTS
480 Hemsted Avenue
Redding, California 96002

597023

AFTERTHOUGHT MINE
EXECUTIVE SUMMARY

The Afterthought Mine is a historic, inactive copper mine that was intensively worked in the late 1800s and early 1900s; however, it has been inactive and abandoned for 45 years. The property containing the mine was acquired by the current owner, Agricultural Management and Production Company, Inc. (AMPCI) in 1996. SHN Consulting Engineers & Geologists (SHN) has been retained to provide the environmental engineering services.

The Afterthought Mine has been identified as a potential source of acid mine drainage (AMD) by the Regional Water Quality Control Board (RWQCB). Therefore, the RWQCB has requested the current mine owner to apply for a NPDES permit and to initiate a site investigation at the mine. The NPDES application was submitted in April 1997, and the NPDES Permit and related Cease and Desist Order was issued on June 20, 1997. AMPCI, is committed to cleaning up the site, and has local support for doing so.

A work plan has been prepared by SHN that outlines the activities as required in the Cease and Desist. The activities outlined in the work plan includes:

- Map the site to identify potential point and non-point sources of AMD.
- Collect monthly flow measurements and correlate these flows with the long-term precipitation record to establish a historical flow record.
- Collect monthly water quality data from the point and non-point sources identified during the mapping phase of work.
- Evaluate remedial alternatives based on flow, water quality data, and mass loading data.
- Present the data and proposed remedial alternatives to the RWQCB.

Once all of the data has been collected, SHN will prepare a feasibility study for mine cleanup. An evaluation of all data will be completed, to determine possible cleanup alternatives to reduce the quantity of heavy metals entering Little Cow Creek.

Drainage from the Afterthought Mine originates when rain water infiltrates into the underground workings and discharges through the mine adits and fractures in the bedrock. As this water contacts the sulfide mineral deposits exposed to the air inside the mine workings, a chemical reaction between the water and the sulfide mineral deposits cause the formation of sulfuric acid. The acid dissolves high concentrations of metals such as copper, zinc, and cadmium, which can be toxic to aquatic life.

The work plan provides activities for determining the sources and extent of the AMD. These activities are necessary in order to determine the best solution for reducing the release of AMD into Little Cow Creek. None of the activities will have an adverse affect on the surrounding land use. This project will alter the environment in a positive way, by reducing the heavy metals that are currently being released.

There are no adverse impacts associated with this project that would affect a third party. All impacts to the environment and adjacent land uses will be positive.

Table 1 is a breakdown of the tasks and estimated costs. The contract amount is to be billed on a time and materials basis. Table 2 contains a timeline for the project.

Table 1 Tasks & Estimated Costs		
Task 1	Site Visit	$1,536.
Task 2	Remedial Action Work Plan	$3,600
Task 3	Site Characterization (one year sampling, laboratory costs, and mapping)	$25,200
Task 4	Feasibility Study	$7,200
Estimated Total Cost		$37,536
Contingency (15%)		$5,630
Total Cost		$43,166

Table 2 Schedule	
Task Description	**Complete Task**
Receive NPDES Permit and Cease and Desist Order	June 1997
Submit Remedial Action Work Plan	August 1997
Site Mapping	September 1997
Flow Monitoring – Beginning August 1997	Monthly
Source Characterization	Monthly
Receiving Water Sampling	Monthly
Remedial Action Plan	June 1998
Commence Remediation	August 1998

The managing personnel handling this project will be John Andrews and Wendy Johnston. Ms. Johnston has over 20 years of experience in resource management and hazardous waste site remediation Ms. Johnston is an experienced public speaker and has a strong professional presence at public meetings. She is an expert in regulations pertaining to water quality, hazardous waste and Superfund site remediation. She has served as a witness in Superfund cost recovery litigation and is considered an expert in CERCLA requirements and the National Contingency Plan. She has maintained a strong relationship with Board staff and is current on recent changes in Board protocol and investigation.

