Very Rough + incomplete draft

Hal,
only the Introduction and the summary sections are included here.
Bruce

POSSIBLE TARGETS FOR DEEP, BONANZA-TYPE GOLD MINERALIZATION ON THE ROBINSON PROPERTY, SEVEN TROUGHS MINING DISTRICT, PERSHING COUNTY, NEVADA

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INTRODUCTION

The Hishikari gold deposits in the southern Japanese island of Kyushu are one of the richest in the world. The purpose of this paper is to point out the striking similarities between Hishikari and the Robinson Property located in the Seven Troughs Mining District of Pershing County, Nevada, which is about 30 miles northwest of the town of Lovelock.

The Robinson Property consists of 65 patented and 241 unpatented, well blocked lode mining claims covering about 4,500 acres of land and the greater part of the District. The 65 patented claims and 107 of the unpatented claims are held by Mr. Robinson under long-term mining leases. The remaining 134 unpatented claims are owned by him.

The similarities of Hishikari and Seven Troughs District include general geologic setting, trace metal content, grade of mined ore, apparent source of mineralization, type of basement rocks, type of overlying formations, types of alteration, and the progressively increasing alteration at depth of the overlying formations. These observations lead to the conclusion that at depth high-grade mineralization may be found on the Robinson Property, as at Hishikari, and that the Robinson Property offers a very attractive exploration prospect.

Hishikari. The present reported reserves of the Hishikari deposits consist of approximately 8 million troy ounces of gold in approximaely 4 million short tons of ore, representing an average grade of about 2.3 troy ounces of gold per short ton of ore. Approximately 400,000 short tons of the ore, with comparable gold recoveries, have already been mined.

The Hishikari deposit occurs in extremely rich, quartz-adularia type, electrum and naumannite-bearing, epithermal veins which are hosted mainly in brittle, domed, fine-grained, Mesozoic-age marine sediments and to a lesser extent in overlying, intensely argillized, ductile, andesitic volcalanistics and flows of a Quaternary-age, flow-dome complex. The Hishikari deposits apparently formed when hydrothermal solutions boiled and also mixed with cooler meteoric water upon approaching the top of the Mesozoic basement section. The extreme richness of these deposits may be due, in part, to the focussing of hydrothermal solutions into the apical portions of a structural high in the basement section and also an apparent dome of the basement-volcanic unconformity.

Broadly developed, horizontal zones of argillic alteration occur in the volcanic section over and adjacent to the rich Hishikari ore zones. These zones increase in intensity with depth and include, near the surface, montromillonite-rich types and a mixed-layer clay type, and at greater depth a white mica or illite-rich type. The most intense alteration, the white mica-rich alteration type, which is the zone that is most closely associated with gold mineralization, is not exposed at the surface. The zone of intermediate-intensity alteration, the mixed-layer clay type, which in some areas is exposed at the surface and over the main ore zone, owes its surface expression, at least in part, to locally deeper erosion. Although several 0.5 to 1 meter (0.8 to 3.3 feet) thick, erractic, calcite, and clay-rich high-grade gold ore-bearing quartz veins are exposed at the present-day surface above the main Hishikari ore zones, the rich, underlying, newly discovered bonanza deposits had apparently little, or not continuous, extension to an expression at the surface.

Discovery of the deeper bonanza ore zones, located about 100 meters (330 feet) below the present surface, resulted from the recognition, based on several types of geophysical surveys, of a coincidence of (i) a resistivity low, due to intense clay alteration, (ii) an induced polarization anomaly due possibly to clay alteration and associated mineralization, and (iii) a domal resistivity high, later determined to be caused by a structural high in the Mesozoic basement. All of the first three diamond drill hiles directed at the target formed by these coincident geophysical anomalies intersected quartz-adularia veins that contained from 149 to 290 grams of gold per metric ton (4.35 to 8.46 ounces of gold per short ton) over widths ranging between 0.15 to 5.45 meters (0.5 to 17.9 feet). The Hishikari deposits are presently producing between 7 and 8 metric tons (225,000 and 257,000 ounces) of gold annually.

Seven Troughs. At Seven Troughs, a series of exceedingly rich, quartz-adularia type, electrum and naumannite-bearing epithermal veins and ore shoots occur over a distance of 2½ miles of a N 15 E striking, intensely argillized zone that is developed in a Tertiary-age, flow-dome complex. This complex is composed of a bimodal, rhyolite-basalt suite of volcanic flows, intrustives, and volcaniclastics.

The Seven Troughs District was the scene of extensive underground mining during the early part of this century. The grade of the ore mined from the District's largest mine, the Coalition mine, averaged 3 ounces of gold per ton over its 9½ year lifespan. The District is credited with the production of about 150,000 tons of ore that averaged about 1.2 ounces of gold per ton. This ore came from about 10 distinct deposits within the District. Selected hand samples from mine dumps range as high as 12 ounces of gold per ton at the exposed southern end of the District to 40 ounces of gold per ton at the northern end of the District.

The high gold to silver ratios and the paucity of base metals in Seven Troughs ore, the common presence of considerable calcite and, locally, zeolite gangue minerals, the erratic and quartz-poor and clay-rich character of the veins, the intense, but commonly low-rank (i.e., montmorillonite-rich) wall rock alteration exposed throughout the District, in addition to the presence of a locally preserved, near-paleo water table alteration zone within the District, all indicate that the known ore shoots most likely occur within a typical quartz-adularia type epithermal system and represent its uppermost levels. These ore shoots appear to exhibit all of the features of the near-surface ore shoots over the rich ore zones of Hishikari.

