CINOLA GOLD PROJECT

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SOME QUESTIONS AND ANSWERS ON

EPITHERMAL GOLD DEPOSITS

We have set out, in a series of booklets, what we believe to be the information that you, a person resident in the communities of the Queen Charlotte Islands, would like to know about the Cinola Gold Project. The information is given in the form of answers to a series of questions, which seem to be the ones that you might or would ask. We will revise and update the information in these booklets as new environmental information comes available and as the work being carried out in the technical studies, is completed.

If you find that any answers are incomplete or lacking in information, or if you have further questions, do not hesitate to get in touch with the Information Officer, or the Project Manager.

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CITY RESOURCES (CANADA) LIMITED

THE BOOKLETS PREPARED BY CITY RESOURCES PROVIDE SOME QUESTIONS AND ANSWERS ON:

THE COMPANY AND THE PROJECT

THE GOVERNMENT REVIEW AND PERMITTING PROCESS

TECHNICAL STUDIES AND ECONOMICS

EPITHERMAL GOLD DEPOSITS

MINING AND MILLING OPERATIONS

WATER QUALITY STANDARDS

WATER QUALITY

ACID MINE DRAINAGE

MINE WASTE MANAGEMENT

WATER MANAGEMENT

EARTHQUAKES AND THE QUEEN CHARLOTTES

ENVIRONMENTAL STUDIES

SOCIO-ECONOMICS

MERCURY IN THE ENVIRONMENT

THE ENVIRONMENT ON CLOSURE

Q: *What are epithermal gold deposits?*

A: Epithermal gold deposits are those that are associated with volcanic action and which have been formed near to the surface. The name is derived from "Epi" - near and "thermal" - heat.

Epithermal deposits are believed to have their origins in the movement of the Tectonic plates where one plate slides underneath another. These movements, although extremely slow, generate enormous amounts of heat and pressure. They also force some rock so deep that it melts. The molten rock and gases then force their way to surface, in faulted and broken areas, as volcanic lavas and ash, forming the characteristic shape of a volcano both on land and under the sea.

It is understood that a general upwelling of molten rock in the middle of the Pacific is moving the ocean floor outwards against the more stable continental masses which has resulted now and in the past in volcanic action. In the Southwest Pacific, the ocean plate is forcing itself against the Australian plate and in the Northwest Pacific the line of the plate boundaries is the Queen Charlotte Fault. There is in fact, volcanic action found all around the Pacific Ocean at the edges of the plate. A map showing the Pacific Plate has been included with this leaflet.

The initial phases of volcanic activity are quite violent and there is little chance that there will be any systematic deposition of minerals, but as a system cools and the explosive outflow of lavas cease, shrinkage cracks in the rocks develop so that steam, hot springs and geysers can discharge at surface as shown in the second accompanying sketch. These springs deposit an unconsolidated form of quartz (siliceous sinter) at the surface that can restrict the flow and cause pressure to increase in the system. When this restriction happens the temperature of the system also builds up and eventually a balance is reached whereby the pressure is released by geyser action. This type of action can be seen in Yellowstone National Park where the eruption of the geysers can be predicted to the second. The hot fluids from deep in the earth contain minute amounts of metals and minerals that have been leached out of the molten rocks. When the pressures on the system are released by geyser action the fluids at a certain depth below surface boil. This boiling action tends to precipitate the dissolved metals. The precipitation takes place in shrinkage cracks, or faults and in rocks that have been broken (brecciated) as part of the mechanism of releasing pressure.

There is therefore, a gradation in the concentration of minerals downwards from the original surface, where only traces of metals are present until the boiling or precipitation level is reached, where the maximum concentration occurs. Over long periods of time fluctuations in pressure and/or temperature may cause this zone to move up or down in the system. Such movements can re-dissolve, or redistribute and re-concentrate any precious metals present, so increasing the vertical extent of the mineralized zone.

Naturally, not all hot spring and geyser activity contains valuable minerals and in some cases, the activity took place so long ago that the mineralized zone may have been partly or completely weathered away, or reburied under later geological formations.

