Chromium

John F. Papp, the U.S. Geological Survey chromium commodity specialist, has compiled the following information on chromium, an important metal essential to health and property.

Chromium is one of the most indispensable industrial metals and it plays an essential but hidden role in daily life. Chromium is used in many consumer and building products, and it contributes to a clean, efficient and healthy environment.

As a trace mineral, chromium is also vital for good health. Insufficient amounts result in glucose intolerance. Organ meats, mushrooms, wheat germ and broccoli are all good dietary sources of chromium.

Chromium is also critical in the manufacturing of stainless steel. Chromium makes stainless steel "stainless" by providing a protective coating, which prevents rust and is easily sterilized. It is popular in kitchen fixtures such as countertops and sinks, and also in flatware, cooking ware and utensils. In factories, food-processing equipment parts that come in contact with food are composed of stainless steel. And because of its hygienic properties, medical and dental tools and equipment are also made of stainless steel.

Another one of chromium's critical uses is in transportation. In automobiles, outside of chrome decorations such as ornaments, trim and hubcaps, a more important use of chromium is in the engineering alloys, which are useful in applications where temperatures are high. Exhaust pipes are commonly made of stainless steel, and the catalytic converter, used in most parts of the world to reduce exhaust emissions, is housed in stainless steel. Buses and passenger trains also use stainless steel to reduce vehicle weight and maintenance costs. Chromium in superalloys permits jet engines to operate in a high-temperature, high-stress, chemically oxidizing environment.

On U.S. roadways, chromium pigments are used to make the yellow lines indicating traffic lanes. Chromium-containing pigments also find their way into beauty products.

Fortunately, chromium is in abundant supply, produced from the mineral and ore chromite. In nature, the deposits are of two major geologic types: stratiform and pod-shaped (podiform).

Stratiform deposits occur in South Africa and India, with one of the largest found in the Bushveld Complex of South Africa, a layered intrusion containing more than 11 billion metric tons of chromite resources. One layer alone, informally named the Steelport Seam, contains 1.5 billion metric tons of chromite resources. Podiform deposits are found in Kazakhstan where parts of the ocean floor were pushed over continental rocks by tectonic forces. Together, South Africa, Kazakhstan and India (in order, by tonnage produced) accounted for 79 percent of global production of chromite in 2003.

Since 1965, there has not been chromite ore production in the United States. Small, marginally economic resources are available and could be exploited in the event of a national emergency. U.S. import dependence is only about 75 percent because substantial amounts of chromium are recycled as part of the incorporation of stainless steel scrap in the stainless steel production

process, reducing energy consumption and conserving natural resources. The United States produces about 2 million metric tons of stainless steel per year that contains, on average, about 17 percent chromium.

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Chromite ore is a common source of chromium. Image from *Minerals in Your World*.