(3680) 6000 0067

TWIN CREEKS MINE

Presentation to
Reno High School Students

December 3, 1996

Twin Creeks Mine
Santa Fe Pacific Gold

History - Chimney Creek Mine

■ Discovered Gold	Dec 1984
■ Started Construction	Jun 1986
■ Started Pre-Stripping	Apr 1987
■ First Gold Pour	Nov 1987
■ Upsized Mining Fleet	Dec 1988
■ Produced 1 Million Oz	Apr 1992

Twin Creeks Mine
Santa Fe Pacific Gold

History - Rabbit Creek Mine

■ Discovered Gold	Jun 1987
■ Started Construction	Mar 1989
■ Started Pre-Stripping	Mar 1989
■ First Gold Pour	Aug 1990
■ Expanded Mining Fleet	May 1991
■ Expanded Mill to 3000 tpd	Nov 1991

Twin Creeks Mine
Santa Fe Pacific Gold

History - Twin Creeks

■ Asset Exchange	Jun 1993
■ 7-Day Mining Schedule	Apr 1994
■ Commissioned DISPATCH	May 1994
■ Sulfide Expansion Approved	Oct 1994
■ Mega Pit Slide	Dec 1994
■ Expanded Mining Fleet	Mar 1995
■ Start Construction - Sage Mill	May 1995
■ Phase 1 Completion (Projected)	Jan 1997

Twin Creeks Mine
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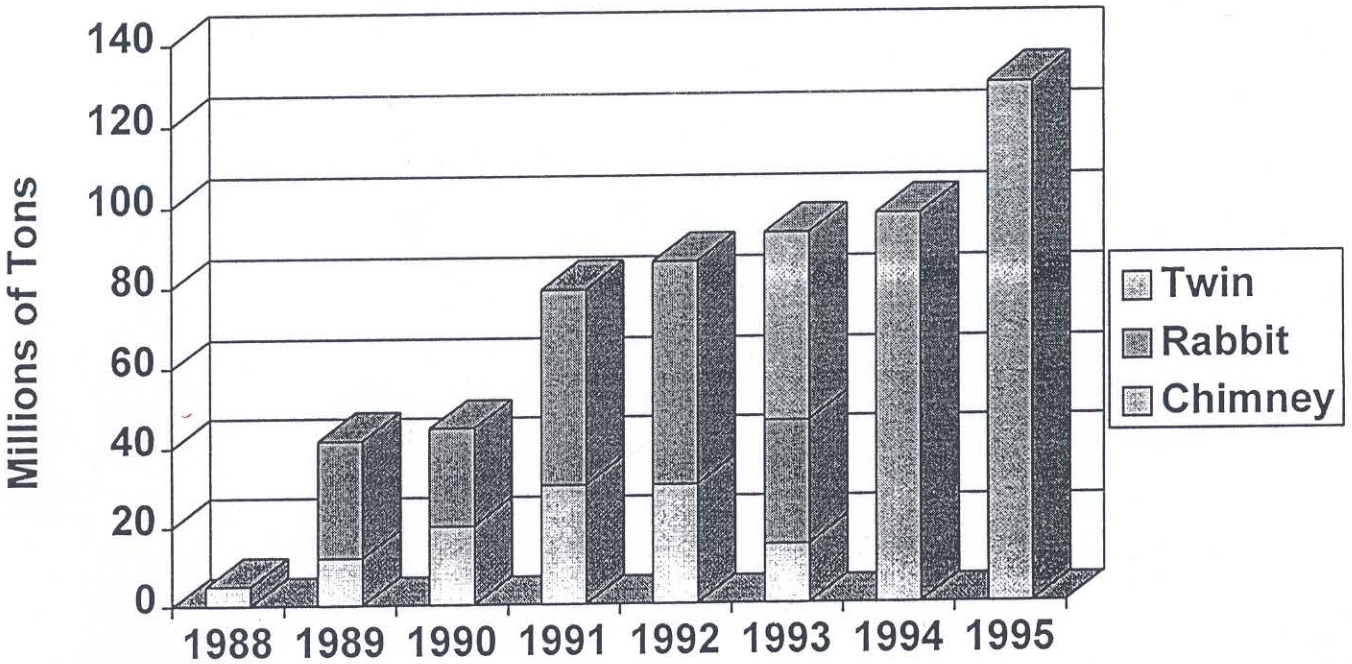
Total Tons Mined



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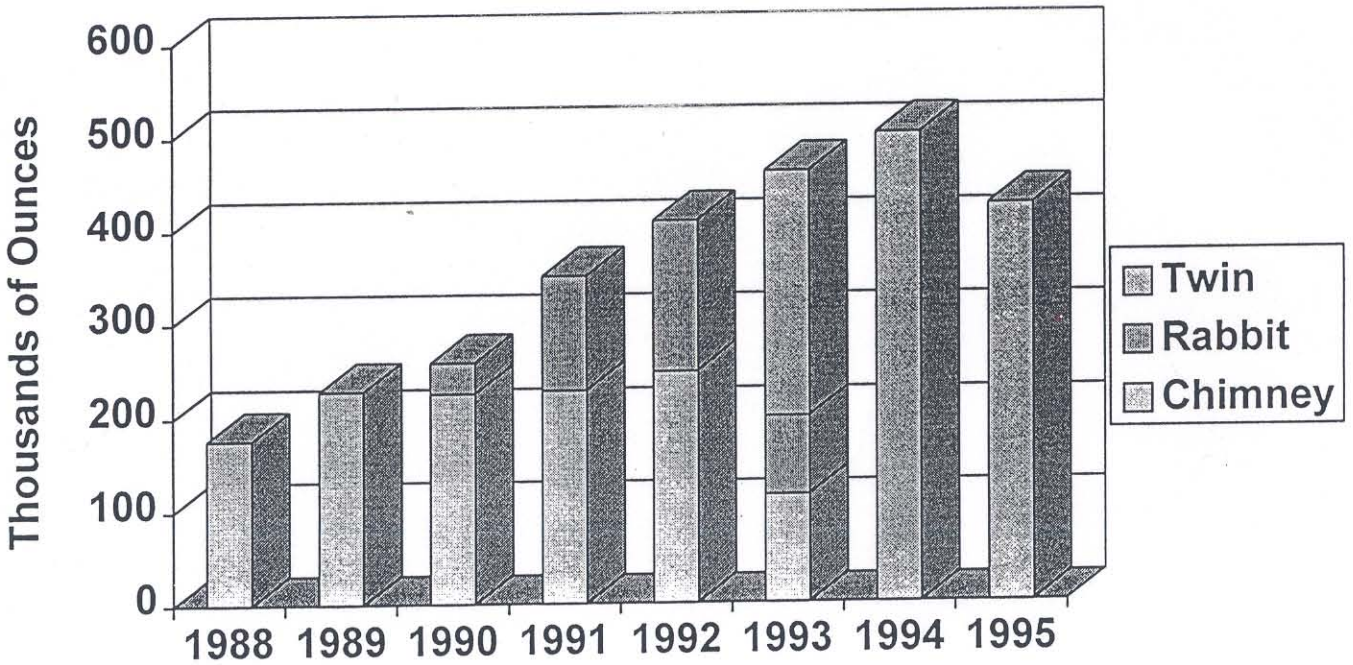
Ounces Gold Produced



