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Mineral extraction on Great Salt Lake has local, national and global impact

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Heavy equipment packages salt near ponds leased to U.S. Magnesium on Dec. 8, 2015. While the company's primary product is magnesium metal, its ponds also produce road salts.

LEIA LARSEN, Standard-Examiner Staff

Tom Tripp sat in U.S. Magnesium's Rowley conference room, rapping a pencil against a can of Fresca.

"If you think of aluminum foil, it's kind of soft, that's why it molds over your leftovers," he said. "This can, it's pretty thin. It'd be a bag except this aluminum has 1.5 percent magnesium in it."

That's what magnesium is mostly used for, alloying with aluminum. Pretty much anything made out of aluminum, apart from foil, has magnesium, from soda cans to pots and pans to the bleachers at little league games.

The number two use of magnesium is auto parts, because magnesium is also lightweight.

"So if you put it in an automobile, it makes it lighter and the fuel efficiency better," Tripp said, popping open the beverage.

After that, magnesium is used for steel production, chemicals, pharmaceuticals, anti-aircraft avoidance systems, fireworks — all kinds of things.

The U.S. Magnesium (http://usmagnesium.com/) plant where Tripp, the company's technical services manager, sat drinking his soda is situated along the Great Salt Lake's western shore. It is the only producer of magnesium in North America, and with the exception of a small operation out of Brazil, it's the only producer of magnesium metal in the Western Hemisphere.

So what would it mean for magnesium — and the price of all the products it goes into — if the Great Salt Lake's water levels keep dropping, and like other saline lakes in the world, ultimately disappears?

Tripp took a drink and slid can along the table.

"Well, that means you'd be almost completely dependent on China for magnesium," he said. "And the price worldwide would probably go crazy."

The market of commodities is complex, but Gabriel Lazoda, an associate professor in economics at the University of Utah, agrees with Tripp.

"When they start having that kind of pricing power, what they tend to do is increase the price," he said. "And that decreases the quantity. That's the type of squeeze that gets put on consumers."

China dominates the magnesium industry, producing over 80 percent of the world's primary supply, according to a 2013 report (http://minerals.usgs.gov/minerals/pubs/commodity/magnesium/myb1-2013-mgmet.pdf)by the U.S. Geological Survey.

It's hard to say how much magnesium the Great Salt Lake provides — because U.S. Magnesium is the only producer on the continent and their information is proprietary. Tripp estimates their contribution is about 14 percent, and the Great Salt Lake Advisory Council, created by the Utah

Legislature, cites that figure (http://www.gslcouncil.utah.gov/docs/2012/Jan/GSL_FINAL_REPORT-1-26-12.PDF), too.

While the U.S. doesn't produce a huge chunk of the world supply of magnesium, its citizens use a whole lot of it and consumers, whether they know it or not, prefer that competing industries exist to help keep the cost of cans, cars and golf clubs low.

The reason China has such a stranglehold on the magnesium market is the same reason it dominates the world supply of a lot of commodities — abundant low-cost labor, laxer environmental regulations and cheap coal to burn for energy.

The only reason U.S. Magnesium is able to compete is because of a somewhat controversial anti-dumping tariffs and because it uses the sun to extract the mineral from Great Salt Lake brine.

"We have 65,000 acres of infill solar ponds," Tripp said. "In the course of a year, we're evaporating 40 billion gallons of water."

And not having to generate power to harvest all the raw magnesium saves Tripp around $2 billion annually, he figures.

"We get this big value from solar evaporation. We don't have mining costs, which tend to be high, so the lake gives us unique advantages," Tripp said.

For centuries — millennia, really — rivers flowing from the Wasatch Mountains have dissolved ore from rocks and carried them to the Great Salt Lake and its massive precursor, Lake Bonneville. As Lake Bonneville dried up, its minerals concentrated (http://geology.utah.gov/popular/general-geology/great-salt-lake/commonly-asked-questions-about-utahs-great-salt-lake-lake-bonneville/#toggle-id-6) down to what's now the Great Salt Lake and the Bonneville Salt Flats.

Because the Great Salt Lake is so big and shallow, a massive amount of water evaporates off its surface every day — around 2.6 billion gallons (http://learn.genetics.utah.edu/content/gsl/physical_char/), or enough to fill 3,900 Olympic-size swimming pools.

