

E - WASTE IN SOUTH AFRICA

(Lighting Lamps)

28 February 2008



INTRODUCTION

Mercury is an essential component of many energy-efficient lamps

The most common lamps used that contain mercury are:

- **Flourescent linear tubes** (Ranges between 5 – 15 mg of Hg dependant on various factors, ie. Type, manufacturer, when manufactured)
- **Compact Flourescent Lamps** (CFL's) – Energy Savers (contain approx. 4 - 6 mg of Hg)
- **High Intensity Discharge (HID) Lamps** - 13 – 80 mg Hg and 10 -170 mg of Metal Halide)
- **Sodium Lamps** - 15 – 30 mg Hg
- **Automotive Mercury-Xenon Lamps**



Although the amount of Hg in a single flourescent lamp is small, collectively, large numbers contribute to the amount of Hg that is released into the environment.

WHY USE THESE LAMPS ?

- More energy efficient (use 75% less energy than incandescent lamps)
- Last up to 10 times longer than incandescent lamps
- Their use reduces power demand, which helps reduce mercury and green-house emissions from power generation plants from the coal burning process, as less coal is burnt



ALTERNATIVES ?

Light-Emitting Diodes (LEDs)

- Energy efficient and mercury free
- Currently used in applications ranging from traffic signals and exit signs, and also used in some motor vehicles

Why not suitable?

- LEDs are directional lights, they do not radiate light 360 degrees as CFL's and other fluorescent lamps do
- More suited for task specific lighting such as desk lamps, spotlights, security lights and signage lighting etc

HEALTH AND ENVIRONMENTAL RISKS

- No mercury is released when the lamps are intact or in use
- Exposure only possible when a lamp has been broken
- Lamp is fragile and can break easily



If breakage occurs:

- Because mercury vaporises at room temperature the released mercury vapours are health threatening when inhaled by a person
- These vapours can also adhere to the handler's exposed body areas and clothing if not protected, as it may pass through the skin
- Mercury can be released into the environment through improper disposal such as through domestic waste disposal, thrown into dumpsters, trash compactors and break
- Improper disposal methods will lead to releases of elemental mercury, which can be converted to an organic form that accumulates in living organisms and can contaminate the food chain (US EPA)

MANAGING Hg CONTAINING LAMPS

Current Status Quo

- General public not educated in terms of dangers of Hg containing lamps, how to handle them or what to do in the case of breakage
- Currently not regulated in terms of domestic disposal
- Some industry not disposing at a hazardous landfill site
- Transportation of the lamps not regulated
- Crushing of lamps not regulated

DEAT NATIONAL WASTE MANAGEMENT STRATEGY

- Report 12/9/6 – Issued 3 May 2005 Draft - Recycling Extended Producer Responsibility
- Focuses on waste prevention and minimisation by all sectors
- Makes reference to European WEEE Legislation as producer responsibility legislation
- Makes reference to extended producer responsibility (EPR), that in developing countries is passed onto the consumer directly as part of the purchase price of the product.
- Priority products for consideration:
 - Electronics: CRT's, CPU's, VCR's, cell phones
 - Products that contain mercury: Fluorescent lamps, button batteries, thermostats, electrical switches (including automotive)






WHY RECYCLE ?

- Lamp recycling started in the mid 1990's,(ENDS Report 361, February 2005) and South Africa is now ready as E-Waste becomes a bigger challenge
- Nationwide, millions of mercury containing lamps are discarded each year
- Most of these are discarded with municipal waste, and all mercury containing lamps, will release mercury into the environment through breakage or leakage, outside a controlled crushing and recycling process
- Reduces volume to landfill
- All the components of the fluorescent lamp can be recycled
- Creates employment and the opportunity for skills training.

For recycling to work, everyone has to participate in each phase of the loop :

- Government & Local Municipalities
- Manufacturers and Importers
- Large Industry
- Small Businesses
- Retailers
- NGO's
- General Public
- Power Utility (ESKOM)

WEEE LAMP TYPES PRODUCT OVERVIEW

Product Categories	Description	Products	Designs	Look alike <small>(See unclassified lamps)</small>
Fluorescent Tubes	Low pressure (some sub-atm) noble gas and mercury containing fluorescent and powder radiant discharge lamps.	straight	> 15	
Non-linear fluorescent		different shapes	> 5	
CFL non-integrated		compact	> 25	
CFL integrated (energy savers)		compact + electronics	> 25	
High Intensity Discharge	High pressure (> 1 k bar) noble gas, mercury, sodium and salts containing atomic discharge lamps		> 50	
	Low pressure (some sub-atm) noble gas and sodium containing atomic discharge lamps		> 5	

RECYCLING PROCESS

1. Collection

- Spent lamps are to be kept whole where possible and stored in a dry locked area that minimises lamp breakage
- Any broken lamps must be stored separately in a sealed container or drum
- Collection Centres are to be introduced throughout South Africa, these being at:
 - Wholesaler Facilities
 - Retailers (collection sites and take back system)
 - Garden Centres
 - Landfill sites
 - Large Industry can allocate collection areas

2. Delivery to recycling facility
3. Processing (Recycling)
4. Re-Using Recycled products



COLLECTION & TRANSPORTATION



- Example of a Collection bin specifically made for Fluorescent tubes in the UK.



- Example of a Collection bin specifically made for CFL's in the UK.

