CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

ORDER NO. 89-034

WASTE DISCHARGE REQUIREMENTS
FOR
GOLD FIELDS OPERATING CO. - MESQUITE
Northeast of Glamis - Imperial County

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

1. Gold Fields Operating Co. - Mesquite (hereinafter also referred to as the discharger), HCR 76 Glamis 100, Brawley, California, 92227, submitted an updated Report of Waste Discharge, dated January 21, 1989, to modify an existing operation. The modification is an increase in the rate of gold ore processing, and modifications to the existing process configuration to account for operational improvements determined since the facility started up in February 1985.

2. The discharger proposes to provide flexibility for the rate of gold production on its approximately 1,200-acre heap leaching/carbon adsorption processing facility. The nominal processing rate is expected to be between about five and eight million tons per year. Larger production rates may be permitted provided the applicant demonstrates to the Executive Officer that the production rate increase will not cause noncompliance with storm run-off and solution volume containment requirements of this Order.

3. The main processing facilities are located in Sections 8, 9, 16, 17, 19 and 20, T13S, R19E, SBB&M, about 6 miles northeast of Glamis near Highway 78. Ore processed in this area would be mined in Sections 3, 4, 5, 6, 7, 8, 9, 10 and 15, T13S, R19E, SBB&M. Additional satellite processing facilities, if approved in writing by the Executive Officer, may be located in the areas indicated on the attached figure entitled "Approximate Areas That Could Include Future Satellite Pads".

4. The estimated life of the processing area is 20 years. The process will continue to use a solution of sodium cyanide, (or an equivalent cyanide compound) applied onto piles (heaps) of ore, to dissolve gold and transport it in lined ditches or pipes to solution containment basins or tanks. The pregnant solution is piped through carbon column units where gold is removed. Sodium cyanide (or an equivalent cyanide compound) is added to reconstitute the resulting barren solution which is recirculated to the process.

5. Ore piles to be leached will be underlain by a continuous synthetic (or equivalent natural) liner designed to be effective throughout the

6-30-93 Chg of Name #93-054

3/29/95 superceded by Order No. 95-016

processing life of each pile or segment. The liner design would be based on but not necessarily limited to the following factors:

a. The size of the ore particles in the initial lift, against the liner,

b. Maximum pile height,

c. Ore placement methods,

d. Subgrade preparation and/or overliner procedures, and

e. Provisions for controlling the hydraulic head of the solution on the liner.

6. Upon completion of the ore-leaching process, each pile or segment would be flushed with fresh water or otherwise rinse-treated after completion of leaching operations to reduce cyanide concentration to an acceptable level which would result in a mining waste classification of Group C, under Article 7, Subchapter 15, Chapter 3 of Title 23 of the California Code of Regulations. The pile would then be either abandoned in place or removed elsewhere.

7. 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 carrying dissolved material into the ground water.

8. The Water Quality Control Plan for the Colorado River Basin Region of California was adopted by the Regional Board on November 14, 1984. The beneficial use of the ground waters in Amos-Ogilby Hydrologic Unit, as set forth in the above Plan, is municipal supply.

9. The processing facilities are located in an area underlain by bedrock with low potential for water supply. The depth to this limited ground water is approximately 200 feet. The industrial water supply for this project is derived from three deep wells drilled into alluvium, approximately two miles southeast of the processing facilities. The beginning of the alluvium basin, known as the Amos-Ogilby Hydrologic Unit, is estimated to be about one mile from the maximum limits of the processing facilities. Potable water at the mine is obtained by treating the local ground water with a reverse osmosis method to reduce naturally high constituents to acceptable drinking water standards. Ground water quality in the project area is sodium chloride in character with a total dissolved solids concentration of approximately 1700 mg/l. This 1700 mg/l is the average TDS value for samples taken from four ground water monitoring wells at the processing site prior to commencement of heap leach operations.

10. 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, based on laboratory tests on crushed rock which show that the material is not acid generating or hazardous, and would not cause discharge having a significant affect on water quality.