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Deposit Geology

- Carlin-type deposit - finely disseminated gold
- Oxide and sulfide gold mineralization
- Host rocks - interbedded sedimentary and igneous rocks
- Complex structural geology
- 0-600 ft. Alluvium cover

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Ore Reserves - December 31, 1995

	Cutoff Grade	Tons (000's)	Grade (oz/ton)	Ounces (000's)
Heap Leach	0.008	70,206	0.021	1,508
Oxide Mill Ore	0.050	21,965	0.091	1,993
Sulfide Mill Ore	0.065	57,973	0.120	6,965
Total Ore		150,144	0.070	10,466

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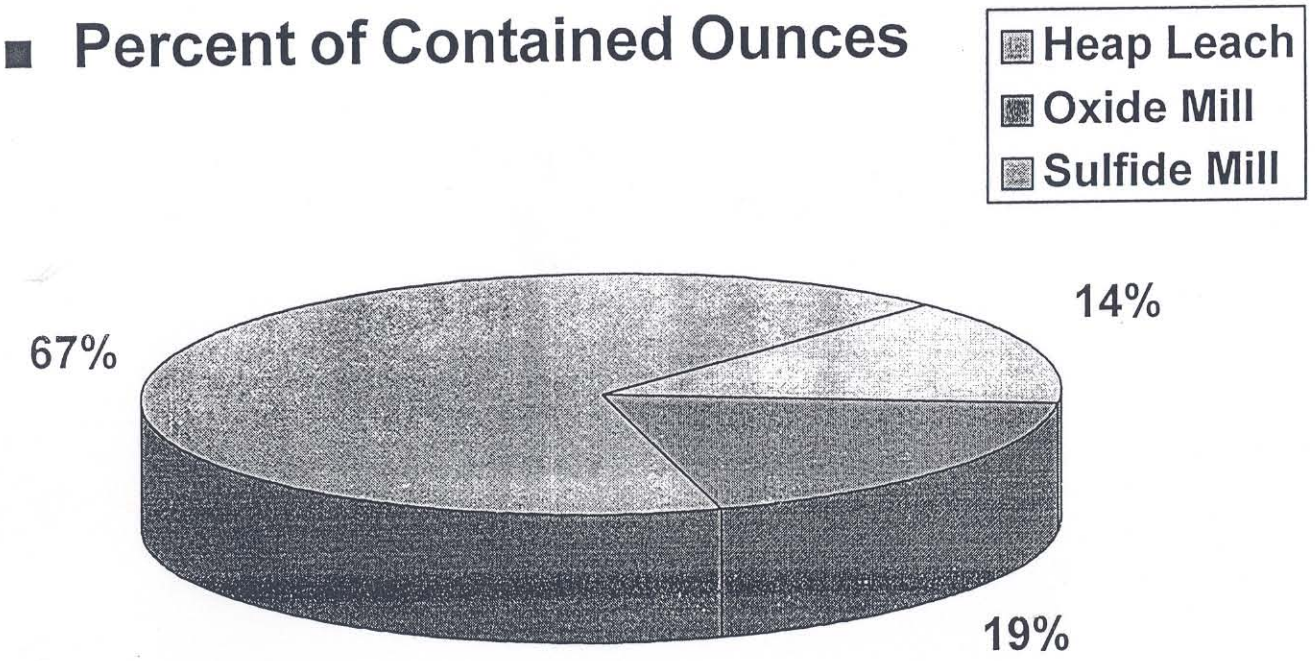
Proportion of Ore Types

- Percent of Contained Ounces



Twin Creeks Mine
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Current Employees

Mine Department	705
Plant Department	172
Administration	53
Total	930

Twin Creeks Mine
Santa Fe Pacific Gold

1995 Production

■ Total Material Mined	130 million tons
■ Avg Daily Rate	366,000 tpd
■ Stripping Ratio	5.4 to 1
■ Gold Produced	424,000 oz
■ Ore Mined	
• Heap Leach	17 million tons @ 0.02 oz/ton
• Oxide Mill	2.6 million tons @ 0.087 oz/ton
• Sulfide Mill	0.6 million tons @ 0.071 oz/ton

Twin Creeks Mine
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Sulfide Expansion

- **Total Capital Cost - $250 Million**
- **Expand Mining Equipment Fleet**
- **Increase Mining Rate by 25%**
- **Sage Mill Construction**
  - **Phase 1 (4000 tpd) complete by January 1997**
  - **Phase 2 (8000 tpd) complete by January 1998**
- **EIS in progress**
- **Ore Blending Requirements**

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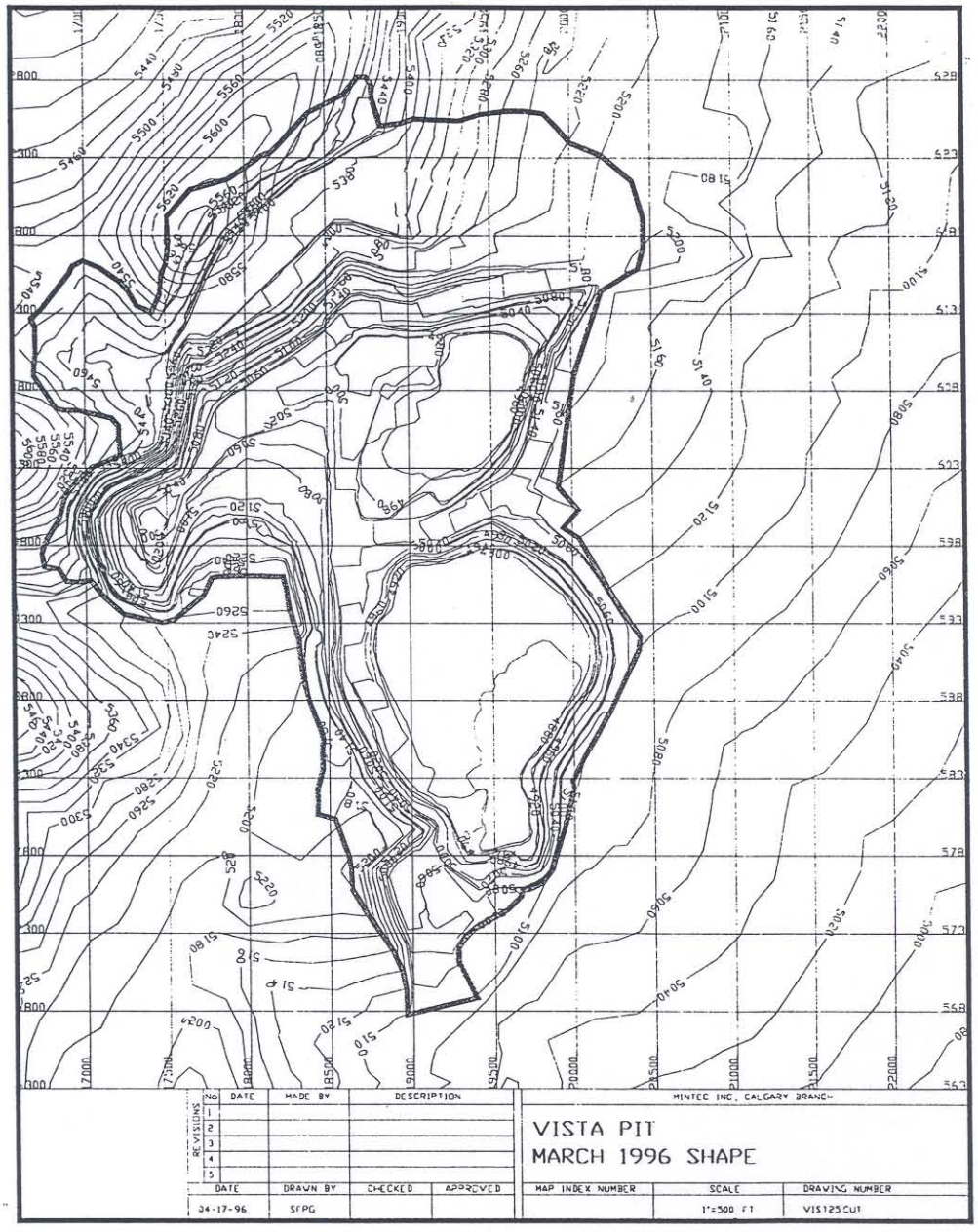
Vista Pit - Current



