Dr. Carmen Chew.

SUMMARY OF HEALTH CONCERNS IN REGARDS TO LAMP

(BY MALAYSIAN MEDICAL ASSOCIATION)

There are solid evidences of health hazards from exposure to external and internal radiation and also the rare earth compounds themselves. A **Health Impact Assessment** is mandatory but lacking.

The MOH/ MOSTI must be and seen to be actively involved in decision making, setting and regulating the conditions for LAMP to ensure safety of public and workers.

AELB has granted Temporary Operating License to LAMP with conditions. These conditions should minimize the potential health hazards. It is the responsibility of MOSTI to ensure this.

PUBLIC HEALTH CONCERNS

1. The open-air design of RESIDUE STORAGE FACILITY (RSF) to store the solid wastes in an exposed manner is unacceptable. This allows continuous emission of Thoron and Radon into the atmosphere, potential dust dissemination through air.
   There is also risk of spillage and dissemination when these wastes are transported to another destination for recycle or permanent disposal purposes.

   Suggestion: to require the solid wastes to be contained and sealed appropriately.

2. *The permanent waste disposal site needs to be identified and approved after* Detailed EIA before production of any scale is allowed to commence. We cannot allow the SEQUENCE of POOR GOVERNING of the Bkt Merah-Papan saga to repeat.

   Suggestion: to require Lynas to identify site, summit Detailed EIA inclusive of marine ecological studies before production of any scale.

3. The liquid effluent will be monitored according to Standard B of Industrial Effluent Regulation. This regulation is general for industrial discharge; it does not monitor the potential radionuclides(radioactive component) in the liquid effluent. China has introduced a new international standard **GB 26451-2011 tailored for RE industry**. The fact that in this new standard radionuclides and some rare earth compounds are taken into account shows they are of potential significant environmental and health hazards.

   Suggestion: Department of Environment (DOE) to adopt and apply GB 26451-2011

4. Similarly, the gaseous effluent needs to be monitored as it may contain radionuclides. Ideally, the point of monitor should be at the exit of the scrubber system before it is diluted *into the atmosphere. Standard* GB26451-2011 *applies here too.*

   Suggestion: DOE to adopt and apply GB 26451-2011

OCCUPATIONAL HEALTH CONCERNS

1. EXPOSURE TO EXTERNAL AND INTERNAL RADIATION

SOURCE : Lanthanide dust, wastes, Radon, Thoron emission from processing and storage site

CRITICAL GROUP : truck drivers, ore handlers, process operators, RSF operators

ASSESSMENT OF EXPOSURE : radiation detector for external radiation only

ESTIMATION OF EXPOSURE DOSAGE: calculation modules are debatable

2.INADEQUATE PROTECTION

mask not specific, only to certain groups

no specified garment for protection

need goggles?

no compulsory shower, change of clothing before worker leaves site

the water run-off from these shower places should also be filtered

3.HEALTH MONITORING PROGRAMME

present occupational accident/disease reporting form not tailored for this industry

long term comprehensive monitoring needed

measures to minimize under-reporting

Suggestion: DOSH to tailor a comprehensive health monitoring programme specific for this industry

Long term health insurance coverage for high risk group to cover pneumoconiosis and cancers?

MORE SUGGESTIONS

MOH needs to design a long term cohort study on the workers and public living within 30km radius of the plant.

To minimize the risk while able to verify the values, the production can be staggered in stages ie first stage 5000ton, second stage 10,000 ton, third stage the remaining planned for first year. This way we can also overcome the initial hiccups in monitoring LAMP.

Given the uncertainties surrounding the risk of low level exposure to ionising radiation (especially from internal emitters, challenges to the existing quantitative risk models which are calibrated against external irradiation, which IAEA, AELB, Lynas rely upon for their international norms of 'safe thresholds'), at the very least Lynas should have been obliged to set aside a substantial contingency fund to deal with potential adverse effects in this situation of uncertainty. **The amount of money should be determined according to the amount of wastes generated each year of production, and be deposited each year.**

Emission Standards of Pollutants from Rare Earth Industry GB 26451-2011

Published 24.01.2011 approved 18.01.2011 effective 01.10.2011

Dept of Environmental Protection, China.

