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Jack Lifton: The Age of Technology Metals

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Jack Lifton, a consultant, author and public speaker with more than 45 years of experience in sourcing and recycling minor metals (including the rare earths), shares his views on the current balancing act between technologies production and available natural resources. Mr. Lifton identifies these dwindling resources and the mining companies in which to invest, as he warns of the devastating effect production cuts will have on our everyday lives in "the age of technology metals."

The Gold Report: Jack, you've been speaking a lot at conferences about technology metals and rare earth metals. Can you give us some insights into your theories?

Jack Lifton: I've been at about seven or eight conferences around the world this year talking about my theme, which is that (notwithstanding the quality of a technology) all production of technologies is strictly regulated by the amount of the particular natural resources available. And we have very quietly, but obviously, transformed our civilization into the age of technology metals.

We're not dependent on just technology metals, however. Without rare earth metals, we can no longer make a powerful small motor, a nickel metal hydride battery, a Prius automobile or even lasers. We can't make cutting tools, military armor, or ammunition without tungsten. We can't make high-efficiency cooling systems for our power plants no matter what their fuel source—oil, gas, coal, wind, solar or nuclear—without molybdenum. Either we're running out of oil or we're running out of rare earth. We're always running out of something, and that is not the issue. The issue is how much can human civilization produce of something in a given year.

TGR: What's the difference between a minor metal and a rare earth metal?

JL: Rare earths are a particular group of metals that are from Atomic #57 to 71 and, with the addition of the metals scandium and yttrium, there's a total of 17 metals designated rare earth. Minor metals were, until recently, considered to have only minor uses. I don't call them minor; I refer to them as the technology metals.

TGR: So if we look at what's happening with the economy, knowing that we're in a recession, which are the minor metals that will still be required going forward?

JL: That's a good question and I break them down into two groups—by-product metals and primary minor metals. Some of the most important of the so-called minor metals are only found as by-products of base metals. For example, the base metal zinc is our only source in the world of germanium, cadmium and indium metals. The base metal copper is a source of 75% of the world's molybdenum and rhenium. Copper is also the source of 95% of the world's tellurium and selenium; and the base metal aluminum is the only

source of the metal gallium.

And when they reduce the production of base metals, they also reduce the production of molybdenum, rhenium, selenium, and tellurium. So what? Well, you can't make a jet engine or a rocket engine without rhenium. First Solar Corporation in Ohio makes cadmium telluride thin film photovoltaic cells; the cadmium comes from zinc, and the tellurium comes from copper. Therefore, the reduction in base metals production has also reduced the production of the key minor technology metals used for solar—and there is no substitute. So right this minute we're in the situation of running on inventory, which is not large, and recycling is almost non-existent for these materials because their uses are dissipated.

TGR: If we're running on inventory right now and there's no possibility of substitute or recycling, why haven't the prices skyrocketed already?

JL: They're actually holding pretty well. None of these metals is exchange traded. You can't get prices for them by looking in the *Wall Street Journal*. So you need to take a look at the current pricing of tellurium, selenium, gallium and germanium and watch those prices. The reporting on those prices is spotty. So what I'm saying is don't watch the actual daily pricing reports. Watch the trends. In a period when base metal production is going down, it means minor metal production is also going down, by-product metal, and we're headed for a crisis here because there isn't very much and the materials we make from them tend to be ordered on a much longer term.

TGR: As an investor then, the play here is to invest in equity companies that are producing base metals. Would that be correct?

JL: Correct. That's correct.

TGR: Are there certain of these by-product minor metals that are more critical?

JL: I predicted at a recent conference that copper would hit perhaps as much as $10 a pound by 2011. Everybody said, oh, you're crazy. But I'll tell you who didn't tell me I was crazy—all the men who were on those panels. One of them said to me, you know what's wrong with your prediction? I said what? He said you're way low—we know that there are critical technologies that are now based on derivatives of copper.

And these industries are going to get a lot of publicity in the next few years because they're making cooling systems for power plants or batteries or photo cells, and they won't be able to get material. I mentioned the Prius a minute ago. Are you aware that every Prius has 64 pounds of copper on board? There are a million of them on the road. That's 32,000 tons of copper just in the Prius. Do you think you can make a car without copper? Our government has decided to continue the production of cars in Detroit. Every one of them eats more than a ton of steel, almost 100 pounds of copper, magnesium, aluminum. And if that comes from existing inventories, how long will those inventories last?

TGR: Can't you get the copper from recycling?

JL: Yes, but if you're going to get it from recycling instead of new production, you'd have to open some smelters. We don't have that kind of capacity.

TGR: If we're recycling copper, then we still don't have these by-product minor metals.