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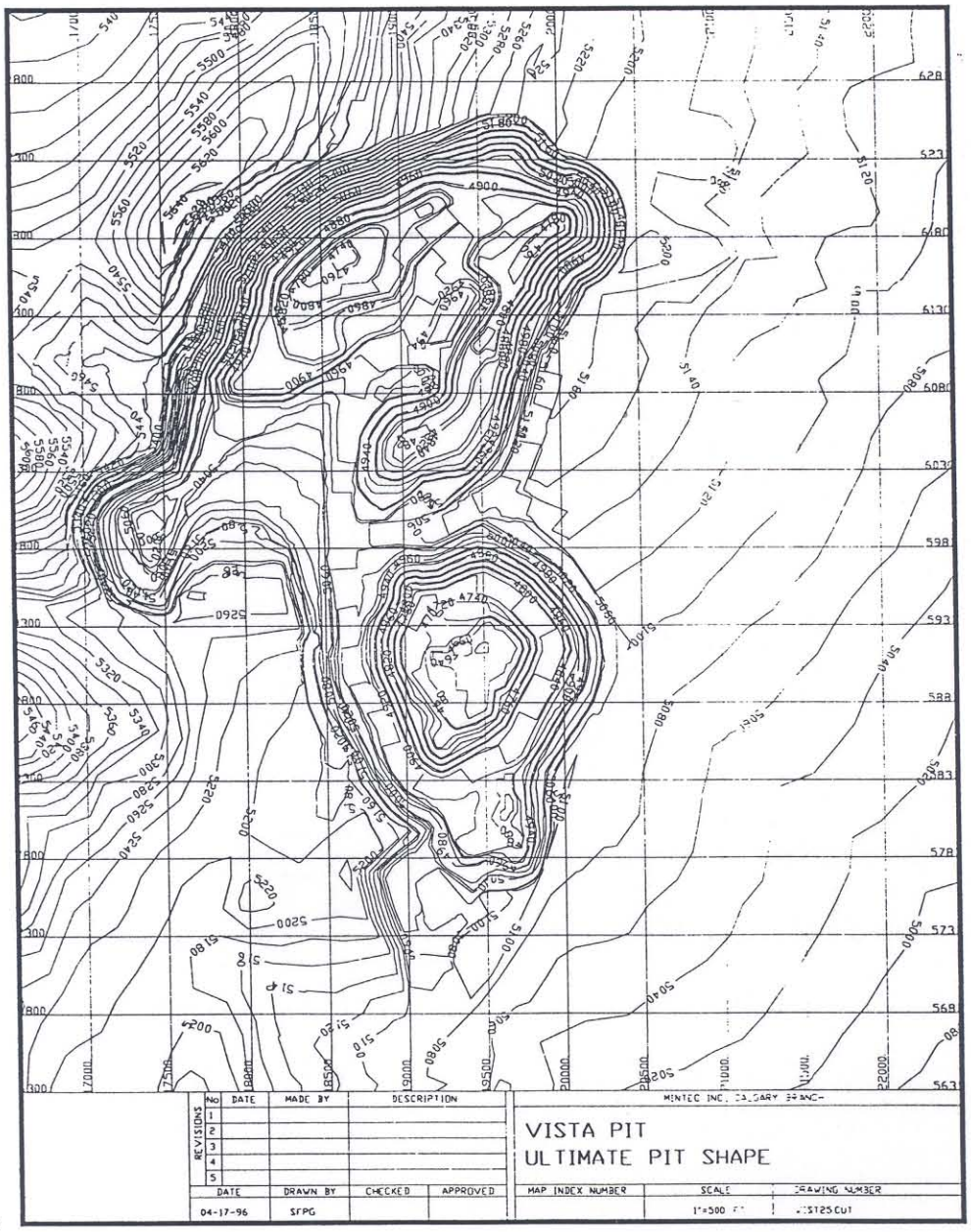
Vista Pit - Ultimate



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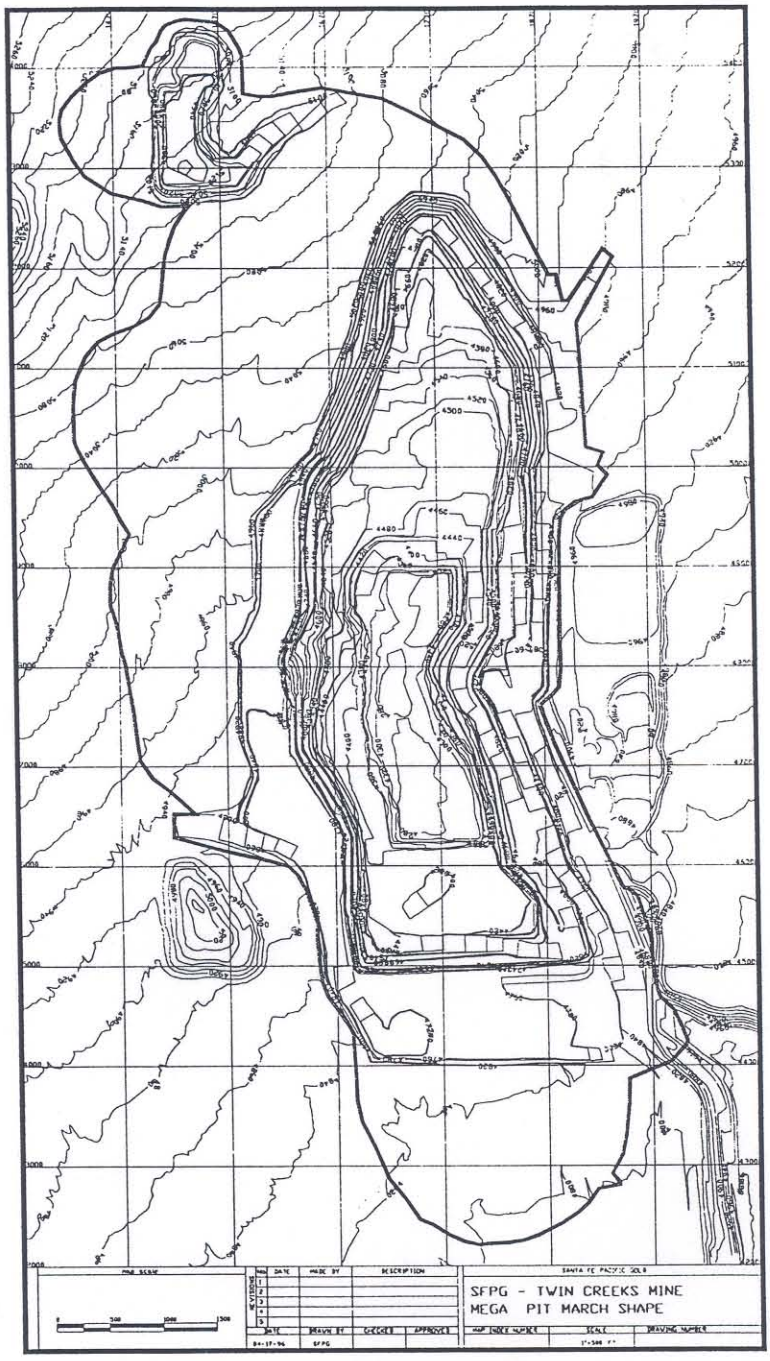
Mega Pit - Current