11. The Regional Board has notified the discharger and interested agencies and persons of its intent to revise waste discharge requirements for this facility.

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

13. The Imperial County Planning Commission adopted on December 12, 1984, Environmental Impact Report - SCH #84040408 which contains mitigation measures for the Mesquite Gold Mine and Processing Facilities on Sections 4, 5, 6, 7, 8, 9, 17, 18, 19 and 20, T13S, R19E, SBB&M. The Imperial County Planning Commission adopted on October 28, 1987, Environmental Impact Report SCH #87052709, which contains mitigation measures for expanded mining areas encompassed by Sections 3, 4, 9, 10 and 15, T13S, R19E, SBB&M. In March 1989, the Imperial County Planning Commission adopted a Negative Declaration finding no significant impact for the modifications currently proposed by the discharger. These EIR's and the Negative Declaration indicate 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 pollution or 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 piles 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. Any pad designed and constructed prior to the effective date of this Order may utilize 36 mil reinforced liners at the edges of the pads.

5. The pregnant and intermediate solution ditches (which are not trunk ditches) and adjacent solution collection and freeboard areas shall be lined with a reinforced weather-resistant synthetic liner which has a minimum thickness of 36 mils and a permeability which does not exceed

1 x 10^{-10} cm/sec, or an equivalent liner approved by the Executive Officer.

6. 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, or an equivalent double containment system approved by the Executive Officer prior to construction. Each synthetic liner shall have a permeability which does not exceed 1 x 10^{-10} cm/sec. The bottom liner shall have a minimum thickness of 40 mils. The upper liner shall be equivalent to a reinforced weather-resistant synthetic material with a minimum thickness of 36 mils. Each basin shall contain a double-lined leak detection and withdrawal sump. Each double-lined trunk transport ditch shall contain leak detection and withdrawal sumps at approximately 1,000-foot intervals. The double liners with leachate collection and removal system shall extend up the sidewalls to at least the following heights (vertical) above the maximum working depth of the cyanide solution and/or sludge contained therein:

   a. 2.0 feet as regards basins

   b. 1.3 feet as regards trunk transport ditches (except as required in Specification No. 10, below).

   The remaining sidewalls of both basins and 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 protection of the quality of the State waters shall also be approved by the Executive Officer. If tanks are used for containment of processing solutions, such tanks shall be situated within a lined and diked area designed to contain potential spillage or leakage of the entire tank volume and either: (1) be located entirely above ground, or (2) provided with a double liner and leak detection and recovery sump if located partially underground. Tank designs shall also comply with other applicable laws and regulations. Lined, diked areas for the sole purpose of temporary storage (less than 60 days) of tank leakage and/or infrequent storm run-off from the processing area shall have a single 36 mil reinforced weather-resistant synthetic liner, or an equivalent liner approved by the Executive Officer.

7. The liner system shall be documented by the discharger and approved by the Executive Officer to be able to withstand the static and dynamic loads that will be applied to the liner system.

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

9. 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 El Centro, Blythe, and Hayfield, California and Yuma, Arizona. The average value shall be taken from these four reporting stations.

10. The heap leach processing area shall be diked, and containment basins (or an equivalent storage facility) shall be provided to contain 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 a flow in excess of existing basin storage capacity. The additional storm storage capacity shall be provided before the new processing configuration is started.

11. The impoundment area dikes and containment basins shall provide at least two feet of freeboard above the storage volumes required in Discharge Specification No. 10 above. Transport ditches at the downgradient perimeter of the process area shall include at least two feet of freeboard for flows during a 100-year storm frequency and the ditch capacity with freeboard shall have an area capable of transporting runoff from the maximum probable one-hour storm.

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

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

14. 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 stream flows or cause accelerated streambank erosion.

15. Prior to removal of leach ore residue from an impervious pad, for disposal, the cyanide contained therein shall be neutralized as described in Discharge Specification No. 19, below.

