



ZERO WASTE INSTITUTE

NEWSLETTER

August 2010

(Strawberry Crab - as cute as crabs get)

This month we concern ourselves with a group of 17 chemically similar metals known as the **Rare Earths** that our high tech industries are totally dependent on but that the Chinese have a lock on.

As a reader of this Zero Waste newsletter, by now you surely expect me to discuss ways in which production and use can be designed in better ways to conserve and reuse products by eliminating discard. In a critical situation such as we have here, you well might expect that that kind of consciousness would be normal. You would expect this entire country to be looking toward ways to conserve their existing stocks of rare earths by recirculating them perpetually. Of course, as you can guess by now, you would be wrong. All of the efforts, without any exception I can find, are directed at finding *new sources* of rare earths. Finding ways to not squander the stocks we already have, never takes root in mainstream minds. Wasting, obsoleting and discarding are woven into the warp and woof of American production. As a survey article from *Science* shows, effective reuse plays no role whatsoever in strategic planning, even while these essential metals are dribbled away into dumps.

The Rare Earths aren't all actually rare (lanthanum is as common as chromium) but they have that name because classical chemists had a lot of trouble separating these elements so they were normally only encountered as a mixture. Today it is quite a bit easier to separate them, though it's still expensive so the prices still make them rare.

At one time there were important sources of rare earths in the US and Australia but today the critically important Chinese sources dwarf all the rest, producing about 97% of the world's supply.. Without the Chinese sources, it will be difficult to produce any quantity of the high-tech products that require various rare earths to gain those properties we covet: their efficient operation, their small sizes or their astounding optical abilities. Since the West is possibly facing a stand-off with China for the world's high-tech markets, this would seem to give the Chinese a huge advantage. Following up on this reality, the Chinese are reducing exports by at least 40% next year and are expected to cut off all exports soon after that.

As you might imagine, the high-tech manufacturers and the military hardware makers are scrambling to find new sources, so long as they don't include design for recapture.

A recent article in *Science* lays out the coming critical need for rare earths. A condensed version of the article can be found at the end of this newsletter. Read it now..

How could we reuse these special metals which have been incorporated in small quantities into widely dispersed products, such as fiber optic cables and computer displays? Does anyone know? Probably not directly, since there is no effort to learn how to reverse the product distribution networks which move smoothly from large scale manufacturer to small scale application; from highly concentrated to highly dispersed.

Is this a reason to give up? I think not. Naturally when no research has been done, any topic will appear confusing and overwhelming. In order to learn how to reverse the distribution network to re-concentrate resources, we will probably need to create analogies to all of the units of that network, such as shippers, distributors, warehousemen, pricing outlets, wholesalers, retailers, resellers and bargain outlets, to name a few.. The way to find out is to put money behind research into the technology of reuse. Without investment into research, there will never be solid information about reuse and the climate of ignorance will perpetuate the comfortable assumption that it must simply be too difficult. The result is the convenient self-defeating cycle we find ourselves in, which profits the garbage industry by fostering a baseless assumption that reuse must not be worth studying since it hasn't been studied.

One thing is already clear. We will not get there by any kind of low-level recycling. We can't just burn up or chop up fiber optics and cell phones to get at their metals. That is incredibly irresponsible and wasteful. The ways that these things are made must be changed to foster long term reuse of all components.

Once more, we are led to the basic question that motivates these newsletters. **How much of a crisis will it take before mainstream society is forced to sponsor research into ways of breaking the stranglehold of garbage creation ?** When will discard be recognized as the great nexus of social wasting which we must eliminate or lose our planet ?

So far it seems that the crises have not become severe enough. But they are coming.

THE LION BEDS DOWN WITH THE LAMB IN CALIFORNIA – BUT THIS IS RIDICULOUS

My friend Bruce sent me a very public ad for the California Product Stewardship Council (CPSC) at <http://calpsc.org/about/partners.html>. This is signed by the largest garbage company in the country (and the Sierra Club) and by the worst garbage company in Marin County (and the Green Party), by dump and incinerator operators across the

country (and Sustainable San Rafael) all of whom have actually donated money to this organization.

It is exactly as though Al Gore and Bill McKibben had both written checks to Exxon and Chevron and joined with them to somehow muddle through to solving the climate crisis.

It's as though the Louisiana Shellfish Society and the Texas Shoreline Protection League had paid for a full page ad demanding the BP Oil Co. receive a billion dollar tax rebate and be invited to drill anytime anywhere.

The idea behind product stewardship – also known as EPR – Extended Producer Responsibility – is that if we collect up all the used up broken garbage that has some manufacturer's name on it and ship it back to that manufacturer, he will somehow get religion and do the right thing. To avoid getting back any more of his broken DVD Players or TV's or sofas, he will reuse all of the materials and design his products to be as green as green can be.

No matter that a container of garbage delivered to any business in this country engenders only one response. Get in a dumpster and fill it up! Garbage rules and reuse is an uphill fight. If the garbage is going to keep on coming, then sign a private, hidden contract with a garbage company to keep the dumpsters coming too. The garbage companies know this full well. Why else would they be dropping thousands of dollars into the CPSC? EPR is the greatest gift to perpetual discard and garbage creation that has ever scammed the public. And boy is it working great.

