

0410 0090



Minerex Resources Inc.
PO Box 10075
Reno, NV 89510-0075
Tel & Fax: (702) 851-4265

DWB _____

SCB _____

WDL _____

DMAP _____

NEVADA GOLDFIELDS CORPORATION



File CT 10.15.1.1.5

EXPLORATION POTENTIAL AT AURORA, NEVADA

Received Jan 12, 1989
from Alon Ball, V.P. NGF
Kevin Schully, VP Expl., NGF
Richard Stetson, Ex V.P., Continuum
JC

K. Schultz
January 5, 1989

CONTENTS

	<u>Page</u>
1. SUMMARY	1
2. LOCATION AND REGIONAL GEOLOGY	2
3. GEOLOGY OF THE GOLD DEPOSITS	3
4. EXPLORATION AND GOLD RESERVES	3
4.1 Historical Production	3
4.2 Exploration and Reserves in the Borealis Group	3
4.3 Exploration and Reserves in the Aurora Group	4
5. FUTURE EXPLORATION POTENTIAL	5
 Appendix 1 Geology of the Aurora Mine	 7
Figure 1 Aurora District - Geology	
Figure 2 Property Map - Aurora District	

1. SUMMARY

Nevada Goldfields operates a 220 tonnes per day gold mine at Aurora, 35 kilometers southwest of Hawthorne, Nevada. The mine was commissioned in December 1987. The first year of operations produced in excess of 15,000 ounces of gold from 72,900 tonnes grading 7.8 grams per tonne (g/t). The operations comprise an open pit on the Prospectus ore zone and concurrent tunnel and drift development to access high grade underground ore shoots.

Ore reserves within the property controlled by Nevada Goldfields were assessed in June 1988 at 315,000 tonnes grading 8.69 grams per tonne gold.

The Prospectus is one of several gold ore deposits in the Aurora District (Figure 1). The deposits are generally aligned along a prominent northeast trend and are clustered in two principal centers, Aurora and Borealis. The total recorded gold inventory of the district, including past production is about two million ounces.

The Borealis group of deposits is owned by the Echo Bay Mining Company which currently produces approximately 50,000 ounces of gold per year by heap leaching ore from its Freedom Flats, East Ridge and Northeast Ridge open pits.

Mining rights on the Aurora group are fragmented between several companies (Figure 2). Under a leasing agreement, Nevada Goldfields has the right to mine reserves on the Prospectus, Ann Vein and Juniata and may exploit any ore discovered below a nominal "400 foot" level on the West Humboldt or on several other, smaller veins in the general vicinity including Last Chance. Minerex Resources Limited holds a sub-lease to mining rights on the entire East Humboldt and on the West Humboldt above the "400 foot" level. Centurion Gold Ltd. owns the mining rights which are leased by Nevada Goldfields; and a fourth party, Electra North West also holds mining rights in the area. Houston Oil & Minerals derive a 6% NSR royalty from claims covering part of the Humboldt deposit.

The ore deposits in the District may all be classified as structurally-controlled epithermal deposits, but they vary in style from high grade, narrow vein bonanzas to very low grade, bulk minable disseminated deposits.

The District has potential for further significant discoveries, and the operations of Echo Bay on the Borealis

group demonstrate the economic merit of maximizing the efficient utilization of established infrastructure. The East Ridge deposit is currently being mined at a grade of only 0.03 ounces per ton (1.0 grams per tonne) of gold.

By contrast, the fragmentation of mining rights on the Aurora group, high royalty payments and the inefficient utilization of infrastructure burden the task of economic exploitation of the potential shared by Nevada Goldfields, Centurion, Minerex and Electra North West.

This report discusses the exploration and development potential of the Aurora group of deposits and urges consolidation of mining rights by the establishment of a joint venture.

As the owner of the only CIP treatment plant in the District, Nevada Goldfields is in a position to improve efficiencies in the recovery of gold from the higher grade deposits in the area.