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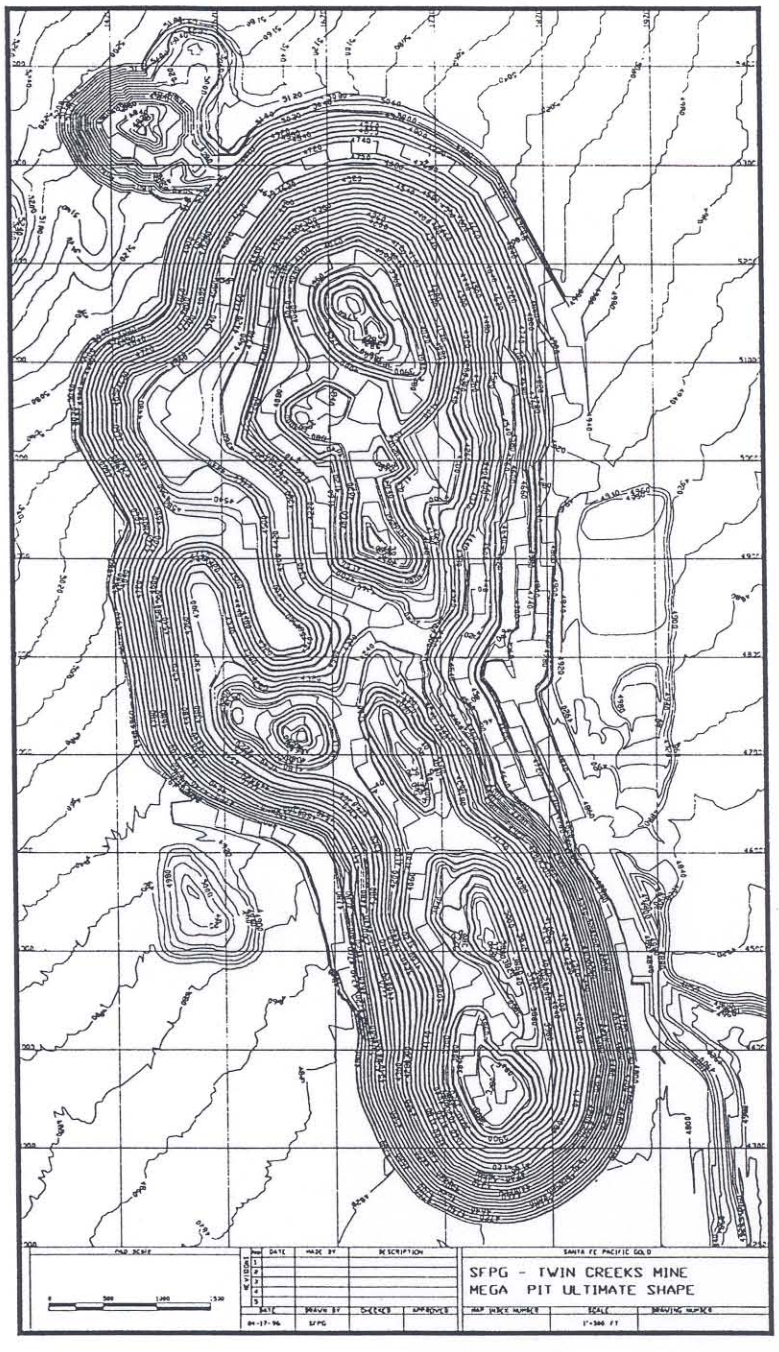
Mega Pit - Ultimate



Twin Creeks Mine
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Dewatering

- Current Pumping Rate - 5,000 gal/min
- Ultimate Pumping Rate - 12,000 gal/min
- Vertical Wells
- Horizontal Drains
- Water Treatment
- Re-Infiltration

Twin Creeks Mine
Santa Fe Pacific Gold

Mine Planning and Design

- **Pit Optimization - Lerchs-Grossman Algorithm**
  - Results Superior to Floating Cone
  - Use Reblocking for Speed
  - Variable Slope Angles
  - Questions With Mining/Dewatering Costs
- **Pit Design**
- **Mine Scheduling**
  - Schedule by Type of Excavator
  - Complex Processing/Blending Requirements

Twin Creeks Mine
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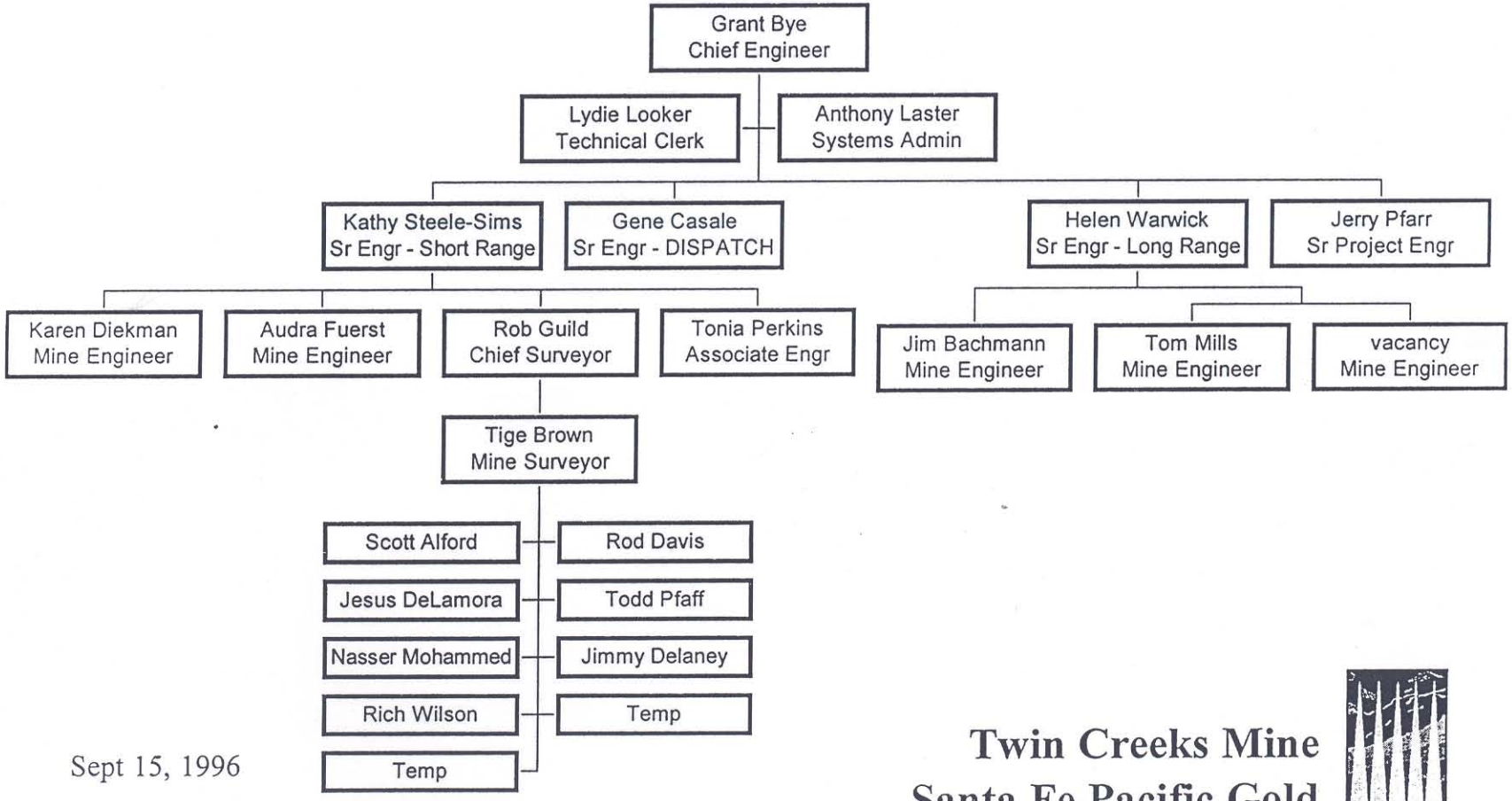
Mine Engineering Organization



