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POLYTYPES OF TUNGSTENITE

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Tungstenite (WS_2) is isotypic with molybdenite and, to date, only two localities are known. *X*-ray powder data for material from the Emma Mine, Salt Lake County, Utah, are given by R. B. Ferguson in Berry & Thompson (1962), and for material from Crevola d'Ossola, Italy, by Graeser (1963).

Table 1 lists the pertinent portions of the *x*-ray powder diffraction data of molybdenite-2*H*, molybdenite-3*R*, and tungstenite (all from Graeser, 1963); tungstenite (Berry & Thompson, 1962); and tungstenite-3*R* (calculated). It is quite clear that the Italian tungstenite described by Graeser is the 2*H*-polytype. Although the Utah tungstenite was indexed as a 2*H*-polytype in Berry & Thompson (1962), the existence of the two broad bands indexed as *d*(103) and *d*(105) led Graeser to speculate on the possibility that the Utah tungstenite might be, in fact, the 3*R*-polytype. Through the kind cooperation of Professor R. B. Ferguson, the

TABLE 1. PARTIAL *d*-SPACINGS FOR MOLYBDENITE AND TUNGSTENITE POLYTYPES

Molybdenite-2*H* (Graeser 1963)		Tungstenite (Graeser 1963)		Molybdenite-3*R* (Graeser 1963)		Tungstenite (Berry & Thompson 1962)		Tungstenite-3*R* (This paper)	
d(Å)obs	*hkl*	*d*(Å)obs	*hkl*	*d*(Å)obs	*hkl*	*d*(Å)obs	*hkl*	*d*(Å)calc	*hkl*
2.28	103	2.29	103	2.35 2.20	104 015	2.35 2.22 *	103	2.362 2.207	104 015
2.04	006, 104	2.05	006, 104	2.04	009	2.06	006, 104	2.060	009
1.825	105	1.835	105	1.894 1.767	107 018	1.907 1.774 *	105	1.906 1.771	107 018

*Limits of broad bands.
N. B. Miller indices refer to hexagonal axes.

writers obtained an *x*-ray powder pattern and a specimen of the Utah tungstenite from the University of Manitoba (Number 2.9.6.2-1). Patterns were produced at the Royal Ontario Museum from Professor Ferguson's specimen as well as from specimens (M 16615 and M 11795) in our collections. Most of these patterns were similar to Professor Ferguson's pattern and showed only broad bands at the pertinent *d*-spacings. One pattern, however, showed discrete doubling and it must be concluded that the Utah tungstenite is the 3*R*-polytype. In fact, it probably is a mixture of the 2*H*- and 3*R*-polytypes.

The limits of the broad bands given in Berry & Thompson (1962) correspond to the calculated *d*-spacings for tungstenite-3*R*, as shown in Table 1.

It is virtually impossible to distinguish the *x*-ray powder pattern of a given polytype of molybdenite from the same polytype of tungstenite, because of the almost identical unit cell parameters. Consequently it is quite possible that tungstenite is more widespread than the literature indicates and that some "molybdenite" may be in fact tungstenite.

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NEW DATA ON TYRRELLITE

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A new cobalt–nickel–copper selenide, at first unnamed was described by Robinson & Brooker (1952) from the Beaverlodge area (previously referred to as the Goldfields District), northern Saskatchewan. Subsequently, the name tyrrellite was given to the mineral by the authors in honour of Dr. J. B. Tyrrell, one of the first geologists of the Geological Survey of Canada to enter the now famous Beaverlodge area and whose report in 1896 first aroused the interest in the mining potentialities of the

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