Information Pack to be supplied to Clients who have purchased a Higher Dose Rate XRF Instrument

Generic guidance on the requirements of IRR99 in relation to the use of Fischer X-ray Instruments, produced for higher dose rate output instruments. It should be noted that IRR99 only applies in the UK. For sites outside the UK, local arrangements will apply.

1. Introduction

As with other instrumentation of this type, the Fischer Instrument produces ionising radiation (X-rays), and whose use must be in compliance with the requirements of regulations made under The Health & Safety At Work Act 1974, namely The Ionising Radiations Regulations 1999 (IRR 99)

These regulations and associated Approved Coe of Practice, ACOP, are available for download at the following address:

http://www.hse.gov.uk/pubns/priced/l121.pdf

In providing the Installation and Commissioning Certificate, and information on the safe use of our product, in particular, the safety features and warning devices, Fischer Instrumentation (GB) have complied with the installers duties under IRR 99.

In order to assist users in understanding their duties under IRR 99 in relation to the use of one of Fischers' X-ray instruments, we have produced this generic guidance on the key relevant requirements of the regulations.

2. Notification to the HSE (IRR Regulation 6).

Notification of those particulars given in Schedule 2 of IRR 99 is required, unless the instrument is to be used on a licensed nuclear site, or you already notified that you work with ionising radiation *and* the category of sources you use already includes electrical equipment (i.e. X-ray sets).

For those users for whom this is the first time work with ionising radiation has been done, notification must be given at least 28 days before work commences. This is done online, using the following link:

https://extranet.hse.gov.uk/lfserver/external/irr6

For those users who have previously notified work with ionising radiation, but not with X-rays, you must notify this material change forthwith, using the same form but selecting the "Change to previously notified work" check box at the start of the form.

In both cases, it is recommended that you retain a copy of the notification to help you demonstrate compliance with Regulation 6.

3. Appointment of a Radiation Protection Adviser (RPA) (Regulation 13).

As the instrument uses an accelerating potential of more than 30 KV, you must appoint a Radiation Protection Adviser in writing, and consult them on your arrangements to comply with IRR.

If you have not got ready access to an RPA, you may wish to appoint the RPA used by Fischer Instrumentation (GB) Ltd. We have appended an appointment template for your convenience.

Appointing AMEC as your RPA incurs no charge, however should additional support be required, such as preparation/review of the PRA or Local Rules, provision of Radiation Awareness Training or an annual compliance Audit this will be subject to a charge.

4. Prior Risk Assessment

AMEC have prepared for Fischer, to be supplied to clients, a Prior Risk Assessment, in accordance with Regulation 7 of IRR99. This PRA has identified the persons at risk, likely radiological exposures under normal operating conditions, any potential reasonably foreseeable radiation accidents, a suitable safe system of work for the operation of the instrument and the need for suitable training to be provided.

Where instruments have a maximum external dose rate of greater than 1μSv/h at 0.1m, but less than 7.5μSv/h, it is recommended that a Supervised Area is designated, Local Rules are written and a Radiation Protection Supervisor, RPS is appointed. The reasoning behind these decisions is summarised within the PRA.

5. Production of Local Rules and the Appointment of an RPS

A Radiation Protection Supervisor, RPS, should be appointed in writing and given appropriate training, in accordance with Regulation 17(4) of IRR99. Local Rules should be written. These written instructions are intended to lay down how the instrument can be operated in a safe and compliant manner. They are based in part on the safe system of work outlined in the PRA and also on Regulation 17(1) of IRR99.

Contents and layout of a suitable set of Local Rules for the operation of an XRF Analyser can be summarised as:

6. Requirements for Designated Areas

Regulations 18 and 19 of IR99 places duties on employers who designate radiological areas. These duties include appropriate signage and monitoring. Included within the PRA for the higher dose rate units is an example of a suitable SA sign.