Sept 15, 1996

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Santa Fe Pacific Gold

Outlook

- Begin Processing Sulfide Ore in 1997
- Increase Productivity & Efficiency
- Replace Current Reserves through:
  - Development Drilling
  - Alternate Sulfide Processing Technologies
    - Flotation Upgrading
    - Bioleaching
- Drilling Potential Underground Targets

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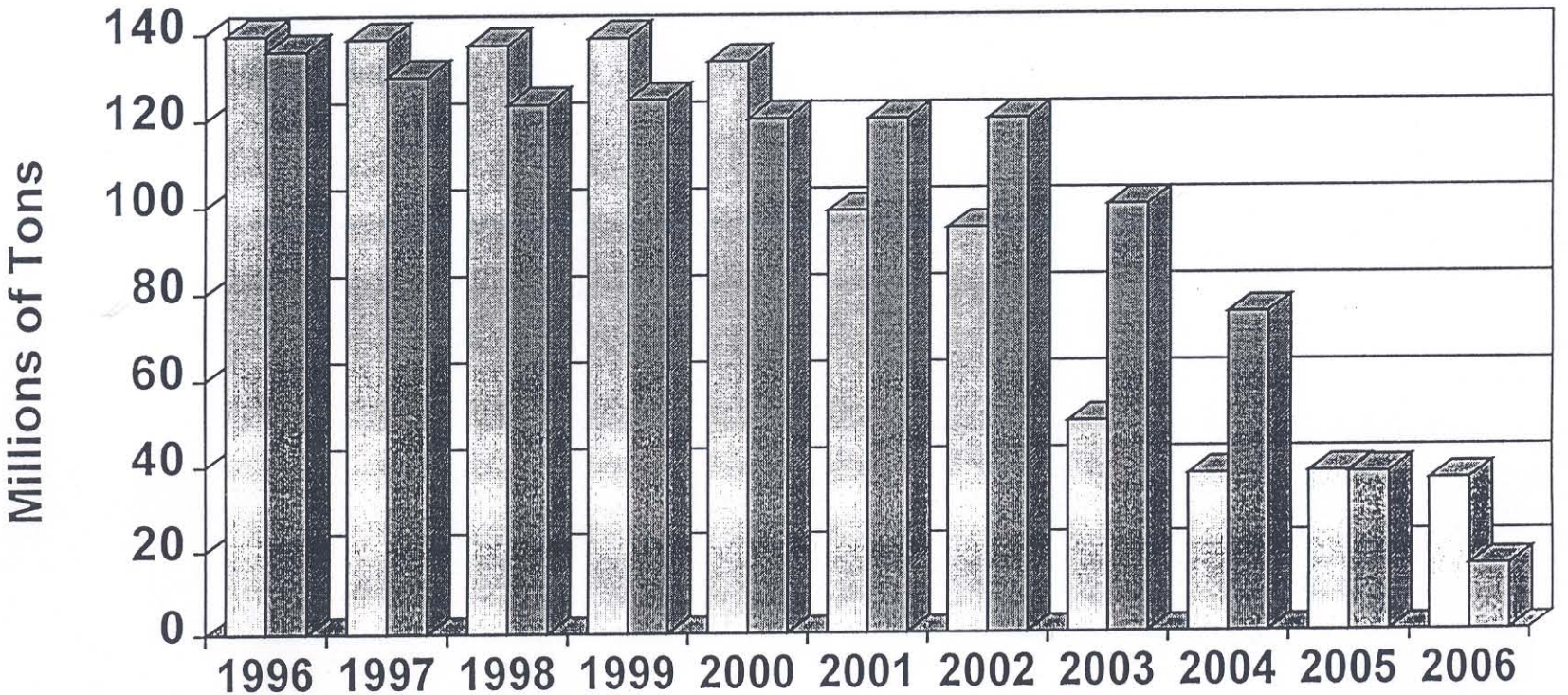
Total Tons Mined



Twin Creeks Mine
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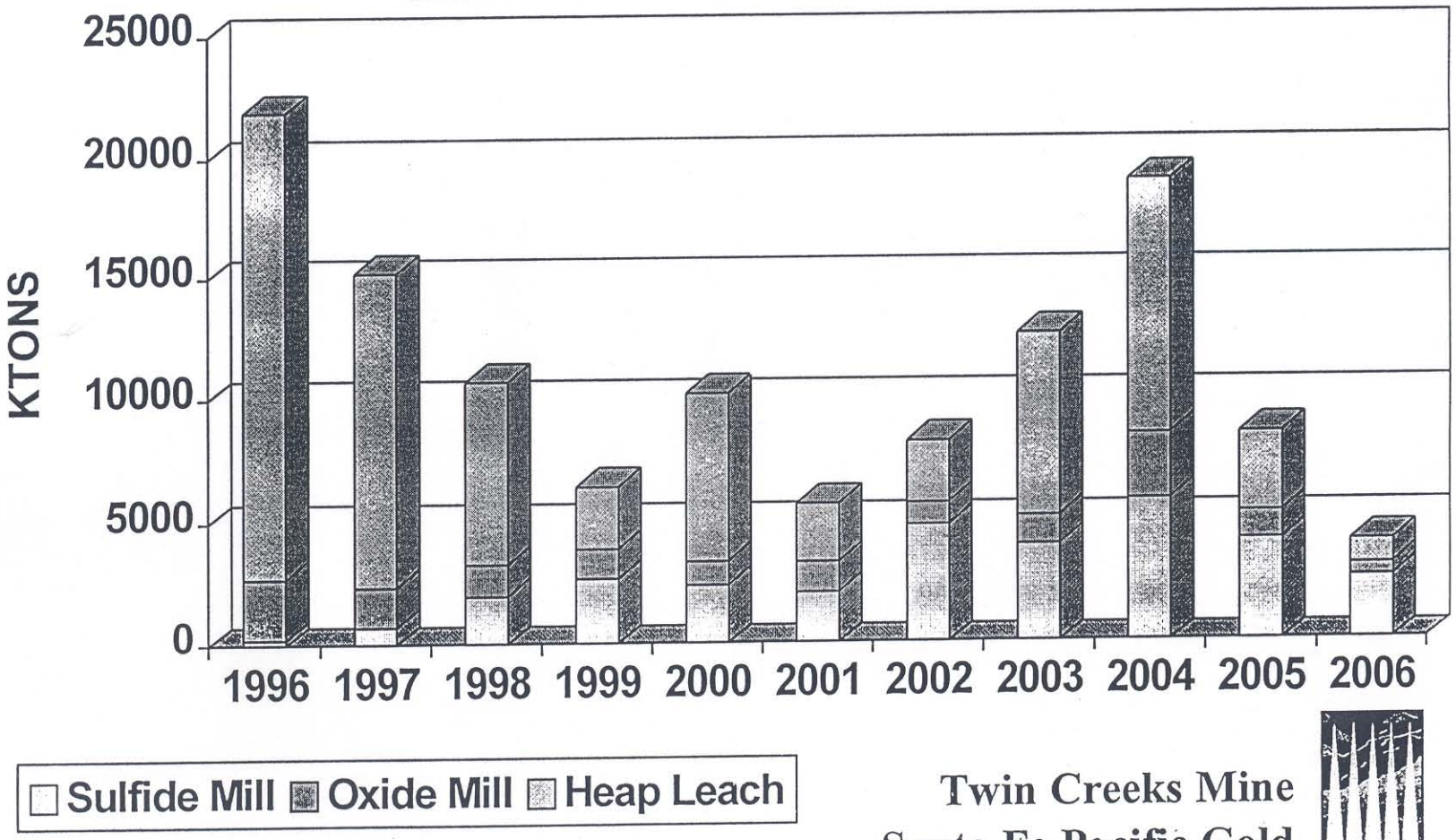
Annual Ore Production



