What's in my Cell Phone?

- **Arsenic (gallium arsenide in the amplifier and receiver)**. Mined in China, Chile, Morocco, Peru, Kazakhstan, Russia, Belgium and Mexico.
- **Copper (circuitry)**. Mined in Chile, United States, Peru, China, Australia, Russia, Indonesia, Canada, Zambia, Poland, Kazakhstan and Mexico.
- **Gallium (gallium arsenide)**. Mined in China, Germany, Kazakhstan and Ukraine.
- **Gold (circuitry)**. Mined in China, United States, Australia, South Africa, Peru, Russia, Canada, Uzbekistan, Ghana, Papua New Guinea, Indonesia, Brazil, Mexico and Chile.
- **Magnesium compounds (phone case)**. Mined in China, Turkey, North Korea, Russia, Slovakia, Austria, Spain, Australia, Brazil, Greece, India and the United States.
- **Palladium (circuitry)**. Mined in Russia, South Africa, Canada, United States and Zimbabwe.
- **Platinum (circuitry)**. Mined in South Africa, Russia, Canada, Zimbabwe, United States and Colombia.
- **Silver (circuitry)**. Mined in Peru, Mexico, China, Australia, Chile, Russia, United States, Poland, Bolivia and Canada.
- **Tungsten (circuitry)**. Mined in China, Russia, Canada, Austria, Bolivia and Portugal.
- A multitude of **petroleum products** are used in cellular phones.

INTERESTING FACTS

- About 130 million cell phones are retired annually in the United States. Collectively, these cell phones weigh about 14,000 metric tons. Annually retired cell phones contain almost 2,100 metric tons of copper, 46 metric tons of silver, 3.9 metric tons of gold, 2 metric tons of palladium, and 0.04 metric tons of platinum.
- Recovery and recycling of cell phones are in the early stages of development, as is the case for recycling of electronics in general. For cell phone recycling to grow, recycling must become economically viable. Efficient recovery infrastructure, product designs that simplify dismantling, and other changes are needed to facilitate the growth of cell phone recycling.
- Gallium arsenide is used in the amplifier and receiver.
- Magnesium compounds are alloyed to make the cell phone cases.

Minerals Education Coalition

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SOURCES

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Sources:

http://www.eoearth.org/article/Cell_phone_recycling; Charny, Ben, 2005. U.S. cell tally-180 million users and counting. CNET.com.

Environmental Literacy Council, 2004. Life cycle of a cell phone.

Fishbein, B.K., 2002. Waste in the wireless world—The challenge of cell phones. New York, N.Y., INFORM, Inc., 81 p. ISBN: 0918780780.

Gartner Inc., 2005. Gartner says mobile phone sales will exceed one billion in 2009.

Heine, Seth, 2002. Interview with Seth Heine. CollectiveGood, Inc.

Mobile Takeback Forum, 2005. FAQ: What is a mobile phone made from?.

Most, Eric, 2003. Calling all cell phones—Collection, reuse, and recycling programs in the U.S. New York, N.Y., INFORM, Inc., 48 p. ISBN: 0910780810

Nokia, 2005. Nokia 3595 phone features.

Sullivan, D.E., 2006, Recycled cell phones—A treasure trove of valuable metals: U.S. Geological Survey Fact Sheet 2006-3097, July, 4 p.

http://www.mii.org

U.S. Environmental Protection Agency, 2005. ReCycling.

U.S. Geological Survey 2010 Mineral Commodity Summaries, http://minerals.usgs.gov/minerals/pubs/mcs/2010/mcs2010.pdf

Other Interesting Facts:

The National Research Council (NRC) of the National Academies *Critical Minerals Report* states that cell phones contain indium, titanium dioxide (for the dielectric heart of the phone), and indium tin oxide (in the liquid crystal display). The NRC Report also states that “the technological barrier to cellular communication was overcome only in the 1970s with the discovery of barium titanate ceramics. These ceramics possess the requisite dielectric properties for avoiding signal broadening and heat buildup, while operating over a wide temperature range at a consistent frequency. Other essential components of the cellular telephone include ceramic magnetic switches that contain rare earth elements (REs) and indium and the base stations for the cell phone networks that also use the element indium, as well as tantalum.”