CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

ORDER NO. 85-2

WASTE DISCHARGE REQUIREMENTS
FOR
GOLD FIELDS OPERATING COMPANY - MESQUITE
MINING WASTE MANAGEMENT FACILITY
Northeast of Glamis - Imperial County

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

1. Gold Fields Operating Company - Mesquite (hereinafter also referred to as the discharger), P. O. Box 441, Brawley, California 92227, submitted a Report of Waste Discharge, dated October 10, 1984, for an expansion of a mining operation.

2. The discharger proposes to construct and operate an open-pit gold mine and on-site ore processing facilities using the heap leaching/carbon adsorption process for gold recovery. Approximately 2,250 acres would be directly affected by development of the proposed facilities. Up to three million tons of ore per year would be processed, and the estimated life of the project is 20 years. Finely crushed ore would be heaped on impervious pads and sprinkled with a solution of sodium cyanide. The solution would leach through the ore, dissolve the gold, and then drain into pregnant solution basins. The solution would then be piped through carbon column units to remove the gold, and the barren solution would drain to basins, where cyanide would be added and recirculated onto the piles. The mine and processing site are to be located in Sections 4,5,6,7,8,9,17,18,19, and 20, T13S, R19E, SBB&M - about 6 miles northeast of Glamis by Highway 78.

3. The discharger has stated preference to utilize synthetic liners throughout the operations.

4. Each heap/leach ore pile would be underlain by an impermeable synthetic liner designed to be effective throughout the processing life of each pile. Reinforced CPE sunlight-resistant impervious liners would be used in all areas subject to sunlight, including adjacent solution transporting ditches, and would extend under the edges of the piles. A typical pile of ore would be approximately 4,200 feet long, 400 feet wide and 30 to 80 feet high. During the project life as many as 20 piles would be processed. The normal duration of leaching for each ore pile would be approximately 100 to 500 days. Each pile would be flushed with fresh water after completion of leaching operations to reduce cyanide concentrations to an acceptable level which would result in a mining waste classification of Group C, under Article 7, of said Subchapter 15. The pile would then be either abandoned in place or removed elsewhere.

Superseded 6/12/85 by 85-60

5. Normal annual precipitation in this area is 3.5 inches, and normal annual surface evaporation is 9 feet; so that precipitation upon a surface is not capable of driving dissolved material into the groundwater in that proximate area.

6. The Water Quality Control Plan for the Colorado River Basin Region of California was adopted by the Regional Board on November 14, 1984. The Basin Plan contains water quality objectives for the Amos-Ogilby Hydrologic Unit.

7. The beneficial uses of the ground waters of the Amos-Ogilby Hydrologic Unit, as set forth in the above Plan, is municipal supply. Ground water quality in the vicinity of the project area is sodium chloride in character with a total dissolved solids concentration of 1000 mg/l to 1200 mg/l. Only a minor amount of ground water underlies the project area and at a depth of about 200 feet. A water supply for industrial use is to be developed at a proposed well field located five miles south of the process plant.

8. 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 said Subchapter 15.

9. This site (using cyanide) is also subject to waste discharge requirements adopted in Board Orders No. 83-7 and 83-106.

10. The Board has notified the discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the proposed discharge.

11. The Board in a public meeting heard and considered all comments pertaining to the proposed discharge.

12. The Imperial County Planning Department adopted on December 12, 1984, Environmental Impact Report - SCH #84040408 which contains mitigation measures for this proposed project. This EIR indicates that this project would not have a significant effect 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 solution shall be contained only in the processing system or in leak-proof containers.

3. There shall be no wind transport of cyanide solution or ore containing cyanide away from the leaching area.

4. The synthetic impermeable liner underlying each leaching ore pile and its cyanide solution transport ditches, shall have a permeability which does not exceed 1 x 10^{-7} cm/sec; and the fluids contained therein shall not penetrate through the lining during the containment period. These synthetic liners shall have a minimum thickness of 40 mils.

5. Each cyanide solution containment basin, each cyanide-bearing sludge containment basin, and each trunk cyanide solution transport ditch, shall be underlain by a double liner with a leachate collection and removal system installed between the two synthetic liners. The synthetic liner's shall have a permeability which does not exceed 1 x 10^{-7} cm/sec, and shall have a minimum thickness of 40 mils. The double liners with leachate collection and removal system shall extend up the walls of each basin to a height of at least two feet (vertical) above the maximum working depth of cyanide solution and/or sludge contained therein. The remaining sidewalls of each basin shall have at least a single liner.