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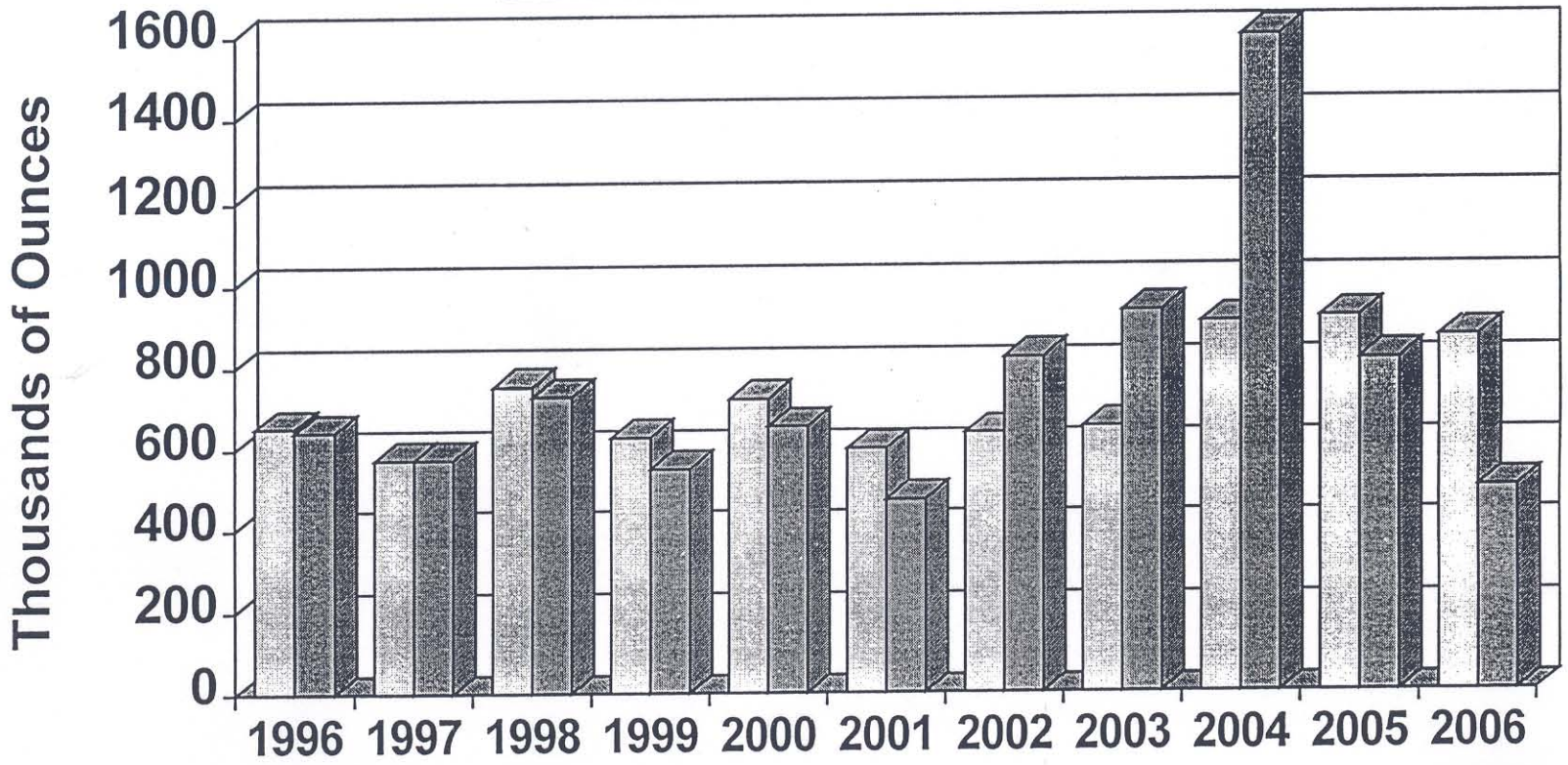
Gold Ounces Mined