As from the date of effect, RE industrial liquid & gaseous wastes will follow this standard, replacing the existing related regulations in –
Combined waste water standards GB 8978-1996
Combined atmospheric pollutant emission standard GB 16297-1996
Industrial furnace gaseous emission standard GB 9078-1996

Table 1 –Existing Industrial Effluent Discharge Concentration Limit and Individual Process Allowable Discharge Volume

No	Item	Direct Discharge(mg/L)	Indirect Discharge(mg/L)	Effluent Point
1	pH	6-9	6-9	Final Effluent Discharge Point
2	Suspended Solid	70	100	
3	Fluoride	10	10	
4	Oil & Grease	5	5	
5	COD	80	100	
6	Total Phosphorus	3	5	
7	Total Chloride	50	70	
8	Ammoniacal Nitrogen	25	50	
9	Total Zinc	1.5	1.5	
10	Total Thorium & Uranium	0.1	0.1	Production Waste Water Discharge Point
11	Total Cadmium	0.08	0.08	
12	Total Lead	0.5	0.5	
13	Total Arsenic	0.3	0.3	
14	Total Chromium	1.0	1.0	
15	*Chromium*, hexavalent	0.3	0.3	
Allowable Discharge Volume	Floatation	M3/t-Raw Material	1.0	Discharge Volume Measurement Same As Waste Water Monitoring Point
	Leaching	M3/t-REO	30	
	Separation	M3/t-REO	35	
	Purification	*M3/t-Product*	*8*	

For the discharged waste containing radioactive materials, it is also necessary to comply with GB18871 besides this standard.

Table 2 –New Industrial Effluent Discharge Concentration Limit and Individual Process Allowable Discharge Volume				
No	Item	Direct Discharge(mg/L)	Indirect Discharge(mg/L)	Effluent Point
1	pH	6-9	6-9	Final Effluent Discharge Point
2	Suspended Solid	50	100	
3	Fluoride	8	10	
4	Oil & Grease	4	5	
5	COD	70	100	
6	Total Phosphorus	1	5	
7	Total Chloride	30	70	
8	Ammoniacal Nitrogen	15	50	
9	Total Zinc	1.0	1.5	
10	Total Thorium & Uranium	0.1	0.1	Production Waste Water Discharge Point
11	Total Cadmium	0.05	0.05	
12	Total Lead	0.2	0.2	
13	Total Arsenic	0.1	0.1	
14	Total Chromium	0.8	0.8	
15	Chromium, hexavalent	0.1	0.1	
Allowable *Discharge* Volume	Floatation	M3/t-Raw *Material*	0.8	Discharge Volume *Measurement Same* As Waste Water Monitoring Point
	Leaching	M3/t-REO	25	
	Separation	M3/t-REO	30	
	Purification	M3/t-Product	6	

For area where the surrounding environment is sensitive and the development is more advanced, where the environment is subjected to high risk of pollution, table 3 standard applies.

Table 3 – Industrial Effluent Discharge Concentration Limit and Individual Process Allowable Discharge Volume				
No	Item	Direct Discharge(mg/L)	Indirect Discharge(mg/L)	Effluent Point
1	pH	6-9	6-9	Final Effluent Discharge Point
2	Suspended Solid	40	50	
3	Fluoride	5	8	
4	Oil & Grease	3	4	
5	COD	60	70	
6	Total Phosphorus	0.5	1	
7	Total Chloride	20	30	
8	Ammoniacal Nitrogen	10	25	
9	Total Zinc	0.8	1.0	
10	Total Thorium & Uranium	0.1	0.1	Production Waste Water Discharge Point
11	Total Cadmium	0.05	0.05	
12	Total Lead	0.1	0.1	
13	Total Arsenic	0.05	0.05	
14	Total Chromium	0.5	0.5	
15	Chromium, hexavalent	0.1	0.1	
Allowable Discharge Volume	Floatation	M3/t-Raw Material	0.6	Discharge Volume Measurement Same As Waste Water Monitoring Point
	Leaching	M3/t-REO	20	
	Separation	M3/t-REO	25	
	Purification	M3/t-Product	4	

Table 4 – Existing Industrial Atmospheric Pollutant Concentration Limits

No	Item	Process Method	Limit (mg/m3)	Waste Monitoring Point
1	SO2	Leaching	500	Production Gas Emission Chimney
2	Sulphate	Leaching	45	
3	Particles	Floatation	80	
		Leaching	50	
		Separation	50	
		Purification	60	
			60	
4	Fluoride	Leaching	9	
		Purification	7	
			7	
5	Chlorine	Leaching	30	
		Separation	30	
			50	
6	Chloride	Leaching	60	
		Separation	80	
7	Nitrous Oxide	Leaching	240	
		Separation	200	
8	Thorium & Uranium	All	0.10	
Allowable Emission Volume	Floatation	M3/t-Raw Material	300	Emission Volume Measurement Same As Waste Gas Monitoring Point
	Leaching	M3/t-REO	25000	
	Separation	M3/t-REO	30000	
	Purification	M3/t-Product	25000	

