

# HAZARD ALERT

## “ELECTOMANTLE” HEATING MANTLE IGNITES PETROLEUM SPIRIT VAPOUR APRIL 2008

### Objective

To warn of the explosion / fire hazard when using some types of heating mantles with flammable liquids

### Background

Recently an Electromantle brand heating mantle was being used to re-distil petroleum spirit 60-80 from waste. The process was being undertaken in a fume cupboard. Due to initial overheating of the spirit and as the vapour is heavier than air; there was a build up of vapour on the base of the fume cupboard. The heating mantle has a vented case to ensure the housing remains cool to touch. When the thermostat on the mantle was adjusted the arc created within the thermostat ignited the vapour and subsequently ignited the roof of the fume cupboard causing significant damage to the cupboard. The fume cupboard is no longer serviceable and must be replaced.

The technician was lucky to sustain only minor burns, however this could have easily been significantly worse.

Electromantle do have a label on the unit indicating that the “equipment is not flame or explosion proof”



“Electromantle” Heating Mantle

### Preventative Measures

A number of preventative measures can be implemented to prevent similar incidents in the future:

- **Any heating mantle that is not intrinsically safe or specifically designed for use with flammable liquids must be removed immediately.**
- Inspect all areas where flammables are used and verify the process (or storage) is actually required – if not, eliminate (or reduce) the risk by disposing of what is not required, or moving it to a purpose built store.
- If the process is required then:
  - Ensure there are no potential ignition sources in the area (consider also the possibility of static electricity).
  - Remove or replace any equipment that has the possibility of providing an ignition source.
  - Ensure all procedures are in writing and are reviewed to ensure the risk of accidental ignition of vapours is minimised – be clear about the consequences of not undertaking critical actions.
  - Ensure personnel are updated and trained with regard to any changes to existing procedures
  - As per the Exempt Laboratory Code of Practice (referencing AS/NZS 2243.8:2006), ensure any review of procedures also includes a risk assessment of the fume cupboard that is being used, and takes into account quantities of flammables being used, any adjacent chemical storage, suitability of the fume cupboard etc.

## Statutory Requirements

### **HSNO**

Generally all Massey laboratories operate under the Code of Practice for CRI and University Exempt Laboratories. This code is quite prescriptive about how flammable liquids should be handled and clearly indicates that sources of ignition should be kept well away from the area in which these flammable liquids are being used.

### **Health & Safety in Employment Act**

This Act is also prescriptive in terms of how hazards are identified and managed. It requires a systematic approach to identifying and managing hazards in the workplace. Using mantles of this type with flammables is a significant hazard and as such must be addressed.

AS/NZS 2243.2:2006; Safety in Laboratories Part 2: Chemical Aspects, also has a very clear statement that “highly flammable liquids **shall** be heated only by use of a heating mantle with a sealed thermostat”

### **Replacing / Modifying Mantles?**

- It may be possible for an existing mantle to be modified with a sealed thermostat. An electrical technician can advise on the feasibility of this for specific mantle types.
- If a mantle cannot be easily modified it could be replaced with:
  - A heating mantle with the controls remote from heating unit
  - A heating block designed to fit on a hotplate / stirrer (which must not present any ignition source)

## Other Considerations

- It is apparent that a number of laboratories store large quantities of class 3 flammable liquids. Quantities should be regularly reviewed and what is not required appropriately disposed of, or stored outside of the laboratory.
- Class 3 flammable liquids need to be stored and handled in compliance with the Exempt Laboratory Code of Practice and/or AS/NZS2243.10:2004; Safety in Laboratories, Part 10: Storage of Chemicals
- Where possible ensure all procedures describe the consequences of critical actions not being undertaken, to aid understanding
- Fume Cupboards are checked six-monthly by an Independently Qualified Person (IQP). In addition to this monthly operational checks are required by users – ensure these checks are being undertaken on fume cupboards you are using. A check list for this is available from the Regional Health & Safety Advisor

## Further Information

- Code of Practice for CRI and University Exempt Laboratories.
  - AS/NZS 2243.2:2006; Safety in Laboratories Part 2: Chemical Aspects
  - AS/NZS 2243.2:2006; Safety in Laboratories Part 10: Storage of Chemicals
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