

# ASSESSING RISK OF NON OBVIOUS HAZARDS

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HOW AN INCIDENT FORCED  
REASSESSMENT

OF CURRENT

RISK ASSESSMENT & AUDIT PROCESSES

# INTRODUCTION

- The research and teaching Instrument Suite.
- Complex of services (tested annually)
  - Bottled / Piped Gases \*
  - Multi-Phase Electrical services
  - Ventilation
  - Heat stabilisation
  - Complex Scientific equipment

\* Not included in current annual audits or Hazard identification processes and checklists.



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# THE PLANT AND EQUIPMENT INVOLVED

- Multiple users from various departments.
- Involved piping of high pressure gas from “G” size cylinders to regulator via stainless steel mesh reinforced tubing. †
- Gas subsequently piped from regulator to Instrument via pressure rated rubber tubing. †
- Cylinders are rented from and maintained by gas supply company.

† As installed by supplier at installation and commissioning.

# THE PLANT AND EQUIPMENT INVOLVED

- Routine inspections are performed throughout Faculty laboratory areas.
- High Pressure gas lines were not within the scope of current risk assessment audit checklists.
- Incident free since Commissioning of equipment.
- Aging yet still integral piece of Equipment for active Scientific Teaching and Research.

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## THE INCIDENT

- Unexpected.
- Occurred during cylinder change over sequence.
- High pressure gas line connected from cylinder to wall mounted regulator.

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# THE INCIDENT



• Fig. 1



Fig. 2



Fig. 3  
“Lost fragment”

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# INJURIES AND POTENTIAL INJURIES



- Fig. 4

Fig. 5

- NB : Cut to back of wrist (Fig. 5), the undetected “lost fragment” entry point.

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# THE EMERGENCY RESPONSE

- Immediate localised emergency response to audible gas release by floor wardens and building campus incident management teams.
- First Aid respondents.
  - Training.
  - Team work.
  - Authority of control / site preservation for evaluation.
- Security team response.
- Incident reporting and internal investigation.

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## FOLLOW-UP AND ANALYSIS

- Liaison with current gas supplier.
- Bottle pressures could not be verified.
- Annual inspections recommended by Gas Supplier.
- Gas Regulators reviewed, including campus wide follow-up.

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# PREVENTATIVE MEASURES

- First analyse gas flows then connections and finally hosing required.



• Fig. 6



Fig. 7

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# PREVENTATIVE MEASURES

- Criteria for connections / plumbing.
  - Allow free swivel around connections to allow connect / disconnect process.
  - Proven long term durability.
  - Withstand high pressure.
  - Non-interchangeable connections.

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# PREVENTATIVE MEASURES

- **Solution**

- Connection of regulator directly to gas cylinder.
- Swagelok swivel / ferruled fittings.
- Two different size fittings to prevent connection of Dewar to Cylinder.
- Over compensation of hose pressure rating.

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# PREVENTATIVE MEASURES

- Solution.



Fig. 8

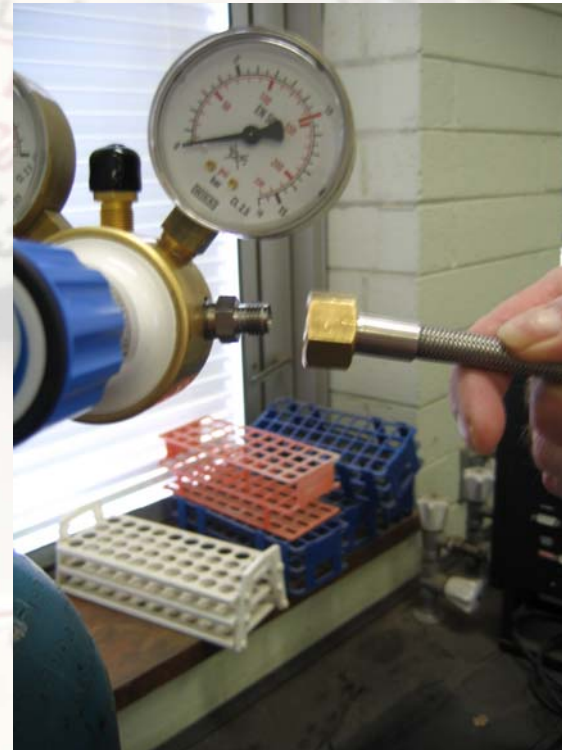


Fig. 9

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# PROACTIVE SAFETY OUTCOMES

- Risk assessment and audit scopes widened to now include interrogative assessment of plant and equipment.
- Multi-campus assessment of high pressure gas lines – rectification.

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# PROACTIVE SAFETY OUTCOMES

- Complex mix of services
    - Bottled / Piped Gases.\*\*
    - Multi-Phase Electrical services.
    - Ventilation.
    - Heat stabilisation.
    - Complex Scientific equipment.
- \*\* Now included on regular hazard inspection checklists.

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