Rhenium

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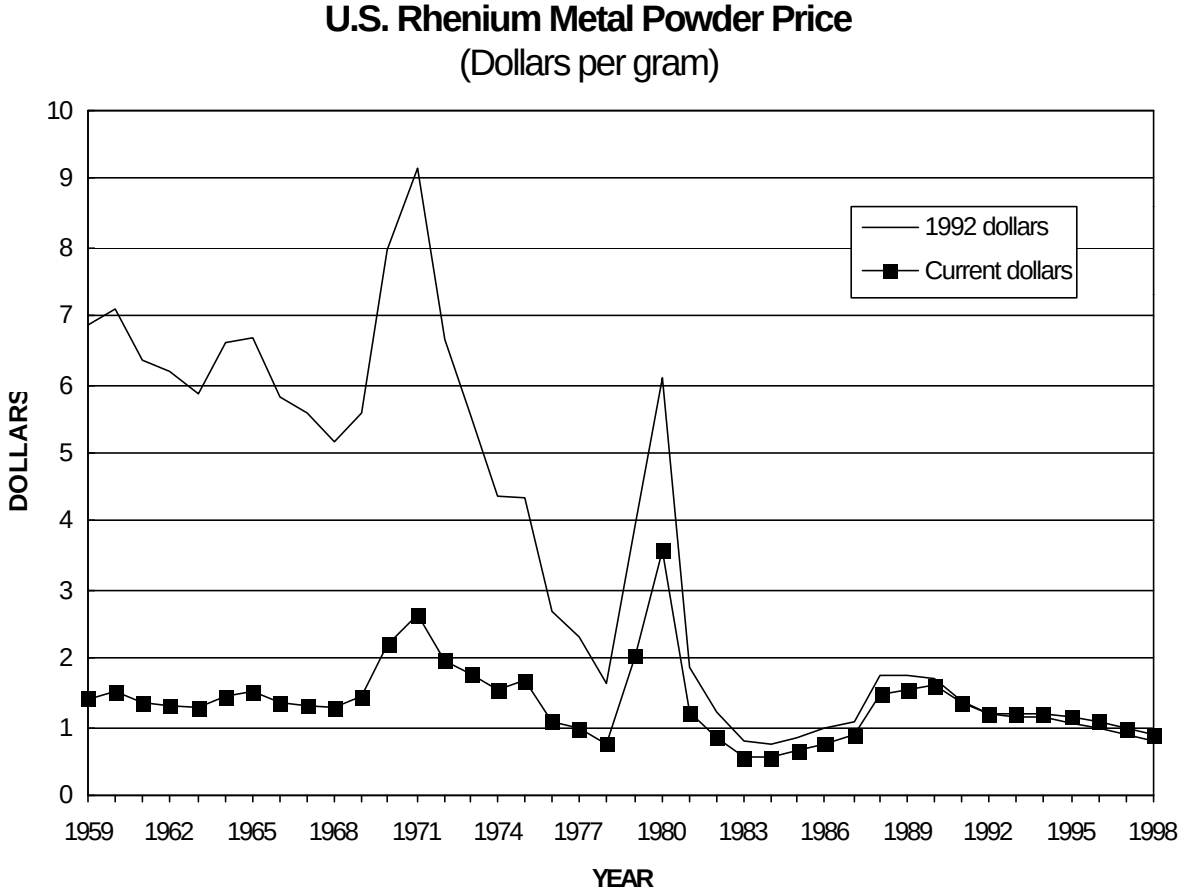

Significant events affecting rhenium prices since 1958

1970	Start of rhenium use in catalysts to make unleaded gasoline
1980	Doubling of percentage of rhenium in catalysts used to make unleaded gasoline
1991	Dissolution of the Soviet Union

Ida (Tache) and Walter Noddack, German chemists, are generally credited with the discovery of rhenium in 1925 (Habashi, 1997). The total cost for producing the first gram of rhenium in 1928 was estimated to be $15,000. At the University of Tennessee in 1942, A.D. Melaven and J.A. Bacon developed a process for extracting the element from the dust that accumulated in the roasting molybdenum ore. This plant in Tennessee was the only rhenium producer in the United States for many years and had a total output of several hundred pounds of the metal and its salts (Sutulov, 1976, p. 206).

In 1942, the price of the metal in the United States was $14 per gram; in Germany, however, the price was reportedly $4 per gram. The price of rhenium decreased from $14 per gram in 1942 to $1.99 per gram in 1951 as techniques for extraction were refined. From 1951 through 1954, interest in rhenium uses was stimulated by research associated with the Korean conflict. Consequently, the price rose to as high as $2.18 per gram. From 1954 through 1969, prices stabilized as new uses for rhenium were developed—the additions of

rhenium increase the corrosion resistance of stainless steel; the nuclear properties of rhenium offer potential as a reactor-shielding material for thermal neutrons; rhenium shield, when compared with a lead shield, results in a significant weight savings; and the inherent brittleness of tungsten and molybdenum metals is inhibited and the ductility is improved by alloying with rhenium. In 1968, the usage in alloy applications decreased as Atomic Energy Commission programs were completed. This decrease was reversed by the development of rhenium and rhenium-platinum catalysts used in the cracking of petroleum hydrocarbons (National Research Council, 1968). The use in catalysts reached a high of 75% of the demand for rhenium, resulting in a price peak in 1971 of $2.64 per gram. The price declined to $0.77 per gram in 1978 because the supply/demand was balanced. In 1980, the price increased to $3.58 per gram as a result of increased demand related to the doubling of the percentage of rhenium in the reforming catalysts used to produce unleaded gasoline (Millensifer, 1997). The price quickly deceased to $1.34 per gram in 1981. The price continued to decrease to $0.55 per gram in 1984, then it increased to $0.89 per gram in 1987. In 1988, the price increased to about $1.50 per gram as a result of demand for new alloys to be used in turbine engines for aircraft. This caused the price to increase to $1.60 per gram in 1990. In 1991, it decreased to $1.34 per gram and had decreased to $0.90 per gram by the end of 1998, partly owing to the decreased demand for aircraft engines following the dissolution of the Soviet Union.

References Cited

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U.S. Rhenium Metal Powder Price
(Dollars per gram)

Year	Price	Year	Price	Year	Price	Year	Price
1942	14.00	1957	1.46	1972	1.98	1987	0.89
1943	10.00	1958	1.45	1973	1.76	1988	1.47
1944	6.50	1959	1.43	1974	1.54	1989	1.55
1945	4.50	1960	1.50	1975	1.67	1990	1.60
1946	3.25	1961	1.35	1976	1.10	1991	1.34
1947	NA	1962	1.33	1977	0.99	1992	1.20
1948	NA	1963	1.28	1978	0.77	1993	1.20
1949	NA	1964	1.46	1979	2.04	1994	1.20
1950	NA	1965	1.50	1980	3.58	1995	1.15
1951	1.99	1966	1.35	1981	1.22	1996	1.10
1952	2.18	1967	1.33	1982	0.84	1997	1.00
1953	2.11	1968	1.28	1983	0.55	1998	0.90
1954	1.43	1969	1.46	1984	0.55		
1955	1.50	1970	2.20	1985	0.66		
1956	1.49	1971	2.64	1986	0.77		

NA Not available.

Note:
1942-82, published by the U.S. Bureau of Mines, but origin is unknown.
1983-94, Rhenium Commodity Specialist, U.S. Bureau of Mines (I.E. Torres and J.W. Blossom).
1995-98, Rhenium Commodity Specialist, U.S. Geological Survey (J.W. Blossom).