2. LOCATION AND REGIONAL GEOLOGY

The Aurora Mine is situated in the Bodie Hills region of Mineral County, Nevada approximately 35 kilometers southwest of the town of Hawthorne.

Metavolcanic and granitic rocks of Mesozoic age form the basement upon which several volcanic units of Tertiary through Quaternary age were deposited.

The oldest Tertiary rocks are flows and intrusions of latitic to andesitic composition. At Aurora these Lower Tertiary volcanics host the gold mineralization in fractured, veined and altered zones.

Progressively younger sequences of Tertiary volcanics unconformably overlie the Aurora intermediate volcanics. Rhyolitic flows and intrusions and associated tuffaceous rocks predominate at Aurora, but the sequences include interbedded and possibly intrusive andesites. At Borealis, Tertiary intermediate volcanics are down-faulted against basement granodiorite of Triassic age along a prominent northeasterly trend (Figure 1). This important trend, recognized also in a broad regional upwarp across the District, is reflected in the strike direction of most of the gold deposits.

A veneer of Quaternary mafic flows unconformably covers the Tertiary sequences between Aurora and Borealis. Recent valley fill alluvium also blankets much of the District.

3. GEOLOGY OF THE GOLD DEPOSITS

A recent report by A. C. Dorff, Nevada Goldfields' Regional Managing Geologist, gives details of the geology of the Aurora Mine (Appendix 1). The report comments on the relationships between several directions of faulting, barren quartz veining, alteration and gold mineralization.

The observations and conclusions are generally valid throughout the District and provide a model which may be used for exploration. Structural control is emphasized with prime targets being northeast-trending veins which are intersected by north to northwest-trending faults.

4. EXPLORATION AND GOLD RESERVES

4.1 Historical Production

Gold and silver mineralization was discovered at Aurora in 1860. Between 1862 and 1865, more than one million ounces of gold and similar quantities of silver were produced, mostly from bonanzas within 60 meters of the surface. The Last Chance deposit, for example, produced in excess of 300,000 ounces of gold from only about 100,000 tonnes of ore.

No
Incorrect
HMR

Unsuccessful attempts were made in the late 1800s to explore from deep shafts and extensive drifts.

In 1912 the Aurora Consolidated Mines Company developed about one million tons of ore, averaging 0.25 ounces per ton (8.5 grams per tonne) on the Humboldt deposit. A 500 tons per day mine operated from 1914 to 1918.

0.136
62/t

The District saw several limited exploration attempts and some small scale mining between the 1930s and 1980s.

The discovery of the Borealis deposit and its development by Tenneco Minerals Inc. in 1980 was a major stimulus for subsequent exploration in the District.

4.2 Exploration and Reserves in the Borealis Group

The Borealis deposit was assessed at 1.69 million tons grading 0.092 ounces per ton (3.1 grams per tonne). Concerted and ongoing exploration by Tenneco, and later Echo Bay, has resulted in the identification of about 500,000 ounces of gold in the group of deposits including Borealis.

Geochemistry, structural studies and drilling were major aids to exploration. The mineralized zones have strong expression in alteration and low-order gold dispersion. Pathfinder elements, such as thallium, arsenic and antimony, were useful aids. The alignment of the deposits along regional structures focused exploration drilling. In total, more than 2,500 exploration holes have been drilled since 1980.

The inventory of reserves for the Borealis group includes the following:

<u>Deposit</u>	<u>Tons</u>	<u>Gold Grade</u>	
		<u>Oz/ton</u>	<u>G/tonne</u>
Freedom Flats	1,100,000	0.133	4.54
Borealis	1,690,000	0.092	3.14
East Ridge	3,400,000	0.030	1.02
Northeast Ridge	2,000,000	0.037	1.26

4.3 Exploration and Reserves in the Aurora Group

Drilling by Electra North West Resources Ltd. in 1981, on land leased from Houston Oil & Minerals which included part of the Humboldt deposit, outlined 950,000 tons grading 0.129 ounces per ton (4.4 grams per tonne). These reserves, subsequently re-assessed as 1,152,000 tons of minable ore grading 0.098 ounces per ton, have been partially mined in operations by Electra North West (in joint venture with Global Resources Recovery) and lately, Minerex Resources Limited. Assessment of the total reserve potential of the Humboldt deposit is ongoing, concurrent with mining operations by Minerex.