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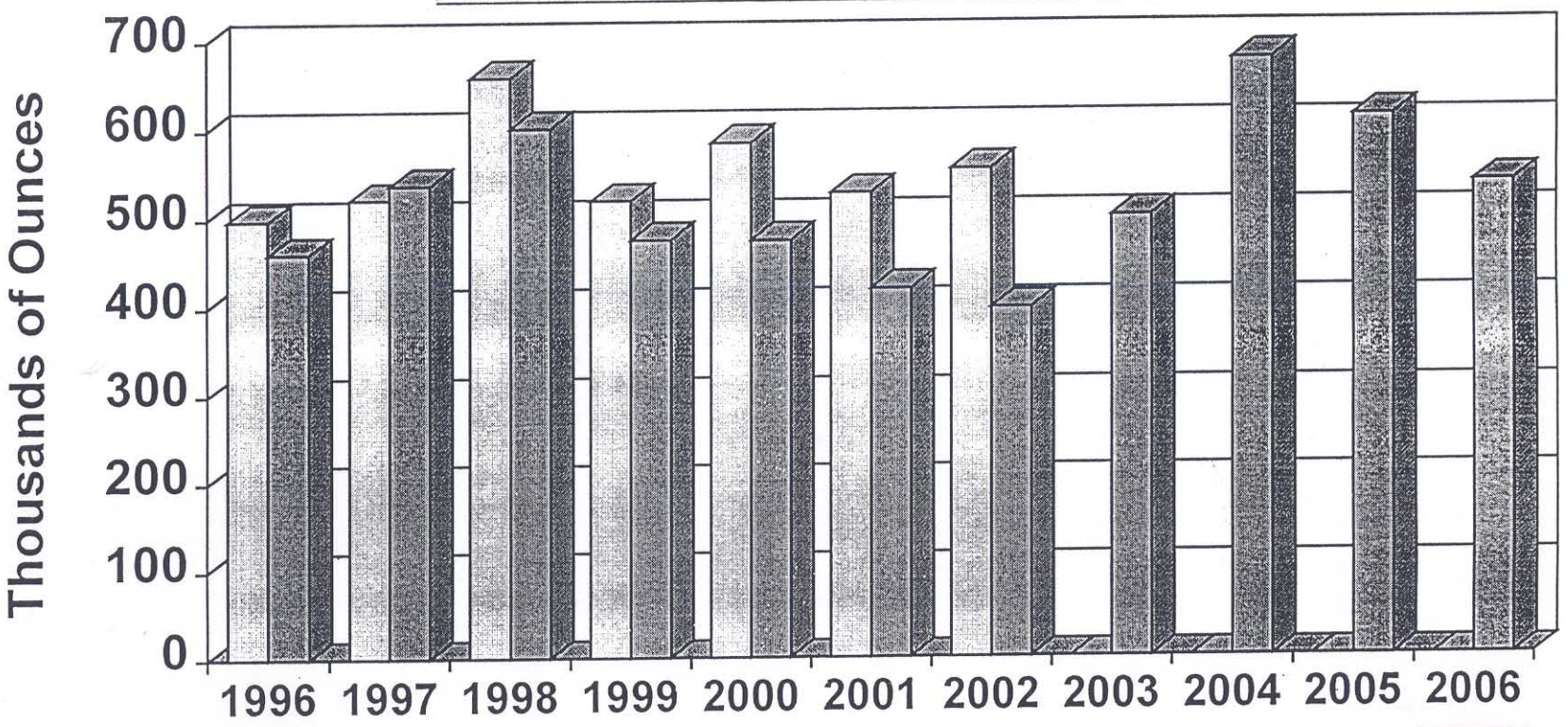
Annual Gold Production



Twin Creeks Mine
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SANTA FE PACIFIC GOLD
TWIN CREEKS MINE

Introduction

Santa Fe Pacific Gold owns and operates three gold mines (Lone Tree, Mesquite, and Twin Creeks) in the United States. Twin Creeks is the largest of the three and is the third largest primary gold mine in North America. The operation covers an area approximately 7 miles long and 3 miles wide. Twin Creeks is located about 35 air miles northeast of Winnemucca, Nevada in the Getchell mining district along the eastern flank of the Osgood Mountains. Other operating mines in the district are the Getchell Mine, operated by First Miss Gold, and the Pinson Mine, operated by Pinson Mining Company. Twin Creeks was formed in mid-1993, through the combination of the Chimney Creek Mine and Rabbit Creek Mine into a single operation. This combination was part of a coal for gold exchange of assets between Santa Fe Pacific Gold, the owner of Rabbit Creek, and Hansen Natural Resources, the owner of Chimney Creek. In this cashless transaction, Hansen traded Chimney Creek as well as the Mesquite Mine in California and several development projects to Santa Fe in exchange for the Lee Ranch Coal Mine in New Mexico. Both operations were developed largely on a checkerboard pattern due to land ownership prior to the asset exchange The northern part of the operation, including Vista Pit, Juniper Mill, tailings impoundment, and 4 heap leach pads, was previously known as the Chimney Creek Mine. The southern half of the operation, including Mega Pit, the Pinon Mill and tailings impoundment, and a single large heap leach pad was previously known as the Rabbit Creek Mine.

History - Chimney Creek Mine

Gold was originally discovered in outcrop at the Chimney Creek Mine by Gold Fields Mining Company in late 1984. Followup drilling showed there was a whole mountain of mineralization, much of it being relatively high grade (> 0.20) opt., near the surface, and with a low stripping ratio. Mine development, including the construction of a 2,200 ton per day oxide mill and heap leaching facility, began in June 1986. The first gold was produced in November 1987. Ownership of Gold Fields Mining Company, including Chimney Creek, changed to Hansen Natural Resources as a result of a takeover in July 1989. The Chimney Creek Mine produced the millionth ounce of gold in April 1992.

History - Rabbit Creek

Santa Fe began exploration at the Rabbit Creek Mine in 1986 and discovered ore grade mineralization from drilling in 1987. The development of Rabbit Creek, including construction of an oxide mill and heap leach facilities, began in 1989 and the first gold was poured 18 months later in August 1990. The time period between discovery to gold production was about 3 years.

History - Twin Creeks

Both mines operated separately until the asset exchange in 1993. The combination of these operations made it economically feasible to develop the large sulfide resource underlying the oxidized portion of the Twin Creeks deposits. The $250 million dollar sulfide expansion was approved in October 1994. Phase I (4,000 ton per day) construction of a pressure oxidation

plant to treat sulfide ore has been underway since mid-1995 and will be completed in December 1996. Phase II will be completed approximately 12 months later.
The Environmental Impact Study covering the effects of the sulfide expansion is underway and also expected to be completed by the end of 1996.

With the expansion of Chimney Creek, Rabbit Creek, and now Twin Creeks, the scale of the operation has grown dramatically since 1988. Three major increases in mining rate have occurred: 1) in 1989, Rabbit Creek started prestripping material and Chimney Creek upsized their mining fleet, 2) in 1991, Chimney Creek expanded the mining fleet for the South Pit expansion and Rabbit Creek completed the Phase 2 expansion of the mining fleet and oxide mill, and 3) in 1995, Twin Creeks expanded the mining fleet to begin the sulfide expansion. The total material mined in 1996 will be about 136 million tons. The peak rate for the remaining life of the operation is planned at 120-130 million tons per year, which will be sustained at least through the year 2000 with present reserves.

Deposit Geology

The deposit at Twin Creeks is similar to many other gold deposits in north-central Nevada and is considered a classic sediment hosted "Carlin-type" deposit. Although visible gold has been found in a few localized areas, generally the gold occurs as very fine particles and is well disseminated throughout the rock. The host rocks for the deposit include both sedimentary rocks, such as shales, siltstones, and limestones interbedded with igneous lava flows, tuffs, cherts, and intrusive sills. The gold is concentrated within favorable stratigraphic units and particularly in areas that have been intensely structurally prepared. Much of the deposit is covered by alluvial overburden, which is not mineralized and can be up to 600 feet thick.

Generalized Stratigraphy

The stratigraphic units hosting the gold deposits at Twin Creeks have been broken down into 3 major units. These include the Etchart limestone, which overlies the Leviathan greenstone rocks. Where these units have not been eroded away, they have been thrust over early Ordovician age rocks, which are a mixture of interlayered shales and basalt flows. The majority of mineralization occurs in both the Etchart limestones and in the Ordovician sediments, and lesser mineralization in the Leviathan unit. With the exception of the limestone and unaltered basalt flow units, most of the rocks in the district that have been mineralized or are near mineralization have been heavily altered and rock strengths therefore are generally low. The bulk of the known mineralization in Mega Pit is hosted along a complexly folded and faulted anticline, that strikes roughly north-south, and has a known strike length of about 3 miles. In the southern part of Mega Pit the Leviathan rocks were eroded off, exposing the Ordovician rocks. The fold is broken and overthrust along the upper axial plane to the south and becomes more flat and recumbent in the central part of the deposit. Further north, the anticline is more open, forming a Z-shaped chevron. A series of pre-mineral northeast trending faults intersect the anticline and appear to have been the feeders for the mineralizing fluids. The highest grade ore is often found where these faults cut across favorable beds in the hinge zone of the fold.