6. All drainage and collection facilities used to contain or transport leaching solutions shall be effectively sealed to prevent leakage of these liquids.

7. A minimum impervious freeboard of at least two (2) feet shall be maintained around the base of the heap leach piles.

8. The processing area shall be protected from any run-on, washout, or erosion which could occur as a result of floods having a predicted frequency of once in 100 years, and based on time of concentration at the processing area.

9. The entire processing area shall be diked to impound all storm water drainage from the cyanide solution collection facilities and basins during a maximum probable one-hour storm, in addition to 24 hours of cyanide solution draindown. Also, standby emergency facilities shall be available to assure continual circulation of the leaching solution.

10. There shall be no discharge of process wastewater at any location without prior approval from the Regional Board.

11. Adequate measures shall be taken to insure that liners will not be punctured for the duration of this activity.

12. Leached ore residue shall not be placed in perennial, intermittent, or ephemeral stream channels unless provision is 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.

13. Prior to removal of leached ore residue from an impervious pad, for disposal, the cyanide contained therein shall be neutralized as described in Discharge Specification No. 17.

14. Ore residue may be abandoned on a pad, provided the cyanide in the ore is neutralized as described in Discharge Specification No. 17.

15. All industrial waste materials shall be discharged at a Board approved waste management unit. Any waste containers shall be rendered unusable prior to final disposal.

16. Adequate measures shall be taken to assure that unauthorized persons and mammals are effectively excluded from the processing area.

17. When abandoning leached ore residue, the procedure 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 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.

    b. The sample to be analyzed from each sampling location shall contain 100 grams as an aliquot of samples taken at 25, 50, and 75 percent of each ore pile depth, 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.

    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. 17 (d) 1 and 2, above.

18. The leaching pads and cyanide solution containment basins shall have leakage detection systems as deemed necessary by the Executive Officer of the Regional Board.

B. Provisions

1. At least 60 days[1] prior to commencement of construction of new facilities, 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 the pads, basins, leakage detection systems and flood protection facilities.

2. At least 10 days prior to commencement of operations, the discharger shall submit to the Board a certificate, signed by a California Registered Civil Engineer, stating that the pads, containment basins, attendant facilities, leakage detection system, flood protection 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. Within 60 days after adoption of this Order, the discharger shall submit to the Board for approval by the Executive Officer, a program for determining the rate of cyanide degradation under natural conditions in ore residue piles.

4. At least 10 days prior to loading ore onto the pads, the discharger shall notify the Board to allow sufficient time to schedule a staff inspection of liners.

5. The discharger shall comply with "Monitoring and Reporting Program No. 85-2", and future revisions thereto, as specified by the Executive Officer.

6. Prior to any 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.

7. In the event of any change in operation, or in control or ownership of land or waste disposal facilities owned or controlled by the discharger, the discharger shall:

   a. Notify this Board of such change; and

   b. Transmit a copy of this Order to the succeeding owner or operator, and file a copy of the transmittal letter with this Board.

8. The discharger shall submit to the Board, at least 30 days prior to commencement of expanded operations, written adequate assurance that money is committed, in an amount sufficient to insure detoxification of all cyanide, plus cleanup and closure of the processing and tailings disposal

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

sites upon abandonment of facilities, in a manner that will not adversely affect water quality.

9. Lack of construction or operational activity on the site for a period of one year shall constitute abandonment for the purpose of this Order.

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 January 23, 1985.

Arthur Swajian

Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

ATTACHMENT A

ANALYTICAL PROCEDURE

FOR

IONIC CYANIDE
also known as free or soluble cyanide

Description: Ionic cyanide and most weak complexes are soluble in distilled water. The strong complexes of iron, 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, flowthrough 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. 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:

Weight out, to the nearest 0.01 g, 100+1 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 of 400 ml H_2O 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.

Calculations:

$$\text{mg/kg CN (ionic)} + \frac{A^1 \times 500}{\text{weight sample in grams}}$$

1. µg/ml CN (equivalent to mg/l) in 500 ml volumetric flask.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

MONITORING AND REPORTING PROGRAM NO. 85-2
FOR
GOLD FIELDS OPERATING COMPANY - MESQUITE
MINING WASTE MANAGEMENT FACILITY
Northeast of Glamis - Imperial County

Location: Sections 4,5,6,7,8,9,17,18,19, and 20, T13S, R19E, SBB&M

MONITORING

Gold Fields Operating Company - Mesquite (discharger) shall report to the Regional Board concerning the following:

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. Analysis for free cyanide and total cyanide in ground water from each ground water monitoring well, and of any water found in each seepage monitoring well.