JL: That is correct because they've been extracted when they were produced the first time. No new copper

smelter or lead smelter has been approved in the United States for years, maybe decades. It takes three years to do the paperwork for a copper smelter, and most copper companies with existing smelters are quite satisfied; they're not even starting the idea of a recycle. We have in America a dozen smelters for recycling battery lead that produce more than 20,000 tons a year each, more than 20,000. Anyway, the total recycled lead in America each year is over a million tons. Now you don't hear about that, do you?

TGR: No.

JL: The Prius uses a nickel metal hydride battery based on the rare earth metal lanthanum. The world's production of lanthanum is almost 100% in the People's Republic of China. In America, we have at least two mines, that I'm aware of, that can produce lanthanum. Toyota's been stockpiling lanthanum for some time, it's been quietly investing; and last week it announced that it had bought a Japanese trading company that specialized in rare earth metals. Through that company, Toyota is now making an investment in a Vietnamese rare earth mine.

TGR: I read that.

JL: Toyota's research center for North America is right near me. So I see these guys in the drug store and meetings and ask why they are investing in Vietnam. They say the Vietnam government has assured them it wants this kind of mining to happen, and they need the material. They also said they're very, very concerned about the Chinese cutting off the world from rare earths, which they've said they're going to do. They're raising the export tax, they're reducing allocation, and there's a prediction that Chinese domestic demand for rare earths will equal Chinese production in 2013, which means no more export.

Toyota knows it needs a safe, reliable source of rare earth metal. Now why don't they come to the U.S., which in 1994 was the world's largest producer of rare earths? Because it feels the regulatory environment here and the political environment is so anti-mining that there's no point to it. In the U.S., we have a company called Molycorp, which was owned by Chevron until two months ago when it was sold to a group consisting of Resource Capital of Denver and Goldman Sachs, the financier, in New York.

In 1994, Molycorp's mine in Mountain Pass, California, was producing 100% of the United States' needs of rare earths and 34% of the world's. It was shut down in '94 because the Chinese came roaring into the market with low prices and put them out of business. Beyond that, there's only one other rare earth source in North America—a private company called Thorium Energy, which has deposits of rare earths and the metal thorium in Lemhi Pass, Idaho. Thorium is looking to finance it or sell it to a developer. That's it for North American rare earth sourcing.

Toyota has been so aggressive in sourcing the rare earth metals (lanthanum, in particular), no other car company in the world outside of Japan has an opportunity to go with the nickel metal hydride battery for use in a hybrid car. It's not about how much there is—it's about how much is produced. And the amount produced is now insufficient to satisfy the Chinese domestic market and Toyota alone. Japan's demand for rare earths this year in the summer was projected to be 40,000 tons of total rare earths; however, China has allocated only 38,000 tons for the entire world this year.

As for Ford, I thought it was committed to the lithium battery. I was very, very surprised to find that it's committed to the nickel metal hydride battery and that the lithium battery is something in the distant future. Now lithium is found as a primary material but it's found in the mineral spodumine, which is used primarily in the glass industry. It's very expensive to extract lithium from this mineral for use in batteries. Since 1994, brine mines have been the largest source of lithium for batteries. The largest group of brine

mines in the world is in South America.

TGR: We've talked a lot about the car industry here, specifically in the battery arena.

JL: There's another rare earth metal that's critically important to our society—neodymium. In 1984, General Motors and Sumitomo developed the neodymium iron boron alloy for permanent magnets, which is the basis of all modern electric motors because it allows you to make a very small electric motor with the highest possible power density. Neodymium total world production is less than 20,000 tons. That may sound like a lot to you, but it's tiny. And the fact is it's recently been projected that a single wind turbine electric generator producing 1 megawatt of electricity requires one ton of neodymium.

TGR: One ton?

JL: One ton. Now the U.S. installed capacity for electric power production is 1,000 gigawatts, which is 1 million megawatts. So, to replace America's capacity with wind would require 1 million tons of neodymium. At current world production, that would take around 50 years—if there were no other uses for neodymium. Clearly this isn't going to happen.

We can produce only so much of any material in a given year. Last year marked the highest production of base metals in history. We produced 39 million tons of aluminum, 16 million tons of copper and 1.3 billion tons of steel. Unfortunately, there's not much in the way of by-products from iron, but copper and aluminum production account for almost all of the minor metals—gallium, molybdenum, rhenium, selenium and tellurium. If the world economy declines and we don't reach those peaks again, then we've already peaked in the production of those metals. The uses are mainly dissipative. We lose them. It becomes uneconomical to recover them by recycling, so we're going to have to get along in a world where we use less, which means any industry planning on increasing production based on those metals is in big trouble. One of them clearly is solar.

TGR: Because we're putting on our investor hats, it sounds like in order to move forward with the whole thing on hybrid cars, solar. . .a whole variety of technology, either we need to invest in China or in base metal production.

JL: Correct.