Mr. Andrews has over 15 years experience in the evaluation of hazardous material and site remediation and is a Registered Geologist in California. He holds a Masters degree in hydrogeology from the University of Arizona and is a Ph.D. candidate at the University of Nevada, Reno. Mr. Andrews has performed technical review on hundreds of hydrogeology projects. In addition, he has worked on numerous State and Federal Superfund projects. Mr. Andrews has a strong relationship with the staff of the Central Water Quality Control Board's Redding office. He is technically well respected and his work commonly serves as an example to other consultants.

PROPOSAL FOR
CALFED BAY-DELTA PROGRAM
1997 CATEGORY III

AFTERTHOUGHT MINE

OWNER:

Agricultural Management
and Production Company, Inc.
Attn: Robert Smythe
14820 Fern Road
Whitmore, CA 96096
(916) 472-1931
Tax ID #:

CONSULTANT:

SHN Consulting Engineers
and Geologists
Attn: Wendy Johnston or John Andrews
480 Hemsted Drive
Redding, CA 96002
(916) 221-5424
Tax ID #: 94-2571944

Technical/Financial Contact, Implementation, Monitoring and Data Evaluation:

SHN Consulting Engineers
and Geologists

RFP Group Type: **Other Services**

597023

July, 1997

PROJECT DESCRIPTION

a. Project Description and Approach

The Afterthought Mine has been identified as a potential source of acid mine drainage (AMD) by the Regional Water Quality Control Board (RWQCB). The RWQCB has adopted a Water Quality Control Plan for the Sacramento Basin, which designates beneficial uses, establishes water quality objectives, and describes an implementation program and polices to achieve the objectives for all waters of the Basin. The concentrations of copper and zinc originating from the mine are elevated above the Basin Plan objectives in receiving waters where they may affect aquatic life in Little Cow Creek.

The RWQCB requested the current mine owner to apply for a NPDES permit and to initiate a site investigation at the mine. The NPDES application was submitted in April 1997, and the NPDES Permit and related Cease and Desist Order was issued on June 20, 1997.

A work plan has been prepared that outlines the activities as required in the Cease and Desist Order including characterization of AMD from the mine in order to evaluate remedial alternatives to reduce or eliminate the discharge. Once these activities have been completed, a remedial action plan will be developed. The remedial action plan will include the feasibility of successfully sealing the portal; evaluating possible treatment technologies; evaluating the feasibility of alternative corrective action technologies; and implementing those technologies to bring the mine into full compliance with the NPDES Permit.

The approach for conducting the activities outlined in the work plan includes:

- Map the site to identify potential point and non-point sources of AMD.
- Collect monthly flow measurements and correlate these flows with the long-term precipitation record to establish a historical flow record.
- Collect monthly water quality data from the point and non-point sources identified during the mapping phase of work.
- Evaluate remedial alternatives based on flow, water quality data, and mass loading data.
- Present the data and proposed remedial alternatives to the RWQCB.

b. Location

The Afterthought Mine is located approximately 25 miles northeast of Redding on Highway 299 East in Sections 10 and 11, T33N, R2W, Mount Diablo Base and Meridian. The mine workings and smelter are located along Little Cow Creek, which is tributary to Cow Creek and the Sacramento River. The town of Ingot is on the northwest side of Little Cow Creek, approximately one mile downstream from the mine workings. The mine location is shown on Figure 1.

