

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION**

ORDER NO. 88-25

**WASTE DISCHARGE REQUIREMENTS
FOR
CHRISTIE GOLD LTD.
North of Winterhaven, Imperial County**

The California Regional Water Quality Control Board, Colorado River Basin Region, finds that:

1. Christie Gold Ltd. (hereinafter also referred to as the discharger), 145 S. Avenue B, B-13, Yuma, Arizona, 85364, submitted a Report of Waste Discharge, dated May 22, 1987, for a heap-leach mining operation.
2. The discharger proposes a gold and silver extraction pilot operation by heap cyanide leaching 50,000 tons of ore. The length of time to complete this pilot operation is projected to be no more than six months from the time of commencement of leaching. A dilute solution of sodium cyanide (NaCN) containing lime (CaO) for pH control will be percolated through the ore heap. The solution will leach through the ore dissolving the gold and silver before draining into a pregnant solution containment basin. The solution would then be piped through carbon column units, where the precious metals will be removed. The remaining barren solution will drain into a tank where cyanide will be added to bring the concentration of the solution to the appropriate strength before it is recirculated onto the pile. The processing site is to be located in Section 3, T14S, R22E, SBB&M, which is approximately 10 miles north of Winterhaven, CA.
3. Up to fifty thousand tons of ore will be leached on one leach pad. The ore to be leached will be underlain by a continuous synthetic (or equivalent) liner designed to be effective throughout the processing lift of the pile. The liner design would be based on: (1) the size of the ore particles in the initial lift, against the liner, (2) maximum pile height, (3) ore placement methods, (4) subgrade preparation and/or overliner procedures, and (5) provisions for controlling the hydraulic head of the solution on the liner.
4. The last step of the ore leaching process would be a thorough rinse of the heap with fresh water in order to remove the residual leaching fluids (with the gold and silver it contains). This final rinse process would reduce cyanide concentrations to a mining waste classification of Group C, as described in Article 7, Subchapter 15, Chapter 3 of Title 23 California Administrative Code. The pile would then be either abandoned in place or moved elsewhere.
5. Normal annual precipitation in this area is 3.5 inches, and normal annual surface evaporation is 9 feet.
6. The Water Quality Control Plan for the Colorado River Basin Region of California was adopted by the Regional Board on November 14, 1984.

*Resubmitted
by 93-033
3/20/93*

The beneficial uses of the ground waters of the Amos-Ogilby Hydrologic Unit, as set forth in the above plan, is municipal supply. The depth to bedrock in the project area is between 5 and 15 feet. The discharger reports that more than 10 drill holes have been drilled at the project site to partially delineate the ore body. These cores were drilled to the depth of 300 feet. The Regional Board has copies of the drill logs in its files. The drill logs show that no ground water was encountered in any of these drill logs. For this reason, ground water monitoring wells would not be practical for this project. The industrial water supply for this project would be piped from the Colorado River.

7. Overburden soil and rock and waste rock from the mining operations would be deposited in piles surrounding the mining pits. These materials have the classification of Group C per Article 7 of the said Subchapter 15, based on laboratory tests on crushed rock which show that the material is not acid generating or hazardous and would not cause a discharge having a significant effect on water quality.
8. The Board has notified the discharger and interested agencies and persons of its intent to issue waste discharge requirements for this facility.
9. The Board in a public meeting, heard and considered all comments pertaining to the proposed discharge.
10. The Regional Board approved on March 23, 1988, Negative Declaration SCH # 88020301 for this completed gold mine pilot project in accordance with the California Environmental Quality Act and State Guidelines. The below waste discharge requirements are designed to assure against any significant adverse effects on water quality.

