

**REMEDIATION PLAN**

**WALKER MINE  
ACID MINE DRAINAGE  
ABATEMENT PROJECT**

**Central Valley  
Regional Water Quality Control Board**

**September 1999**

## Introduction

This Remediation Plan for the Walker Mine Acid Mine Drainage Abatement Project is submitted pursuant to Water Code Sections 13397 and 13398 which authorize a remediating agency to remediate the effects of discharge of mine waste from abandoned mined lands without assuming responsibility for discharge from those lands. The Water Code allows public agencies to reduce the threat to water quality caused by abandoned mined lands without becoming responsible for completely remediating abandoned mine waste to a point that meets water quality objectives and related regulatory requirements.

The purpose of this Remediation Plan is to describe the Central Valley Regional Water Quality Control Board's (remediating agency) involvement at this site and to limit the Regional Board's responsibilities for current and past remedial activities including discharges affected by the Regional Board's activities. The Regional Board is applying for Section 13397 protection for the portion of remedial work that was completed at Walker Mine from 1987 through 1999. This work includes the installation of the mine seal, mine seal maintenance, and surface water monitoring of the affected watershed.

This plan is being submitted to the State Water Resources Control Board (oversight agency) for its review and approval. The record shows that the remediating agency has substantially improved water quality at Walker Mine. Section 13398.7(c) does not require this Remediation Plan to achieve water quality objectives for the plan to be approvable.

In 1997, Cedar Point Properties, Inc. (Cedar Point Properties) purchased the Walker Mine for the purposes of harvesting timber from the site. The Regional Board issued a Cleanup and Abatement Order to Cedar Point Properties in August 1997 (attached). In July 1999 the Regional Board issued an NPDES permit and a Cease and Desist Order (attached) to Cedar Point Properties. The Cease and Desist Order contains a compliance time schedule directing Cedar Point Properties to implement and complete corrective actions.

Cedar Point Properties, as the current landowners, is legally responsible for all current discharges, for maintaining the existing remedial structures, and for conducting all future remedial activities at the site. The Regional Board will enforce all terms of the NPDES permit and Cease and Desist Order. In the event that Cedar Point Properties abandons the site or fails to comply with the Cease and Desist Order, the Regional Board may implement relevant provisions of this Remediation Plan pursuant to its cleanup and abatement authority and Water Code Sections 13397 and 13398.

The Regional Board developed this Remediation Plan for past remedial activities and a proposed surface water diversion project. Since Cedar Point Properties is the new property owner, they are responsible for continuing maintenance and all future remedial activities. The Regional Board does not propose any additional improvements to this project.

As required by Section 13398.3, this Remediation Plan includes an identification of the Walker Mine site, a description of the affected waters of the state, a description of the existing remediation project and proposed actions to improve the project, a plan for monitoring remedial activities, and a budget to pay for plan implementation.

**A. Identification of the remediating agency**

The remediating agency is as follows:

California Regional Water Quality Control Board, Central Valley Region  
3443 Routier Road, Suite A  
Sacramento, CA 95827-3098  
Attention: Patrick Morris (916) 255-3121

The California Regional Water Quality Control Board, Central Valley Region (Regional Board) is a remediating agency as defined in Section 13397.5(f).

**B. Identification of the abandoned mine lands**

Walker Mine is the abandoned mine that is the focus of this Remediation Plan. The Walker Mine is in central Plumas County about 24 miles north of Portola in Sections 19, 29, 30, 31, and 32, T25N, R12E, and in Sections 5,6,7, and 8, T24N, R12E, MDB&M. The property consists of Assessor's Parcel Numbers 009-080-01, 009-090-01, 009-100-09, and 009-090-02. Cedar Point Properties, Inc., owns Nos. 009-080-01, 009-090-01, and 009-100-09. A private party owns No. 009-090-02; this parcel does not appear to contribute to pollution from the Walker Mine.

Calicopia Corporation, the former owner of the property, abandoned the Walker Mine property in the early 1990s. Calicopia was relieved of further responsibility for the site pursuant to a stipulated judgment issued by the Plumas County Superior Court.

The current landowner is Cedar Point Properties. The Regional Board, in conjunction with the Attorney General's Office, is pursuing cost recovery and injunctive relief from Cedar Point Properties.