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.17, and shall request a Regional Board staff inspection to approve the proposed discharge or cleanup procedure.

D. Report of completion of cleanup of premises shall be submitted to the Regional Board in writing within one week following completion of work.

REPORTING

The above monitoring program shall be implemented immediately upon adoption of this Order.

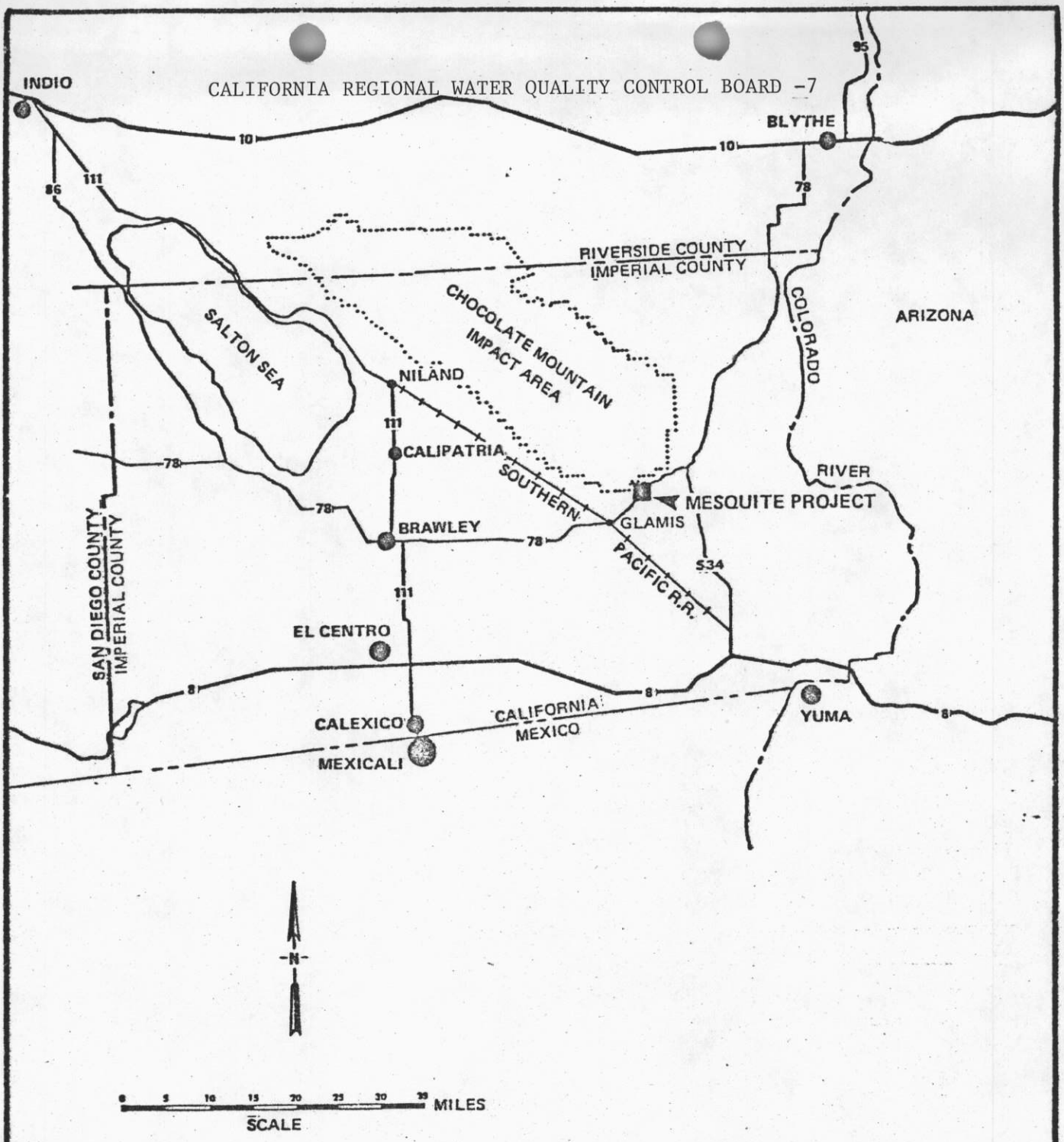
Monthly reports shall be submitted to the Regional Board by the 15th day of the following month. Reports for Items 2A, B, and D (above) shall be forwarded immediately and if at all possible shall be preceded by phone communication to the Regional Board's office, phone No. (619) 346-7491. Copies of the 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