Q: Why is the amount of gold found in the deposits different?

A: As previously noted, some hot spring and geyser activity may not contain any gold or valuable minerals, so that some systems that are found will be barren. The gold, if it occurs in an epithermal deposit, will normally be concentrated in three areas:

- In sediments and precipitates from hot springs at or near the original surface.
- In favourable fractured rocks which induced precipitation by their nature. These rocks can include those broken because of the volcanic explosions (breccias).
- In zones of weakness or fracture such as faults around the edge of the volcanic action. This is especially true where these fractures, which act as conduits for solutions, cut favourable rock types. The solutions are often so silica rich that quartz veins are precipitated to line the fractures before the gold and other minerals are deposited.

Two of the best-known favourable rocks are firstly, a porous volcanic rock, which has at some time been cemented with lime and secondly, carbon bearing, porous sediments. Both of these rocks readily precipitate out minerals from solutions which pass through them.

The total amount of metal or mineral that is contained within an epithermal system is directly dependent on the type of rocks surrounding the hot springs centre, the duration of the geyser and hot spring activity and on the number of times the waves of solutions, together with the attendant fracturing of the rock, were repeated.

Q: How did the Cinola deposit come to be formed?

A: The original rocks in which the Cinola deposit has occurred are a series of comparatively young, loosely cemented sediments, consisting of layers of pebbles alternating with fine sediments. Certain of these beds had animal life and vegetation present while they were being formed, as a certain amount of iron sulphide (pyrite) and fossilized wood is found in the unaltered rock.

Faulting, which may have been associated with the Sandspit Fault System occurred at some time. The faulting has lifted up the rocks to the West of the deposit to expose much older mudstones and shales (argillites). The young sediments on this side of the fault are now completely weathered and eroded away. Volcanic lava (rhyolite) was then intruded on the line of the fault and this explosive action was followed by a long period of quieter, hot spring activity.

The sediments being highly porous gravels and sands allowed solutions rich in silica to flow through them. They then solidified into hard rocks which formed a cap on the hot spring activity. The cap caused a periodic build up of pressure which was released by violent eruptions and breaking of the silicified rocks.

The original sediments close to the hot spring centre have now been totally altered, by repeated breaking and silicification (hydro-thermal brecciation). It is in these rocks that the gold occurs in the greatest concentrations. Surrounding this type of rock as a sort of halo the original sedimentary rocks, though highly silicified, are still recognizable in their original form. These rocks contain considerably less gold than the hydrothermal breccias but in certain areas are economically valuable because they have been fractured aad the fractures have been filled with quartz veins whieh contain relatively large amounts of gold.

Surrounding these silicified sediments is another halo where the original sediments have been altered, either totally or partially, to a form of clay (argillic alteration). This has occurred because of the continual heating of the rocks during the formation of the deposit, combined with the lack of silicification. The process can be thought of as greatly accelerated weathering.

The gold in the Cinola deposit is concentrated in the following rock types:

- The hydrothermal breccias close to the volcanic lavas and the fault.

- Those parts of the silicified sediments which have the most highly silicified quartz veinlets (stockworks).

