UNIVERSITY OF BATH
DEPARTMENT OF CHEMISTRY

LOCAL RULES FOR X-RAY CRYSTALLOGRAPHY LABORATORIES

1. RADIOLOGICAL PROTECTION

For the purposes of the Ionising Radiations Regulations 1999, the University of Bath shall be considered as nine distinct radiation areas, one of which includes the Department of Chemistry research building (1 South).

X–ray crystallography sets of maximum voltages of 55kVp are housed in 1S 1.33, 1S 0.48a and 1S 0.48b.

2. AREA DESIGNATION

The X-ray laboratories (1.33, 0.48a and 0.48b) are designated as SUPERVISED areas.

3. UNIVERSITY RADIATION WORKERS (and relevant areas by Lab no.) in building 1 South

R.P.S.	Dr. Mary F. Mahon		ext. 3752
Authorised Users:	Dr. Mary F. Mahon	1.33	ext. 3752
	Dr. Gabriele Kociok-Köhn	1.33	ext. 6520
	Prof. Kieran Molloy	1.33	ext. 6382
	Prof. Paul Raithby	1.33	ext. 3183
	Prof. Matthew Davidson	1.33	ext. 6443
	Dr. Matthew Jones	1.33	ext. 4908
	Dr. Andrew Johnson	1.33	ext. 4467
	Dr. Steve J. Roser	0.48b	ext. 6569
	Dr. Karen Edler	0.48a	ext. 4192
Technical Staff	Mr.Alan K.Carver		ext. 5508

University Radiation Protection Officer	Mr. Pete Jewell, 3 South room 1.01, ext. 6540
Radiation Protection Adviser	Mrs. Sheila Liddle

4. UNIVERSITY & STATUTORY REGULATIONS CONCERNING THE USE OF RADIOACTIVE MATERIALS

All work with radioactive materials must comply with the provisions of the approved Code of Practice for "The protection of persons against ionising radiations arising from any work activity" based upon *The Ionising Radiations Regulations 1999*.

5. NOTIFICATION OF WORK WITH RADIOACTIVE MATERIALS

Persons intending to work with ionising radiations must notify the University Radiation Protection Officer (either directly or through the departmental RPS) and obtain permission to commence the work.

Dependent on the nature of the work, workers will be informed of the need for:

1. Classification as a radiation worker
2. A blood & medical examination
3. Wearing a personal dosimeter

6. TRAINING

It is the responsibility of supervisors to ensure that their postgraduates, experimental officers and research officers are adequately trained in the safe use of equipment that uses ionizing radiation prior to the commencement of the work. In the case of users of X-ray crystallography apparatus Dr.Mary F. Mahon must be informed or consulted (as appropriate) before using departmental equipment. If in any doubt, training can be arranged through the R.P.O.

7. STATUTORY RECORDS

In all laboratories where X-rays or sealed sources of radioactive materials are used leak tests must be conducted at intervals of not greater than 14 months and records must be kept for at least 2 years

8. SYSTEMS OF WORK

8.1 Local rules for normal routine operation of X-ray crystallography units

All users are registered with the Departmental Radiological Protection Supervisor and authorised to use X-rays sealed sources. Authorisation will necessitate a training procedure for inexperienced users.

All apparatus is used strictly in accordance with the manufacturers' handbooks which ensures safe working practices and reduces the risk of accidental exposure to X-rays.

No part of the primary beam is accessible to personnel in the standard working procedures and when access is necessary to the sample chamber, safety interlocks ensure that the primary beam is interrupted. Any practice that circumvents this precaution that increases the possibility of an accidental exposure can only be accomplished by authorised personnel.

All X-ray units must be checked regularly for radiation leaks and records of inspection must be maintained. Before the generator is brought to full voltage and operational tube current, it is essential to confirm the correct functioning of the following:

a. interlock on enclosure
b. warning lights "X-rays on
c. warning lights "Shutter open

If in any doubt contact the Radiological Protection Supervisor before proceeding. All <u>users must familiarise themselves with the location of the "power off"' button in case of emergency</u>.

The X-ray laboratory 1.33 houses 3 generators, which supply X-rays for two Nonius KappaCCD single-crystal diffractometers and one Bruker D8 powder diffractometer. Access is restricted to “key holders”, who are also designated film badge wearers, and those accompanied by key-holders.

The Reflectivity Laboratory (0.48b) houses one generator that supplies X-rays for a purpose built low–angle X–ray reflectometer. As above, access is restricted to “key holders”, who are also designated film badge wearers, and those accompanied by key-holders.

The SAXS Laboratory (0.48a) houses one generator that supplies X-rays for an Anton Paar SAXSess small angle X-ray scattering instrument. As above, access is restricted to “key holders”, who are also designated film badge wearers and those accompanied by key-holders.

8.2 Local rules for setting up crystallographic apparatus

a. Adjustment operations for which enclosures have to be removed and interlocks overridden may only be carried out by authorised persons.
b. The area in which such adjustments are carried out must be a "controlled area" or temporarily designated as such.
c. Generators must be run on the lowest voltage and tube current compatible with the operation.
d. A suitable monitor must be switched on and placed in a position to record scattered beams.
e. The direct beam must be excluded by design features or by temporary shielding in line with the direct beam and designed such that it prevents sideways scatter.
f. Temporary shielding must he provided in place of the usual labyrinth if this has been removed to enable the adjustments to be made.
g. On completion of the adjustments the safety interlocks should be restored and their effectiveness checked. No radiation leaks should be detectable.

8.3 Contingency plans

Any instance which indicates scattered radiation must be dealt with immediately by hitting the "power off" button. Any such radiation leakage must be reported to the Radiation Protection Supervisor who will investigate the consequences of such a leak. Both the R.P.O. and the R.P.S. will investigate and report the incident to the SHE Unit and R.P.A.. Should potential radiation injury be suspected then the individual will be immediately referred to the University's Occupational Health Service provider.

8.4 Dose investigation levels

If an effective dose of ionising radiation exceeds the following limits this will trigger a full investigation as outlined above. This is to ensure that exposures to ionizing radiation remain as low as reasonably achievable;

X–ray crystallography work 1 mSv whole body, 5 mSv extremity

DECLARATION FORM

THIS FORM MUST BE SIGNED AND RETURNED TO THE DEPARTMENTAL R.P.S. BEFORE WORKING WITH THE 1 SOUTH X–RAY DIFFRACTION FACILITES WITHOUT DIRECT SUPERVISION

I certify that I have received a copy of both the Departmental Local Rules for X-ray laboratories and the University Radiological Protection Policy Statement, and that I have fully read and understood both documents.

I undertake to wear my X–ray monitor badge at all times when I am in the X–ray suites.

I further acknowledge that I will inform the relevant X-Ray lab supervisor(member of academic staff) and the Department's RPS (currently MFM) if I have any condition or illness (e.g. pregnancy, epilepsy) which might pose any safety risk to myself while using the X–ray facilities in Room 1S.

Name: _____ Email: _____

Date: _____

Please detach and return this signed form to Dr. Mary F. Mahon.