Personal monitoring is not required but area, environmental monitoring is. This can be achieved by the use of a suitable instrument such as a Mini Instruments 900 with a 42A scintillation probe or by the use of TLDs.

7. Provision of Training

Before appointing as an RPS they must receive appropriate training. This training should be based on the HSE core competency syllabus and include a module on X-ray specific issues.

Regulation 14 of IRR99 requires that all employers of persons who operate radiation generators to ensure that their staff should receive suitable training. This training can be fairly simple in nature, it should address the nature of the potential radiological risks associated with the operation of the instrument, the importance of following the safe system of work identified in the PRA and the actions to be taken in the event of damage to the instrument.

8. Critical Examination and Site Based Commissioning

Fischer as the erector/installer of the equipment have a duty under Reg 31(2) of IRR99 to ensure that a "Critical Examination" of the instrument is carried out as part of the on-site commissioning. Essentially, the requirement is to ensure that Fischer are supplying an instrument which operates safely in line with its designed, engineered controls, all safety warning systems are operational and all essential training and operational information is provided to the client. A record must also be kept of these requirements having been met.

Appendix 1

Below is a suitable, generic template for Local Rules which cover the use of a Higher Dose rate XRF unit. This suggested layout is to be used where designation of a Supervised Area is required.

1. GENERAL

1.1 These rules are written in compliance with the Ionising Radiation Regulations 1999 (Regulation 17) and the associated code of practice and guidance, Work with Ionising Radiation (L121).

1.2 The rules contain the principles for restricting radiation exposure and means of complying with IRR 1999 and should be seen as implementing part of the general safety policy required by Section 2 of the Health and Safety at Work Act 1974

1.3 Aims: To ensure that work with ionising radiations is controlled so that:

- *During normal working, radiation doses to all persons are As Low As Reasonably Practicable (ALARP).*
- *Precautions are taken to minimise the risk of equipment failure or other occurrence that may result in significant radiation doses to any person.*
- *No doses exceed the limits specified in the regulations*

2. SUMMARY OF RISK ASSESSMENT

The Risk Assessment concludes that although there are significant dose rates within the cabinet when X-rays are being generated, the engineering and safety controls are suitable to prevent access to the interior of the cabinet when X-rays are produced and the shielding is suitable to restrict exposure to operators of the X-ray set to a level that can be considered ALARP.

In normal use, exposure to workers is likely to be much less than 1 mSv per year and is unlikely to be occupationally significant. For comparison, it is noted that the annual average exposure from natural background radiation in the UK is approximately 2.3 mSv.

In order to ensure exposure remains insignificant, regular monitoring is undertaken together with checks on the interlocks and safety systems which prevent access to the interior of the cabinet when X-rays are being generated.

The incidents identified as having the potential to give rise to a significant exposure are

- *Failure of an interlock resulting in resulting in generation of X-rays while the cabinet door is open. Observation of warning signals would indicate this failure and allow the operator to minimise their exposure by taking prompt action.*

- *Radiation leakage from the cabinet as a result of misplaced shielding following repairs to the unit. Routine monitoring around the cabinet following repairs or maintenance should minimise this risk.*

- *Fire or mechanical damage which may affect the integrity of the shielding.*

3. DESIGNATED AREAS

The interior of the X-ray cabinet is designated a Supervised Area, as conditions are monitored and kept under review.

4. APPOINTED RADIATION PROTECTION SUPERVISORS (RPSs)

4.1 Name –
4.2 Contact
4.3 Name-
4.4 Contact Details.
4.5 The RPS is responsible for ensuring that work is carried out in accordance with the requirements of the regulations and for taking all reasonable steps to ensure that these rules are observed. In addition the RPS should ensure the monitoring and safety system checks are carried out in accordance with Sections 10 and 11 of these Local Rules.

5. DOSE INVESTIGATION LEVEL

The company has adopted a Dose Investigation Level of 1 mSv.