Nobody asks what happens when the manufacturer is in China or Malaysia. Or the products are started in Japan, assembled in Guam and finished in Puerto Rico. This is the face of global trade today, yet the CPSC fantasizes some convenient factory no further than Canada or Cleveland.

But the environmental movement in the resource field has never found a dump they couldn't love, especially if it paid dues. Recycle a few scraps, promise the moon and we are all one big happy family. Meanwhile the garbage keeps on coming and the dumping subsidies abound. EPR may be coming soon to an organization near you so be prepared.

Please, take a look at the CPSC website shown above, and ask yourself where else you can see so clearly the failure of the environmental movement and the success of planetary destruction in one blinding insight. And think of how Zero Waste theory cuts through all of the posing and provides real, workable solutions.

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Rare-Earth Elements

Table 1. Names and symbols of the REE:

La	lanthanum	Tb	terbium
Ce	cerium	Dy	dysprosium
Pr	praseodymium	Ho	holmium
Nd	neodymium	Er	erbium
Pm	promethium	Tm	thulium
Sm	samarium	Yb	ytterbium
Eu	europium	Lu	lutetium
Gd	gadolinium	Y	yttrium

A FEW CRITICAL APPLICATIONS OF RARE EARTHS

Rare Earth	Application	Price Indication	Uniqueness
Europium	Red phosphor on color CRT's	>\$1000/kg	Irreplaceable
Europium	Red phosphor in LCD displays	>\$1000/kg	No substitute
Erbium	Doped fiber optic cables (the basis of modern communication).	~\$700/kg	No substitute
Nd, Gd, Dy, Sa or Pr	Strong permanent magnets for hard drives and many other electromechanical units		No substitutes
Gd, Tb, Dy, Ho, Er and Tm	Magnetic refrigeration		No substitutes
Y, La, Ce, Eu, Gd, Tb	Energy efficient fluorescent lamps		Other alloys are less efficient
La	Lanthanum nickel hydride batteries for electric cars		Other alloys work poorly

Chinese Policies Could Pinch U.S. Efforts to Make Electric Vehicles (condensed version)

From Science: July 23, 2010

(emphasis added - PP)

Last week, President Barack Obama high-lighted his commitment to clean-energy jobs by visiting the last of nine battery-manufacturing plants to be funded from last year's massive economic stimulus package....

This month, China announced that it will cut exports this year of rare-earth elements (REE) by 40%, leaving demand outside China exceeding the supply for the first time ever. Combined with Chinese export tariffs of 10% to 25%, the policy could ground fledgling efforts to build clean-energy industries in the United States and other Western countries. China currently produces more than 97% of all rare earths, a group of 17 elements consisting of scandium, yttrium, and the 15 lanthanides. They are vital for a host of electronics and green-energy technologies, and their use is expected to triple between 2000 and 2014, topping 200,000 metric tons....

In response, the United States and other countries **are gearing up for production**. Molycorp Minerals in Greenwood Village, Colorado, for example, is expected to **reopen its mine** in Mountain Pass, California, in 2012....

That gap could spell trouble for the Obama Administration's plans to develop electric vehicles. In recent years, the U.S. Department of Energy (DOE) has spent roughly \$5 billion on projects to promote electric-vehicle technologies, including nine battery-manufacturing plants and 11 electric drive component-manufacturing facilities. Last week, DOE said that by 2015 these investments would give the country the capacity to produce up to 40% of all advanced batteries manufactured globally....

Most of the new advanced batteries are slated to be lithium-ion batteries, which do not require rare earths from China. Even so, **lithium is mined in only a few countries**, which has also prompted concerns about supply shortages. And current hybrid-car batteries typically include *more than 10 kilograms of lanthanum*, the lightest of the rare earths....

Although one of the most abundant rare earths, lanthanum could be hardest hit by China's new export controls, which cap overall exports. Observers worry that companies, to increase profits, may try to export more high-value REEs, such as dysprosium and terbium, and drastically reduce lower-value elements such as lanthanum....

To counter the advantages enjoyed by Chinese companies, U.S. companies that make magnets and other high-tech components want Congress to set up loan guarantees to back domestic mining, processing, refining, purification, and metals production of rare earths....

References:

1. <http://www.eurekalert.org/features/doe/2001-09/dni-lrb061902.php>
This is an article about the introduction of lanthanum into batteries at the rate of 1/3 of the weight (1/5 of the molar fraction) of the La-Ni mix.
2. *"The only hope for the further availability of the rare earths outside of China after 2015 is a collaborative effort by the rare earth mining, refining, metal and alloy production and fabrication, and end use product manufacturing industries to build a complete rare earth supply chain, including, by the way, a recycling industry targeted at recovering the rare earths from civilian and industrial products and processes, in one country, such as Australia, Canada, or the USA, or, at least, on one continent, North America."*
<http://seekingalpha.com/instablog/65370-jack-lifton/39864-some-thoughts-on-the-rare-earth-crisis-of-2009-as-2010-approaches>
3. Table of Rare Earths taken from <http://pubs.usgs.gov/fs/2002/fs087-02/fs087-02.pdf>
4. <http://www.sciencemag.org/cgi/content/short/329/5990/377-a>