The presence at Seven Troughs (as seen from limited deep drilling) of intense hypogene argillic alteration over an area of 2½ or more square miles and the zonation of this alteration with depth from near-surface montmorillonite-rich types to a mixed-layer type, and, then, apparently, with greater depth, to an illite-rich type indicates the presence of a very broadly developed and probably large hydrothermal system. The presence and the zonation of these alteration types are almost identical to those of Hishikari. Furthermore, at both Hishikari and Seven Troughs higher gold values are associated with illite-rich alteration. The presence of such alteration at Seven Troughs suggests that the zones having the greatest potential for vein-hosted epithermal ore shoots exist at depths somewhat greater than those that have as yet been explored.

As at Hishikari, a sequence of Mesozoic age, fine-grained marine sediments, now metamorphosed to phyllite, and also possibly some Mesozoic-age grandiorites, underlie much of the Seven Troughs District, at least that portion of the District not underlain by Tertiary-age dikes and plugs. From presently available information, it seems likely that the depth of this basement should not be greater than the reasonable extension to the depth of the presently known epithermal system - and that the epithermal system should intersect and pass through the contact between the basement and the overlying volcanics.

Because of the suspected greater brittleness and lesser permeability (ouside of fault zones) of the Mesazoic basement rocks at Seven Troughs than those of the overlying Tertiary, intensely argillized, clastic-bearing volcanic section, rising hydrothermal solutions may have experienced throttling and initial boiling and mixing with meteoric water, resulting in bonanza ore deposition near the point of contact between the basement and the overlying volcanic section. In this manner, ore deposits similar in type and magnitude to those found at Hishikari may have been formed in and near the basement at Seven Troughs.

By the same geophysical methods as were used at Hishikari, one should readily be able to define at Seven Troughs (i) the depth of the basement, (ii) any structural highs in that basement, and (iii) any anomaly of intensely argillized and possibly pyritic zones above and near the basement. Thus, well defined targets for zones of potential mineralization could readily be identified, if they are present. Although possible basement and near-basement ore shoots at Seven Troughs may occur at depths of 1,500 feet or more below the ground surface, the cost of identifying such targets and testing them by drilling would not be prohibitive if the risk-to-reward ratio of a Hishikari-type discovery is taken into consideration. To date, no such exploration effort has been made notwithstanding the striking similarity of the Seven Troughs District to Hishikari.

The writer will be glad to discuss the deep target that is the subject of this paper with anyone interested in considering the possibility of undertaking an exploration program. In addition to the deep target, the Robinson Property offers several other near-surface, bulk-mining targets. For information regarding those targets, the reader is referred to Dr. Joseph G. Wargo. Inquiry as to the terms on which the Robinson Property is available for either type of exploration should be addressed to Mr. Robinson.

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SUMMARY

At Hishikari, a quartz-adularia, vein-type epithermal system has produced exceedingly rich gold deposits that now known to contain over 8 million ounces of gold. These deposits occur largely in quartz veins within Mesozoic-age, fine-grained, marine sediments and also to a lesser extent in a clay-rich, fairly ductile section of Quaternary-age volcanic rocks that overlie the Mesozoic basement sediments. The best vein thicknesses and truly bonanza grades of gold ore are found in the basement rocks within about 100 meters of their contact with the overlying volcanics. Vein thicknesses and grades tend to decrease in the volcanic rocks, and very few if any of the veins reach the present ground surface. The gold-rich veins occupy the apical portions of a prominent dome in the basement section and also trend northeasterly, apparently along a zone of structural weakness and faulting. Four categories of alteration affect the volcanic rocks and form near-horizontal layers that cover and envelope the gold mineralization. These include two types of montmorillonite-rich, low-intensity alteration that are the most widely exposed alteration types in the district and are also the most peripheral and highest-level alteration types relative to the ore deposits. An alteration type rich in interstratified clay minerals underlies the montmorillonite-rich alteration. At greater depth in the volcanic section and most closely associated with the ore shoots, a broad horizon of sericite or illite and chlorite-rich alteration, which envelopes the ore-bearing veins, is present. Within the basement, apparently due to limited fluid migration outside of the fault zones that form the conduits for fluid migration, only narrow alteration selvages of chlorite-sericite alteration are present. Although intense clay alteration occurs above ore shoots in the basement rocks and around ore shoots in the volcanic rocks, the more intense clay-rich alteration types are not always exposed at the ground surface.

It is thought by observers of the Hishikari deposit that these bonanza ore shoots formed within the basement rocks near their contact with the overlying volcanics as a result of throttling and boiling, and also of mixing, of the ascending ore-forming solutions near that contact with descending, cooler meteoric water. These ore shoots are thought to have formed at a depth of about 1,500 feet below the water table present at the time of mineralization. The presence of a prominent dome in the basement rocks under the more plastic and less faulted volcanic section may have been important in directing and focussing ore-forming solutions to the apical portions of the dome. It has also been suggested that the limited upward development and decrease in widths and grades of the quartz veins within the volcanic rock may have been caused by the greater ductility of the of the volcanic rock than that of the basement rock.

