

Banging on a Tin Can – North America's Tin Vulnerability

☒ Tin (Sn) this prosaic metal has caused a flurry amongst the minerals trading crowd in recent years as it has gone from pariah to the most-sought-after status. Long associated with the humble tin can it has come into its own with the switch into the metal away from lead solders. This has happened as alluvial production from places like Malaysia and Indonesia has been in gradual decline. Three events promise to deepen the supply decline. Firstly the Indonesians are choking off exports on unelaborated ore wanting to keep the value added onshore, secondly the massive mine owned by Minsur in Peru is entering its last years of production, while in China the over-exploitation of reserves promises lower production at weakening grades.

As we noted in our recent discussion here tin is one of the swathe of other metals of which the US has NO stockpile, in fact no Western Hemisphere supply source. It was interesting recently to read that when the Second World War started that the US had no tin production and the only deposits it had in Alaska were inadequate for its needs, so it was dependent on Bolivia. We might note that relations with Bolivia these days are not as rosy as they were in 1942 and that the South American nation is barely a shadow now of what it was in the tin production stakes back then.

Some stats...

Tin has not been mined or smelted in the United States since 1993 and 1989, respectively. Twenty-five firms used about 90% of the primary tin consumed domestically in 2012. The major uses were: cans and containers, 23%; construction, 18%; transportation, 17%; electrical, 12%; and other, 30%.

In 2012, primary metal consumed was worth \$1.02 billion; imports for consumption/refined tin amounted to \$1.38 billion; and secondary production (recycling old scrap) was \$381 million.

The US's source of imports (2008–11) were Peru, 47%; Bolivia, 17%; Indonesia, 11%; China, 3%; and others, 22%. North American industry is now totally dependent upon distant, declining and unreliable sources.

Avalon – Embedded Value

Back in the days before Rare Earths took off, Avalon was hedging its bets by calling itself “Rare Metals” rather than “Rare Earths” and its property mix reflected this with not only the Thor Lake project but also the Tin/Indium property at East Kemptville in Nova Scotia. This 100% owned project is located approximately 45 km northeast of Yarmouth, in Yarmouth County, southwestern Nova Scotia in the vicinity of the former East Kemptville Tin Mine.



The deposit was discovered in 1979 by Shell Canada Resources Ltd. It was developed as a mine by Rio Algom between 1982 and 1985. The mine was North America's first and only primary Sn producer, more analogous to sites in Europe, where similar greisen-hosted deposits had been mined for centuries. It was a large low-grade open pit operation producing some 4,000 tpa up to its closure in 1992. The mine had operated for seven years and was also a producer of zinc and copper.

East Kemptville was first thought of as a large (56 Mt of 0.17% Sn) greisenized, quartz-topaz leucogranite. It was initially interpreted as something similar to a large, porphyry-style deposit, with evenly disseminated mineralization. Once mining began, however, it became apparent that there was a strong structural control of the mineralization along northeast-trending shear and fault zones

and along country rock contacts. Most of the tin and base metals in the deposit are contained within 1-10 m wide zones of massive quartz-topaz-sericite-muscovite greisen.

Even though East Kemptville, when producing, was the lowest grade hard rock producer in the global tin industry, the mine and mill performed famously with 75% recoveries, excellent for such a low grade ore. The mine's demise was the result of poor economic circumstances. When mining began in 1985 tin sold for over \$9/lb. but within a month the global tin market had collapsed, Sn dropped to less than \$3/lb. and it remained so until the mine closed in 1992. In the opinion of the provincial mining authority, some 12-15mn tonnes of low grade Sn ore remains there.

The property held by Avalon consists of 10 contiguous exploration licenses and a Special License comprising 15,480 acres (6,264.53 ha) and 880 acres (356.12 ha) respectively. The Special License was granted by the Province of Nova Scotia in August of 2006 over part of the former mine site and since that time, various exploration licenses have been staked to cover potential regional exploration targets identified in the company's compilation efforts. Avalon's 22 claims total approximately 880 acres (356.12 ha).