Ore Reserves

The following table summarizes the ore reserves at Twin Creeks as of December 31, 1995. These reserves are based on a gold price of $400 per ounce. Over 90% of the reserves are located in Mega Pit. The existing reserves in Vista Pit will be mined out within the next 2 years. The reserves at Twin Creeks have almost doubled in the 2.5 years since the asset exchange and presently comprise about 58% of the gold reserves within Santa Fe Pacific Gold. Approximately two-thirds of the total 10.4 million ounces of remaining reserves at Twin Creeks are contained in sulfide ores. The combination of the Chimney Creek and Rabbit Creek operations into Twin Creeks has been very important to expanding the ore reserves and therefore extending the life of the operation.

Reserves (as of 12/31/95):

	Tons (1,000's)	Grade (opt)	Ounces
Oxide Mill Ore	21,966	0.091	1,994
ROM Leach Ore	70,206	0.022	1,507
Refractory Mill Ore	57,972	0.120	6,966
Total Ore Tons	150,144	0.070	10,467

Total Waste Tons	984,729	Waste to Ore Ratio	6.6:1
Total Tons	1,134,873	Tons per Recovered Oz	126.3

Drilling is completed on 100 ft centers or 100 by 200 foot centers. There has been a total of 4,553 holes drilled which equates to approximately 2.8 million feet of drilling. Approximately 40% of the drilling is core. The 1995 development drilling program delineated approximately 1 million ounces of gold at a finding cost of $5.99/ounce. The $3.2 million development drilling program for 1996 is targeted for additional extension towards the south (Section 30), Vista area sulfides, and two underground targets.

Current Personnel

There are over 900 employees at Twin Creeks today. An additional 50 employees to will be hired in 1996 to operate and maintain the Sage Mill. Approximately 80%, of Twin Creeks employees live in Winnemucca. The majority of the rest live in Golconda and Battle Mountain. The mine provides transportation to all employees from each of these areas.

Mine Operations Group

	Hourly	Salary	Total
Dewatering	14	4	18
Engineering	0	24	24
Geology	0	17	17
Maintenance	185	33	218
Production	400	28	428
Total	599	106	705

Dewatering

The operation is currently pumping around 6,200 gpm from wells that range in production capacities of a few gallons per minute to a couple of thousand gallons per minute. All water is treated to meet required water quality standards prior to use and/or discharge. Water pumped and not consumed by the operation is either released into Rabbit Creek or reinfiltrated utilizing rapid infiltration basins.

Mine Operations

The operation is presently mining from two pits using conventional open pit mining techniques. Mine production crews operate on two 12-hour shifts daily, 7 days per week. Maintenance, Engineering, Geology, and Dewatering support is provided for this schedule with those groups working schedules of 8, 10, and 12 hours per day. Current production rates are nominally 360,000 - 380,000 tons daily. Benches range in height from 20 feet in ore areas to 50 feet in alluvium overburden. The operation uses a computerized truck dispatching system to assist in optimizing overall production. The DISPATCH program utilizes linear programming techniques to optimize scheduling of haul trucks in the mine. Each truck and loading unit is equipped with a field computer system which transmits relevant information to the control tower. The system allows one supervisor (DISPATCH operator) to monitor the activities in all three pits and make adjustments as required. Several statistical reports are available in the data collection and reporting areas of the DISPATCH system (tons mined and hauled by equipment and area, equipment operating and downtimes, equipment availabilities, cycle times, etc,) and used by the Engineering, Maintenance, and Production Departments to monitor an improve operating efficiencies.

Mining Equipment

The following table summarizes the major mining equipment currently operating at Twin Creeks. Since the asset exchange, efforts have been made to standardize the fleets. As equipment is replaced, we will continue to reduce the number of equipment types in the fleet, in order to simplify operator and maintenance training and reduce the variety of parts in inventory.

Equipment Fleet	Manufacturer	Capacity	Quantity	Hours (06/23/96)
Electric Shovels	P&H 4100	56 cuyd bucket	1	9,826
	P&H 2800	41 cuyd bucket	1	29,779
	P&H 2300	27 cuyd bucket	1	57,264
Hydraulic Shovels	Hitachi EX3500	23 cuyd bucket	1	26,148
	Hitachi EX3500	23 cuyd bucket	1	16,615
	Caterpillar 5230	22 cuyd bucket	1 (FS)	9,602
	Caterpillar 5230	19 cuyd bucket	1 (ME)	NA
Front End Loaders	Caterpillar 994	23 cuyd bucket	1	9,293
	LeTourneau L1100	20 cuyd bucket	1	17,294
Haul Trucks	Caterpillar 793	240 ton class	18	8,500 - 10,200
	Caterpillar 789	190 ton class	13	12,500 - 24,000
	Titan T-2190	190 ton class	12	23,200 - 26,600

Equipment Fleet	Manufacturer	Capacity	Quantity	Hours (06/23/96)
Drills	Driltech D40K	40,000 lbs	8	20,300 - 38,200
	Driltech SP400	40,000 lbs	1	25,000
	IR DMM2	75,000 lbs	1	7,000
Track Dozers	Komatsu D375A-2	525 HP	2	22,000 - 25,700
	Caterpillar D10N	520 HP	3	9,400 - 18,200
	Caterpillar D9L	460 HP	2	25,000
	Caterpillar D9N	370 HP	2	21,700 - 25,800
Rubber Tire Dozers	Tiger 690B	690 HP	1	10,100
	Komatsu WD600	454 HP	2	22,000 - 28,000
	Caterpillar 834	450 HP	4	8,200 - 25,900
Motor Graders	Caterpillar 16G	275 HP	6	9,300 - 28,000
	Caterpillar 14G	200 HP	1	27,400
Water Trucks	Dresser 170D	30,000 gallon	2	35,800 - 39,000
	Dresser 85D	16,000 gallon	5	18,200 - 31,300
	Caterpillar 621	7,000 gallon	1	11,000

1995 Production

During 1995 record mining rates were achieved as a result of the new larger equipment added for the sulfide expansion. The total material mined increased to 130 million tons, up 30% from 1994. This is an average mining rate of 366,000 tons per day, although the record for a single days production was 504,000 tons. Gold production was almost 425,000 ounces for the year, all recovered from oxide ore. The sulfide ore is being stockpiled until the sulfide mill is completed.

Outlook

Mining activities will continue for at least another 10 years, and processing for several years beyond that. Over a billion tons of material remain to be mined in order to recover the current reserves. We expect to continue to replace reserves that are depleted by production over the next few years through continuing exploration and development drilling and potentially by finding ways to economically recover gold from the mineralized material within the pit that is currently below our sulfide mill cutoff of 0.065 ounces per ton. We are currently investigating flotation and bioleaching as potential options for treating lower grade sulfide ores. We are also looking for gains in the productivity and efficiency of our operation, both through better coordination and planning, and through continuing improvement in technology. We are currently using the global positioning system (GPS) for surveying and ultimately hope to use it for tracking equipment locations and for providing ore control zone boundaries for the loading units. Finally, we are actively investigating potential underground deposits, with the idea that, if found, an underground operation would ideally be developed and mined during the life of open pit operation, in order to minimize incremental overhead costs and maximize the net present value of the operation to the shareholders.