Gibellini Hill mining site, located in central Nevada

THE CRITICAL ELEMENT:

Not to be undermined, vanadium now the rising energy-source superstar

By Maramis Choufani
Las Vegas Tribune

Once upon a time – way back in 1801 – Andres Manuel del Rio, a Spanish-Mexican scientist and naturalist, discovered a new brownish lead-bearing mineral in Hidalgo, Mexico. Originally calling it panchromium (for its diverse colors), del Rio soon renamed it erythronium (or eritronium) based on the Greek word, eritros, for the color red, because its mineral salts, once heated, turned predominantly red.

The following year del Rio made arrangements to have some samples of his newly discovered element sent off to Paris for analysis; unfortunately, those who did the analysis mistakenly concluded that it only contained chromium and not the critical element that was to become known by the symbol "V," atomic number 23 on the periodic table.

In 1830, however, vanadium surfaced again. This time the discoverer, Swedish chemist and professor Nils Gabriel Sefstrom, named the colorful substance after the Germanic goddess of beauty, love and fertility, Vanadis. And this time, del Rio's erythronium was renamed vanadinite for its actual vanadium content, making it clear to the world that erythronium and vanadium were indeed one and the same. It was not until 1867, however, that an English chemist used hydrogen to remove the chloride surrounding the metal discovered in del Rio's erythronium to isolate the pure vanadium for the first time.

In the years since, vanadium has come a long way: Broadly accepted in scientific and mining circles as the valuable metal it is, it is appreciated on many levels for its diverse applications, value, and purity – from strengthening steel for use in buildings, bridges, ships, automobiles and more; to its use in titanium applications that encompass the latest aircraft needs; to its use in small applications such as the vitamin and supplement market; to its marriage with the original and less powerful lithium-ion batteries for electric vehicles (hence allowing for more charge recycles, slower depletion of energy, and fastest recharges); to its more forward-looking and perhaps largest application of all: that of vanadium electrolyte for use in renewable energy storage batteries. According to Bill Radvak, president and CEO of American Vanadium Corp., leading the way toward such a new grid scale energy storage solution is – the vanadium flow battery.

To understand how the vanadium flow battery will work, in the easiest possible terms, we can look at it this way: The U.S. Department of Energy has said that "the electric grid is the world's largest supply chain without a warehouse." But what, exactly, you may ask, is an electric grid? An electric, or electrical, grid is an interconnected network for delivering electricity from suppliers to consumers. It consists of three main components: 1) plants that produce the electricity from combustible (coal, natural gas, etc.) or non-combustible (wind, solar, or other power) fuels; 2) transmission lines to carry the electricity from power sources to demand centers; and 3) transformers, which actually transform the electricity into "travelling voltages" to enable the distribution lines to get the power to its ultimate destinations.

Once in that supply chain, the "dispatchable energy" or "dispatchable power" (terms used in the electricity industry) of the vanadium flow batteries allow inherently intermittent flows of energy to be regulated from moment to moment, which enables the grid to balance the amount of energy being put into the wires, in keeping with the demand from the consumers, Radvak explained.

Today, Nevada can boast having the only viable mine project capable of economically and simply producing amounts of vanadium sufficient for making this country's desire for forward-looking solutions to our current energy-need problems come true. Once the actual sulfuric acid heap-leach operation — the industrial mining process that will extract the precious metals and other compounds, including the critical element vanadium, from ore – is up and running at the Gibellini Hill project, Nevada can realistically look forward to having both the only producing vanadium mine in the country, and having "the greenest mine in the nation," Radvak said. Even more, the U.S. can then hopefully look forward to going from being dependent on other countries for its vanadium imports to depending on itself for fully 100 percent of its vanadium needs.

As it stands now, the U.S. imports 99 percent of its vanadium, with more than 80 percent coming from countries with geopolitical risk. The big suppliers of vanadium currently are Venezuela, Russia, China, South Africa and Mexico, with most of our vanadium being