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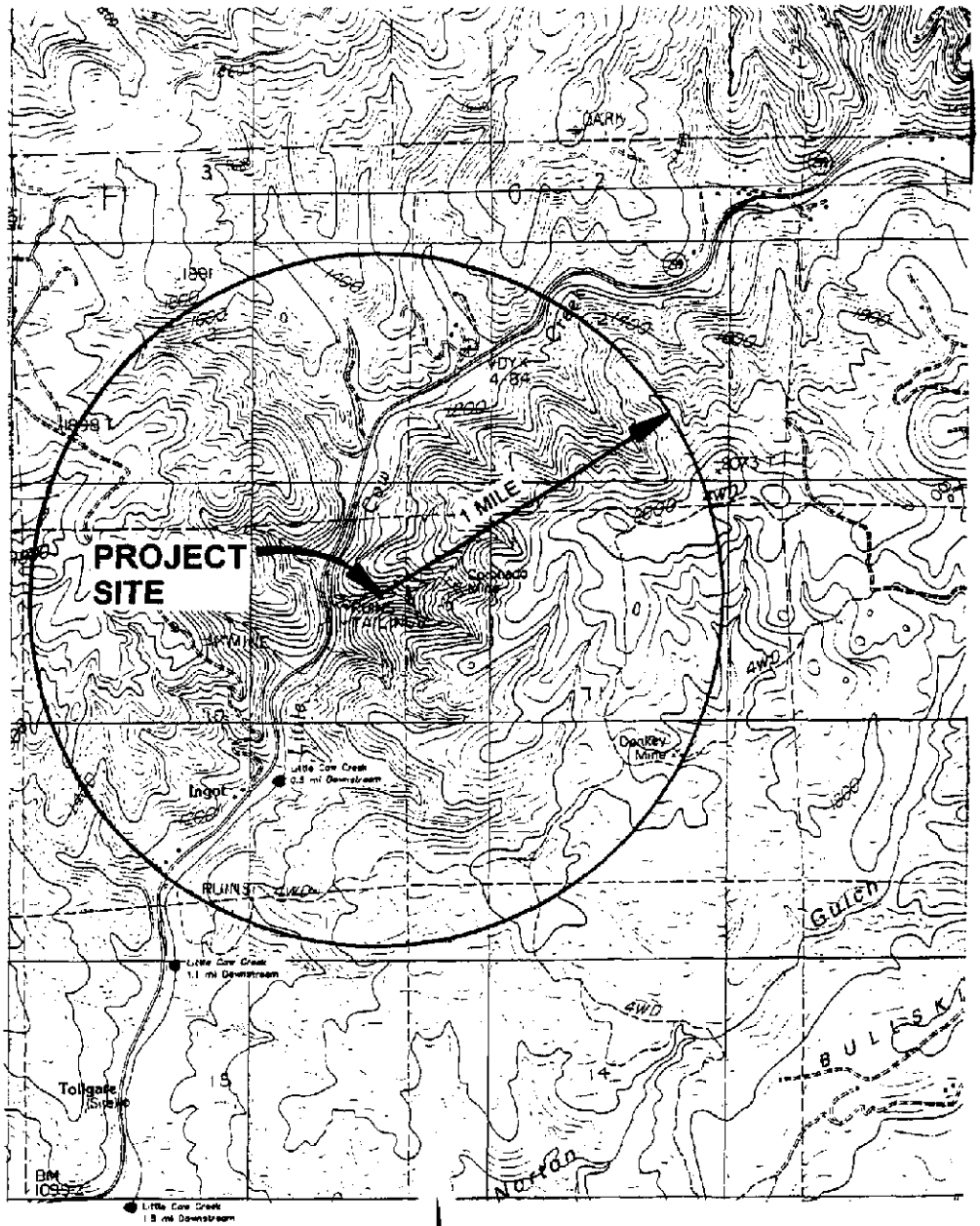

FIGURE 1
GENERAL SITE LOCATION
AFTERTHOUGHT MINE
SHASTA COUNTY, CALIFORNIA

SOURCE: USGS, 1985 SCALE: 1" = 2000'+

SHN 597023 JULY 1997 SHN CONSULTING ENGINEERS & GEOLOGISTS

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c. Expected Benefits

Surface drainage from the mine enters Afterthought Creek, which is an intermittent tributary to Little Cow Creek. Little Cow Creek discharges into Cow Creek, which is tributary to the Sacramento River. Potential beneficial uses of Afterthought Creek are limited because it is an intermittent stream. For this reason, the RWQCB has identified Little Cow Creek as the receiving water for the purposes of the NPDES permit. Existing and potential beneficial uses of Little Cow Creek are identified in the Basin Plan as irrigation, stock water, power, recreation, cold water habitat, migratory and spawning habitat, and wild life habitat. The resource value in Little Cow Creek is very high and warrants a high level of protection. In addition, reducing the discharge will reduce the heavy metal loading in Little Cow Creek, hence in the Sacramento River.

d. Background and Biological/Technical Justification

The Afterthought Mine is a historic, inactive copper mine that was intensively worked in the late 1800s and early 1900s; however, it has been inactive and abandoned for 45 years. In 1996, the property containing the mine was acquired by the current owner, Agricultural Management and Production Company, Inc. (AMPCI).