At Seven Troughs, what appear to be the upper portions of a number of exceedingly high-grade, quartz-adularia type, epithermal, gold bearing veins and ore shoots are exposed in a Tertiary-age, flow-dome complex. As at Hishikari, a basement complex composed mainly of somewhat metamorphosed, fine-grained, Mesozoic, marine sediments underlies a clay-rich, apparently more ductile section of volcanic rock. The volcanic section, which includes felsic and mafic volcaniclastics, flows, and intrusives, hosts the known ore shoots. Although the basement rock has not been intersected by the deepest mine working or drill holes within the district, its known presence at several peripheral locations in the immediate area of the district suggests that it may underlie

the volcanics throughout the whole or greater part of the district at a depth well within range of typical epithermal mineralization and not beyond the range of exploration consideration.

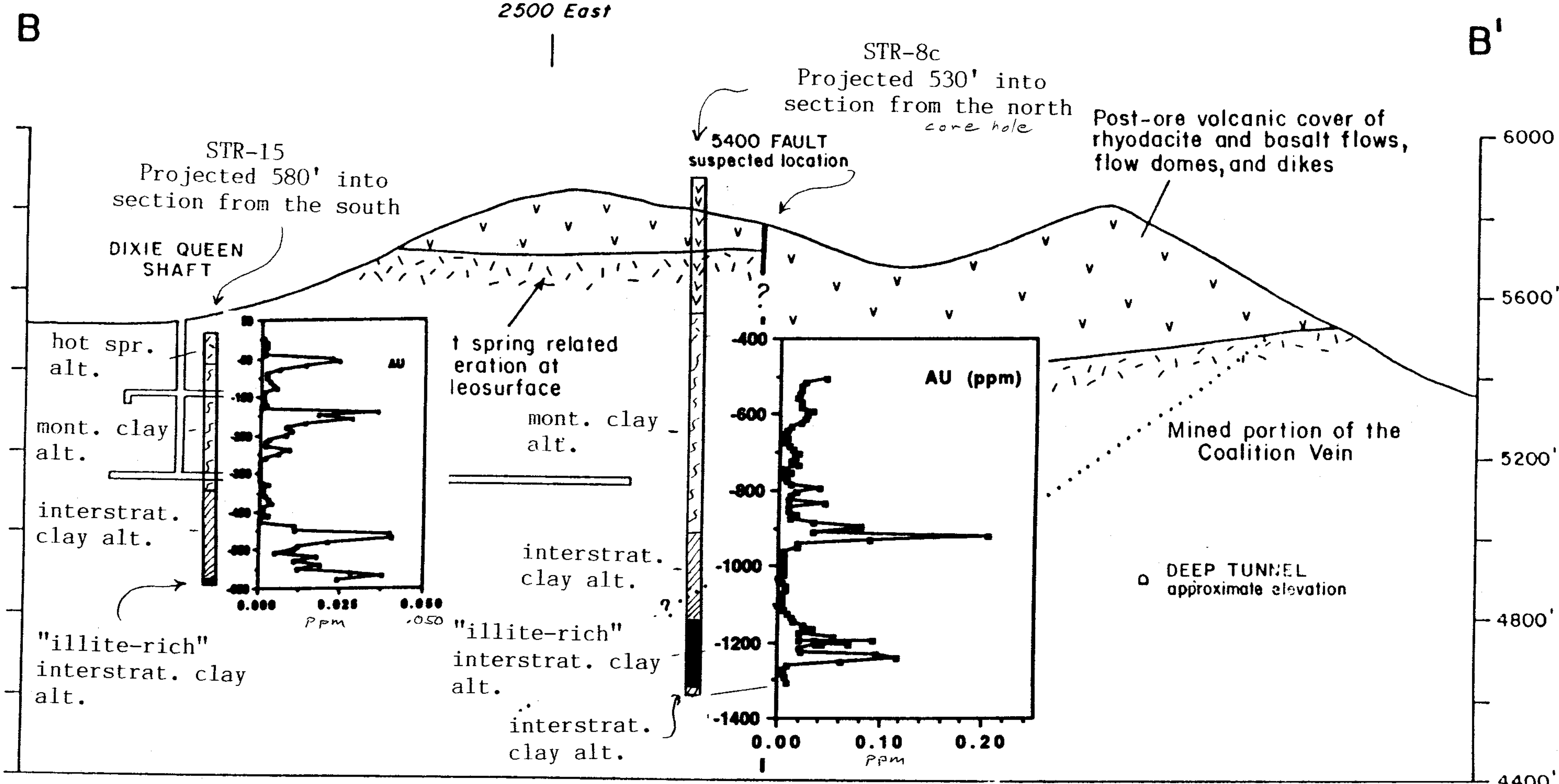
Alteration at Seven Troughs occurs over several square miles and shows strong similarities to that of Hishikari. A highly leached and opal-rich type of alteration, which probably formed near and possibly above the water table extant at about the time of gold mineralization, is preserved locally underneath post-mineralization volcanic flows. This alteration type probably also marks the approximately uppermost extent of the hydrothermal system, and the approximate ground surface, at the time of mineralization. This near-paleo, water-table type alteration, which is from 30 to 100 feet in thickness, gives way to several types of montmorillonite-rich alteration that appear to make up the majority of the surface exposures of altered rock in the district. Results from a limited number of deep drill holes indicate that at Seven Troughs, as at Hishikari, the montmorillonite-rich alteration types give way at depth to an alteration zone rich in mixed-layer type clays, which in turn with still greater depth gives way to a zone of illite-rich alteration. These different alteration zones tentatively appear to form fairly broad, sub-horizontal horizons in the more altered portions of the district. As at Hishikari, limited X-ray diffraction study indicates that at Seven Troughs the better gold values appear to be associated with the illite-rich alteration type. These observations suggest that possibly broad areas of the illite-type alteration, which is apparently the most closely associated with gold mineralization, exist at depth in the district and remain largely unexplored. The large volume of altered rock present at Seven Troughs, in addition to the apparently broadly developed, different types of alteration (in contrast to restricted, irregular, and eradically developed alteration zones) indicates the presence of a fairly large hydrothermal system which may have been capable of producing, in the most favorable setting, gold deposits of significant size and grades.