IT IS HEREBY ORDERED, the discharger shall comply with the following:

A. Discharge Specifications

1. Neither the mining process nor the discharge of wastewater or other wastes shall create a pollution or a nuisance as defined in Division 7 of the California Water Code.
2. The cyanide solutions shall be contained only in the processing system or in other leak-proof containers.
3. There shall be no wind transport of cyanide solution or ore containing cyanide away from the leaching area.
4. The heap leach ore pile shall be underlain by a synthetic liner which has a maximum permeability of 1×10^{-10} cm/sec and a minimum thickness of 40 mils. An equivalent liner may be approved by the Regional Board's Executive Officer if the discharger demonstrates that the equivalent liner will function equal to or better than the above specified minimum system.
5. Each cyanide solution containment basin, shall be underlain by a double liner with a leachate collection and removal system installed between the two synthetic liners. Each synthetic liner shall have a permeability which does not exceed 1×10^{-10} cm/sec. Each liner shall have a minimum thickness of

40 mils. Each basin shall contain a leak detection system and withdrawal sump. The double liners with leachate collection and removal system shall extend up the sidewalls to at least 2.0 feet heights (vertical) above the maximum working depth of the cyanide solution.

The exposed sidewalls of both basins and truck transport ditches shall have a single 36 mils reinforced weather-resistant synthetic liner, or an equivalent liner approved by the Regional Board's Executive Officer. Other design details for the protection of the quality of State waters shall also be approved by the Executive Officer.

6. The processing area shall be protected from any run-on, washout, or erosion which could occur as a result of a storm having a predicted frequency of once in 100 years, and based on time of concentration at the processing area, as set forth in Department of Water Resources Bulletin No. 195 for Arizona.
7. The heap leach processing area shall be bermed, and capacity in the above described containment basins shall be provided to impound all storm water drainage from the piles and from the cyanide solution collection and transport facilities during a maximum probable one-hour storm, as set forth in Department of Water Resources Bulletin No. 195 for El Centro, Blythe and Hayfield, California and Yuma, Arizona. The average value (5.0 inches) taken from these four reporting stations is to be used. In addition, containment capacity shall be provided for 24 hours of cyanide solution draindown from the piles. Also, standby emergency facilities shall be available to assure continual circulation of the leaching solution if at any time it is determined that a planned processing configuration or rate could in an emergency result in flow in excess of existing basin storage capacity. The additional storm storage capacity shall be provided before the new processing configuration is started.
8. There shall be no discharge of process wastewater at any location without prior approval from the Regional Board.
9. Adequate measures shall be taken to ensure that liners will not be punctured for the duration of the leaching activity.
10. Leached ore residual shall not be placed in perennial, intermittent, or ephemeral stream channels unless provisions are made to divert runoff around the waste in a non-erosive manner. Waste shall not be placed where it can be eroded by streamflows or cause accelerated streambank erosion.
11. Prior to removal of leached ore residue from an impervious pad for disposal, or prior to abandonment in place, the cyanide contained therein shall be neutralized as described in Discharge Specification No. 14, below.
12. All industrial waste materials not covered by said Article 7, Subchapter 15 shall be discharged at a Board approved waste management unit. Any hazardous waste containers shall be rendered unusable prior to final disposal.
13. Adequate measures shall be taken to assure that unauthorized persons and mammals and any endangered species are effectively excluded from the processing area. Reasonable efforts shall also be made to prevent birds from drinking toxic solutions.

