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Co-operation / Synergy between Waste Management and Supply and Storage Sectors

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Now that the Minamata Convention (MC) is moving into its full implementation phase, it may be opportune to draw on the lessons that were leaned during the early implementation phase of the Kyoto Protocol in the period 1997 - 2000. A number of the issues that we faced with the Kyoto Protocol are similar to the issues we are now facing with the implementation of the MC.

One of the key issues with the Kyoto Protocol was the tracking of, and accounting for, embodied energy transfers between Nations. This was a critical issue for the Aluminum Industry globally and has strong similarities with the issues that will now arise between the Waste Management and Supply and Storage Sectors of the MC.

Aluminum is basically '*crystallized electricity*'. The key issue was that one tonne of aluminum billet used by the car industry in Japan or the EU was produced in Australia and had an embodied energy content equal to the CO_2 emission of 14 MW - 18 MW of Australian black or brown coal electricity generation equivalent. When these motor cars that embodied this aluminum reached the end of their life, were written off in an accident or when the aluminum was recycled, the emissions saved by the use of the recycled aluminum were credited to another member country and hence the benefit did not flow back to the country that produced the aluminum in the first place.

The system that was developed to track this embodied energy is effectively the same system that could now be used to track and control mercury recovered by the Waste Management Arm of the UNEP/ Minamata Convention, as this mercury is supplied into the Supply and Storage Arm of the convention.

As the implementation phase of the Minamata Convention hopefully shuts down the few remaining Cinnabar Mines it will be the Mercury Waste Management Partnership area that provides the only legitimate supply of mercury for the Supply and Storage Sector, which will also be providing mercury for the remaining authorized manufacturers who still require to use mercury into the future.

This leads to a number of key issues for the two sectors to rationalize:

1. How will the major issues with supply to third world artisanal mining sectors be handled?
2. How will legitimate mercury users be identified?
3. How much mercury will collectively be required by these legitimate users?
4. Where will this mercury be sourced from?
5. Where will the required and as yet unquantified long term permanent storage facilities be built?
6. How will the ongoing maintenance and overheads of these facilities be funded?
7. How and where is the next generation of mercury bureaucrats going to be trained by the very small number of existing and aging mercury experts?

<u>From the waste management partnership prospective, the overwhelming issue to address is the supply of mercury to the artisanal mining sector for a sufficient period to allow alternative technology to be developed and implemented.</u>

Our most recent provisional research work (which should be regarded as highly conservative), in the area of artisanal mining mercury usage provides the following preliminary data:

1. The <u>Wholesale</u> value of mercury used by the Artisanal Sector is at least $US 390 million eq. per year;

2. The actual price paid by the miners can be up to four times this figure due to the often lengthy supply chains;

3. Returns to artisanal miners for the sale of gold are often less than 50% of the ruling gold price;

4. The cost of mercury to the artisanal miner for the recovery of a gram of gold is normally between 70 and 80 cents in $US equivalents;

5. Currently one gram of gold is approximately $ US 39 eq. on the international market;

6. The artisanal miner is most likely to be getting around $US 15 - 20 per gram;

7. Our preliminary work indicates that the Artisanal Sector is using at least 3980 tons of mercury per year;

8. On current gold prices, the sector is producing gold worth approximately $38.5 billion US dollars on the international market;

9. The price of mercury in the immediate future will not impact the use of mercury in the Artisanal Sector. The miner in the field is currently paying over $400 per kg and could pay twice this amount with little impact to their cost of production;

10. Between 50% and 80% mass of the mercury is used one time only.

These figures indicate that small to medium scale Cinnabar mines may well continue to operate as the rewards are so large.

The key issue for the waste management partnership is to develop mechanisms to better understand the global mercury supply mechanisms and move to develop alternatives to the use of mercury in the Artisanal sector as quickly as possible.

FERAL MERCURY

There is currently no data on the precise location of the mercury that will have to be removed from the environment over the next 50 years, so that the high risk areas can be remediated of necessity, as a priority. The development of this data should be a major priority for all countries and the UNEP.

Whilst most countries now have active programs to recover mercury from lighting, switch gear and medical instruments, the major sources of potential mercury recovery, i.e. historical gold mining sites, redundant ChlorAlkali plant sites and Historical Shipwrecks which are known to have carried mercury ballast, have yet to be examined in detail.

In 2010 our company received an Australian Federal Government permit under the Environment Protection and Biodiversity Conservation Act to identify and remove feral mercury from the Upper Goulburn River Historical Gold Mining area in the State of Victoria.

