*** Name Origin:**

From the Rhines provinces of Germany.

*** Sources:**

Found in small amounts in gadolinite and molybdenite.

*** Uses:**

It is added to tungsten and molybdenum alloys and is used in refractory metal components of missiles, electronic filaments, electrical contacts, high-temperature thermocouplers, oven filaments, electrodes, igniters for flash bulbs, jewelry, plating of metals by electrolysis and vapor-phase deposition.

*** Additional Notes:**

Discovery of rhenium is generally attributed to Noddack, Tacke, and Berg, who announced in 1925 they had detected the element in platinum ores and columbite. They also found the element in gadolinite and molybdenite. By working up 660 kg of molybdenite they were able in 1928 to extract 1 g of rhenium. Rhenium does not occur free in nature or as a compound in a distinct mineral species. It is, however, widely spread throughout the earth's crust to the extent of about 0.001 ppm. Commercial rhenium in the U.S. today is obtained from molybdenite roaster-flue dusts obtained from copper-sulfide ores mined in the vicinity of Miami, Arizona, and elsewhere in Arizona and Utah. Some molybdenites contain from 0.002 to 0.2% rhenium. More than 150,000 troy ounces of rhenium are now being produced yearly in the United States. The total estimated Free World reserve of rhenium metal is 3500 tons. Natural rhenium is a mixture of two isotopes, one of which has a very long half-life. Thirty nine other unstable isotopes are recognized. Rhenium metal is prepared by reducing ammonium perrhenate with hydrogen at elevated temperatures. The element is silvery white with a metallic luster; its density is exceeded only by that of platinum, iridium, and osmium, and its melting point is exceeded only by that of tungsten and carbon. It has other useful properties. The usual commercial form of the element is a powder, but it can be consolidated by pressing and resistance-sintering in a vacuum or hydrogen atmosphere. This produces a compact shape in excess of 90% of the density of the metal. Annealed rhenium is very ductile, and can be bent, coiled, or rolled. Rhenium is used as an additive to tungsten and molybdenum-based alloys to impart useful properties. It is widely used for filaments for mass spectrographs and ion gages. Rhenium-molybdenum alloys are superconductive at 10 K. Rhenium is also used as an electrical contact material as it has good wear resistance and withstands arc corrosion. Thermocouples made of Re-W are used for measuring temperatures up to 2200°C, and rhenium wire has been used in photoflash lamps for photography. Rhenium catalysts are exceptionally resistant to poisoning from nitrogen, sulfur, and phosphorus, and are used for hydrogenation of fine chemicals, hydrocracking, reforming, and disproportionation of olefins. Rhenium costs about $12/g (99.99% pure). Little is known of its toxicity; therefore, it should be handled with care until more data are available. Rhenium is a metallic element that has a very high tensile strength (80,000psi), high modulus of elasticity, is virtually insoluble in hydrochloric acid and does not oxidize or corrode in saltwater. In addition it has the widest range of valences of any element and it retains its crystalline structure all the way to its melting point. Alloys of rhenium-

molybdenum are superconductive at 10K.