Avalon acquired mineral title to the property in 2005, although Rio Algom (now part of the giant BHP Billiton group) retains surface rights to the property. Avalon has been granted a 12 month extension of its obligation to spend \$1.5 million on exploration and a preliminary economic analysis.

Last official news out of this project was back in 2010 when a planned work program awaited agreement by the Nova Scotia government and BHPB. In 2010 Avalon had spent around \$500,000 on exploration of the Ikes Ridge property which is adjacent to the East Kemptville site. However recently Allnovascotia a 'well regarded' local news website said "...the Yarmouth-based deposit is in limbo as Bubar and Co. continue to negotiate

with the province and a nearby property owner for site access. Under its special license Avalon committed to a \$1.5 million spend by September 2014. But it has requested the Nova Scotia Department of Natural Resources extend its deadline to reflect the delay””

Road access is good with Highway #203 which connects the Town of Yarmouth to the southwest with the Town of Shelburne to the east passing a short distance to the northwest of the exploration licences.

Frankly tin/indium is the thing relating to Avalon that most gets our pulse racing. The last news we can find was the company’s “putting on hold” its PEA plans for East Kemptville (also back in 2010). This is frustrating because Indium is a very interesting topic indeed. We have commented before on how we believe the machinations surrounding South American Silver’s Malku Khota property in Bolivia probably relate to a Chinese inspired asset grab in this metal. East Kemptville is an asset where a spin-out into a NewCo could give Avalon shareholders a fillip while they wait to see if Nechalacho comes to fruition.

Ucore – Tin as the Bonus Card

We are long-term believers in Ucore’s Rare Earth Bokan deposit but were made aware back in 2011 that the company also owned a very interesting tin deposit in mainland Alaska. This asset has its origins in the hunt for further Rare Earth assets in Alaska in the early days of Ucore’s emergence as a REE player in that state. Of the global production of REE some is a by-product of tin mining (i.e. that in Malaysia), most specifically cassiterite. Ucore’s team includes veteran geos with a broad knowledge of the state’s historic metal resources and they advised inclusion of the Ray River deposits in the project portfolio for its REE potential and instead it turned into a very interesting tin prospect.

The definitive work on the deposits, INVESTIGATION OF TIN-RARE EARTH ELEMENT PLACERS IN THE RAY RIVER WATERSHED was written by Ucore's current consultant James C. Barker, when he was working for the Bureau of Land Management. Thus is scarcely any surprise that UCU got first dibs on these promising assets. With finite resources Ucore naturally has focused on moving Bokan forward while keeping Ray River in reserve as a follow-up project. However with tin having held up so strongly in recent years, the company has come to consider that there may be potential to monetize the tin potential of the deposit over the REE aspect in the short-term.

The Ray Mountains region of central Alaska features an extensive sheet of alluvial sediments in some places 100 m thick. These alluvial deposits contain widespread concentrations of tin (Sn), tungsten (W), REE, Zircon (Zr), Niobium (Nb) and Tantalum (Ta) minerals. The minerals are primarily derived from granitic source rock of the Ruby Batholith, and they are most abundant in the lower elevation terrain between the Ray Mountains and the northern Fort Hamlin Hills.



It is useful to note the way in which this deposit evolved geologically. In the first instance basalt flows blocked local drainages, and 50-to 100-ft of terrace gravel was eventually deposited on top of the flows. Further downwarping and eventual fluvial downcutting of the flows resulted in cycles of accelerated sediment transport, deposition, and reconcentration. Repeated erosional cycles concentrated heavy minerals and resulted in development of tin placers.