A comparison of the geology of the Seven Troughs district with that of the Hishikari district suggests the possible presence also at Seven Troughs of bonanza-type gold mineralization. At Seven Troughs as at Hishikari, the region of contact of the brittle basement section with the possibly more ductile overlying volcanic section may have been the site of significant gold mineralization as a result. at that site, of initial throttling and boiling of ascending hydrothermal solutions and also of the mixing of these solutions with cooler, descending ground water. At Seven Troughs as at Hishikari, the fairly ductile volcanic sections may have tended to focus ore-forming solutions into any domal or other structural highs in the basement section, resulting in the possible concentration of ore-forming processes and the development of especially rich mineralized zones. Such rich ore zones might be expected to occur within the uppermost part of the basement section and also in the volcanics just above the basement. At Seven Troughs as has been suggested may have have occurred at Hishikari, the clay-rich portions of the volcanic section may have disrupted the vertical and lateral continuity and upward expression of the high-grade ore shoots, with the result that near-surface expression of any more strongly mineralized zones existing at depth, especially those within or near the basement rock, are effectively masked. The possible presence of such postulated deep, bonanza-type ore zones at Seven Troughs is entirely consistent with the observations that at Seven Troughs (i) apparently only the uppermost portion of the epithermal system, including the paleo water table, is exposed and that the most productive portions of the system may exist at greater depths than those as yet explored, (ii) the alteration types most likely to host the highest grade mineralization are apparently present at depths greater than those as yet explored, and (iii) the basement rock, which may be the focus of the better mineralization at depth, may reasonably be expected to be found underneath the volcanic section and within the range of typical epithermal-type precious metal mineralization, possibly at depths somewhat in excess of 1,000 feet.

Although normally the existence of blind epithermal bonanza ore shoots at depths in excess of 1,000 feet over a broad target area of several square miles would present an exploration challenge of questionable risk-to-reward ratio, the experience at Hishikari indicates that such targets in a Hishikari-type, Seven Troughs-type, setting may be readily identified by the use of conventional geophysical methods. At Hishikari, recognition of (i) more or less coincident resistivity lows, due to clay alteration, (ii) induced polarization anomalies, due to disseminated pyrite mineralization and/or clay alteration, and (iii) a gravity high, due to an uplift or dome in the basement, led to the drilling and discovery of the rich deposits. Specifically, the application of a gravity survey and Schlumberger depth soundings can indicate the approximate depth and shape of the top of a basement section, and resistivity and induced polarization surveys can identify some of the most highly altered and possibly mineralized zones, which may be coincident with ore zones in the volcanic section or may overlie deeper ore shoots in the basement. A similar geophysical approach to exploration at Seven Troughs, combined with some additional definition of the geologic section and expansion of the reconnaisance X-ray study of alteration within the district, especially in existing drill holes, should greatly facilitate the identification of any targets for deep mineralization. In this manner, drilling could be confined to testing what appear to be the best target areas.

The great value of the ore zones discovered at Hishikari, the reserves of which now total over 8 million ounces of gold in high-grade ore, suggest that a target of this type, even if present at considerable depth, has the potential of great reward, especially when effective exploration tools and geologic models are available to readily identify the target.

Because of (i) Seven Trough's striking geologic similarities to Hishikari, including the known presence of very rich ore shoots, (ii) the potential for great value in this type of epithermal, bonanza deposit, (iii) the feasibility of readily locating the most promising targets with conventional geophysical methods and other exploration tools, (iv) the availability of considerable general geological information gained from past mining operations and exploration, and (v) the large size of the Robinson Property (306 well blocked patented and unpatented claims), I regard the Robinson Property as a most attractive property for exploration.



Plane of section is east and west and passes through the Dixie Queen Shaft

Cross section suggesting increase in gold values with increasing rank of alteration with depth at Seven Troughs

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Seven Troughs Mining District
Generalized Geologic Section
Coalition Vein, Southern Portion