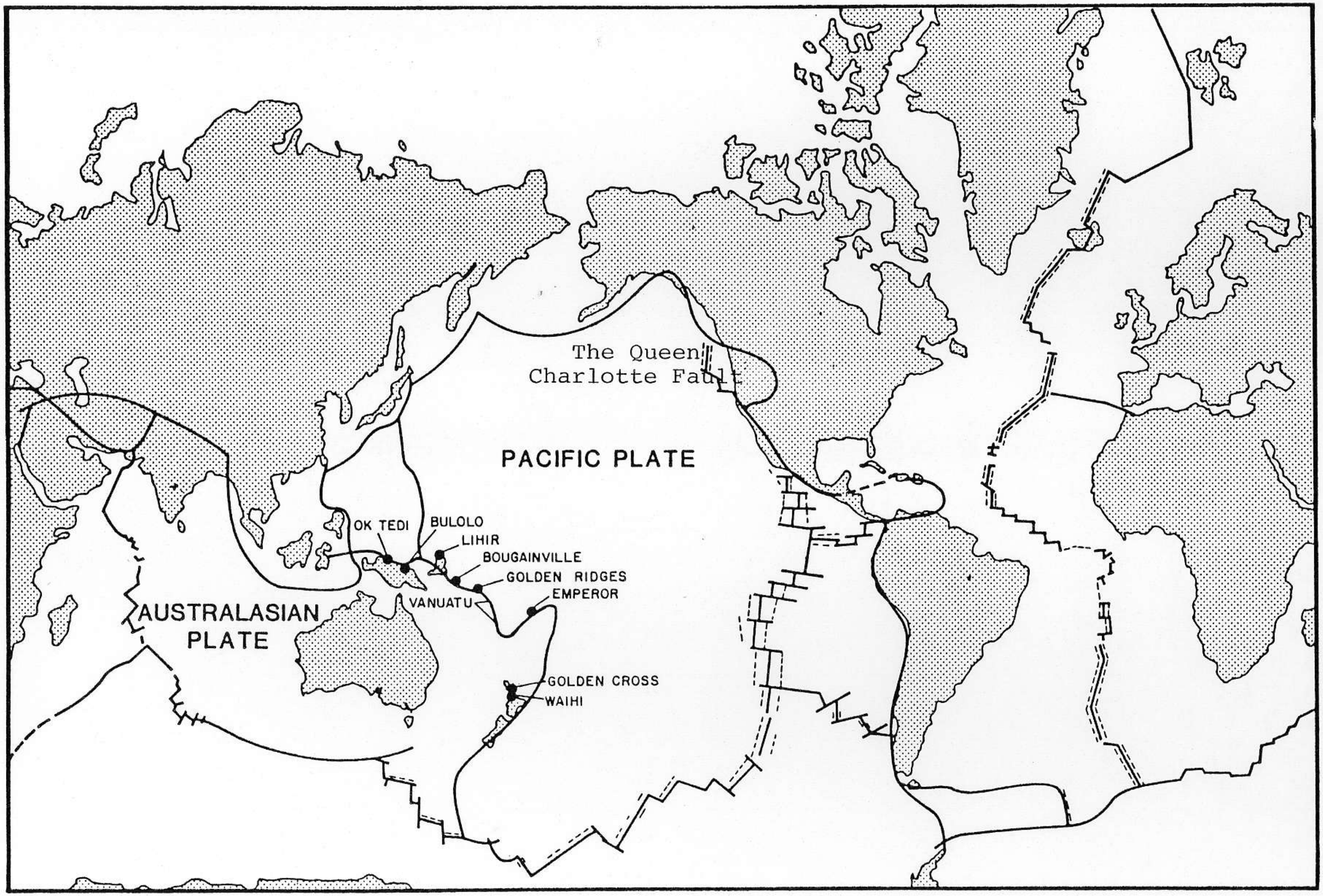
- Those particular parts of the sediments which have been totally silicified.

- In the volcanic lavas (rhyolite) wherever they too have been brecciated.