Drainage from the Afterthought Mine originates when precipitation infiltrates into the underground workings and discharges through the mine adits and fractures in the bedrock. As this water contacts the sulfide mineral deposits exposed to the air inside the mine workings, a chemical reaction between the water and the sulfide mineral deposits cause the formation of sulfuric acid. The acid dissolves high concentrations of metals such as copper, zinc, and cadmium, which can be toxic to aquatic life. High metal concentrations in the discharge can impede the ability of fish to draw oxygen into their gills causing them to suffocate and die.

The RWQCB determined that copper levels in Little Cow Creek below the mine exceed Basin Plan water quality objectives. Furthermore, the RWQCB has determined that the main portal of the Afterthought Mine is the primary source of the exceedances. Summary of historic discharges are included in Figure 2.

The RWQCB requested the current mine owner to apply for a NPDES permit and to initiate a site investigation at the mine. The NPDES application was submitted in April 1997, and the NPDES Permit and related Cease and Desist Order was issued on June 20, 1997. Since then, a Work Plan has been prepared that outlines the necessary steps to be taken to comply with the NPDES receiving water limits including a site investigation and Remedial Alternatives. Reduction in discharges from the mine will reduce heavy metal loading in Little Cow Creek and hence the Sacramento River.

Proposed Scope of Work

The scope of work outlined in the Work Plan Objectives are:

