

Rutherford Appleton Laboratory  
Ionising Radiations Regulations 1999

## LOCAL RULES FOR R55 EXPERIMENTAL HALL

### 1. Introduction

Local rules are a requirement of the Ionising Radiations Regulations 1999. They apply to all persons working within the specified area. Operations not covered within these local rules must have a prior risk assessment completed and be authorised by the RPS in consultation with the RPA before any action can proceed.

### 2. Description of Area

These Local Rules cover the main hall area of R55 including all the neutron and muon instruments, R69 (HRPD) and R77 (ENGIN-X). They exclude EPB1 (inside and on top), the target monolith, the Target Services Area, manipulator rooms, remote handling cell, underground tunnels and the Tritium Counting Lab.

### 3. Responsibilities and Contact Details

RPS: **Steve Wakefield** (07770 858075)  
Deputy RPS: **Erik Johnson** (07900 136963)  
RPS (Sample Preparation): **Steve Roberts** (07917 243263)

Each instrument is operated by an Instrument Scientist and every experiment has a designated local contact, responsible for the preparation of the experiment, running the experiment and clearing up afterwards. Responsible Science Group Leaders are:

**Daniel Bowron** (01235 446381)  
SANDALS

**Steve Bennington** (07799 092649)  
ALF (ROTAX), PRISMA, HET, MARI, MERLIN, MAPS

**Sean Langridge** (07990 506709)  
SURF, CRISP, LOQ

**John Tomkinson** (01235 446686)  
OSIRIS, IRIS, TOSCA, VESUVIO

**Laurent Chapon** (07786 747383)  
POLARIS, INES, PEARL, HRPD, ENGIN-X, GEM, SXD

**Philip King** (07730 801966)  
RIKEN (4 Ports), EMU, MuSR, HIFI

### 4. Radiological Classification

All areas in the experimental hall are **Controlled**.

## 5. Radiological Hazards

### **For Prisma, Alf (Rotax), Surf, Crisp, Tosca and Engin-X Instruments**

An intense collimated neutron beam is admitted through the front-end beamline into the blockhouse by opening the beam line shutter, situated inside the target monolith. Radiation levels in the beam are expected to be hundreds of mSv/h. With the shutter closed, radiation levels are expected to be tens of  $\mu\text{Sv/h}$ .

### **For Sandals, Osiris, Iris, Polaris, Het, Pearl, Hrpd, Gem, Mari, Merlin, Sxd, Vesuvio and Maps Instruments**

The neutron beam enters a vacuum tank located inside the blockhouse when the beam line shutter is opened. The sample position is in the vacuum tank. Radiation levels in the beam are again expected to be hundreds of mSv/h and with the shutter closed, tens of  $\mu\text{Sv/h}$ .

### **For Loq Instrument**

The neutron beam enters a vacuum tank located inside the blockhouse when the beam line shutter is opened. The sample position is immediately upstream of the vacuum tank. Radiation levels in the beam are expected to be hundreds of mSv/h and with the shutter closed, tens of  $\mu\text{Sv/h}$ .

### **For the Muon instruments**

A beam of muons enters the instrument enclosures when the blockers are opened. Radiation levels in the beam may be mSv/h and tens of  $\mu\text{Sv/h}$  out of the beam. Levels in the instrument with the blockers closed are background only.

### **Active samples:**

Material placed in any neutron beam may become activated. All material which may have been affected in this way must be handled according to ISIS/SI16. Some samples may have been activated prior to arrival at ISIS or may be naturally radioactive. All such materials must be managed according to Experimental Operating Instructions (EOI1 and EOI3). Effective dose rates will generally be  $<1\mu\text{Sv/h}$ .

### **Radiochemical Lab:**

One laboratory on the north side of R55 contains basic facilities for handling radioactive samples. These facilities include a dedicated fume hood and a glove-box. Work in this area is supervised by the Sample Preparation RPS and Health Physics Technicians.

### **Neutron Sources:**

Neutron sources may be used on instruments or other areas of the Experimental Hall. Each source is subject to its own risk assessment, must be secure at all times and must have its movements logged promptly and accurately using the Isostock database. Radiation levels exhibited by these sources will generally be less than  $1\mu\text{Sv/h}$ .

### **For all other areas**

Radiation from the monolith has been shielded to the extent that working with completed shielding is non-hazardous (largely  $<1\mu\text{Sv/hr}$ , although some areas very close to the monolith show levels of around  $5\mu\text{Sv/h}$ ). Removal of shielding could expose radiation in the area of the shield wall and the beamlines when the ISIS accelerator is running beam to TS1. The expected levels are tens of  $\mu\text{Sv/h}$ .

## **6. Signs**

A copy of the local rules will be posted at the entrance to R55.

Signs indicating the Controlled designation of the Experimental Hall area will be posted at all doors leading to it.

Radiation signs indicating the “Controlled” designation and radiation levels must be displayed at all entrances to interlocked areas.

## **7. Procedures for Restricting Access**

Access to R55 is a card swipe system with all staff and users receiving training before being allowed to work in the building.

Access to any beam line or blockhouse is restricted to classified persons and persons operating under a Safe System of Work. A mechanical and electrical interlock system prevents access to the beamline while beam is being admitted and will shut ISIS accelerator down if challenged. A blockhouse search procedure must be carried out before the beam line is closed up, ready for beam to be admitted. Failure to complete the search prevents the shutter from being opened.