XRD clay alteration analysis by D. Hudson

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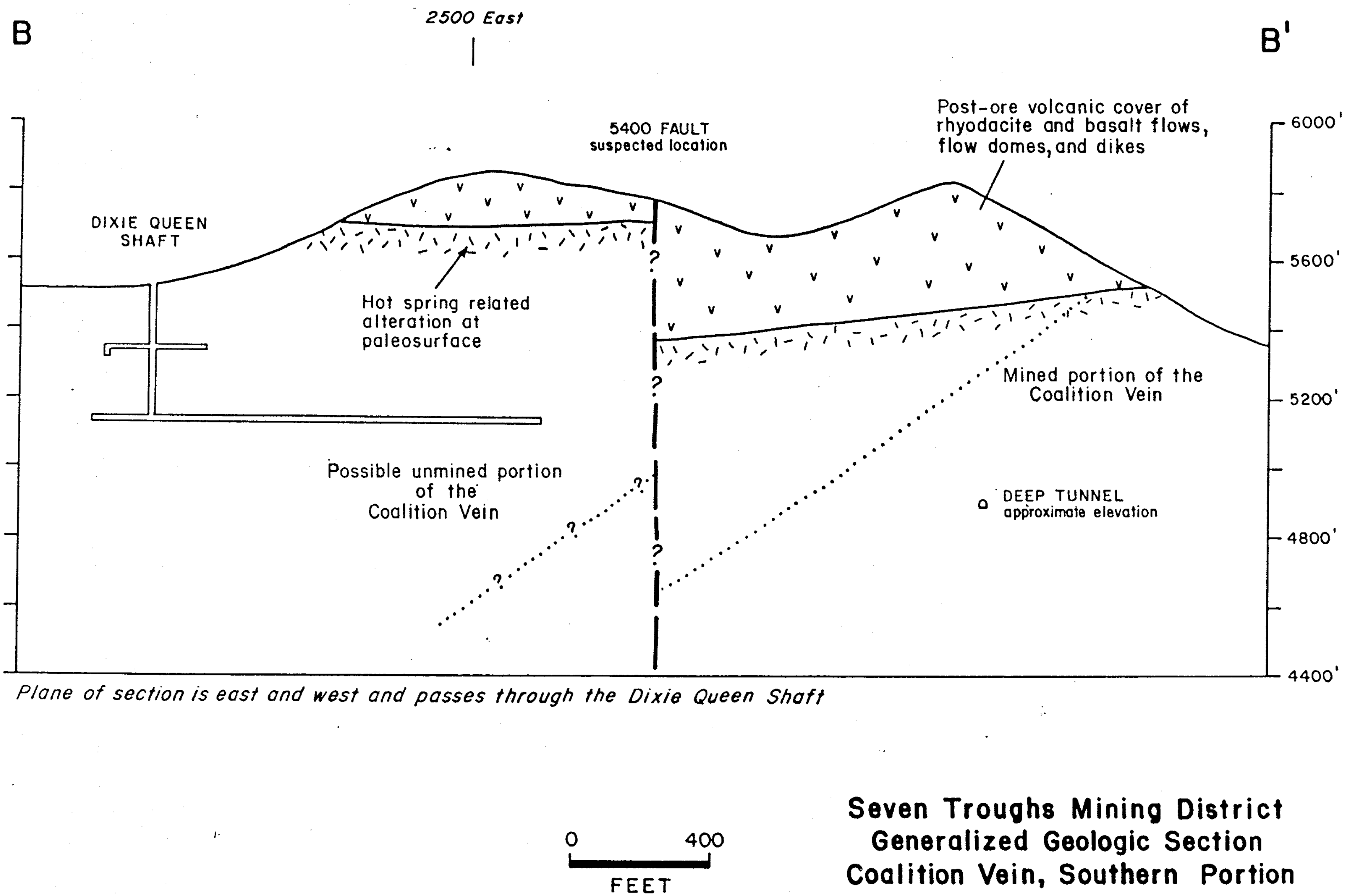
Figure 8

modified by Miller, 7 / 91



Seven Troughs Mining District
Generalized Geologic Section
Coalition Vein, Southern Portion

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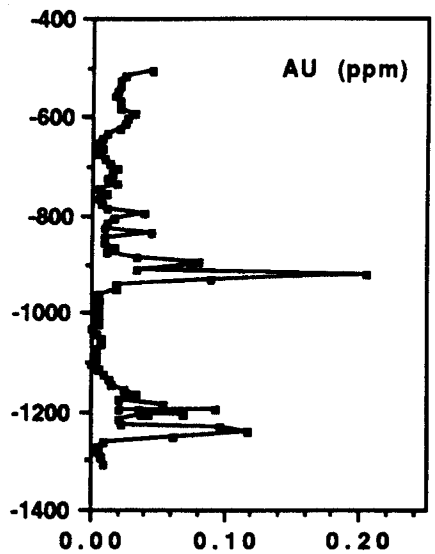
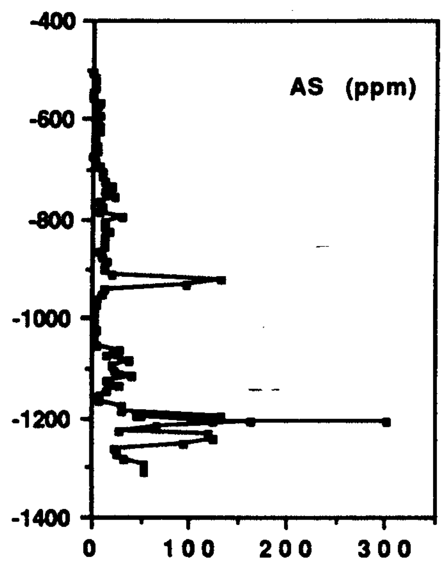
Figure 8

Seven Troughs, NV
GSI - ICP (Au fire assay)