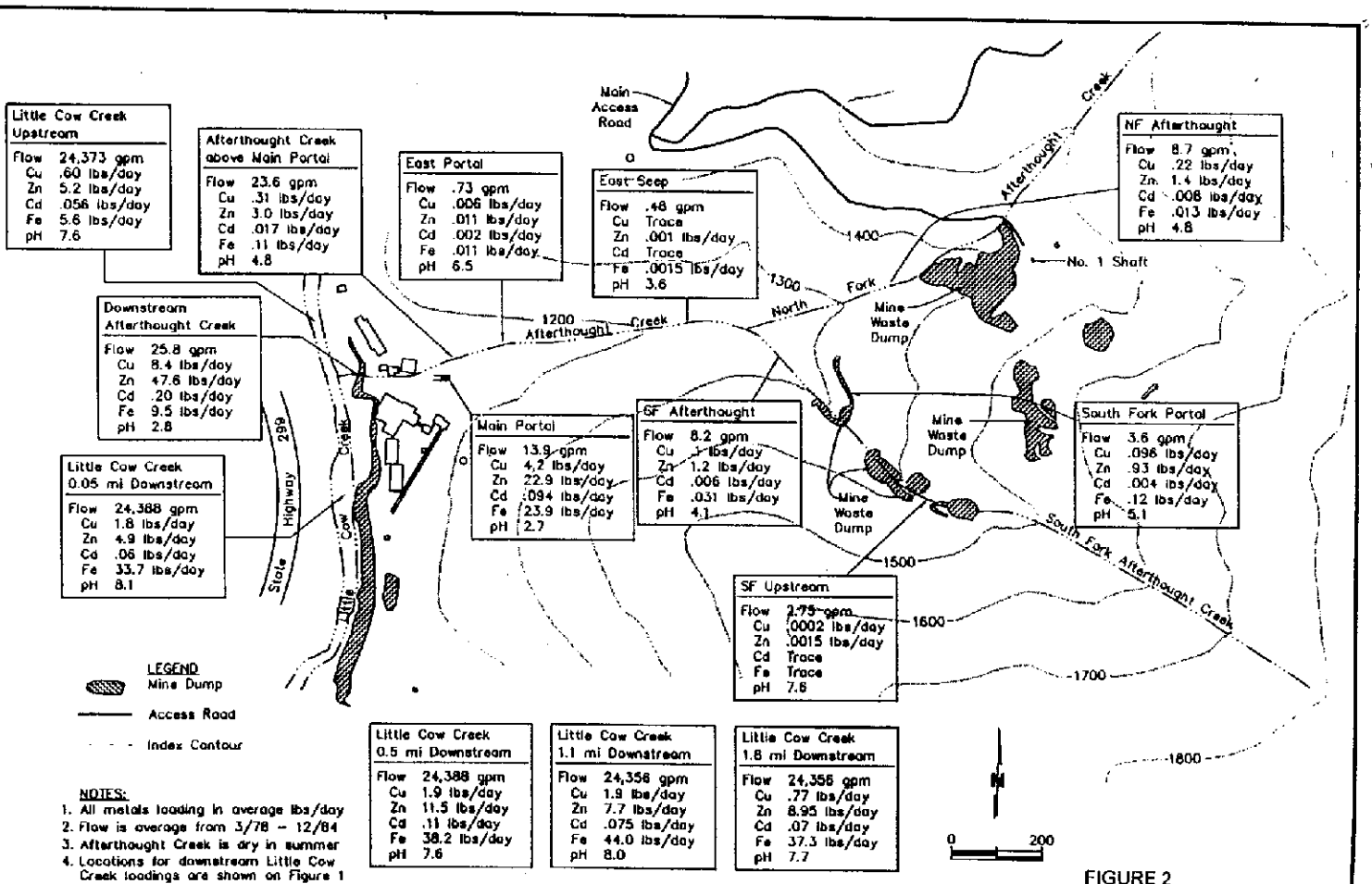

FIGURE 2
AVERAGE FLOW & CONSTITUENT LOADING
AFTERTHOUGHT MINE
SHASTA COUNTY, CALIFORNIA

SHN 597023 JULY 1997

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Initial Site Characterization

- Accurately map the mine area showing locations for underground workings, portals, waste rock dumps, seeps, and gossen outcrops.
- Establish accurate flow records for surface water at the site, including receiving waters and discharge from portals, seeps, springs, and waste rock dumps.
- Determine heavy metal loading for the identified point and non-point sources.
- Collect sufficient data to recommend options for cost-effective corrective action.
- Report the findings and recommendations to the RWQCB.

Remedial Action Plan

- AMPCI will prepare a Remedial Action Plan following completion of Phase I.
- The plan will include maps and descriptions of the physical setting of the site, the nature and characteristics of any AMD problems, and an evaluation of remedial alternatives that will be considered for the site.
- The evaluation of the alternatives will include the technical and economic effectiveness and feasibility of each alternative. The goal will be to meet the applicable effluent and receiving water limits specified in the Cease and Desist Order.

e. Monitoring and Data Evaluation

A detailed map will be prepared from survey data and Shasta County records. The physical characteristics of the mine will be identified on the base map. This information will be obtained from geologic reports prepared for the mine. Based on the historical information the location physical characteristics of potential sources of AMD will be verified in the field.

Flows associated with the point and non-point sources will be measured on a monthly basis for the first year and quarterly for the second year. Where possible, stream flows will be determined by surveying a cross-section of the channel and measuring the velocity of the water along the cross-section using a pygmy meter. Where flows are too low to be accurately determined using a pygmy meter, they will be estimated visually or by diverting the flow into a pipe or weir where the discharge can be measured using a bucket and stop watch.

In conjunction with the flow measurements, precipitation will be recorded at the facility. This information will be used to develop a correlation between flow and precipitation.

To determine the relative contribution from each source, the point and non-point sources will be sampled on a monthly basis for the first year and quarterly for the second. The samples will be tested in the field for electric conductivity, pH, turbidity using portable instrumentation. Samples will be analyzed by a California State Certified Laboratory for suspended solids, cadmium, copper, lead, mercury and zinc.

The water quality data will be used in conjunction with the flow data to calculate the mass of contamination associated with each source.

To evaluate the impact that the mine and mine-workings may have on the receiving waters, Little Cow Creek will be sampled approximately 100 feet upstream of the confluence with Afterthought Creek, at the confluence of Afterthought Creek, approximately 100 feet downstream of the confluence of Afterthought Creek and one approximately 100 feet downstream of the smelter site. Samples will be collected monthly, and they will be analyzed in the field for electric conductivity, pH, turbidity. Samples will also be collected and analyzed by a California State Certified Laboratory for cadmium, copper, lead, mercury, zinc, total dissolved solids, total suspended solids and hardness.