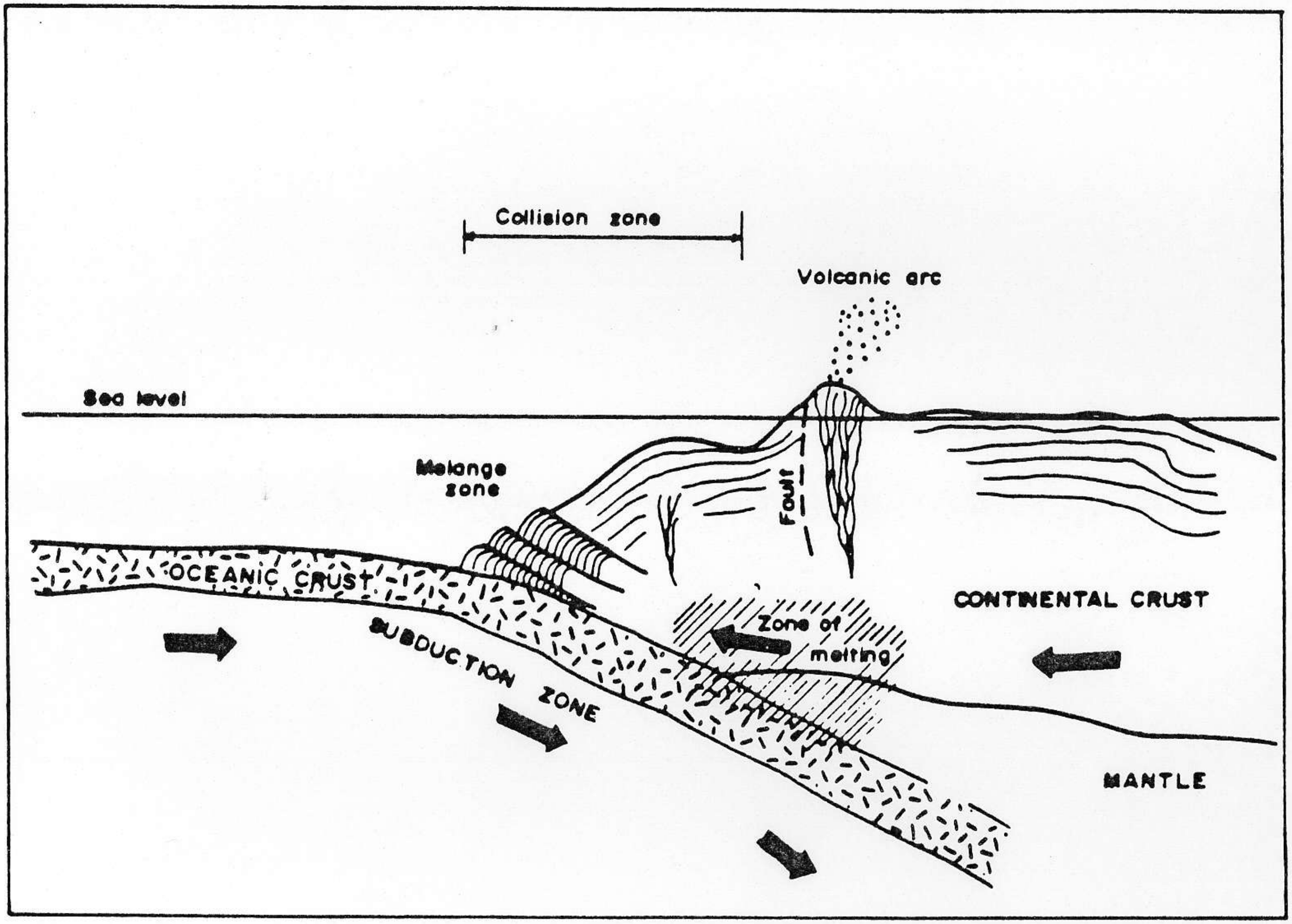
- The discrete quartz vein systems cutting all of the above rocks.

It is believed that the volcanism that was associated with the deposit occurred about 13 million years ago and the whole process of volcanic eruption and hot spring activity spanned a period of about one million years. It appears possible that there were a number of stages of volcanic activity, which could have been separated by quiet periods when the surface of the hot spring was weathered away and the deposit buried by more beds of sediments.