Data from STR-8C





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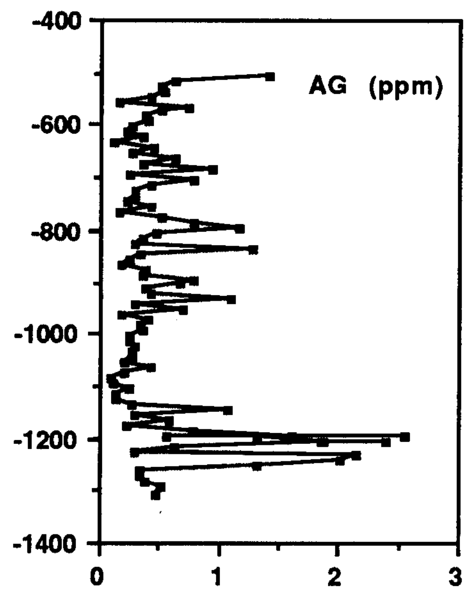
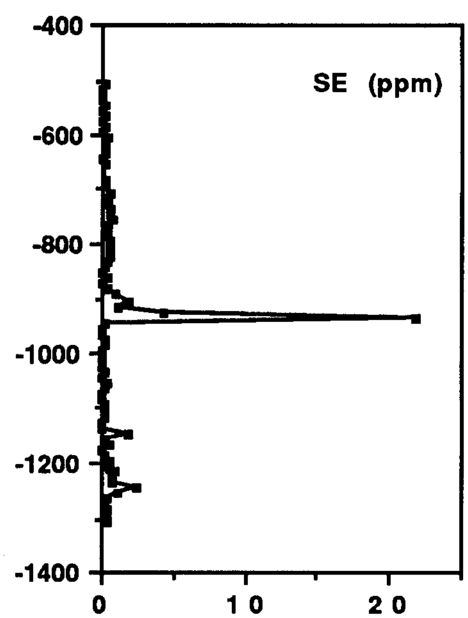
Seven Troughs NV
GSI - ICP

STR - 8c





Seven Troughs, NV
GSI - ICP

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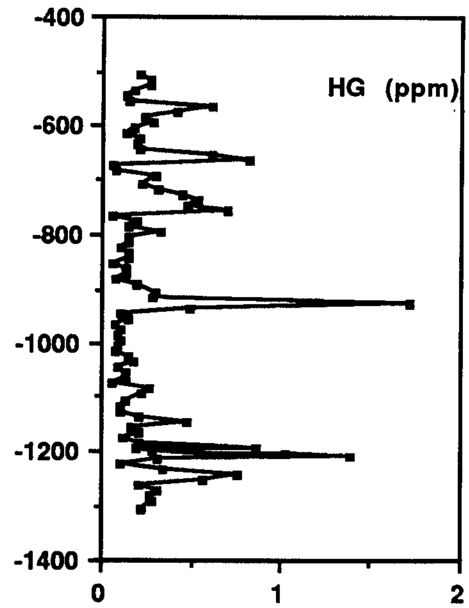
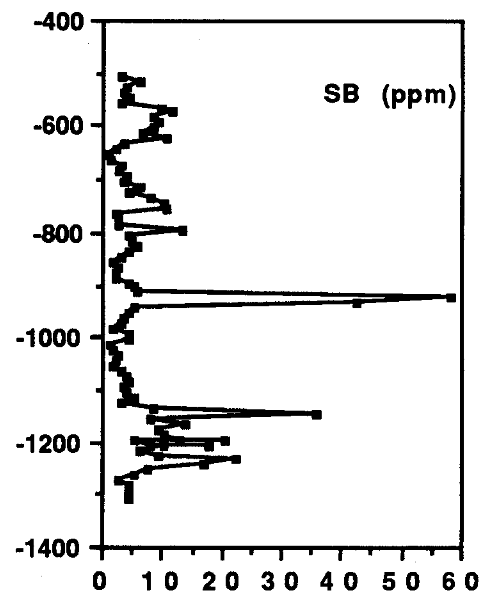
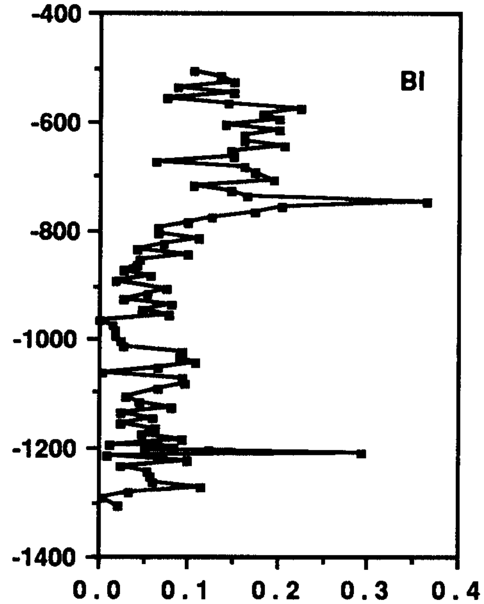
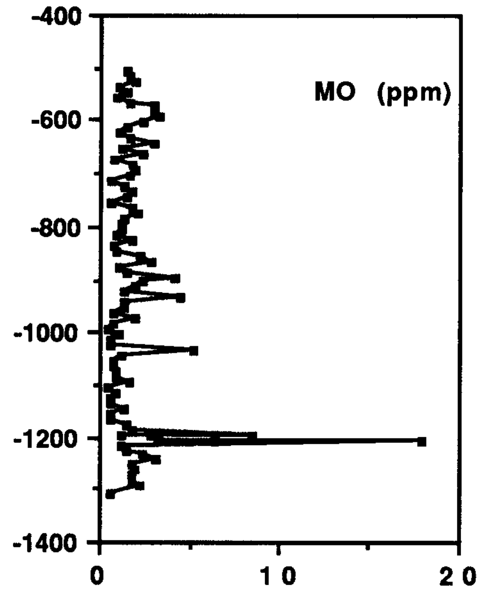