The samples will be collected directly from the sample location into containers supplied by the analytical laboratory. In instances where direct sampling is not possible due to shallow water or low flows, a disposable bailer will be used to obtain the sample and the sample transferred to the laboratory supplied sample bottles.

The volume of waste piles will be estimated from surveyed cross-sections. Volume information is necessary for evaluating the impact of capping or moving the waste piles in the Remedial Action Plan. The chemical characteristics, and acid generation and leaching potential of the waste piles will be determined by collecting representative samples. Samples will be collected from each waste pile and analyzed for pH and ICP metals. Acid generation and leachability tests will also be conducted on a minimum number of samples.

In addition to waste characterization, the potential impact that the waste piles have on adjacent water courses will be evaluated. Where possible, monthly surface water samples will be collected immediately upstream and downstream of the waste piles. The samples will be analyzed for electrical conductivity, pH, turbidity and ICP metals.

A feasibility study for mine cleanup will be prepared based on all of the data obtained. This report will present the data required during characterization, identify the percent contribution of each source and present proposed cleanup alternatives to reduce the quantity of heavy metals entering Little Cow Creek.

Once all of the data has been collected, SHN will prepare a feasibility study for mine cleanup. An evaluation of all data will be completed, to determine possible cleanup alternatives to reduce the quantity of heavy metals entering Little Cow Creek.

f. Implementability

This project is being undertaken to comply with the NPDES permit and the Cease and Desist Order issued by the RWQCB on June 20, 1997. The owner, AMPCI, is committed to cleaning up the site, and has local support for doing so.

The work plan provides activities for determining the sources and extent of the AMD. These activities are necessary in order to determine the best solution for reducing the release of AMD into Little Cow Creek. None of the activities will have an adverse affect on the surrounding land use. This project will alter the environment in a positive way, by reducing the heavy metals that are currently being released.

COSTS AND SCHEDULE TO IMPLEMENT PROPOSED PROJECT

a. Budget Costs

The following table is a breakdown of the estimated costs. The contract amount is for $40,000.00, to be billed on a time and materials basis.

Table 1
Estimated Cost

Task 1	Site Visit	$1,536.
Task 2	Remedial Action Work Plan	$3,600
Task 3	Site Characterization (one year sampling, laboratory costs, and mapping)	$25,200
Task 4	Feasibility Study	$7,200
Estimated Total Cost		$37,536
Contingency (15%)		$5,630
Total Cost		$43,166

b. Schedule Milestones

Table 2
Schedule

Task Description	Complete Task
Receive NPDES Permit and Cease and Desist Order	June 1997
Submit Remedial Action Work Plan	August 1997
Site Mapping	September 1997
Flow Monitoring – Beginning August 1997	Monthly
Source Characterization	Monthly
Receiving Water Sampling	Monthly
Remedial Action Plan	June 1998
Commence Remediation	August 1998

c. Third Party Impacts

There are no adverse impacts associated with this project that would affect a third party. All impacts to the environment and adjacent land uses will be positive.

APPLICANT QUALIFICATIONS

a. Breakdown of Tasks

Table 3 Breakdown of Tasks	
Task	**Responsible Personnel**
Required Studies for RWQCB	John Andrews
Remedial Report and Evaluation	Wendy Johnston
Remedial Design	John Andrews, Marty Lay
Remedial Construction (not a part of this proposal)	To be determined

b. Individual Qualifications

Team Member: Wendy Johnston
Responsibility: Water Board and NCP Compliance, Site Characterization

Ms. Johnston has over 20 years of experience in resource management and hazardous waste site remediation. She served as a member of the Regional Water Quality Control Board under Governor Deukmajian during the initial Iron Mountain Mine Record of Decision. In addition, she prepared the regulatory ARARS analysis for the Boulder Creek Operable Unit at Iron Mountain Mine while employed by CH2M HILL. She is currently project manager for the Diamond Match Superfund site in Chico, California. Ms. Johnston is an experienced public speaker and has a strong professional presence at public meetings. Prior to joining SHN, she served as Regulatory Coordinator for CH2M HILL's Redding office. She is an expert in regulations pertaining to water quality, hazardous waste and Superfund site remediation. She has served as a witness in Superfund cost recovery litigation and is considered an expert in CERCLA requirements and the National Contingency Plan. She has maintained a strong relationship with Board staff and is current on recent changes in Board protocol and investigation.