16. Ore residue may be abandoned on a pad, provided the cyanide in the ore is neutralized as described in Discharge Specification No. 19, below.

17. All industrial waste materials not covered by said Article 7, Subchapter 15 shall be discharged at a Regional Board-approved waste

management unit. Any hazardous waste containers shall be rendered unusable prior to final disposal.

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

19. 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 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 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 5 mg/l free cyanide (CN-) in the filtrate.

        2. None of the samples shall contain more than 10 mg/l free cyanide (CN-) in the filtrate.

    e. For any sampling location that indicates a free cyanide level in excess of 10 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. 19 (d) 1 and 2, above.

20. 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.

21. The discharger shall maintain the monitoring system approved by the Executive Officer in writing, including ground water wells, vadose zone monitoring systems, and hydrostatic pressure sensors.

22. Specific locations of satellite leaching areas which are not within existing northern leach pad area or Section 16, shall be subject to review and approval by the Executive Officer.

23. At least 60 days[1] prior to commencement of construction of each component 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.

24. At least 10 days prior to commencement of operations, the discharger shall submit to the Regional Board 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.

25. 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 evaluation of construction and inspection procedures utilized by the discharger for liner installation.

26. Prior to any significant modifications in this facility which could result in material change in the 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.

27. The discharger shall submit to the Regional Board, at least 30 days prior to commencement of the herein stated 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 site upon abandonment of facilities, in a manner that will not adversely affect water quality. If the discharger presumes that the expanded operations should not require significant change in the amount of funds previously set aside, the discharger may submit a letter for the Regional Board Executive Officer's consideration, stating that a change is not warranted.

28. The discharger shall install devices in each new ore pile to measure solution depth (hydraulic head) above the liner.

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

29. The discharger shall install a device for testing the leak detection system of each double-lined containment basin. Said testing shall be subject to approval by the Executive Officer.

B. Provisions

1. The discharger shall comply with "Monitoring and Reporting Program No. 89-034" and future revisions thereto, as specified by the Executive Officer.

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

IT IS FURTHER ORDERED that Board Order No. 87-44 be superseded by this Order.

I, Phil Gruenberg, 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 May 17, 1989.

Philip A Gruenberg
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

ATTACHMENT A TO ORDER NO. 89-034

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 solubilized. 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;

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/1)

2) Reagents necessary to perform cyanide analysis as described in narrative above.

Procedure:

Weigh out, to nearest 0.01 g, 100±1 g of samples as received. Place in glass funnel, either glass wool plugged or with filter paper. Add 50.00 ml of 2.5 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 of the solids, add an additional 50ml 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. The sample is then read directly by either titrametric (412C) or the ion selective probe (412E) and the results reported in mg/l (CN-).

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

MONITORING AND REPORTING PROGRAM NO. 89-034
FOR
GOLD FIELDS OPERATING CO. - MESQUITE
Northeast of Glamis - Imperial County

Location of Discharge: Sections 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19 & 20, T13S, R19E, SBB&M

MONITORING

Gold Fields Operating Co. - 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. The amount of liquid collected in each seepage detection sump and the period of time since the last evacuation.

D. Analysis for free cyanide and total cyanide in ground water from each ground water monitoring well, and 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 Regional 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. The discharger shall submit quarterly reports showing present and planned drainage parameters. These drainage parameters shall show compliance with Discharge Specifications A-9 and A-10 of this Board Order.

D. 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. 19, and shall request a Regional Board staff inspection to approve the proposed discharge or cleanup procedure.