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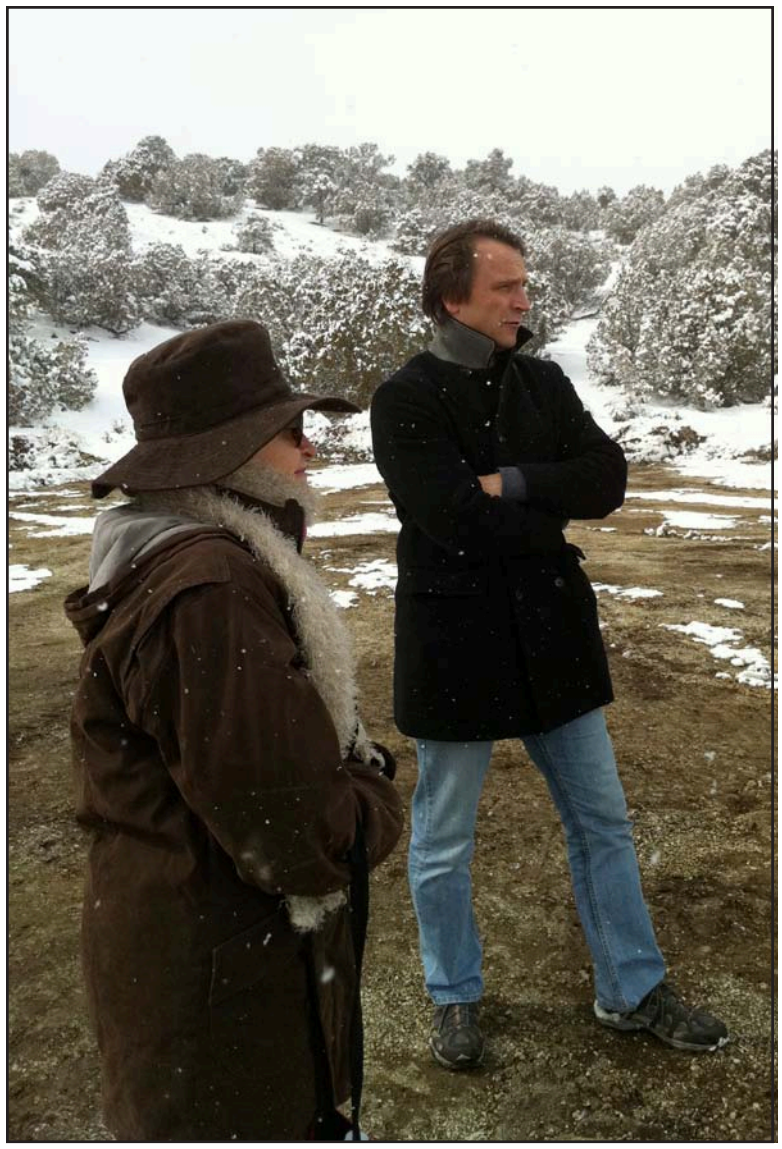

Maramis Choufani, managing editor of the Las Vegas Tribune, and Bill Radvak, president/CEO of American Vanadium, at Gibellini Hill.

Vanadium ore nuggets

Vanadium

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imported from China.

The Gibellini Hill mining project, practically smack-dab in the middle of the state, is totally above ground and is probably one of the least expensive and simplest vanadium mine operations to be developed anywhere in the world. Located about 25 miles or so south of Eureka, Nev., in what may well be the most remote part of the continental United States, somewhere off Highway 50 (yes, the one often referred to as "the loneliest highway in America"), the Gibellini property covers over 7,000 acres of the state that has already given birth to one of the world's top ten mining sites.

Currently, vanadium is most well known for making steel stronger. And a little bit goes a long way, since adding only ≤0.2 percent of vanadium to steel inscreases its strength up to 100 percent while decreasing its weight up to 30 percent. But it's more than an agreeable little "body-builder" for steel. It's really a "Clark Kent" just waiting for its big chance to "save the day" by using its super-energy powers in amazing ways. Already more or less on President Obama's "radar" ("Vanadium Redox Fuel cell – that's one of the coolest things I've ever said out loud," Pres. Obama said in his closing remarks at a forum on small business in Cleveland, Ohio last year), the vanadium flow batteries are finally making their presence well known after more than a quarter of a century of being more like the Invisible Man than Superman.

So, what makes vanadium the power source to consider? In a nutshell: (1) ease of mining (it's all above ground, and the ore flakes off in pieces without needing considerable strength and effort to chip it away. "We're basically mining a hill," said Alan Branham, vice president of exploration for American Vanadium); (2) economy and environmental acceptability of the mining and processing of the ore (environmental permitting process underway); (3) sufficient water available and being leased from two nearby ranches; (4) economy of the processing procedures (using the low-tech heap-leach operation, suitable for the project due to the nature of the hill. "It was pre-crushed," said Branham, adding that "Mother Nature formed this," referring to the fractures in the ore); (5) mine availability in an already-established vast mining mecca in the heart of Nevada, formerly known for its gold deposits; (6) the long-range view of achieving cleaner energy all along the way, with reduction of CO_2 and greenhouse gases; and (7), last but not to be considered least, energy independence and self-sufficiency.

It may seem like a big nutshell, but then this is a big mining project for the ultimate good of our state, our country, and our world.

So not to be undermined, vanadium really IS the rising energy-source superstar.