Table 5 – New Industrial Atmospheric Pollutant Concentration Limits

No	Item	Process Method	Limit (mg/m3)	Waste Monitoring Point
1	SO2	Leaching	300	Production Gas Emission Chimney
2	Sulphate	Leaching	35	
3	Particles	Floatation	50	
		Leaching	40	
		Separation	40	
		Purification	50	
			50	
4	Fluoride	Leaching	7	
		Purification	5	
			5	
5	Chlorine	Leaching	20	
		Separation	20	
			30	
6	Chloride	Leaching	40	
		Separation	50	
7	Nitrous Oxide	Leaching	200	
		Separation	160	
8	Thorium & Uranium	All	0.1	
Allowable Emission Volume	Floatation	M3/t-Raw Material	300	Emission Volume Measurement Same As Waste Gas Monitoring Point
	Leaching	M3/t-REO	25000	
	Separation	M3/t-REO	30000	
	Purification	M3/t-Product	25000	

Table 6 – New and Current Industrial Boundary Atmospheric Pollution Concentration Limits

No	Item	Limit (mg/m3)
1	SO2	0.4
2	Sulphate	1.2
3	Particles	1.0
4	Fluoride	0.02
5	Chlorine	0.4
6	Chloride	0.2
7	Nitrous Oxide	0.12
8	Thorium & Uranium	0.0025

Table 7 – Water Pollutant Concentration Measurement Standards

No	Item	Standard Code
1	pH	GB/T6920-1986
2	Suspended Solid	GB/T11901-1989
3	Fluoride	GB/T7484-1987
		HJ487-2009
		HJ488-2009
4	Oil & Grease	GB/T16488-1996
5	COD	HJ/T70-2001
		HJ/T132-2003
6	Phosphate	GB/T11893-1989
7	Total Nitrogen	HJ/T199-2005
		GB/T11894-1989
8	Ammoniacal Nitrogen	HJ/T195-2005
		HJ535-2009
		HJ536-2009
		HJ537-2009
9	Thorium	GB/T11224
10	Uranium	GB/T6768
11	Total Cadmium	GB/T7475-1987
12	Total Lead	GB/T7475-1987
13	Total Zinc	GB/T7475-1987
14	Total Arsenic	GB/T7485-1987
15	Total Chromium	GB/T7466-1987
16	Chromium, Hexavalent	GB/T7467-1987

Table 8 – Atmospheric Pollutant Concentration Measurement Standards

No	Item	Standard Code
1	SO2	HJ/T56-2000
		HJ/T57-2000
		HJ482-2009
		HJ483-2009
2	Sulphate	HJ 544-2009
3	Particles	GB/T16157-1996
		GB/T15432-1995
4	Fluoride	HJ/T67-2001
		HJ480-2009
		HJ481-2009
5	Chlorine	HJ/T30-1999
		HJ547-2009
6	Chloride	HJ/T27-1999
		HJ548-2009
		HJ549-2009
7	Nitrous Oxide	HJ/T42-1999
		HJ/T43-1999
		HJ479-2009
8	Thorium & Uranium	GB/T11743

Standard serial number: GB 26451-2011

Chinese standard name: Rare earth industry pollutant discharge standard

Replaces the standard number: ,

Standard synopsis:

This standing operating procedure rare earth Industrial enterprise or production facilities water pollution and air pollutant emission limit, monitor and monitoring request, as well as standard implementation and surveillance and so on related stipulation.

This standard is suitable for the existing rare earth Industrial enterprise's water pollution and the air pollutant emissions management, after as well as the rare earth Industrial enterprise items of basic construction's environmental effect appraisal, the environmental protection facility design, completion environmental protection approves and goes into production the water pollution and the air pollutant emissions management.

This standard is not suitable for the rare earth material processing enterprise (or workshop, system) and attached for the rare earth Industrial enterprise's non-characteristic technique of production and the equipment.

This standard is suitable for the legal permission pollutant discharge behavior. Sets up the source of pollution newly in the selected location and the special protected zone the existing source of pollution management, according to "the People's Republic of China Air pollution Prevention law", "People's Republic of China Water pollution Prevention law", "Marine Environmental Protection Law of the People's Republic of China", "People's Republic of China Solid waste Pollution of the environment Prevention law", "People's Republic of China Radioactive contamination Prevention law", "People's Republic of China Environmental effect Appraisal Law" and so on legal, laws and regulations, rules and regulations related stipulation execution.

This standing operating procedure's water pollution emission control request is suitable for the enterprise direct or discharges the water pollutant indirectly to its legal boundary outside the behavior.

Standard state:

Standard table of contents:

Quotation standard:

This standard content has quoted following document or provision.