January 23, 1985
Date



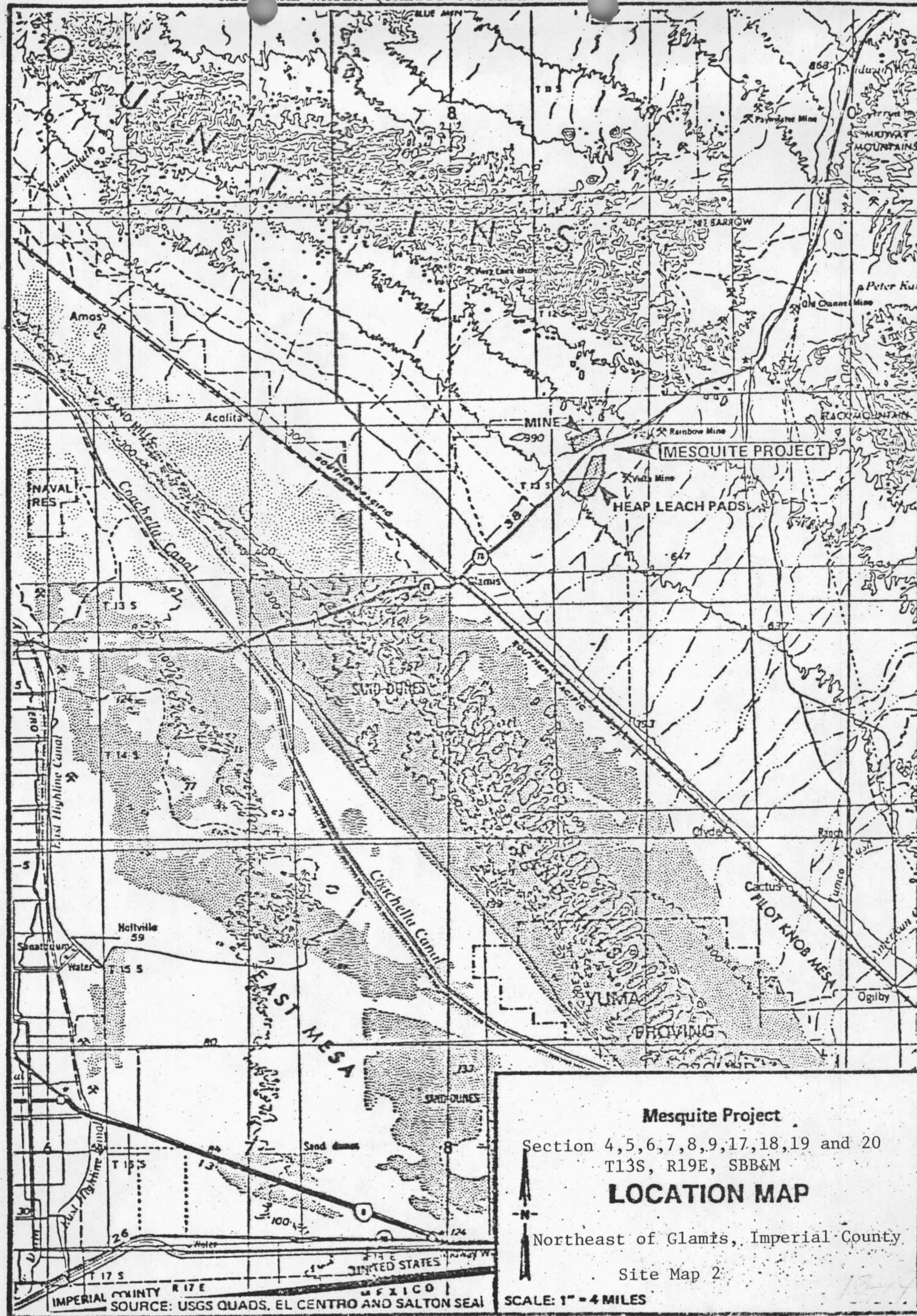
Sections 4,5,6,7,8,9,17,18,19 and 20, T13S, R19E, SBB&M