Seven Troughs, NV
GSI - ICP

STR-8c





Seven Troughs

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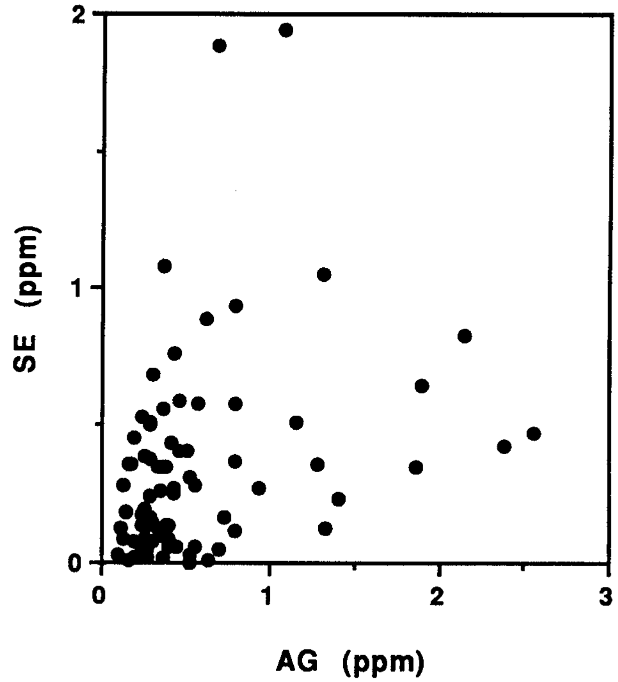

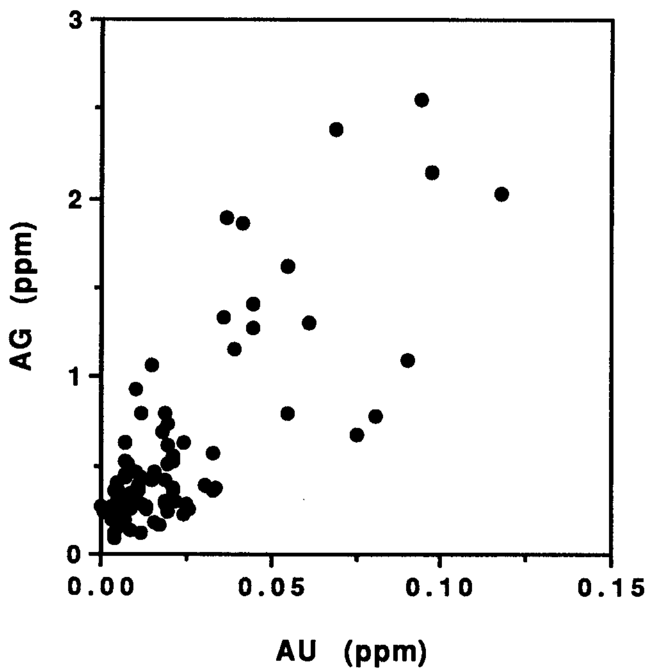

Seven Troughs NV
GSI ICP (Au Fire)

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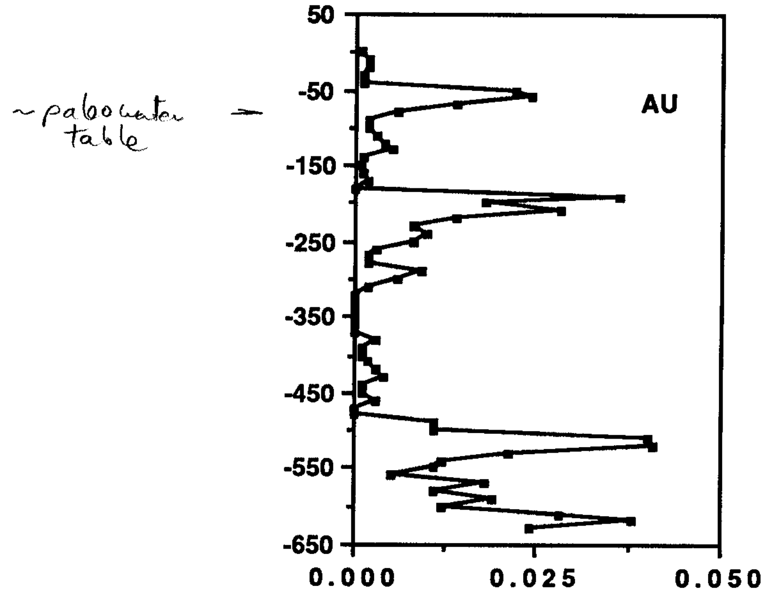