14. When abandoning leached ore residue, the procedures for determination of whether free cyanide (CN^-) in the ore residue has been neutralized to a satisfactory level shall be as follows:
 - a. A sampling grid of the ore pile or segment on the leach pad shall be submitted that is acceptable to the Executive Officer. The sampling grid shall contain a total of at least ten sampling locations on the ore pile or segment being abandoned.
 - b. The sample to be analyzed from each sampling location shall contain 100 grams as an aliquot of samples taken as set forth below, except that no sample shall be taken within three feet above the plastic liner unless special provisions are made to avoid penetrating the liner or for sealing said penetrations:
 1. An ore pile thirty feet or less in depth shall have samples taken at 25, 50 and 75 percent of the depth.
 2. An ore pile greater than thirty feet in depth shall have samples taken every ten feet of depth.
 - c. The sample analysis procedure shall be as set forth in Attachment A.
 - d. The maximum allowable free cyanide (CN^-) shall not exceed the following levels in the filtrate portion of a 5/1 extraction:
 1. 90 percent of at least 10 samples shall contain less than 10 mg/l free cyanide (CN^-) in the filtrate.
 2. None of the samples shall contain more than 20 mg/l free cyanide (CN^-) in the filtrate.
 - e. For any sampling location that indicates a free cyanide level in excess of 20 mg/l in the filtrate, the areal extent of the inadequately detoxified area shall be determined and detoxified so that the cyanide levels in that particular ore pile will comply with the limitations contained in Specification No. 14(d) 1 and 2, above.
15. Adjacent and contiguous ore piles or segments shall also be sampled simultaneously when any pile or segment is to be abandoned. If any additional processing is done in the sampled areas, the piles and segments tested will require additional rinsing and testing prior to abandonment or removal.
16. The discharger shall maintain vadose zone monitoring systems in locations as approved by the Executive Officer.

B. Provisions

1. At least 60 days¹ prior to commencement of construction of each of the above-mentioned components of the facility, the discharger shall submit to the Board for approval by the Executive Officer, a technical report which shall include a plan showing in detail the proposed construction of that component.
2. At least 5 days prior to commencement of operations, the discharger shall submit to the Board's Executive Officer a certificate, signed by a California registered Civil Engineer, stating that the pads, containment basins, leakage detection system, flood protection and attendant facilities, and disposal areas are constructed in accordance with the technical report as approved by the Executive Officer to meet the requirements of this Order.
3. At least 5 days prior to loading ore onto pads, the discharger shall notify the Board to allow sufficient time to schedule a staff evaluation of construction and inspection procedures utilized by the discharger for liner installation.
4. The discharger shall comply with "Monitoring and Reporting Program No. 88-25", and future revisions thereto, as specified by the Executive Officer.
5. Prior to any significant modifications in this facility which could result in material change in the quality or quantity of wastes discharged, or any material change in location of discharge, the discharger shall report in writing to the Regional Board, allowing sufficient time for Board consideration and action.
6. The discharger shall submit to the Board, at least 30 days prior to commencement of the herein stated operations, written adequate assurance that money is committed in an amount sufficient to ensure detoxification of all cyanide, plus cleanup and closure of the processing site upon abandonment of facilities, in a manner that will not adversely affect water quality.
7. Lack of construction or operational activity on the site for a period of one year shall constitute abandonment for the purpose of this Order.
8. The discharger shall install a device for testing the leak detection system of each double-lined containment structure. Said testing shall be subject to approval by the Executive Officer.

¹ 60 days unless a lesser period is approved by the Executive Officer

I, Arthur Swajian, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Colorado River Basin Region, on March 23, 1988.


Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

ATTACHMENT A TO ORDER 88-25

ANALYTICAL PROCEDURE
FOR
IONIC CYANIDE
also known as free soluble cyanide

Description: Ionic cyanide and most weak complexes are soluble in distilled water. The strong complexes of ions, although normally soluble, are bound too tightly to the particle surface and are not solublized. The sample is leached with distilled water in a single pass, flow-through manner. The leachate is collected, alkalized for preservation, and made up to a definite volume. This leachate sample is then analyzed via "Standard Methods" 412 C or E. Method 412 D may not be used.

Apparatus:

- 1) Large glass funnel, the stem throat plugged with glass wool;

or

- 2) Large glass funnel with glass fiber filter paper: Whatman GF/C, 934-AH, or equivalent.
- 3) Balance capable of weighing to nearest 0.01 g.
- 4) 500 ml volumetric flasks.
- 5) Items necessary to perform cyanide analysis as described in narrative above.