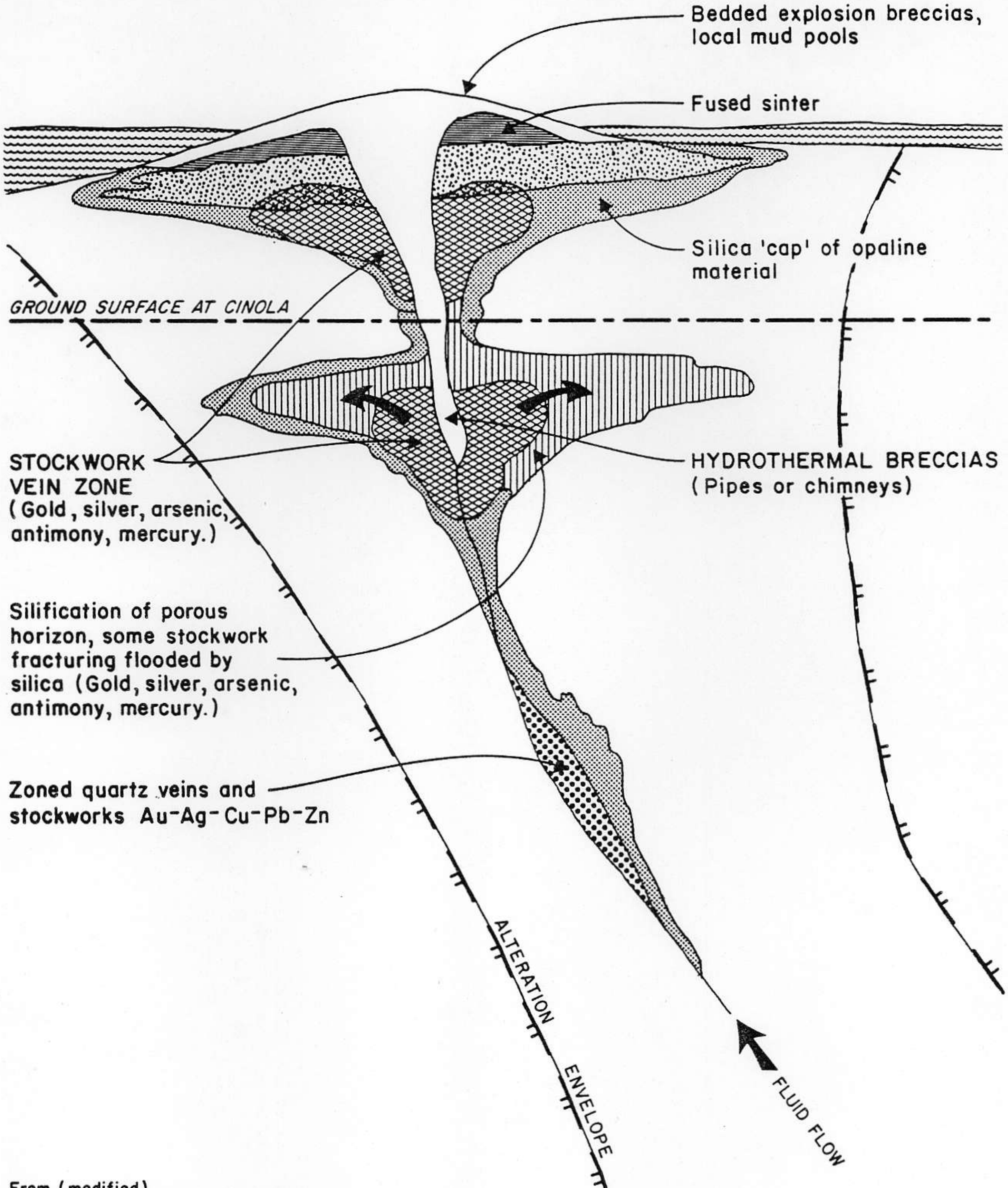
Epithermal deposits all have certain common features, even though each one is unique in some aspects. These common features enable the geologist to compare one deposit to another and the cross section of an epithermal system included with this leaflet shows how the Cinola deposit compares to other Canadian and North American deposits.



MAP SHOWING THE PACIFIC CRUSTAL PLATE



MAP SHOWING VOLCANIC ACTIVITY AT THE EDGE OF A CRUSTAL PLATE



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CROSS SECTION OF A SCHEMATIC MODEL OF A CLASSIC EPITHERMAL SYSTEM BEFORE EROSION

EPITHERMAL GOLD DEPOSITS

THE QUESTIONS THAT HAVE BEEN ANSWERED ARE:

WHAT ARE EPITHERMAL GOLD DEPOSITS?

WHY IS THE AMOUNT OF GOLD FOUND IN THE DEPOSITS DIFFERENT?

HOW DID THE CINOLA DEPOSIT COME TO BE FORMED?