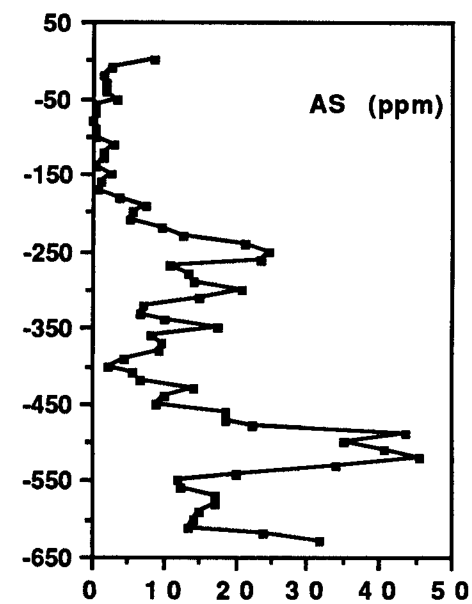

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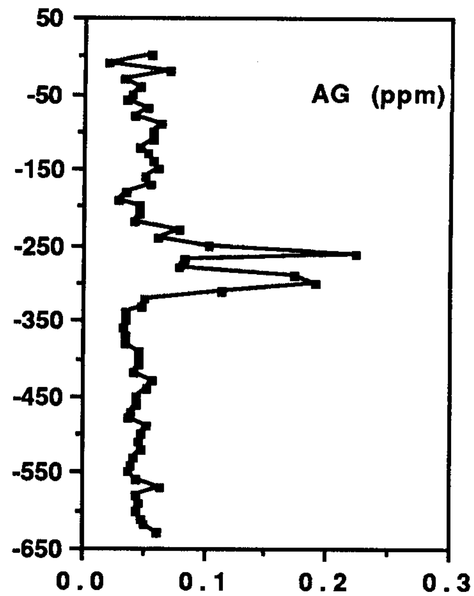
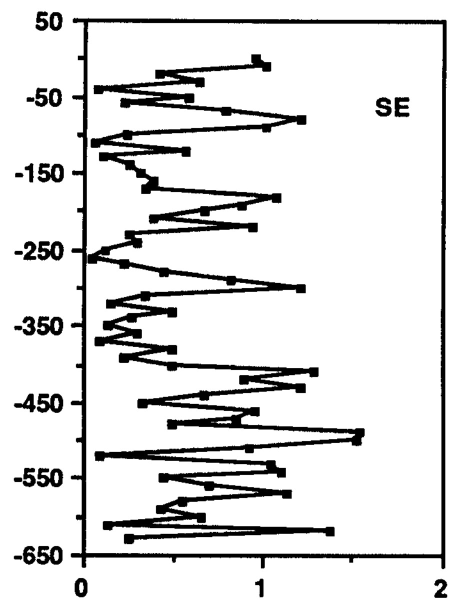
Seven Troughs, NV
GSI - ICP

STR-15





Seven Troughs, NV
GSI -ICP

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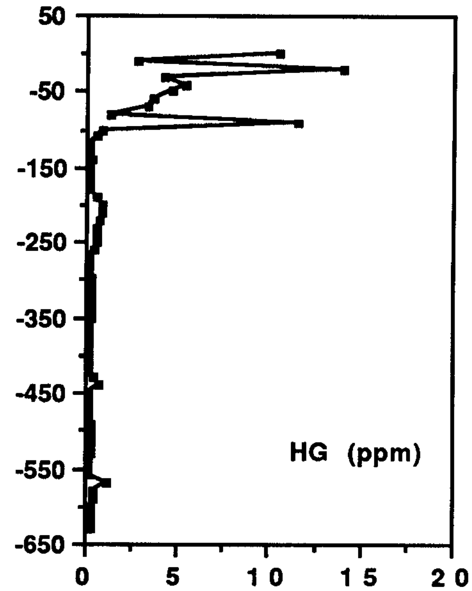
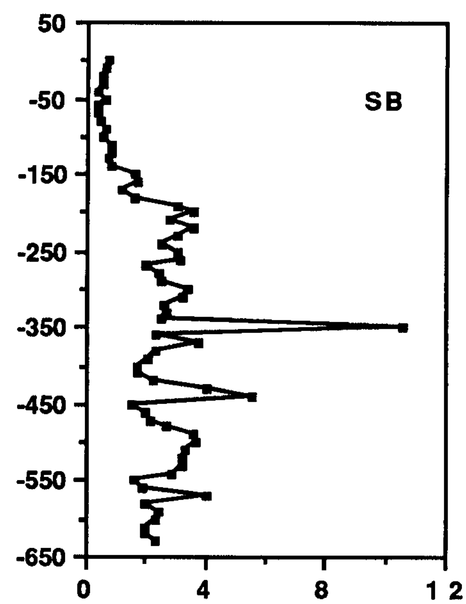
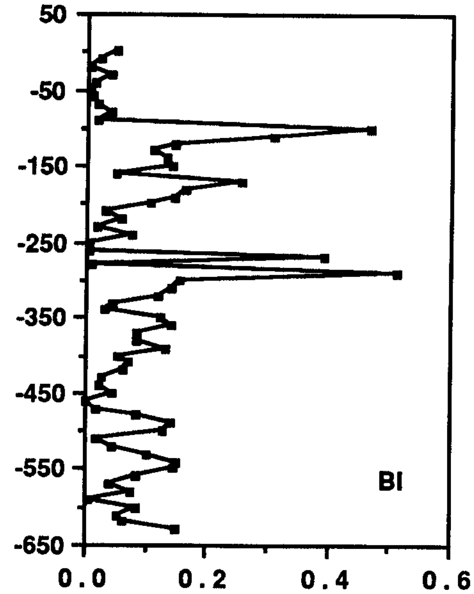


chalcedony rich, above paleo water table alt.



STR - 15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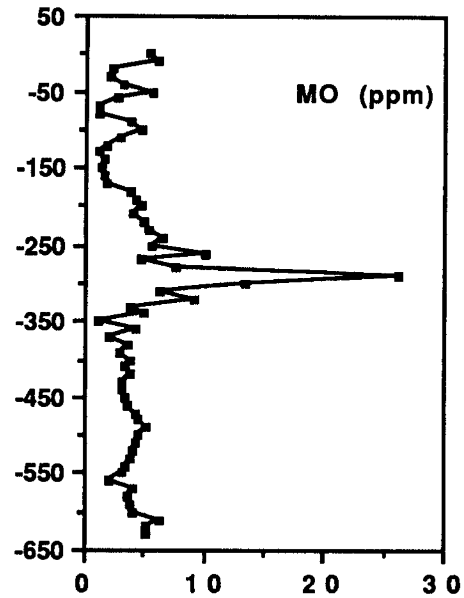
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MO (ppm)

Seven Troughs NV

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