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Keeping civilization from collapsing

by Thomas W. Camm, Associate Professor, Mining Engineering Department, Montana Tech

Civilization as we know it would collapse without mining engineers. There, I said it (actually I wrote it, but you get the idea). This is being published in *Mining Engineering*, so I know that most of the readers will be sympathetic to my premise. I would like to address my remarks in particular to our colleagues and friends, — and detractors — who may not be aware of how important the profession and the industry we serve is to the preservation of our civilization.

Buildings

Let's start with the buildings in which we live and work. Most buildings rest on a foundation of concrete, which contains cement (commonly containing limestone mixed with a small amount of clay, heated in a kiln, then mixed with gypsum) and aggregate (gravel and sand) and water. On this foundation, the building itself is constructed of concrete, steel, drywall (composed of gypsum plaster and paper), wood, glass, copper and a host of other materials. These materials have to be extracted out of the ground from a mine or, in the case of paper and wood, trees have to be cut down using metal tools, transported over roads constructed of mined materials, to be cut and processed by equipment using a variety of metals. Without the materials supplied by the mines we design and operate, modern buildings are not possible.

Glass

I mentioned glass in buildings. Glass is also used for eyeglasses, windshields in cars, drink containers, protecting framed pictures and screens for electronics, to name just a few applications. A quick look on Wikipedia shows that even for the most common glass, a mix of silica, sodium carbonate, lime, magnesium oxide, aluminum oxide, lead, barium and thorium are all used. And yes, all of those materials must be extracted from the ground.

Roads

Roads, parking lots and airport runways are most commonly constructed of asphalt or concrete. Asphalt is composed of petroleum materials mixed with aggregates.

While I will acknowledge our petroleum engineers colleagues supply part of the raw material, they would be lost without metals we provide for drill derricks, engines, drill steel and bits, pipelines and refineries. All

are constructed using equipment made from a variety of metals, all of which must be mined. In addition to the roads, bridges and rail lines require aggregates, concrete and steel for their construction. Once again, without the individual components of concrete, gravel and steel, all of which must be mined, the transportation infrastructure of our civilization will collapse.

Power

Our civilization runs on power. Currently, we can meet our power needs with a combination of coal, gas, hydro and alternatives, including wind and solar. While there are those who would like to see coal go away, for now, at least, it is unreasonable to expect people to pay an exorbitant extra amount for power and to deny other countries the opportunity to develop their economies without the benefit of reasonable power costs supplied by coal.

But if you want alternative energy, we are fine with that, too. Wind turbines are beautiful feats of engineering. Solar panels tap into an inexhaustible power source. Electric cars, with their lithium batteries, do not have toxic emissions. Guess what? For all those applications, you are going to need lots of metal and other materials that come from our mines, so we are good, regardless of the power sources used by our civilization.

Food

Who do we let starve? There are currently more than seven billion people on the planet, with the population expected to grow to nine billion by midcentury. Current food production already struggles to meet world demand. Modern farming methods use machines built from metals and fertilizer containing potash and phosphate, all of which depend on materials extracted from mines. So, to put it in stark terms, without the metals for modern machinery and the potash and phosphate for fertilizer to magnify the production from farms, there will not be enough food.

And let's not forget...

I could go on — many of my students would say and on and on — for there are a few other reasons we need mining.

Ships and aircraft, which are essential to global trade, transportation and a modern military, use a variety of metals: iron, manganese, molybdenum, chromium, nickel, tungsten and cobalt are common in different types of steel. Power lines and communication lines use aluminum, copper, steel and concrete for tower foundations. Gold and silver, in addition to their use as precious metals, are also critical components in electronics. Catalytic converters, which play a central role in reducing auto emissions, contain platinum and palladium as key components.

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PETER J. CRESCENZO

An appreciation by Martin Kuhn and Roger Newell

Peter J. Crescenzo was born in Duluth, MN in 1923. He graduated from Michigan Technological University with two degrees, a B.S. in mechanical engineering in 1947 and a B.S. in electrical engineering in 1948. He died in



CRESCENZO

Tucson, AZ after a very short illness on May 30, 2014.