Neither Calicopia Corporation nor Cedar Point Properties are remediating agencies.

**C. Identification of the affected waters of the state**

Walker Mine has impacted waters in the Little Grizzly Creek watershed. Acid mine drainage (AMD) from the mine portal, settling pond, and waste piles flows directly to Dolly Creek, then to Little Grizzly Creek. Little Grizzly Creek flows into Indian Creek which flows into the North Fork Feather River.

**D. Description of the physical conditions that have caused adverse water quality**

The Walker Mine is an 800-acre inactive copper mine at an elevation of about 6,180 feet. Active mining took place between 1915 and 1941. The mine contained five major ore bodies ranging from 600 to 1,400 feet long and 10 to 100 feet thick, with a typical thickness of about 50 feet. The mine contains approximately 13 miles of tunnels and 3,500 feet of vertical shafts. The estimated total void volume in the mine is between 330 and 543 million gallons.

Since the Walker Mine closure in 1941, the site has discharged acid and heavy metals directly into Dolly Creek. The discharge to surface waters eliminated aquatic life downstream in Dolly Creek and Little Grizzly Creek for a distance of about ten miles. Only through dilution at the confluence with Indian Creek does the water quality improve sufficiently for aquatic life. The Regional Board began investigating specific pollutants discharging from the Walker Mine Site in 1957.

There are three discharges from the Walker Mine property. These are identified as discharges from the main 700 level adit (portal), intermittent discharge from a settling pond, and intermittent discharges of surface water runoff from waste piles. Mine drainage from the portal was the primary source of pollution in Dolly Creek and Little Grizzly Creek.

Prior to 1987, mine drainage from the portal had a pH ranging from 3.7 to 6.6 and copper and zinc concentrations as high as 69 mg/l and 3.4 mg/l, respectively. The Freshwater Aquatic Life

Protection (EPA) criterion for copper is about 0.005 mg/l and for zinc is 0.060 mg/l. The MCL for copper is 0.1 mg/l.

In November 1987, the Regional Board installed an engineered concrete mine seal 2,675 feet from the 700-level adit portal. The seal installation prevented direct discharge of AMD from the underground ore zone to the surface waters of Dolly Creek. The Walker Mine concrete seal project has resulted in a 98% reduction on copper loading to surface waters.

The secondary source of pollution is the surface run-off from springs, rainfall, and/or snowmelt that has passed through mine waste piles and an unlined settling pond that are immediately south of the portal. Oxidation of pyrite and other sulfide minerals in the piles resulted in the production of acid and mobilization of heavy metals. Due to the expense of remediating the waste pile materials, the low level of metals discharged from them, and the potential that Cedar Point Properties may conduct remedial activities, the Regional Board has not remediated the waste piles.

**E. Description of the practices that have been implemented and the practices that are proposed to improve the existing project**

As discussed above, the Regional Board installed an engineered concrete seal to eliminate the direct discharge of AMD to Dolly Creek. Consultants under contract to the Regional Board have provided engineering studies and remedial plans to reduce mine drainage and maintain remedial structures. Board staff has monitored the effectiveness of those structures.

The 1999 project improvement will be the construction of surface water diversion channels around subsidence areas north of the portal. The subsidence areas provide a direct pathway for surface water runoff to enter the mine. Diverting surface water from entering the mine will result in less water coming in contact with acid generating ore and less hydrostatic pressure against the concrete seal. Although Cedar Point Properties is responsible for this work and has been given the opportunity to perform, they have elected not to construct the channels. Since the Regional Board considers this work to be a critical component of maintaining the mine seal, Board staff will be conducting this work through contractors.

The Cease and Desist Order directs Cedar Point Properties to maintain the mine access tunnel and to monitor the performance of the seal for effectiveness, leakage, and hydrostatic pressure. The concrete seal has had up to 210 feet of pressure head against the back of the seal and it holds back 90 acre-feet of polluted water.

The project must be maintained so that remedial structures do not fail, releasing the polluted water containing heavy metals which would eliminate aquatic life in nearby creeks. The Regional Board has adopted Operation and Maintenance Procedures to maintain the mine seal and surface water diversion structures at the Walker Mine. These procedures (attached) provide details on specific activities that are required to maintain the Walker Mine remedial structures. The maintenance program addresses safe mine entry, mine seal accessibility and integrity, surface water quality monitoring, surface water erosion, and vandalism. The maintenance program requires site inspections, monitoring of water quality, identification of problems, and development and implementation of contracts for repair and replacement of site structures.