Whilst the State EPA had initiated a number of excellent comprehensive in-depth scientific investigations in this catchment in the 1970's and early 1980's, the enormity of the historical gold mining legacy toxic metal pollution issues identified throughout this catchment were such that the State Government was reluctant to commit further funds to fully scope the removal of the identified toxic metals. Indeed, given the overwhelming evidence to the extent of toxic metal contamination and the many urgent recommendations provided within the body of these various scientific investigations, the Government chose not to warn the community of the risks that the presence of these toxic metal posed to both the community and the environment from mercury and other toxic metal contaminated fish and crustacea species, including in places even the river and stream water, itself.

For a survey period of over two years our company (Hg Recoveries P/L) employed the latest most modern XRF based survey tools to comprehensively determine the extent of remaining mercury pollution in this catchment and also for the first time in Australia, included other toxic metals, such as arsenic and chromium, that were also liberated by historical gold mining activities throughout this catchment.

Recently we have added state of the art Japanese gaseous mercury measuring equipment to our ongoing survey investigations to measure mercury levels in the air in these catchments.

We now have a very good data base of toxic metal pollution occurring in this historical gold mining catchment.

Since that time we have looked at a number of other major gold mining areas in the same State and this work has confirmed that our initial results that we gained in the first catchment, apply over all the other polluted catchments in the State where historic gold mining occurred, often at much higher levels of pollution than the scientific investigations of the 1970's and 1980's had indicated.

Interwoven into all the work to identify the major risks existing in historical gold mining areas, two other key historical mercury pollution sources have now been identified. The first of these are the large scale legacy issues with improperly remediated mercury based ChlorAlkali plant sites, and the critical issues of mercury cargoes in historical shipwrecks.

Now that Cinnabar mining has been reduced to small Artisanal operations, the only legitimate supply sources for the Supply Sector may come from the Waste Management Sector.

At the moment, the only legally sourced mercury supply for the Supply and Storage Sector is from the recycling sector. There are no reliable mercury supplies arising from the small number of power plants that have stack recovery systems and supplies from the oil and gas sector are, in many cases, still leaking into the grey market. There is no evidence available at this time that the mining and smelting industries are making any significant inroads into capturing their entire mercury emissions.

As we move to large scale mercury recoveries from the historical mining sector, these recoveries could have the ability to swamp the legitimate markets and may lead to a dramatic drop in market prices, which will then impact the economics of the mercury recycling market for items such a lighting, medical uses, and automotive switches.

As identified previously in this paper, the Artisanal Mercury Market may not be very price sensitive due to the fact that mercury is a small percentage of the cost of production. However, large supplies of low cost mercury would mean that use of mercury in the Artisanal Sector would not have the economic drivers for careful uses which higher prices would deliver, and this could then ultimately lead to defeat of the primary goals of the Minamata Convention.

The key issue for both sectors in the immediate future will be to identify, permit and fund the construction of a number of interim storage facilities until permanent mercury storage facilities can be established at strategic global locations.

SHIPWRECKS

There is an urgent need to identify historical shipwrecks which contained mercury as ballast, usually as cargoes. These are generally shipwrecks from the period 1830 to 1930 with the bulk of the wrecks in the period 1840 to 1890. Current indications are that the bulk of these wrecks are on the West African coast, the Southern Australian coast, and Californian coast.

Unfortunately, data on the historical exports of mercury from China to Chinese mines in the Pacific Islands, Vietnam, Laos etc., is non-existent in the Western world, and at some time research will have to be carried out to identify the hundreds of historical gold mines across the region, so that transport routes from the suppliers can be identified.

Both sectors face major issues in educating the people that will be responsible for these sectors over the next 50 years! The very small core group of people (~ 5-10 people globally) with experience in these sectors are almost all in their mid to late 60's and it is therefore critical that these individuals' skills be passed to the next generation of mercury experts before it is too late and this "precious or crucial information" is lost forever.

The rapid establishment of these *'centers of educational excellence'* and the transfer of the existing skills will be critical to the long term success of the implementation of the Minamata Protocol.

The UNEP Mercury Secretariat urgently needs to carry out a preliminary investigation to better scope and plan the next five years of the implementation of the Convention.

The Global issues surrounding mercury pollution are clearly far greater than the currently held views in the global community. These very real issues drive the need for the Waste Management Sector and the Supply and Storage Sector to forge a strong working relationship, in a very pressing and urgent sense.