In GB/T 6768 water micro uranium analysis method

GB/T 6920-1986 6920-1986 water quality pH value determination glass electrode law **water quality PH value determination glass electrode law**

GB/T 7466-1987 7466-1987 water quality total chromium determination

GB/T 7467-1987 7467-1987 water quality six price chromium determination benzoin carbonyl two jing spectrophotometric methods

GB/T 7475-1987 7475-1987 water quality coppers, zinc, lead, cadmium determination atom absorption dispersion of light spectrographic methods **water quality copper, zinc, lead, cadmium determination atom absorption spectrophotometric method**

GB/T 7484-1987 /484-1987 water quality fluoride determination ection electrode law

GB/T 7485-1987 7485-1987 water quality total arsenic determination two ethyl dithio- amino silver formate spectrophotometric method

In GB/T 11224 water thorium analysis method

In GB/T 11743 soils radionuclide GAMMA power spectrum analysis method

GB/T 11893-1989 water quality total phosphorus determination ammonium molybdate spectrophotometric method

The GB/T 11894-1989 water quality total nitrogen's determination alkalinity potassium persulfate dispels the ultraviolet spectrophotometric method

GB/T 11901-1989 water quality suspension determination weight method

GB/T 15432-1995 ambient airs always suspended particulate determination weight method

In GB/T 16157-1996 fixed source of pollution exhausts particles determination and gaseous state pollutant sampling method

GB/T 16488-1996 water quality petroleum class and zoology and botany oil determination infrared luminosity law

GB/T 18871 ionisation radiation protection and radiant safe primary standard

In HJ/T 27-1999 fixed source of pollution exhausts Hydrogen chloride determination mercuric thiocyanide spectrophotometric method

In HJ/T 30-1999 fixed source of pollution exhausts chlorine determination methyl orange spectrophotometric method

In HJ/T 42-1999 fixed source of pollution exhausts nitrogen oxide determination ultraviolet spectrophotometric method

In HJ/T 43-1999 fixed source of pollution exhausts nitrogen oxide determination hydrochloric acid naphthalene ethylene diamine spectrophotometric method

The HJ/T 55 air pollutant non-organization emission monitoring technology leads

In HJ/T 56-2000 fixed source of pollution exhausts sulphur dioxide determination iodimetric

In the HJ/T 57-2000 fixed source of pollution exhausts the sulphur dioxide determination decides the electric potential electrolytic process

HJ/T 67-2001 atmosphere fixed source of pollution fluoride determination ection electrode law

HJ/T 70-2001 high chlorine waste water chemical oxygen demand determination chlorine method of corrections

HJ/T 75 fixed source of pollution haze emissions continuous monitoring technology standard (implementation)

HJ/T 132-2003 high chlorine waste water chemical oxygen demand determination potassium iodide alkalinity potassium permanganate process

HJ/T 195-2005 water quality ammonia nitrogen determination gas phase molecular absorption spectrographic methods

HJ/T 199-2005 water quality total nitrogen determination gas phase molecular absorption spectrographic methods

HJ 479-2009 ambient air nitrogen oxide (nitrogen monoxide and nitrogen dioxide) determination hydrochloric acid naphthalene ethylene diamine spectrophotometric method **ambient air nitrogen oxide (nitrogen monoxide and nitrogen dioxide) determination hydrochloric acid naphthalene ethylene diamine spectrophotometric method**

HJ 480-2009 ambient air fluoride determination filter diaphragm sampling fluorine ection electrode law

HJ 481-2009 ambient air fluoride determination lime filter paper sampling fluorine ection electrode law **ambient air fluoride determination lime filter paper sampling fluorine ection electrode law**

HJ 482-2009 ambient air sulphur dioxide determination formaldehyde absorption - vice-rose aniline spectrophotometric method

HJ 483-2009 air quality sulphur dioxide determination tetrachloride mercuric salt - hydrochloric acid vice-rose aniline color method **ambient air sulphur dioxide determination tetrachloride mercuric salt absorption - vice-rose aniline spectrophotometric method**

HJ 487-2009 water quality fluoride determination alizarin sulfonic acid zirconium visual color method

HJ 488-2009 water quality fluoride determination fluorine reagent spectrophotometric method

The HJ 535-2009 water quality ammonia nitrogen's determination accepts the reagent spectrophotometric method

HJ 536-2009 water quality ammonia nitrogen determination salicylic acid spectrophotometric method

HJ 537-2009 water quality ammonia nitrogen determination distillation - neutral titrimetric method

HJ 544-2009 fixed source of pollution waste gas sulfuric acid mist determination ion chromatography (temporary)

HJ 547-2009 fixed source of pollution waste gas chlorine determination iodimetric (temporary)

HJ 548-2009 fixed source of pollution waste gas Hydrogen chloride determination silver nitrate capacity law (temporary)

HJ 549-2009 air and waste gas Hydrogen chloride determination ion chromatography (temporary)

"Source of pollution Automatic monitoring Policing method" (Country Environmental protection Bureau makes 28th)

"Environmental monitoring Policing method" (Country Environmental protection Bureau makes 39th)