Between 1981 and 1984, the M.A. Hanna Company conducted exploration including drilling on the Juniata, Ann Vein and Prospectus deposits. Limited reserves were outlined on the Juniata and Ann Vein deposits, but ore grade intersections on the Prospectus deposit suggested a more significant potential. In 1985, Nevada Goldfields became the operating partner in a lease agreement with M.A. Hanna (whose interest subsequently passed to Centurion Gold Ltd.) to continue the evaluation of the Prospectus with a view to commencement of a mine. In a feasibility study completed in mid-1987, minable reserves were quantified as 563,600 tonnes grading 7.26 grams per tonne. The reserves were re-assessed after the commencement of mining and in June 1988 were recorded as 315,000 tonnes grading 8.69 grams per tonne.

5. FUTURE EXPLORATION POTENTIAL

The success of Echo Bay in extending the reserve inventory of the Borealis group of deposits by ongoing exploration clearly demonstrates the potential for additional discoveries in the District.

To date, exploration drilling on the Aurora group has been restricted to the follow-up of outcropping ore discoveries. The number of holes drilled in the exploration of the Aurora group would not exceed 300 compared with more than 2,500 on the Borealis group.

The extensive Quaternary mafic lavas covering much of the area between Aurora and Borealis impedes conventional exploration for additional deposits. However, the difficulties may be counted by a better understanding of ore controls and the application of modern geochemical exploration methods.

In a district with a history of repetitious discovery of multiple deposits, such as the Aurora District, the accumulation of ore reserves is often a straight line graph related to exploration dollars spent. There is little doubt, based on results to date, that ongoing exploration will continue to add to the reserve inventory across the District. Past exploration costs, which have been in the \$10-20 per ounce range, will likely increase to \$20-30 per ounce in the more difficult exploration terrain. Replacement of annual production by exploration would be expected to cost about \$2 million per year for the whole District (\$450,000 for Nevada Goldfields).

Nevada Goldfields commenced exploration beyond its established reserves in 1988 and has successfully located new zones of potentially minable gold mineralization. Eight holes on the Last Chance deposit made intersections ranging from 3 to 7.5 meters wide and averaging 5.5 grams per tonne gold. Best intersection was 3 meters at 19 grams per tonne. The mineralized zone is open to the northeast and will warrant further drilling to define open pit minable reserves. The Company has considerable enthusiasm for continuing exploration which can be readily justified in terms of the potential of the District.

Undoubtedly, Minerex and Electra North West are similarly enthusiastic to explore the properties they hold in the District.

(The greatest concern, which is likely shared by all parties, is whether the return on investment is adequate after servicing underlying royalties. High royalty payments in lease agreements militate against development of lower grade reserves which may constitute a high proportion of the future potential.

An emphasis on developing only the higher grade discoveries implies a trend away from heap leaching to maximize gold recovery. Using carbon-in-pulp technology, Nevada Goldfields achieves 92% recovery of the gold content of its ores.

(The parties involved in land ownership and mining rights at Aurora might profit most by merging their respective interests and technical capabilities in their efforts to realize the full potential of the District.

APPENDIX 1

GEOLOGY OF THE AURORA MINE

Geology of the Aurora Mine
Mineral County, Nevada

A.C. Dorff
Nevada Goldfields, Inc.

Introduction

The Aurora Mine lies in the Bodie Hills region of Mineral County, Nevada, in Sec. 17 and 18, T.5N, R.29E, Mount Diablo Meridian. It is approximately 35 road miles southwest of Hawthorne, Nevada, in the Aurora Mining District.

Activity in the district began in 1860 with the discovery of precious metals. Production began and continued intermittently from the early 1860's through the late 1940's. Estimated production is 49,200 kg. (1.6 million ounces) of gold, and 76,000 kg. (2.4 million ounces) of silver. Most of the production came from shallow, high-grade pods (Osborne, 1987).