TGR: Do you foresee a situation in which a Prius is going to cost some ungodly amount because the rare metals used in the car are exponentially expensive?

JL: That's what Toyota is worried about. The world production of cars this year was supposed to be 70 million units, so now it's going to be 60 million due to the downturn. But the projection for 2015 is 125 million cars built, including 20 million just from China—which, by 2015, will not be only the world's largest producer of automobiles but the largest producer in the history of automobiles.

China's developing huge industries utilizing these materials, which it currently controls like rare earth metals. And as those industries build, we're seeing the export of these metals sharply reduced. Can we really live without magnets for small motors? Just remove everything that's got a small motor in it (a cell phone, Blackberry, etc.), and you'll see why we really need the rare earth metals from China.

I happen to know the Japanese trading companies have approached SQM (NYSE:SQM)(Santiago Stock Exchange: SQM-B, SQM-A)(Sociedad Química y Minera de Chile S.A.) in Chile to talk about locking up

some lithium supplies because they are concerned that Japanese car companies will need lithium. If you could name one American trading company that's ever bothered to think about that, I'd be shocked. The people I know in Chile told me that, about a year ago, Japanese delegations started showing up talking about exotic metals for the first time. Japanese and Chinese companies have already bought into Chilean mining operations. But aren't you guys mainly interested in gold?

TGR: Oh, no. We do precious metals, base metals. In fact, we think some of the more interesting plays are going to be in rare earth. We have been hearing more about the mineral tantalum? What is it used for?

JL: Tantalum is one of the most important metals used to make capacitors—a fundamental component to many of the electronics we use daily. It is found in our cellular telephones, iPods and computers. You are probably aware of the fact that the Australian company, Talison Minerals, the world's largest producer of tantalum raw material, has shut down production.

TGR: Right. That's where the question was going—what is the impact of that?

JL: The impact is dramatic. Talison, historically, produced up to 63% of the world's tantalum raw material. Where will the makers of capacitors get their raw materials from?

TGR: If there's a demand for tantalum, why is it shutting down?

JL: First off, the tantalum industry is unique in its lack of transparency with respect to the supply of raw materials. I feel that the shutdown of Talison's mine is a decision that is more strategic than one relating to the demand for tantalum. There are limited alternate sources for tantalum raw materials, which puts Talison in a strong negotiating position if there is a real or perceived disruption in the supply of raw materials. And right now, it's in a price negotiation.

TGR: In a price negotiation with whom?

JL: The processors of the tantalum raw materials. Processors, such as Cabot Corporation (NYSE:CBT) and H.C. Starck have long-term contracts with Talison at fixed prices. Talison supplies them with concentrate, and they produce tantalum metal and powder from which electronics are made. Talison knows that if processors do not purchase material from them, the alternative is to purchase material from central Africa. The major companies are reluctant to do this due to the growing publicity of the fact that much of the material is mined illegally and proceeds are used to fund the ongoing civil wars. The material is even referred to in the industry as 'blood tantalum.'

TGR: So there are no suppliers in more politically stable areas, such as Europe or North America?

JL: Not any major suppliers. Talison is betting that, due to this fact, they can continue to sign long-term contracts with processors at prices much higher than the metal's spot price. I believe they probably will until a new deposit of significant size is developed.

TGR: We understand that Commerce Resources Corp. (TSX.V:CCE) (PK SHEETS:CMRZF) is developing a tantalum project. Are you familiar with them?

JL: Yes I am. Commerce Resources is not producing, but they're close. They are at the stage of pre-feasibility and developing a very large project in British Columbia, Canada. I believe that of those companies exploring and developing new deposits, Commerce is well positioned. They are financially strong and have been involved in the tantalum industry for years. Putting their deposit into production and

offering competitive rates, they will capture the attention of processors and capacitor manufacturers who have long been looking for alternate sources of raw materials. This is a common theme for exotic metals, such as tantalum.

TGR: So you agree that some of the more interesting plays are going to be in rare earths?

JL: Yes, I agree with that. I think that the minor metals are going to lead the recovery in base metals.

Jack Lifton is an independent consultant, focusing on the sourcing of nonferrous strategic metals. His work includes exploration and mining, and the recovery of metal values by the recycling of not only metals and their alloys but also of metal-based chemicals used as raw materials for component manufacturing. Mr. Lifton has more than 45 years of experience in the global OEM automotive, heavy equipment, electrical and electronic, mining, smelting and refining industries. His background includes the sourcing, manufacturing and sales of platinum group metal products, rare earth compounds and ceramic specialties used to make catalytic converters, oxygen sensors, batteries and fuel cells. He is knowledgeable in locating and analyzing new and recycled supplies of "minor metals," including tellurium, selenium, indium, gallium, silicon, germanium, molybdenum, tungsten, manganese, chromium and the rare earth metals.