Reagents:

- 1) 2.5 N NaOH (100 g NaOH/l)
- 2) Reagents necessary to perform cyanide analysis as described in narrative above.

Procedure:

Weigh out, to nearest 0.01 g, $100 \pm$ g of sample as received. Place in glass funnel, either glass wool plugged or with filter paper. Add 50.00 ml of 2.50 N NaOH to 500 ml volumetric flask and place it so as to catch the filtrate from the funnel. Pour 50 ml of distilled (or deionized) water onto the solid sample and allow to percolate through. When liquid level is even with the top of the solids, add an additional 50 ml of water.

Repeat the addition of water until a total 400 ml H₂O has been used. Make up volume in volumetric flask to mark with distilled water. This constitutes the sample ready for analysis.

The titrametric (412C) and the ion selective probe (412E) require no further preparation. The sample is then read directly by either titrametric (412C) or the ion selective probe (412E) and the results reported in mg/1 (CN⁻).

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION**

MONITORING AND REPORTING PROGRAM NO. 88-25
FOR
CHRISTIE GOLD LTD.
North of Winterhaven, Imperial County

Location: Section 3, T14S, R22E, SBB&M

Monitoring and Reporting No. 1

The discharger shall submit to the Regional Board monthly reports containing the following:

- A. The current status of mining operations as to whether the operation is active or inactive.
- B. An estimate of the total amount of ore (tons) presently being processed.
- C. The amount of liquid collected in each seepage detection sump and the period of time since last evaluation.
- D. Analysis for free cyanide and total cyanide of any water found in each seepage detection sump.
- E. Analysis for free cyanide and total cyanide for any liquid found in the vadose zone monitoring system.

Monitoring and Reporting No. 2

- A. Immediate reporting of any accidental spillage, leakage, or release of waste material, including immediate measures being taken to correct same and limit detrimental effects.
- B. Upon request from this Board's Executive Officer, the discharger shall furnish special technical and/or monitoring reports on the treatment and discharge of wastes, and on the integrity of the cyanide solution containment system.
- C. At least 30 days prior to any proposed abandonment of leached ore residues or discharge of wastewater, or termination of the operation described in this Order, the discharger shall submit a copy of the results of analyses of the cyanide concentration in the leached ore residue and in the wastewater in accordance with Discharge Specification No. 14.
- D. Report of completion of cleanup of premises shall be submitted to the Regional Board in writing within one week following completion of work.

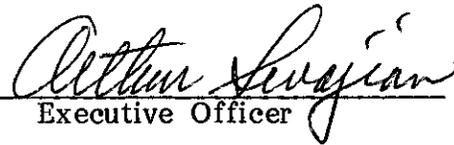
The above monitoring program shall be implemented and/or maintained immediately upon adoption of Order No. 88-25.

Monthly reports shall be submitted to the Regional Board by the 15th day of the following month. Reports for Item 2A, (above) shall be forwarded immediately and if at all possible shall be preceded by phone communication to the Regional Board's office, telephone number (619) 346-7491. Copies of the reports submitted to the Board pursuant to this Monitoring and Reporting Program shall be maintained at the operations site, and shall be made available to staff of the Regional Board upon request.

Mail reports to:

California Regional Water Quality Control Board
Colorado River Basin Region
73-271 Highway 111, Suite 21
Palm Desert, CA 92260