Gold mineralization in the district is localized in six regions - Last Chance Hill, Middle Hill, Silver Hill, Humboldt Hill, Prospectus Ridge, and the Juniata Mine. All of these areas display prominent, outcropping veins. Prospectus Ridge, site of the Prospectus Vein, is the area presently being mined by Nevada Goldfields.

Prior to development, a 73-hole drilling program was conducted on the Prospectus Vein. It delineated an ore body with a strike length of approximately 307m (1000'), a dip length of 132m (405'), and a width of 10m (35'). Ore-grade mineralization begins within 25m (80') of the surface.

Generalized Geology

The Bodie Hills region, lying within the Walker Belt at the western margin of the Basin and Range Province, contains the Aurora Mining District. A regional N60-65E-trending upwarp extends through the area, with Aurora situated on its northwestern flank (Al-Rawi, 1970.)

Dominant lithology in the vicinity of the mine is Tertiary volcanics which range in age from 15.4 m.y to 0.25 m.y. Oldest units are 13.5 to 15.4 m.y. agglomeratic and flow andesites which are host to +10.3 m.y. veins related to precious metals deposits.

Associated with the andesites are altered rhyolitic domes, plugs, and flows (+11.0 m.y.). The youngest rocks in the

district are the basalts of the Aurora Crater, dated at 0.25 m.y. (Silberman and McKee, 1972; Kleinhampl and others, 1975; Stewart and others, 1982).

Structure

Three distinct fault systems occur at Aurora. The first, trending approximately N45-70E, is pre-mineralization and provided the locus for vein emplacement. Observation of veins in the district indicates that this system dips both southwest and northeast.

The first system, with its attendant veining, has been offset by the Juniata Fault, trending generally NE. Surface evidence indicates that the southeast block is dropped.

The final and most important stage of faulting is the development of the Prospectus Fault. It trends generally north and offsets the Prospectus Vein, in a right-lateral sense, by approximately 550m (1800'). This structure is critical to mineralization at Aurora because associated faulting provided the ground preparation and avenues for gold-bearing solutions. This associated faulting trends generally N-NW, cross-cutting the Prospectus Vein (fig.1). Fault widths vary from 0.6m (2') to 3m (10'). Faults viewed in the pit wall at Aurora show an anastomosing system, generally high-angle, with related faults striking in multiple directions with variable dips, ranging from high-angle to flat.

Prospectus Vein

The Prospectus Vein strikes N53E, and dips 70-75 degrees southwest. It appears to have been emplaced along a fault system as a barren vein with gold mineralization occurring as a secondary feature. It is generally massive, vuggy, has contorted banding occurring around andesite breccia inclusions, and shows signs of alteration, principally resiliification. Portions are chalcedonic. Vugs contain secondary quartz in the form of crystals, and calcite. Approximately 0.6m (2') of the footwall segment of the vein was deposited secondarily as banded, crystalline quartz, accompanied by thin veinlets which cross-cut the massive veining. Adularia and calcite are present, as are rare box-work structures and cavities indicative of leached sulfides. No other minerals, other than manganese oxides, have been noted within the vein.

Within the present pit, the vein has been repeatedly offset by the previously mentioned N-NW faulting. Maximum widths noted have reached 10m (33'). The vein shows numerous splits, horse-tails, and, at higher elevations, contains andesite horses.

Wallrock Alteration

Hypogene alteration surrounding the Prospectus Vein consists of various degrees of propylitization, argillization, and silicification.

On the hanging wall side of the vein, an andesite wedge, approximately 3m (10') wide has been strongly silicified and contains sparse sulfides, primarily chalcopyrite, with subordinate amounts of pyrite and arsenopyrite. This same type alteration also occurs in a 3m interval between splits in the vein, and locally in the footwall andesite.