The Regional Board, through the Cease and Desist Order, has ordered Cedar Point Properties to develop and implement a plan that includes all of the elements of the Regional Board's Operation and Maintenance Procedures. Board staff will review and monitor Cedar Point Properties' implementation of the plan. Other activities that Cedar Point Properties is required to complete include, in part, (1) testing the mine seal integrity, (2) evaluating and remediating all discharges from the site, and (3) maintaining access to the mine seal.

Other than the proposed surface water diversion project, the Regional Board does not propose any additional improvements at Walker Mine. Cedar Point Properties is responsible for continuing maintenance, monitoring, and all future remedial activities.

**F. Analysis demonstrating that the improvements have caused a substantial improvement in water quality**

The mine seal project resulted in a 98 percent reduction in copper loading in Dolly Creek. Since construction, the mine seal has successfully eliminated the direct discharge of AMD from the underground ore zone. Prior to the mine seal construction, the portal discharge averaged 420 gpm. After the installation of the mine seal, there was no flow passing the mine seal. The post-1987 portal flows consists of minor surface water infiltration that enters and drains from the portal area.

In addition to the reduction of AMD flow, the copper concentrations from the portal decreased. Prior to the seal, copper concentrations in the portal discharge were as high as 69 mg/l. Post seal copper concentrations range from 0.14 to 0.45 mg/l (see Operations and Maintenance

Procedures, Figure 2). Zinc concentrations prior to the seal were a maximum of 3.4 mg/l, whereas post-seal concentrations range from 0.001 to 0.046 mg/l.

**G. Description of monitoring activities to assess the success of the implemented activities**

Cedar Point Properties must maintain and monitor the site to ensure continued success of this Remediation Plan. Cedar Point Properties must continue to sample and analyze surface water in the Little Grizzly, Ward, and Nye Creek watersheds to monitor the project's success in preventing a release to these watersheds.

Cedar Point Properties' NPDES permit requires monitoring of the Walker Mine effluent and the receiving water (Dolly Creek). Monthly monitoring parameters include metals and pH. Cedar Point Properties must conduct chronic toxicity testing on an annual basis.

In addition, Cedar Point Properties is required to implement the Regional Board's Operations and Maintenance Procedures which describe in detail the area-wide surface water monitoring program. The Procedures contain a surface water monitoring program that consists of 25 monitoring stations in Dolly Creek, Little Grizzly Creek, Ward Creek, and Nye Creek. Monitoring of Dolly Creek and Little Grizzly Creek is used to determine the direct effects of the portal and tailings discharges. Nye and Ward Creeks are monitored twice per year to determine if water stored within the mine is seeping to these watersheds. Monitoring of Nye and Ward Creeks includes surface water upgradient and down gradient of the elevation of the water stored behind the seal. This method allows a determination of whether the mine water is seeping out of the mine into adjacent watersheds. Baseline conditions are determined from historic water quality data; these data are reviewed for trends on an annual basis. To date, there is no substantial evidence that mine water is entering Nye Creek or Ward Creek.

The Regional Board constructed a mine water monitoring well in 1997. The monitoring well can be used to measure the elevation of the mine water behind the seal without entering the access tunnel. Water samples collected from the well will determine mine water quality.

The Operations and Maintenance Procedures list the surface water monitoring locations, sampling frequencies, and sampling parameters. All water samples are monitored for pH, electroconductivity, and total and dissolved metals including copper, zinc, iron, and aluminum. The general minerals that are monitored include alkalinity, calcium, sodium, chloride, sulfate, total hardness, and total dissolved solids.

**H. Budget and identified funding to pay for implementation of the plan.**

In 1991, the Regional Board received a \$1.5 million settlement from Calicopia Corporation. The Regional Board has been spending this money for ongoing remedial and maintenance activities and will expend the balance of the settlement funding in 1999 with the proposed surface water diversion project. Because the Regional Board does not propose any additional improvements at Walker Mine, the Regional Board does not propose to budget or identify additional funding for this project. In the event that the Regional Board must continue remedial activities, the Regional Board will take action to receive funds or reimbursement from any responsible parties, and if necessary, request funds from the State Water Resources Control Board.