Crescenzo served in the U.S. Navy from 1943 to 1946. Part of his naval career was spent as an aerial navigator in the Pacific. He loved baseball and briefly played professionally as a third baseman. As a boy and teenager, he was the family vintner, and as an adult, he was an expert connoisseur of good wines and Italian cuisine.

From 1949 to 1953, he was a partner in Crescenzo and Holmes Electrical Contractors. In 1953, Crescenzo joined Pickands Mather and Co. in Minnesota's Iron Range and held titles of general superintendent, regional metallurgist, plant supervisor and electrical engineer. He stayed with Pickands Mather until 1964, when he joined Jones and Laughlin Steel Corp. as manager, raw materials engineering and construction.

In 1971, Crescenzo joined Newmont Mining Corp. in New York, NY as assistant chief engineer. He was vice president of engineering from 1974 until 1989. During his 18 years with Newmont, Crescenzo played a critical role in Newmont's projects worldwide. He served with distinction on the boards of several of Newmont's subsidiaries, including Atlantic Cement and Peabody Coal. When he retired to Tucson, AZ, he began providing consulting services through P.J. Crescenzo and Associates.

At the Telfer Gold Mine, a Newmont grassroots dis-

covery in Western Australia's remote Patterson Range, the original 1975 project capital cost estimate was US\$38 million for a 1,224-t/d (1,350 stpd) mill and related infrastructure; the project was considered uneconomic. At the request of Newmont's CEO, Plato Malozemoff, Crescenzo found the necessary savings and the project was built for US\$27 million.¹ Malozemoff also stated that Peter Crescenzo's performance through the years has been outstanding.² His contributions to Newmont are also mentioned in the 2010 book *Going For Gold — The History of Newmont Mining Corporation*.

In 1993, Crescenzo and Martin C. Kuhn joined to form Minerals Advisory Group, LLC and later, in 2006, formed Minerals Advisory Group Research and Development, LLC in Tucson, AZ. For the past 21 years, Crescenzo dispensed sage advice and counsel to the international mining community at large. The industry has lost an exceptional engineer and mining company executive.

Crescenzo had many friends. All will miss his accurate economic intuition, his cheerful nature and his sharp pencil. He was well respected for his engineering abilities and for the inspiring and instructive way he mentored younger engineers with whom he worked. He was an active member of SME and of MMSA and a licensed professional engineer.

Crescenzo is survived by his loving wife, Antonia Crescenzo, who was also his constant companion and skiing partner, and by his children, Peter Crescenzo Jr., Kitty Batman, Phillip Crescenzo, Andrew Crescenzo and Diane Blomgren.

¹ Malozemoff, Plato, 1990, Oral History Bancroft Library, Univ. of Calif., Berkeley, California, p. 169.

² Ibid. p. 285. ■

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Final thoughts

I like trees. I live in the mountains of Montana and revel in being able to see tree-covered mountains under blue sky. I don't want to go back to the days of smoke from wood-burning stoves and dust-filled air from dirt roads and horse-drawn wagons.

We are a modern society, and the solutions for the challenges of keeping our air and water clean, people fed and, yes, our planet the right temperature, will be technological solutions. And for those solutions, we will need the materials supplied by mining engineers and the mines they develop.

We do disturb the land. But we are not the mining industry of the last century, and the combination of our own self-regulation combined with government regulation means we

do our job in a responsible manner.

Without mining, you literally might have to live in caves. And even then you will need mining engineers, because we are the ones who know how to keep underground openings from collapsing. (Sorry about that.) I know there are things about mining that might bother you, but trust me — you would not like the alternative.

Rock in the Box editor's note: Tom, thanks for your insightful and thought provoking article. I'm sure that the other engineering disciplines would like to weigh-in on this as well. Comments or article submissions by readers can be sent to Bob Washnock, Rock in the Box editor, for response. His email address is cobreminer@gmail.com. ■

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