E. 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. 89-034.

Quarterly reports shall be submitted to the Regional Board by January 15, April 15, July 15 and October 15 of each year. 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. Phone No. (619) 346-7491. Copies of the report 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: Philip A. Gruenberg
Executive Officer

May 17, 1989
Date

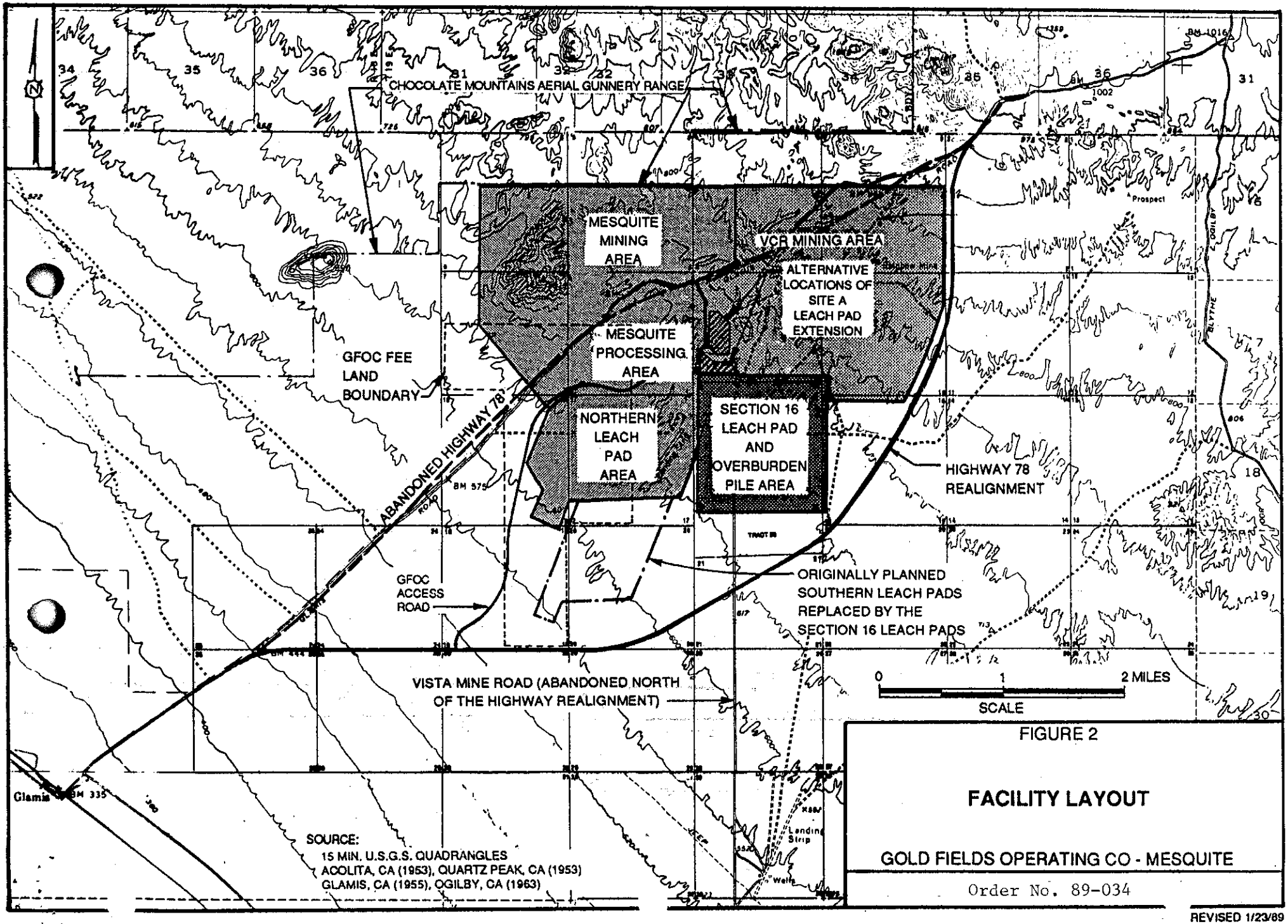

FIGURE 2

FACILITY LAYOUT

GOLD FIELDS OPERATING CO - MESQUITE

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REVISED 1/23/89

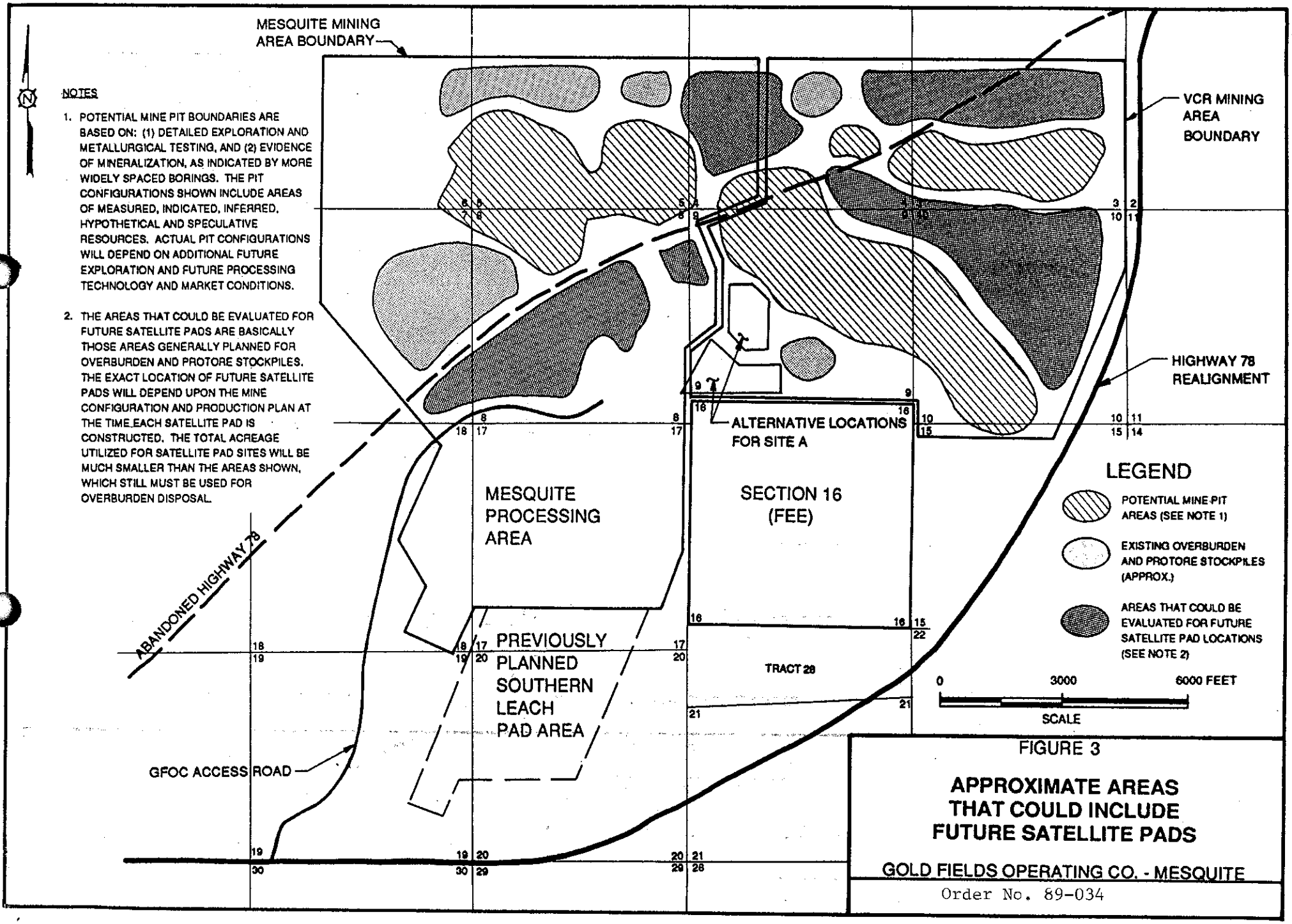

FIGURE 3

APPROXIMATE AREAS THAT COULD INCLUDE FUTURE SATELLITE PADS

GOLD FIELDS OPERATING CO. - MESQUITE

Order No. 89-034

REVISED 4/27/89