## **8. Safety Alarms**

### **For beam lines only**

An alarm sounds while the search procedure is in progress. On hearing this alarm, anyone inside the blockhouse must leave. An alarm test forms part of the interlock functionality safety checks.

## **9. Personal Dosimetry**

Standard RAL dosimetry requirements apply (STFC Safety Code 29).

## **10. Methods of Protection**

None required for radiological protection.

## **11. Radiation and Contamination Monitoring**

Any material that may have been exposed to the neutron beam must be monitored and dealt with according to ISIS/SI16. Unexpected radiation detected in the beam line will cause the interlock system to switch the ISIS accelerator off.

## 12. Dose Investigation Level

The dose investigation level for all areas within ISIS is specified in STFC Safety Code 29.

## 13. Accounting for Radioactive Material

All radioactive material must be treated in accordance with ISIS/SI16. Nuclear materials are subject to Safeguard accounting and reporting.

## 14. Detailed Working Arrangements

1. All work in R55 must be carried out *either* by classified radiation workers *or* by people working under a permit-to-work system wearing OSL badges.
2. All radiation warning signs *must* be complied with.
3. No alterations may be made to any locking systems controlling personnel access to radiation areas without *explicit* authorisation. Refer to OPIs.
4. No alterations may be made to any interlock systems covering radiation areas without *explicit* authorisation from the ISIS Safety Modifications Panel.
5. No radiation shielding blocks (steel, concrete or wax tanks) may be removed without *explicit* authorisation. See OPI201.
6. No services (electrical, water, compressed air, gases, etc.) may be worked on without *explicit* authorisation from the appropriate RPS with Health Physics cover.
7. No alterations may be made to radioactive gas extraction systems without *explicit* authorisation from Health Physics management
8. Any accidental damage to shielding or accidental movement of shielding *must* be reported *immediately* to the Main Control Room (MCR) and the RPS.
9. Any incident associated with radiation must be reported immediately to the RPS, Main Control Room (MCR) and the Radiological Protection Adviser.
10. Sample handling information can be found in ISIS/EOI1.
11. Any beamline components or materials exposed to the neutron beam will be treated according to ISIS/SI16.

## 15. Risk Assessment

Operational risks assessments have been completed for all experiment and experiment support work on the beam lines.

## 16. Accident Scenarios and Contingency Plans

### For all beam lines

Radiation is expected to be contained within the beam line and blockhouse structure. A search procedure and personnel interlocks should prevent personnel exposure. The blockhouse personnel interlock system includes emergency beam-off-buttons and emergency break-out through the door.

Residual radiation risks are low for all other areas covered by these local rules.

ISIS/EOI1 includes plans for handling sample contamination.

OPI305 covers the contingency plans for accidental radiation exposures.

### **16.1 Fire**

If you discover a fire:

- Break glass alarm.

- Shout to alert persons nearby.

- Dial RAL Site Security on 2222 (01235 778888 from a mobile)

- Give location of fire.

- Secure any radioactive material if it is safe to do so.

- Inform the RPS, Main Control Room (MCR) and the Radiological Protection Adviser.

If you hear the fire alarm:

- Secure any radioactive material if it is safe to do so.

- Leave the area by the nearest exit

- Go to the Fire Assembly Area and

- Check on the presence of colleagues known to be at work.

### **16.2 Loss or damage to radioactive materials**

In the event of loss or damage to any radioactive materials, inform the RPS immediately.

If there is any possibility of contamination then evacuate and secure the area.

Assemble safely, and so as to minimise the spread of contamination, and await help from ISIS Health Physics.

### **16.3 Damage or reduction of radiation shielding**

In the event of any damage or reduction to any of the radiation shielding close the shutter and report the incident to the RPS and the Main Control Room (MCR) immediately.

### **16.4 Accidental injury**

In the event of exposure or possible exposure to the neutron beam (person present in an interlocked area with blue lights on and interlock system **not** in a failsafe fault condition), the incident must be reported to the RPS, who will instigate an investigation. OPI305 covers the contingency plans for accidental radiation exposures. ISIS/EOI1 includes plans for handling sample contamination.

## **17. Documentation**

A copy of these rules must be placed on the wall near the entrance to the area.

Hardcopies are also available at the ISIS Main Control Room and with the RAL RPA.

An electronic version should be stored on the ISIS Health and Safety Sharepoint area under 'Local Rules'.

The following must also be clearly available in the area:

- Copies of specific operating procedures.
- Risk Assessment for the area.

These rules must be reviewed, and appropriately amended, not later than 1 year from the date below.

Other relevant information:

- Certificates issued to RAL by the EA under RSA93
- The Ionising Radiations Regulations 1999 and its Approved Code of Practice
- STFC Safety Codes 14, 21 and 29
- ISIS Safety Instructions 15 and 16
- Experimental Operating Instruction 1

## 18. Authorisation

Compiled by: Radiation Protection Supervisor		Date
Advised by: P Wright, RPA	Sent to PW for comments / approval	Date 24/02/10
Authorised by: Division Head responsible for this Radiation Controlled Area		Date