The Great Salt Lake has no outlet, so while the water evaporates, the only way salt minerals leave the lake is if they're taken out.

Five companies currently extract salt and minerals from the lake through evaporation. Mineral extraction on the Great Salt Lake brings over $1 billion to the Utah economy each year.

Apart from magnesium, salt for roads and potassium for fertilizer are the other important products mined from the lake.

While dropping lake levels help concentrate those valuable minerals even more, the loss of water is taking an economic hit on the extraction industries.

U.S. Magnesium, for example, had to move its pumps to get water to its evaporation ponds. That cost over $500,000, Tripp said. If the lake continues dropping, they'll have to dig canals, which takes complicated permits and costs millions of dollars. Those growing operation costs cut into profits.

"When you're a commodity, you don't get to set the worldwide price. It's not like your cost goes up and you suddenly get to increase the price," Tripp said. "Take salt, there's a worldwide price for salt. Suddenly your salt costs more (to extract), so your profit is less."

Compass Minerals (http://www.compassminerals.com/who-we-are/locations/ogden-utah/) (formerly Great Salt Lake Minerals), which employees around 375 people at its Ogden plant, had to extend canals to reach the lake's low water this year. Their target product, potassium, is used in sulfate of potash (https://en.wikipedia.org/wiki/Potash), and is sold to farms in Florida and California to grow fruit and nuts. (Potash is a combination of salts and other mined minerals that contain potassium in a water-soluble form.) The fertilizer produced by Compass Minerals helps increase yields, ever more important as the nation's farmland gets gobbled up by urban development (https://e360.yale.edu/digest/most-productive-us-farmland-disappearing-at-fastest-rate-report-says/2627/).

The lake is the only commercial source of sulfate of potash in North America and the fertilizer is all used domestically.

"The Great Salt Lake provides an essential mineral that's critical to putting food on the plate of U.S. consumers," said Joe Havasi, director of natural resources for Compass Minerals.

Compass Minerals' representatives are quiet about how lower lake elevation is affecting its Great Salt Lake business, but officials with the Utah Division of Forestry, Fire and State Lands say the company has spent "quite a bit of money and time extending their intake this year." The division knows this because it is in charge of issuing permits to mineral companies and collects royalties based on how much the companies extract.

Compass Minerals moves water from the north arm to its evaporation ponds through a 21-mile underwater canal called the Behrens Trench. (http://epod.usra.edu/blog/2014/06/behrens-trench.html) The process is getting trickier as water evaporates and salt builds up.

Compass Minerals operates off the north arm of the lake, which is significantly saltier than the rest of the lake because of the Union Pacific Railroad Causeway, which effectively cut off all freshwater sources to that part of the lake. Now a salt crust below the water is building up as thick as eight feet (http://www.standard.net/Environment/2015/11/20/Great-Salt-Lake-oddity-created-by-causeway-to-get-makeover) in some areas.

According to scientists working with the Utah Department of Natural Resources, salt keeps accumulating in the Behrens Trench and needs to be cleared.

So, dropping water levels and concentrating minerals, "it's kind of double-edged" for Compass Minerals, said Andew Rupke with the Utah Geological Survey.

"It makes it easier to get to the potash because you don't have to evaporate as much, but you have trouble with loading," he said.

Even as the costs mount, Tripp and Havasi said they aren't worried about those companies completely drying up on the Great Salt Lake, but both said they're concerned about the health of the ecosystem on which their industry depends.

"This (is) a watershed issue, not just a lake issue," Havasi said.

Water diversions have made the lake 11 feet lower than it would naturally be today, according to a white paper recently published by scientists with Utah State University.

Tripp and Havasi also said they worry about the proposed Bear River development project that could drop the elevation another 8 inches.

Mineral industries' salt ponds account for 1.4 feet of that drop, which isn't insignificant. But Compass Minerals has been lauded recently (http://www.standard.net/Environment/2016/04/27/Oil-Gas-and-Mining-board-recognizes-Compass-Minerals-for-Great-Salt-Lake-protection.html) for efforts to reduce water needs while expanding operations.

"We've really grown in the appreciation of the health of the lake," Havasi said. "We're aligned with so many stakeholders with many different interests. But one common thing is, we all want water to flow to the lake so the lake will be healthy."

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