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ITEM 25

DIAGNOSTIC MINERALS OF THE VARIOUS ROCK FORMATIONS
IN THE KIMBERLY DISTRICT

2320 0022

by J. H. Courtright.

The following is a brief summary of information obtained thru the examination of exposures on the surface and underground, and from churn drill sludge samples. The minerals were identified by microscopic observation of crushed rock or of panned concentrates of same. In cases where the heavy minerals are of very sparse distribution (such as the zircon in porphyry) gravity concentration is the most reliable method. Clove oil is the emersion media commonly used:

EIX LIMESTONE

Fresh. Mainly calcite, chert common, minor amounts of detrital quartz and zircon common. Sandstone horizons may be present.

Lightly metamorphosed. Mainly calcite plus variable amounts of amphibole as colorless, elongated prisms or needles. The amphibole closely resembles tremolite, however analyses show considerable alumina (H.S. 937, 938) and the mineral may be the aluminous amphibole, pargasite.

Strongly metamorphosed. Quartz, garnet, pyroxene (diopside), amphibole (tremolite or actinolite), chlorite, epidote, apatite. The percentages of these minerals present may vary considerably from place to place. For instance, in certain areas the rock is almost wholly composed of diopside, or of quartz and garnet, or of amphibole and quartz.

Silicified limestone. This formation is roughly one to three hundred feet in thickness and extends, according to churn drill information, from the Veteran to the west end of the Emma. It occupies a position immediately beneath the partly silicified Rib Hill Sandstone. It is composed essentially of chalcedony or very fine grained quartz, low temperature type. A mosaic texture (similar to chert) is common. Zircon (detrital) is generally sparse to absent, but may be abundant in a few horizons. The silica may be of supergene origin.

Kaolinized Limestone. Limestone is either wholly or partly replaced by clay (halloysite?). Churn drill samples should be examined before panning, otherwise clay may be entirely washed out. Siderite common in Richard, Alpha and east Tonopah areas. A few detrital minerals, such as zircon and quartz are often present. Amphibole (tremolite or pargasite) common in Richard clay.

RIB HILL SANDSTONE

Fresh. Mainly detrital quartz, det. zircon sparse to abundant, apatite sparse, tourmaline rare. Numerous limey beds (calcite) present.

Silicified. Remnants of sandstone texture show in fragments, det. zircon sparse to abundant, some fine grained quartz (type found in silic. limestone) may be present.

**Diagnostic Minerals of the Various Rock Formations
in the Kimberly District.**

PILOT SHALE

Fresh. Mainly lime or clay shale, calcite fairly common, detrital quartz and zircon rare.

Metamorphosed. Composed essentially of hornfels, garnet and diopside common. Detrital zircon rare. Andalusite common in shale of Morris 850 level.

CHAINMAN SHALE

Fresh. Mainly lime or clay shale, detrital zircon and quartz common, also calcite. More or less quartzite may be present.

Metamorphosed. Hornfels, garnet, quartz, pyroxene, epidote, andalusite, sillimanite. Detrital zircon may or may not occur. In section of Chainman near Ferra Shaft upper half is essentially limey, lower half sandy.

May be intimately intruded with porphyry near contacts -- or partially assimilated (?). In such cases (north wall Copper Flat Pit) euhedral zircon and feldspar will be present with above listed minerals.

JOANA LIMESTONE

Mainly coarse calcite, chert sparse to absent.

MONZONITE PORPHYRY

Euhedral zircon invariably present, apatite common. Sphene and rutile common. Zircon sometimes has corroded appearance and may be mistaken for detrital type.

RHYOLITE

Euhedral zircon sparse to absent. Clear or smoky quartz phenocrysts always present -- the only reliable diagnostic feature.

Rhyolite breccia may contain fragments of several of the various rocks -- for example, a specimen of the pipe-like breccia body at 25 Drift in the Morris contained both detrital (derived from sandy shale) and euhedral zircon.

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TABLE OF DIAGNOSTIC HEAVY MINERALS-----NON-METALLIC

		Zircon		Garnet	Diopside Actinolite?	Apatite	Epidote	Andalusite Stilpnomelane	Sphene Rutile	Tourmaline	Hornblende	Siderite			
		Det	Fr												
SANDSTONE Rib Hill	Fr	+		± Det.	± Sp.	± Det.		± Sp.	± Sp.	± Det.					
	Min	+		± Det.	?	?				?					
LIMESTONE Ely	Fr	*1		± *3	± *5	+	±					± *9			
	Min	*1		± *3	± *5										
SHALE Chainman	Fr	*2													
	Min	*2		± *4	± *6	+	±	±							
LIMESTONE Joana	Fr				± *7		?								
	Min														
SHALE Pilot	Fr														
	Min			±	+	±	±	±							
PORPHYRY	Fr	+				+	± *5	±	+		+				
	Min	+		?		+			+						
RHYOLITE	Fr	±									±				
	Min														

1. Ely ls. contains a few sandy beds---psuedo Rib Hill ss occurs on Rib Hill, in Richard Mine.
2. Ch. Sh. contains numerous sandy beds---discontinuous.
3. Heavy garnetized zones very common in met. ls.
4. Garnet abundant in intercalated lime beds---more prominent in upper half, KCC pit area.
5. Nearly always present in met ls, however some mineralized and subsequently altered ls contain mainly clay and quartz with but traces of the actinolite-diopside assemblage--Tonopah pit
6. present in met. calcareous beds.
7. Very minor amounts have been noted.
8. Found in pp in pipeline excavation under highway near hospital.
9. Abundant in Richard and Alpha, also found in East Tonopah.