Again, on the hanging wall side, outside the andesite wedge, there is an approximate 60m (200') zone which has been completely argillized. Fault contacts and quartz content suggest that the argillized zone was previously the margin of the rhyolite which outcrops west of the vein. The first few meters proximal to the andesite contact are silicified and locally contain the same sulfide suite that is associated with the silicified andesite. Although no analysis has been done to determine clay type, swelling of the clay in underground workings indicates a high montmorillonite percentage.

On the footwall side, andesite, propylitically altered to varying degrees, is horizontally zoned with wedges of fresh, fine-grained and agglomeratic andesite. The weakly altered rock is generally light green, with plagioclase phenocrysts showing altered rims and yellowish discoloration. Intervals show a high degree of chloritization. Strongly altered rock varies from light to chocolate brown, has moderate to complete alteration of phenocrysts, and contains quartz veinlets of 0.0x meters (1/4-1/8 inch) in width, developing locally into stockworks. Unaltered andesite is dark green to purple, and has local quartz veining, but no attendant alteration at the vein margins. Propylitic alteration is directly associated with N-NW-trending faulting.

Mineralization

Gold mineralization is found in the footwall segment of the Prospectus Vein, extending for approximately 2m (6') into the vein. There is also strong mineralization in the altered andesite lying in the footwall of the fault which contains the vein. Within a strike length of approximately 40m (130'), assay values average 16 grams/tonne (0.5 opt) in a zone of intense faulting and alteration. An additional 40m (130') averages 12 grams/tonne (0.4 opt). Mining width varies from 1.5m (5') to 15m (50'). Average mining width is 7m (22').

Mining is currently proceeding within the oxide zone; assays of mill heads show only trace amounts of copper which is probably due to dilution associated with ore block margins. Sulfide-

bearing rock associated with silicification is weakly auriferous. Repeated sampling has demonstrated that the presence of sulfides and silicification is a good indicator of being outside ore zones. Repeated assays of these intervals indicate values in the 0.x gram/tonne (0.0x opt) range.

Within the ore zone, the gold/silver ratio varies from 1:1 to 1:3. Much lower ratios are common (up to 1:20). However, as the ratio decreases, gold values drop below 2 grams/tonne (0.06 opt). Because of these ratios , it is assumed that electrum is the chief ore mineral.

Discussion

Based upon the above-mentioned observations, the following is considered the sequence of events which led to mineable grades of ore being deposited at Aurora:

1. Emplacement of the Prospectus Vein as a barren structure.
2. Argillization of the hanging wall rhyolite.
3. Hypogene alteration producing silicification adjacent to the Prospectus Vein.
4. Development of N-NW faulting.
5. Alteration and gold mineralization of the footwall of the Prospectus Vein.
6. Second episode of silicification.

This sequence is postulated due to observable cross-cutting relationships and textures in the present pit. Sampling of the Prospectus Vein outside areas of propylitic alteration generally shows trace amounts of gold, although values of 1-2 grams/tonne (0.03-0.05 opt) are observed in areas which are not intensely altered. Within these areas, even though the wallrock has not been altered, the vein has, as evidenced by the presence of sericite associated with cross-cutting faults.

The argillic zone is silicified and sulfidized for a short interval away from its contact with the silicified andesite which is in contact with the Prospectus Vein on its hanging wall side. The similarity of alteration between it and silicified andesite indicates that the argillic zone predates silicification and sulfidization.

The N-NW-trending faulting which offsets the Prospectus Vein can be traced through the silicified zone, and in instances, into the argillic zone for very short distances before dissipation in the clay. Obviously, both units predate faulting.

Propylization is directly associated with the above-mentioned faulting; gold deposition is directly associated with propylization. Propylitically altered andesite alternates

with fresh andesite wedges, trending normal to the Prospectus Vein. Alteration extends laterally from individual faults and shear zones. Logging and assaying of blastholes in the Prospectus pit indicates that gold deposition is directly related to the altered zones, with very high assays occurring in samples taken from zones containing veinlets and stockworks in the altered andesite. Assays as high as 500 grams/tonne (15 opt) have been recorded, and, within high-grade shoots, 50-60 gram/tonne (1.6 opt) assays are common.