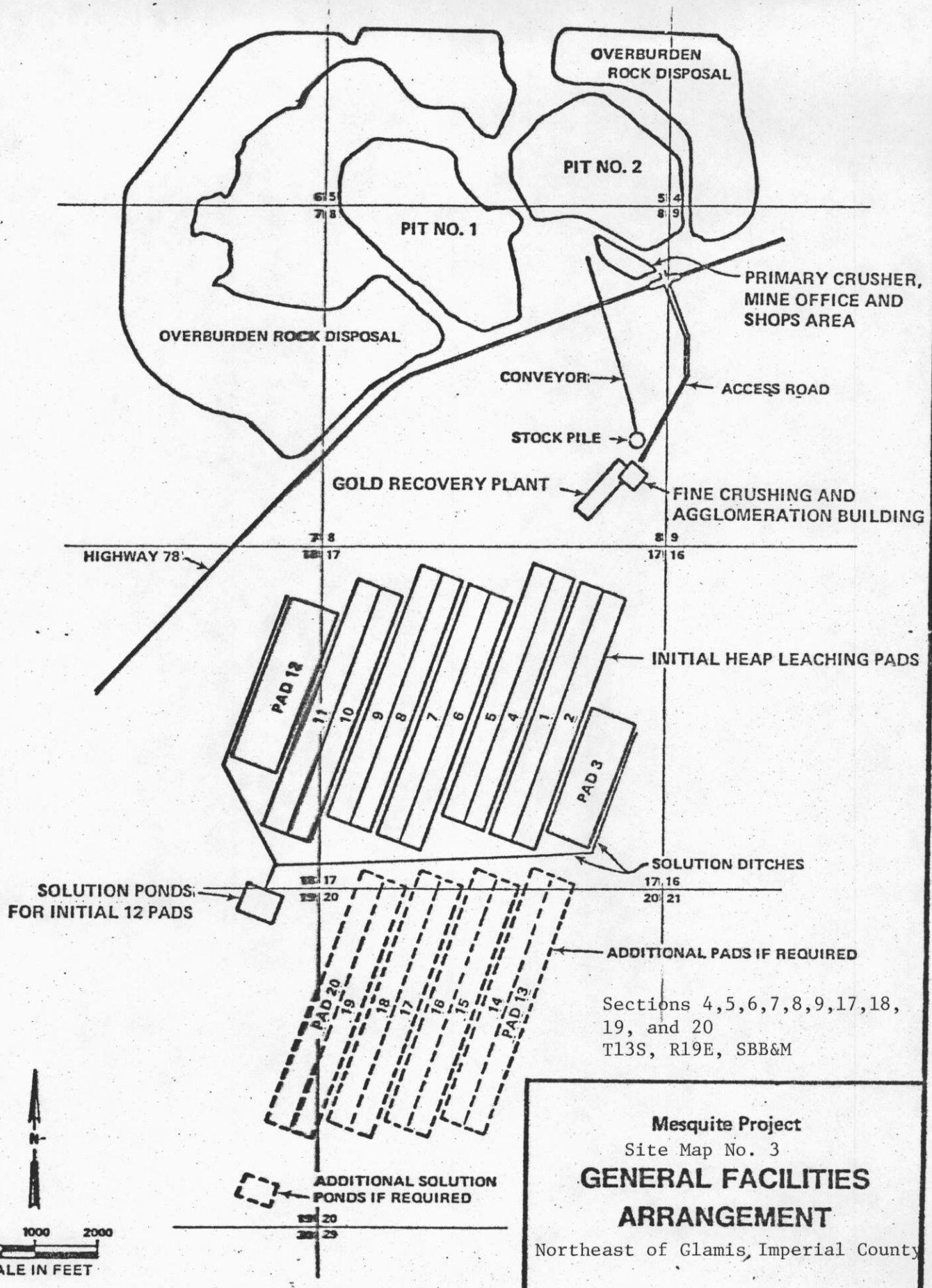
Mesquite Project

Site Map No. 1

VICINITY MAP

Northeast of Glamis, Imperial County


MINE
Rainbow Mine
MESQUITE PROJECT
HEAP LEACH PADS
Acolita
Amos
NAVAL RES
Coachella Canal
SOUTHERN PACIFIC
Glamis
SAND DUNES
EAST MESA
YUMA PROVING
Holtville
Clyde
Cactus
PILOT KNOB MESA
Ogilby
MIDWAY MOUNTAINS
Peter Kane
Old Channel Mine
East Highline Canal
UNITED STATES
MEXICO
IMPERIAL COUNTY
SOURCE: USGS QUADS. EL CENTRO AND SALTON SEA
Mesquite Project
Section 4,5,6,7,8,9,17,18,19 and 20
T13S, R19E, SBB&M
LOCATION MAP
N
Northeast of Glamis, Imperial County
Site Map 2
SCALE: 1" = 4 MILES



Sections 4,5,6,7,8,9,17,18, 19, and 20
T13S, R19E, SBB&M

Mesquite Project

Site Map No. 3

GENERAL FACILITIES ARRANGEMENT

Northeast of Glamis, Imperial County