RecLite – ACCREDITED LAMP RECYCLER FOR SA

TECHNOLOGY TO BE USED

- RecLite have chosen a Swedish Company known as MRT System to be the preferred technology supplier for the following reasons:
 - Recognised as the world leader in supplying complete mercury/lamp recycling systems
 - MRT recycling systems are used successfully worldwide
 - The technology is designed for processing a wide range of mercury bearing products : Fluorescent tubes, CFL's, HID, Halogen lamps, batteries, medical and dental waste, electrical components etc.
 - Produces very clean recycled fractions which makes them desirable for re-use

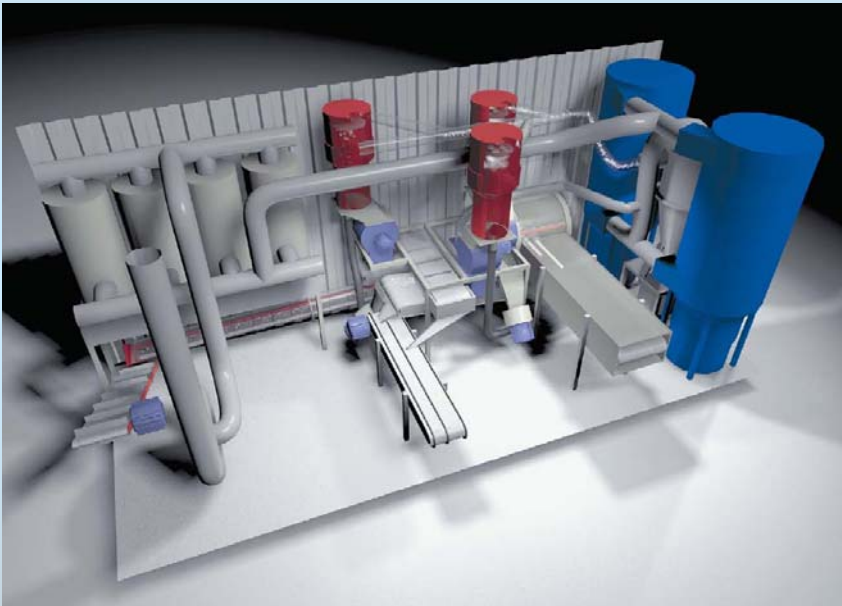


CRUSH AND SIEVE PLANT



- Designed for processing large quantities of discarded fluorescent lamps safely
- Has a capacity of more than 6000 tubes per hour
- Crushes and sieves the lamps for processing in the CCS Plant

COMPACT CRUSH & SEPERATION PLANT



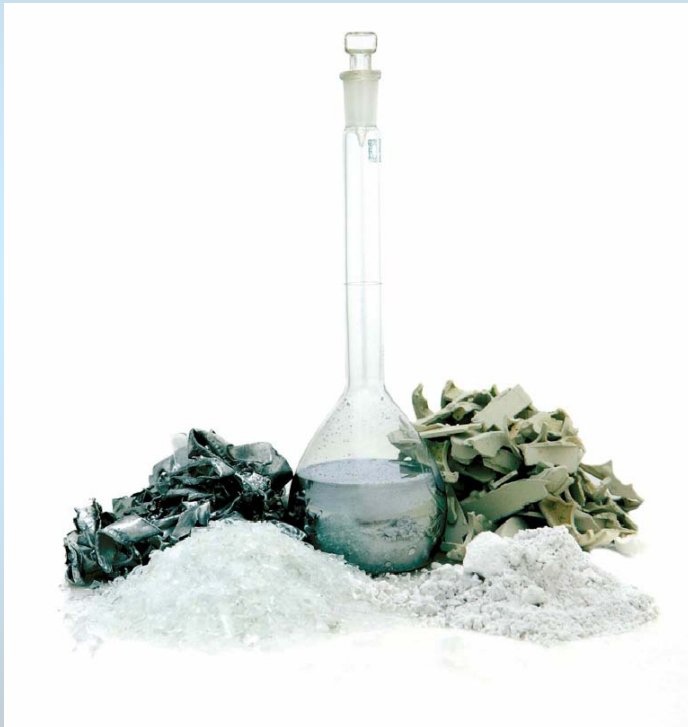
- A self contained processing system
- Has a capacity of more than 300 kg's of lamps per hour
- Operating conditions meet the toughest environmental standards

BATCH DISTILLER



- Processes mercury bearing waste in a vacuum chamber
- Applied heat causes mercury to vaporise
- Mercury is then condensed into free flowing 99% analytical grade mercury
- Completely closed system – no emissions

RECYCLED FRACTIONS



- Glass
- Plastic
- Fluorescent Powder
- Aluminium
- Ferro Metal
- Mercury

LOCATION AND OPERATIONS

- Johannesburg to be the main central hub for processing lamps for South Africa
- Crushing centres to be established in other cities and transported in sealed containers to Johannesburg facility
- Johannesburg facility proposed to be based on the West Rand
- The Environmental Impact Study is currently underway and will be done through Lombard and Associates – Environmental Consultants
- GDACE are aware of the project and initial meetings have been established
- Equipment planned to arrive in South Africa in second half of 2008
- Intend to implement ISO 14001:2004 from start-up to aim for certification
- All operating training to be provided by MRT Staff on start-up
- Finalise agreements with off-take partners

THE WAY FORWARD

- Develop a committee with chosen members from the present forum to work on an action plan to implement the lamp recycling strategy
- Agree and formalise the Advanced Recycling Fee proposal
- Launch a consumer/public awareness and education programme
 - ➔ Leaflets placed into packaging detailing recycling information
 - ➔ Posters at retail outlets at the lamp selling areas
 - ➔ Awareness advertisements printed on back of electricity and water bills by the different metros together with accidental spillage clean-up procedure for households
- Develop the collection centre and transportation plan for South Africa, starting with Gauteng working with all the role players