Although previous works have referred to boiling as a mechanism for gold deposition (Green, 1964), it appears that the deposition was caused by an alkaline, near-neutral solution permeating and reacting with the andesite along fault planes, producing a change in pH and gold deposition. Boyle (1979) notes this reaction and describes the attendant alteration products—calcite, albite, adularia, which have been described by Osborne (1987).

If boiling was the mechanism primarily responsible for deposition, a predominantly vertical zonation with sharp margins would be expected. However, mineralization at Aurora has a strong horizontal distribution component, both parallel and normal to the vein. This mineralization pattern, combined with the lack of evidence of boiling, suggests that another means of deposition is required.

Contouring of assay values shows a distinct pattern of gold mineralization trending along the footwall of the Prospectus Vein and following faults out into the footwall (fig. 2). At the intersection of faults, pods of very high grade mineralization develop. Grades decrease away from the vein, declining to only trace amounts, indicating that the gold-bearing solutions have reacted with the wallrock and gradually become spent.

Of suggested possibilities for changes affecting ascending hydrothermal solutions, - boiling, cooling, condensation, (Rose and Burt, 1979) cooling appears the most likely mechanism for the massive argillization of the hanging wall seen at Aurora, particularly when combined with the style of mineralization and alteration observed in the footwall. The lack of appreciable amounts of sulfides in any of the units would seem to preclude any acid leaching. Cooling of solutions, along with a descending water table, would appear to provide the mechanism for the development of the argillic zone.

The presently accepted model for Aurora is that of Berger and Eimon (1983). Aurora is representative of a low sulfur bonanza deposit, Bonanza IA, with deposition occurring below the water table by reaction with the wallrock. That model is being used for exploration within the district.

Attention is directed toward areas of strong propylitic

alteration with emphasis on identifying N-NW-trending faulting which intersects NE-trending veins. As noted, high-grade ore occurs in relatively short shoots. This leads to an initial step of mapping and sampling on a large scale to delineate these intersections, followed by drilling on relatively tightly-spaced patterns (30m lines, 15m centers) once potential targets are identified.

Due to the lack of pathfinder elements related to the ore zone, coupled with non-productive drilling of arsenic and antimony anomalies in the past, sampling is directed strictly toward gold. Structural control coupled with appropriate lithology is assumed to be the chief guide to mineralization.

References Cited

- Al-Rawi Y.T., 1970, Cenozoic history of the northern part of Mono Basin, California and Nevada: Unpub Ph.D. thesis, Univ. of California-Berkeley, 163p.
- Boyle, R.W., 1979, The Geochemistry of Gold and its deposits (together with a chapter of geochemical prospecting for the element), Geol. Survey of Canada Bull. 280, pp.409-410.
- Green, W.R., 1964, Structural control of mineralization at the Aurora Mining District, Mineral County, Nevada, Unpub M.S. thesis, Univ. of Nevada-Reno, 41 p.
- Kleinhampl, F.J., Davis, W.E., Silberman, M.L., Chesterman, C.W., Chapman, R.H., and Grey, C.H., Jr., 1975, Aeromagnetic and limited gravity studies and generalized geology of the Bodie Hills Region, Nevada and California: U.S. Geol. Survey Bull. 1384, 38 p.
- Osborne, M.A., 1987, Geology and alteration of a part of the Aurora Mining District, Mineral County, Nevada. in Bulk Mineable Precious Metal Deposits of the Western United States, Guide Book for Field Trips. pp.245-249.
- Rose, A.W., and Burt, D.M., 1979, in Barnes, H.L. (ed), Geochemistry of Hydrothermal Ore Deposits, second edition, pp.205-206.
- Silberman, M.L., and McKee, E.H., 1972, A summary of radiometric age determinations on Tertiary volcanic rocks from Nevada and western California - Part II - western Nevada: Isochron West, no.4, p.7-28.
- Stewart, J.H., Carlson, J.E., And Johannesen D.C., 1982, Geologic map of the Walker Lake 1-degree by 2-degree Quadrangle,

California and Nevada: U.S. Geol. Survey Misc. Field
Studies Map MF-1382-A, Scale 1:250,000.