Team Member: John Andrews, R.G.
Responsibility: Senior Hydrogeologist, Hydrology, Expert Witness, NCP Compliance

Mr. Andrews has over 15 years experience in the evaluation of hazardous material and site remediation and is a Registered Geologist in California. He holds a Masters degree in hydrogeology from the University of Arizona and is a Ph.D. candidate at the University of Nevada, Reno. Prior to joining the SHN team, Mr. Andrews served as a Senior Hydrogeologist for CH2M HILL in Redding for eight years. Mr. Andrews has performed technical review on hundreds of hydrogeology projects. In addition, he has worked on numerous State and Federal Superfund projects, including Kesterson Reservoir, Stringfellow Acid Pits, Purity Oil Sales, and the Diamond Match Site. He has a strong working knowledge of the CERCLA process, and has served as an expert witness in numerous Superfund-related litigation projects. He also served as the Project Manager and expert witness on NCP compliance and hydrogeology during cost recovery for a Superfund site in Oroville, California. He also served as expert witness for cost recovery litigation at the Diamond Match Superfund site in Chico, California. Mr. Andrews has a strong relationship with the staff of the Central Water Quality Control Board's Redding office. He is technically well respected and his work commonly serves as an example to other consultants.

Team Member: Martin E. Lay,
Responsibility: Senior Environmental Engineer

Mr. Lay has over 23 years of environmental engineering experience. He is a California registered Civil Engineer in environmental, water, soils, and site civil capacities. He has been project manager/design engineer and resident construction engineer on a variety of water and wastewater collection and treatment system projects. Mr. Lay has managed, investigated, designed and implemented remedial actions and overseen site redevelopment operations for "Brownfield" type land conversions (industrial to residential) of soil and groundwater contaminated lumber mills and metals recycling areas in the Northcoast area of California. Mr. Lay twice served as the Interim City Engineer for the City of Fortuna (1987 and 1994) when the City was seeking candidates to fill the position of full-time City Engineer. Mr. Lay operated a consulting engineering and light commercial diving business and performed job shop work for several consulting engineering firms. Responsibilities included design and construction inspection of water systems, on-site sewage disposal systems for coastal subdivisions and mobile home parks, and rural wastewater projects in Northern California. Diving work included pier piling inspections, subsurface soil sampling, underwater inspection and support for near-shore and bay water studies. Additional experience in engineering and environmental work includes hydrologic, soils and land use planning studies, light structural design, stream monitoring program initiations, near-shore, ocean water, physical characteristics studies and logging road layout and design.

COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

The terms and conditions contained in the Request for Proposal are agreeable and able to be complied with by AMPCI and SHN.

Attached are the documents required for RFP Project Group Type – Other Services, and a private firm. These are Non-Discrimination Compliance and Small Business Preference.

Item 8

NONDISCRIMINATION COMPLIANCE STATEMENT

COMPANY NAME
SHN Consulting Engineers & Geologists

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME

DATE EXECUTED
July 25, 1997

EXECUTED IN THE COUNTY OF
Shasta

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE
Regional Manager

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME
SHN Consulting Engineers & Geologists

Item 12

Agreement No. _____

Exhibit _____

STANDARD CLAUSES --
SMALL BUSINESS PREFERENCE AND CONTRACTOR IDENTIFICATION NUMBER

NOTICE TO ALL BIDDERS:

Section 14835, et. seq. of the California Government Code requires that a five percent preference be given to bidders who qualify as a small business. The rules and regulations of this law, including the definition of a small business for the delivery of service, are contained in Title 2, California Code of Regulations, Section 1896, et. seq. A copy of the regulations is available upon request. Questions regarding the preference approval process should be directed to the Office of Small and Minority Business at (916) 322-5060. To claim the small business preference, you must submit a copy of your certification approval letter with your bid.

Are you claiming preference as a small business?

____ Yes* X No

*Attach a copy of your certification approval letter.