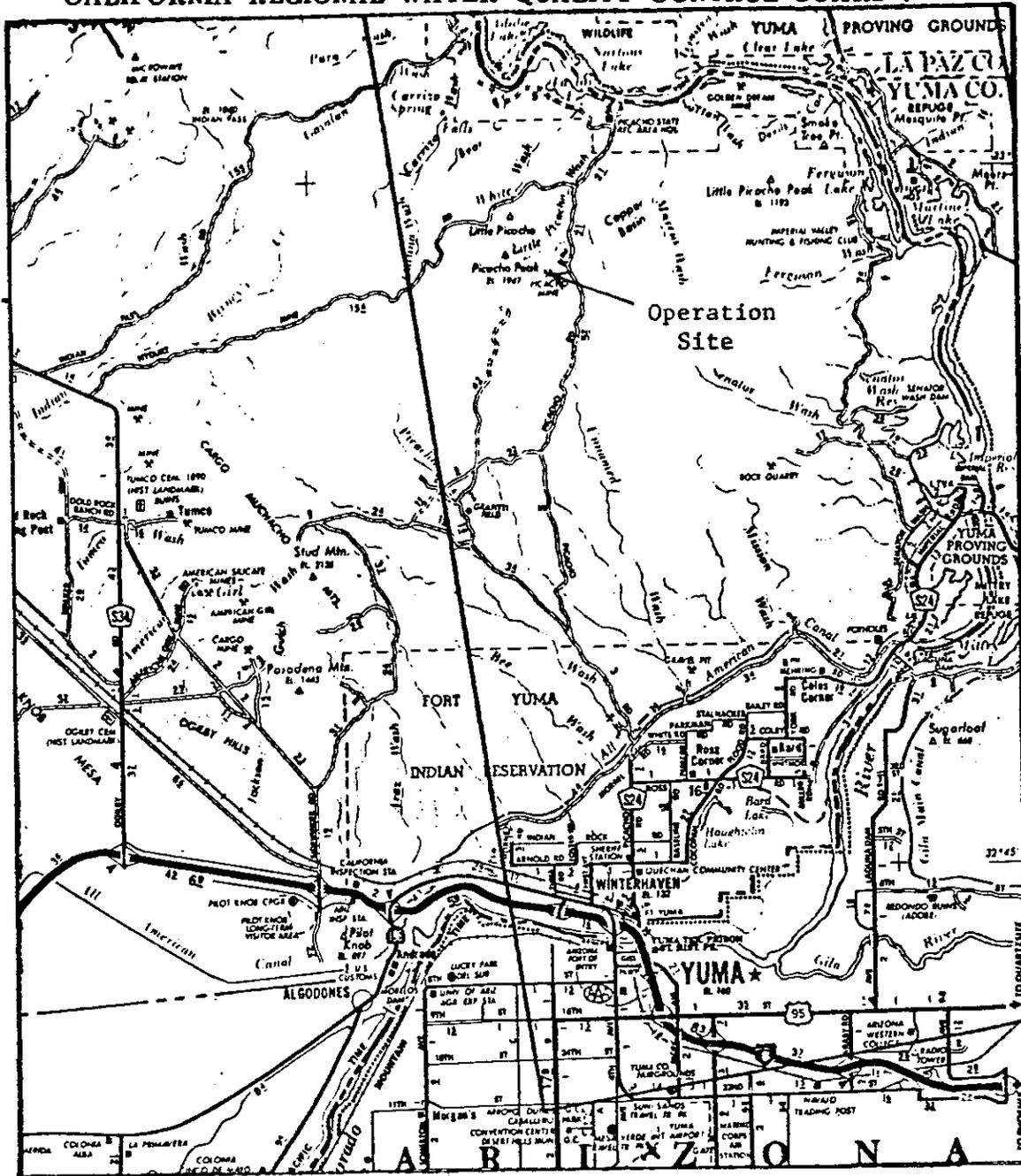
ORDERED BY:


Executive Officer

March 23, 1988

Date

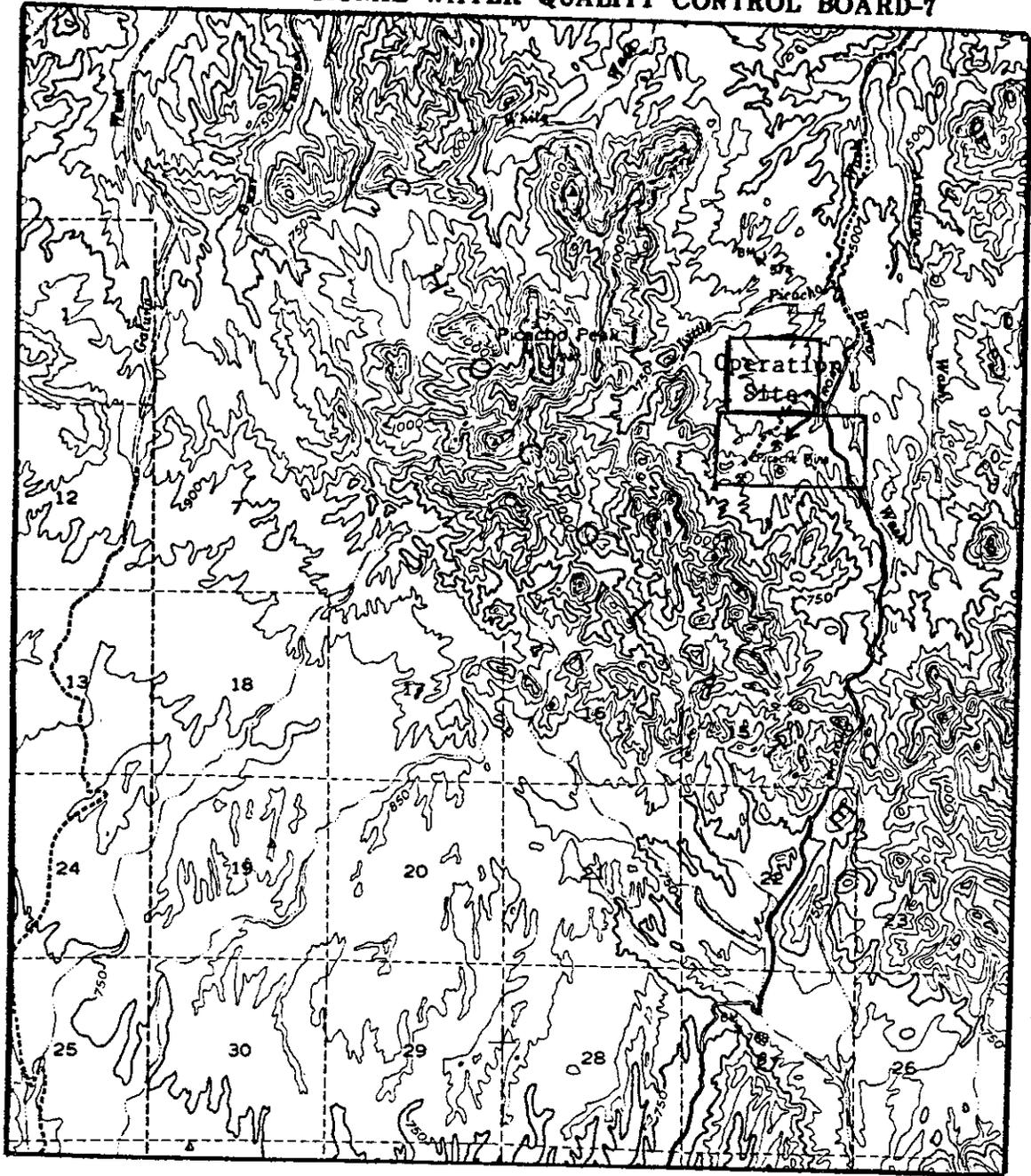
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD-7



SITE MAP NO. 1
 CHRISTIE GOLD LTD
 North of Winterhaven, Imperial County

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD-7



SITE MAP NO. 2
CHRISTIE GOLD LTD
North of Winterhaven, Imperial County
Location: Section 3, T14S, R22E, SBB&M
USGS Picacho Peak 15 min. Topographic Map

Order No. 88-25