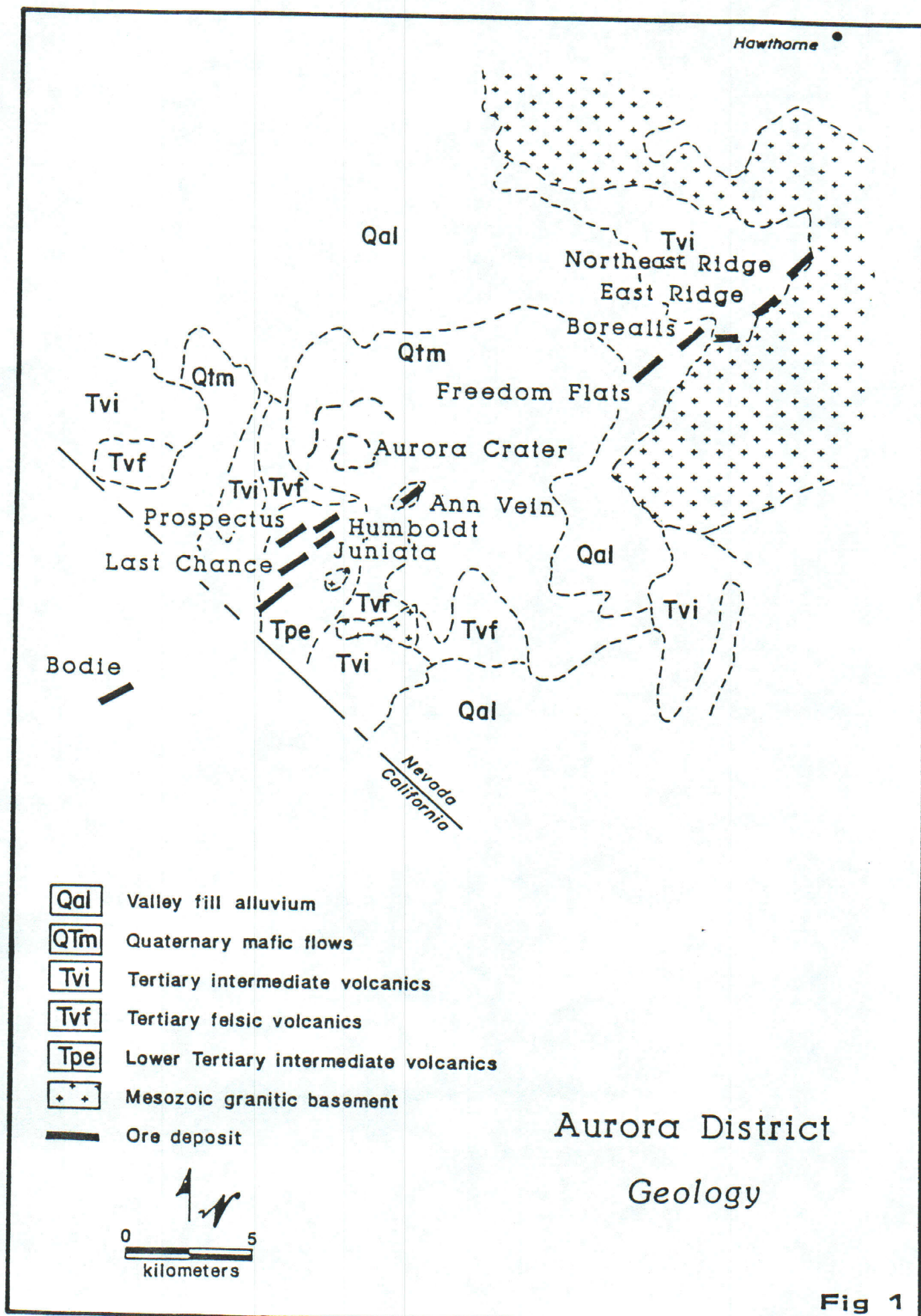


Fig 1