Work by the BLM on the Ft. Hamlin Hills-Ray River project was conducted intermittently from 1975 to 1989. Resource estimates of contained tin in recent alluvium ranged from 62mn to as much as 172mn lbs of Sn in 300 million cubic yards. The grade of about 90% of the gravels was estimated to range between 0.2

lbs to 0.5 lbs of Sn per cubic yard. These estimates were projected on the basis of surface sampling and seven auger drill holes and are provided for the purpose of land-use management planning.

Sample results from investigations point to potential economic grade concentrations in at least three drainage basins: the upper Kilolitna River, the Ray River, and No Name Creek. Each of these exhibits numerous surface exposures of alluvial gravel and sand containing a threshold of at least 0.15 kg/cubic meter (0.22 lbs/cubic yard) of REE and/or Sn, along with by-product concentrations of tungsten (W), zirconium (Zr), niobium (Nb), and tantalum (Ta). Locally samples contain up to 1 kg/m³ each of Sn and REE in the extensive floodplain of the Ray River. Mineralized sediments from No Name Creek and the Caribou Heights prospects contain up to 9 kg Sn/m³.

The sampling program rendered heavy mineral concentrates composed primarily of ilmenite with cassiterite, monazite with lesser xenotime, zircon, wolframite (ferberite end-member), and trace amounts of allanite, scheelite, and yttrifluorite. The concentrates contained up to 50% Sn, up to 10% total REE (TREE), and 0.01 to 1.0% W, Ta, and Nb. Heavy rare earth elements (HREE`s), including Tb, Dy, Er and Y, compose 15% to 25% of the TREE in the majority of samples, with the notable exception of localized areas such as No Name Creek valley, which delivered TREE content comprised of up to 60% HREE`s.

The potential would appear to exist to exploit these alluvial deposits utilizing dredging. The BLM report, authored by Barker noted that that the estimated average grade was 0.2-to 0.5-lbs-Sn/yd³ for the Ray River gravels. Tin dredges commonly work ground containing 0.3-to 0.4- lbs-Sn/yd³. Malaysian tin dredges have successfully operated in ground containing as little as 0.18 lbs Sn/yd³.

The Ray Mountain area is accessed by the partly sealed Dalton Highway from Fairbanks. The road is heavily trucked in both winter and summer (and indeed featured in various episodes of the program, Ice Road Truckers). There is a barge service that is seasonally available along the Yukon River connecting directly to the Alaska Railroad freight yard at Nenana.

Ucore is better known for its REE attributes than its tin prospects. It is often that we hear the comment that "Such-and-such company receives little value for its X deposit" which is sometimes open to debate but in the case of Ucore it is certain that the company gets no credit for Ray River, even if investors believed it to be a REE deposit if only for the reason that the asset has been kept away from the public glare to minimize the distraction of having multiple projects. Bokan Mountain rightly dominates the public perception of Ucore.

This is not to diminish Ray River. Indeed this asset if put in a standalone form would make one of the most interesting tin prospects in North America with the added advantage of a very favorable jurisdiction and the ease (and low cost) of establishing alluvial mining in the tin production space. We might also note that Alaska has a long history of alluvial mining so the activity is not groundbreaking and to this is added the superlative relations that the company has not only at the state level but also in the US Senate.

To put this in perspective the activation of tin mining at Ray River would provide the only source of tin supply (besides recycling) on US territory and that would mesh well with the work that UCore has done in Washington in cultivating interest in securing production of strategic metals for the long term security of the US supplies of these products. While this has been mainly in Rare Earths, it is clear that tin is also subject to Chinese dominance and the capriciousness of supply from places such as Indonesia and Bolivia. This should be a hot button issue in Washington as tin has greater economic importance than Rare Earths.

Conclusion

The tin space is short of quoted plays and the Canadian markets in particular are thin on that score. The ideal solution to that is for the two companies here to set free their tin assets in standalone pure play vehicles that can make their own way in the world. With the current great price dynamic of tin and a worsening supply scenario, that's a tailwind any newly launched stock would love to have. As the old song goes "If you love someone, set them free" and the tin assets of these two companies could certainly do with that kind of loving.