As personal dose monitoring is not required at these low exposure levels, this can be determined by routine dose rate monitoring with a suitable hand held instrument.

OR

Where an environmental TLD dosimeter is used:

" a reading of more than 0.25 mSv on a quarterly area monitoring badge will trigger an investigation".

6. CONTINGENCY PLANS

6.1 In the event of a fault, switch off the equipment and remove key from switch.

6.2 Tag the key "FAULT – DO NOT USE" and similarly label the X-ray set

6.3 Notify the RPS of the fault.

6.4 Do not use the equipment again until the fault has been rectified, and a survey has been performed which shows radiation levels to be normal and the correct operation of interlocks and warning signals has been confirmed.

6.5 Should an incident occur which might have exposed a person to radiation to an extent more than normal, the RPS must be notified immediately. The RPS will conduct an immediate investigation, and if it cannot be shown beyond reasonable doubt that the incident has not resulted in an over-exposure, the Health and Safety Executive must be notified of forthwith. A full investigation must then be undertaken. The company should seek assistance from their RPA in conducting these investigations.

7. WORK INSTRUCTIONS

7.1 The X-ray set may only be operated by Authorised Staff

7.2 Upon opening the door to the X-ray cabinet, the operator should observe the warning signals to ensure that any X-ray emission is terminated.

7.3 Any failure, defect or deterioration in the X-ray set and its safety and warning devices must be reported immediately to the RPS, after the Contingency Plan has been put into effect, where appropriate.

7.4 Employees must return the control key to the lock-box once the work is complete, or at the end of the working day, as appropriate, in order to prevent unauthorised or inadvertent use of the unit.

7.5 Employees must immediately report any incident which may have resulted in the exposure of a person to the RPS.

7.6 Employees must not intentionally or recklessly misuse or without reasonable excuse interfere with the X-ray set

7.7 Following maintenance, the X-ray set must not be returned to service until a radiation survey has been completed and shown that radiation levels are normal, and the proper function of the interlocks and warning signals has been confirmed.

8. AUTHORISED STAFF

8.1 Only staff who have been trained in the use of the X-ray unit, have been made aware of the contents of these Local Rules (including Contingency Plans) and have received information instruction and training on the risks to health presented by ionising radiation, the precautions to be taken and the importance of complying with the IRR 1999, are authorised to operate this equipment.

8.2 The staff currently authorised to use the equipment are listed in the attachment to these Local Rules

9. INFORMATION FOR FEMALE EMPLOYEES

9.1 Female employees who work with the X-ray sets are to receive a copy of the Health & Safety Executive information booklet "Working Safely With Ionising Radiation: Guidance for Expectant or Breastfeeding Mothers".

9.2 Female employees must inform the company in writing as soon as possible after discovering they are pregnant.

10. MONITORING

10.1 Monitoring using a sensitive X-ray monitor is to be undertaken at monthly intervals or following the return to service after maintenance, with a formal record made. Any elevated readings should be discussed with the RPA.

Or

10.2 Monitoring of long term average radiation levels is undertaken with a radiation dosimeter badge, that is changed at quarterly intervals.

11. MAINTENANCE AND EXAMINATION

11.1 Maintenance will be carried out by appropriately qualified service engineers when necessary. No attempt should be made to repair the X-ray unit without advice from a qualified service engineer.

11.2 Preventative maintenance should be undertaken annually by the manufacturer / supplier.

11.3 After maintenance the unit should be monitored using a suitably calibrated radiation instrument and a record kept of the monitoring results

11.4 Monthly examination of the condition of the X-ray system including warning signals, and a test on the interlocks is to be undertaken by the RPS or their designate with records kept

12. USEFUL CONTACTS

12.1 The local Health & Safety Executive Office is

*[insert details of address, telephone etc] * Site Dependent*

12.2 The appointed Radiation Protection Adviser (RPA) is AMEC who may be contacted as follows:

Tel: 01925 462578 Email: nigel.reeves@amec.com