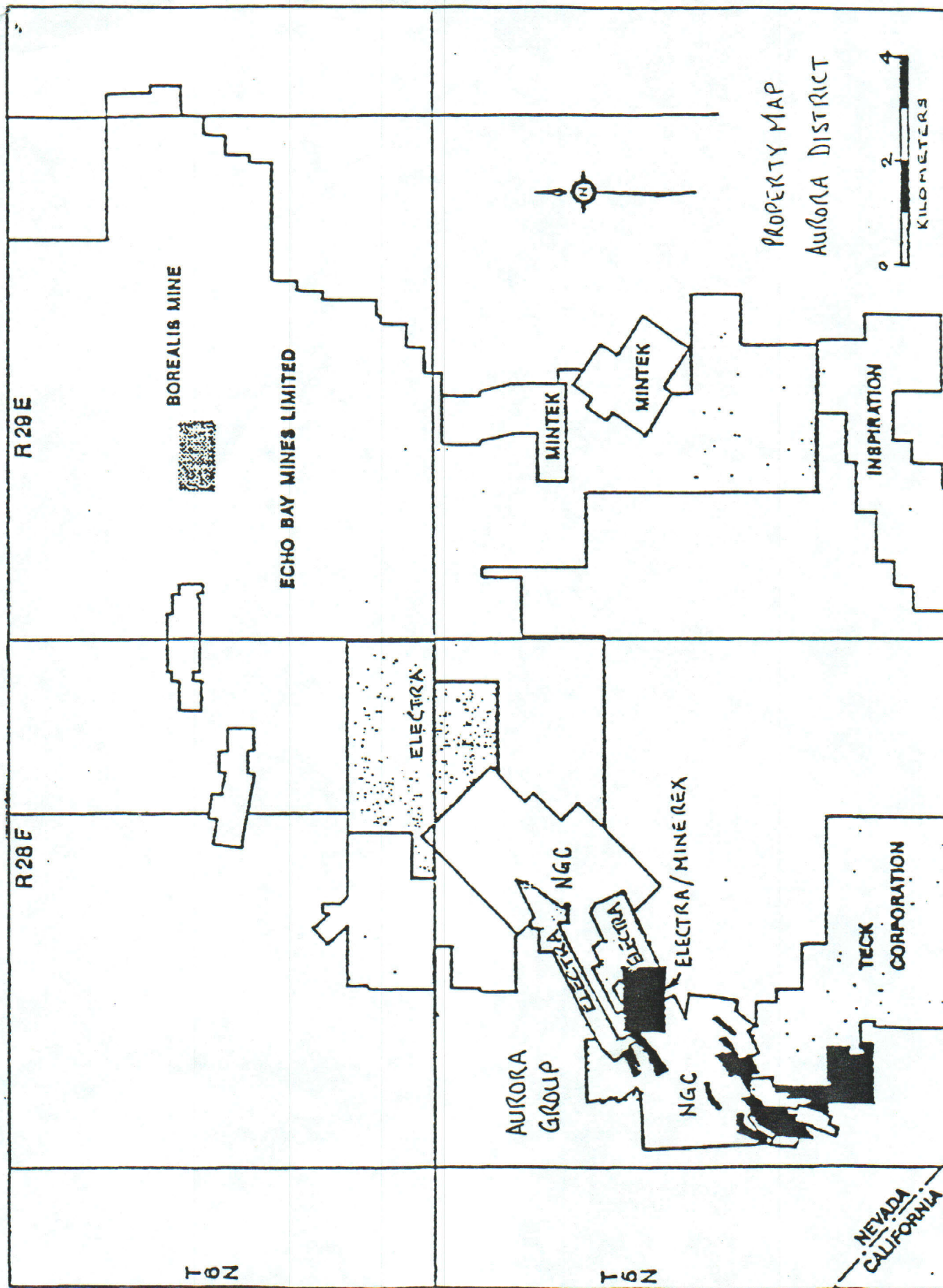


Fig. 2