Cedar Point Properties is responsible for funding continuing maintenance, monitoring, and all future remedial activities.

**I. Remediation goals**

The remediation goal for this project was to protect water quality by minimizing the discharge of AMD from Walker Mine to Dolly Creek. This objective was achieved by the installation of the concrete mine seal. The proposed surface water diversion structures will reduce the hydraulic head on the mine seal, thus further reducing the threat of an AMD discharge.

**J. Contingency Plan**

Cedar Point Properties is ultimately responsible for the Walker Mine site. The Regional Board will enforce the Cleanup and Abatement Order, Cease and Desist Order, and the NPDES permit as necessary to obtain compliance.

The existing surface water monitoring program will monitor the effectiveness of past remedial activities. Cedar Point Properties, under oversight of Regional Board staff, must conduct periodic inspections of the remedial structures in accordance with a Board staff approved operations and maintenance plan. In the event that a remedial structure is deemed to be ineffective or failing (e.g., excessive seepage from seal), Cedar Point Properties must contract with engineering consultants and contractors to repair or replace the questionable structures.



Additional remedial structures will be constructed as required in order to maintain existing structures.

In the event that Cedar Point Properties does not submit an acceptable remedial workplan (by December 1999, as required by the Cease and Desist Order), the Regional Board will develop a detailed contingency plan containing the steps necessary for treatment and discharge of the mine water to minimize the threat of discharges to uncontaminated watersheds and to reduce the pressure head on the mine seal. If the water reaches an elevation of 300 feet above the seal (100 feet less than a known spillage elevation), the Regional Board will work through the contracting process for the specific design and construction of an AMD treatment facility to drain and treat the AMD.

At this time the Regional Board does not have funds available to either develop a contingency plan or contract out for the specific design. The Regional Board will require funding from the State Water Resources Control Board to develop both a detailed contingency plan and to design and implement a treatment system. The funding, contracting, design, and construction process is lengthy and staff estimate that at least two years would be required to fully implement a plan. It may be in the State's best interest to reserve funding for this project in the event that Cedar Point Properties fails to comply with their Orders. Regional Board staff estimate the design and construction of an AMD treatment plant would be in excess of \$1 million in capital expenditures and \$250,000 per year for operations and maintenance. The estimated cost to contain discharges from the waste piles would be on the order of \$4 million.

Conceptually, the Regional Board's contingency plan would consist of treating the large volume of AMD behind the seal to regulate the pressure head on the mine seal and to prevent the release of AMD from seeps or springs caused by excessive water levels behind the seal. Flow to a treatment plant or wetlands could be controlled by using the mine workings as a reservoir to contain seasonal fluctuations. The system would be designed to meet effluent limits for the receiving water and to provide for long term treatment requirements with minimal maintenance. In the event the system is ineffective in the winter months, the valves would be closed and AMD would be retained within the mine and then treated in the summer and fall. To minimize on-going treatment costs, the required capacity of the treatment system would be kept to a minimum by reducing the volume of AMD to be treated (i.e., maximize surface water diversions at subsidence areas).

**K. Description of the remediating agencies legal right to enter and conduct remedial activities**

A 1991 settlement agreement between the State and Calicopia Corporation provided access to the State for remedial activities. In 1998 the Regional Board received access privileges from Cedar Point Properties. The Regional Board has authority to undertake remedial work pursuant to Water Code Sections 13304 and 13305.

**L. Signature of the authorized representative of the remediating agency**

The undersigned is the authorized representative of the Regional Board.



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Gary M. Carlton, Executive Officer  
Central Valley Regional Water Quality Control Board  
3443 Routier Road, Suite A  
Sacramento, CA 95827-3098

**M. Identification of pollutants addressed by the plan**

The heavy metal pollutants identified in this Remediation Plan include copper, zinc, iron, and aluminum. Other constituents of concern include pH, alkalinity, calcium, sodium, chloride, sulfate, total hardness, and total dissolved solids.

Attachments: Waste Discharge Requirements Order No. 99-110

Cease and Desist Order No. 99-111

Cleanup and Abatement Order 97-715

Central Valley Regional Water Quality Control Board, Resolution No. 97-161

Operations and Maintenance Procedures for Walker Mine