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ESS Safety Plan

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ISIS Delivery of instruments for ESS:

The aim of the Safety Plan is to document the safety management system which is in place to ensure the ESS Instruments and designed, built, commissioned, operated and decommissioned in a safe manner

1. Introduction

The aim of the Safety Plan is to document the safety management system which is in place to ensure that ESS instruments and associated equipment etc are designed, installed, operated, maintained, and eventually decommissioned and dismantled in a safe manner and in accordance with legislation and relevant standards, including internal organisational standards. Hence the safety management system will apply to the whole life-cycle of the instrument.

2. Design

2.1. Design Standards

Health and Safety is an integral part of the design process and this will be achieved by the involvement of multi-disciplinary teams working together to understand how the design effects the health and safety of workers who construct, operate, maintain and eventually decommission the ESS instruments.

There is an added layer of complexity as the ESS instruments will not be installed or operated either in ISIS or the UK. However as a general principle ISIS will design the beamlines as if they are ISIS beamlines and will only apply different principles or legislation when specifically instructed by ESS in a timely manner to do so.

The ESS instruments will be designed using a risk based approach complying with applicable legislation, standards, codes of practice, STFC, RAL and ISIS policy and guidance and where appropriate the equivalent ESS and Swedish codes. Key legislation includes:

- Health and Safety At Work Act 1974
- Management of Health and Safety at Work Regulations 1999
- Supply of Machinery (Safety) Regulations 1992
- Construction (Design and Management) Regulations 2007
- Ionising Radiation Regulations 1999
- Electrical Equipment (Safety) Regulations 1994

(This is not an exhaustive list)

The equipment will not be CE marked but it will comply with the Supply of Machinery (Safety) Regulations 1992.

The main hazards associated with the ESS instruments will be identified in accordance with the Management of Health and Safety at Work Regulations 1999 and STFC SHE Code 6 Risk Management.

The adopted principles of hazard control for TS1, Phase I and Phase II instruments for TS2 are to exclude personnel from high hazard areas during operation and to contain the hazards through appropriate radiological shielding and the provision of enclosures.

The shielding shall be designed to reduce the radiation doses to below the permitted levels allowed for continuous personnel occupation outside the shield of 3 μSev/h. Exclusion of personnel will be achieved by interlocking areas so as to prevent access during operations and to shut down the facility should unauthorised access occur. Interlocks shall be provided in accordance with ESS code of practice– Functional Safety of Electrical / Electronic/ Programmable Electronic Systems.

These principles will be applied to the ESS instruments.

2.2. Organisation

The multi-disciplinary teams which make up the ESS instrument design team will be fully furnished with the necessary skills and competencies to allow the identification of the health and safety risks for the lifecycle of the ESS instruments, the elimination of hazards at the design stage, the reduction of risk and the sharing of information.

There will be the clear allocation of responsibility and all persons will be given sufficient information, instruction, training and supervision to ensure that they can discharge these responsibilities, as necessary.

Expert advice will also be sought, where appropriate, to supplement the competencies of the design team.

2.3. Planning

As stated in section 2.1, the design process will identify, as far as is reasonably practicable, the hazards associated with the lifecycle of the ESS instruments. The competent design team shall:

- Identify significant health and safety risks that arise from the design
- Eliminate the hazards so far as is reasonably practicable
- Prioritise and assess the remaining risks and reduce them where possible

Significant Health and Safety risks will be identified in a systematic and structured approach and in accordance with STFC SHE Code 6 Risk Management. Eliminating hazards will be an integral part of the design process and the assessment of risk will ensure that eliminating one hazard does not create a new and more significant hazard. Risk reduction solutions will be selected on the basis of the risk control hierarchy (The Management of Health and Safety at Work Regulations 1999):

(a) avoiding risks;

(b) evaluating the risks which cannot be avoided;

(c) combating the risks at source;

(d) adapting the work to the individual, especially as regards the design of workplaces, the choice of work equipment and the choice of working and production methods, with a view, in particular, to alleviating monotonous work and work at a predetermined work-rate and to reducing their effect on health;

(e) adapting to technical progress;

(f) replacing the dangerous by the non-dangerous or the less dangerous;

(g) developing a coherent overall prevention policy which covers technology, organisation of work, working conditions, social relationships and the influence of factors relating to the working environment;

(h) giving collective protective measures priority over individual protective measures; and

(i) giving appropriate instructions to employees.

Engineered controls such as specific structures, systems, components etc. that deliver safety functions i.e. Key Safety Related Equipment (KSRE) and Safety Related Equipment (SRE) will be specifically identified.

Information about residual risk will be communicated by the design team to those persons who are likely to be at risk. Although not a legal requirement, a risk register for health and safety will be prepared as this demonstrates that the risks have been considered and will allow the sharing of information with persons involved in the construction, operation, maintenance and eventual decommissioning.

This information will be documented and communicated with the final delivery of the instrument via the technical file.

2.4. Measuring Performance

As required ESS instrument design will be supported by HAZOP studies, Safety Integrity Level (SIL) Assessments and other appropriate measures to identify hazards and review safety performance. The recommendations from these studies will be used to inform design.

Evidence will be documented that structures, systems, components have been designed and manufactured to the required standards and commissioning tests will demonstrate that, as built, the design intent has been achieved.

The safety requirements for in-service testing, inspection, examination and other maintenance procedures and frequencies will also be documented.

2.5. Reviews

As well as the Schedule of Design Milestone Reviews given in the ESS Quality Plan, operational reviews will also take place. These reviews will consider, amongst other things, the information on residual risks particularly for operation and maintenance activities. These will be instigated by the Task Leader at a planned point in the design and before manufacture and will be undertaken by the design team.

Reviews of key safety related and safety related equipment, systems and components will also take place at a planned point there will be a Technical Advisory Board Set up who will be available to advise on key safety issues. Specifically, a review of the shielding will be undertaken involving the ESS RPA (Radiation Protection Adviser).

3. Construction and Installation

The construction and installation of the ESS instruments prebuilds will comply with the requirements of The Construction (Design and Management) Regulations 2015. In accordance with the Regulations, a Principal Contractor will be appointed.

All work will be undertaken by suitably qualified and experienced persons (SQEP) and will require risk assessments and method statements (Management of Health and Safety at Work Regulations 1999).

A requirement of the CDM Regulations is that a Construction Health and Safety Plan is produced in advance of the construction phase commencing. Residual risks, identified by the design team, for the construction and installation phase of the projects will be fed into the Construction Health and Safety Plan via the CDM Co-ordinator.

4. Operation and Maintenance

At a pre-determined point when the ESS instrument enters “Hot commissioning” and operations, the CDM Regulations will no longer apply. The instrument will be handed over to the relevant ESS Science Group Leader according to the procedure detailed in ESS Operating instructions. At this point, responsibility for safe operation and maintenance of the instrument will be given to ESS and the instrument will be operated and maintained according to risk assessments and local procedures put in place by ESS. Local rules for the instrument will also be produced in accordance with the Ionising Radiation Regulations 1999 or Swedish equivalent.

Information from the Technical File will be essential for the safe operation and maintenance of the ESS. This will be completed and handed to ESS as part of the instrument sign off.

5. Decommissioning and Dismantling

The design of the ESS instruments will take into account the periodic replacement of components and eventual end of life decommissioning. For many components, it will be possible to decommission them following standard maintenance and removal procedures.

There will be a need for a decommissioning plan and methodical planning of decommissioning operations for the ESS instruments before the start of this phase. This work will be carried out by ESS.