
ESS SAMPLE MANAGEMENT PROCEDURE



	Name	Role/Title
Owner	Monika Hartl	Group Leader for Chemistry and Life Science Support
Reviewer	Ana Cintas	Radiation Protection Expert, ESH Division
	Andrew Jackson	Group Leader Instrument Scientists, NSS Division
	Helen Boyer	OHS Group Leader, ESH Division
	Oliver Kirstein	Technical Sub Project Leader for Science, SD
Approver	Per Roos	Radiation Protection Group Leader, ESH Division
	Arno Hiess	Head of the Scientific Activities Division, SD



TABLE OF CONTENT		PAGE
1.	PURPOSE.....	3
2.	PROCEDURE APPLICABILITY.....	3
3.	SAMPLE MANAGEMENT PROCEDURE	3
3.1.	Procedure map.....	3
3.2.	Procedure details.....	4
3.2.1.	Input.....	5
3.2.2.	ESF information from the proposal team.....	5
3.2.3.	Experiment Safety Review Procedure: pre-screening of the ESF	5
3.2.4.	Experiment Safety Review Procedure: SRC meeting.....	5
3.2.5.	Transition from Experiment Safety Review Procedure to Sample Handling Procedure.....	5
3.2.6.	Sample Handling Procedure: Planning	6
3.2.7.	Sample Handling Procedure: Briefing	6
3.2.8.	Sample Handling Procedure: Experiment	6
3.2.9.	Experiment Safety Report.....	7
3.2.10.	Output	7
4.	RULES, REGULATIONS, CONSTRAINTS, GUIDELINES	7
5.	GLOSSARY	8
6.	REFERENCES	8

1. PURPOSE

Based on the *NSS Concept of Operations* (ESS-0005817) [1], the *Neutron Scattering Systems - System Design Description* (ESS-0377817) [2], as well as the NSS radiological hazards described in *Neutron Scattering Systems - Radiological Hazards and Radiation Safety Provisions for Operations and Maintenance* (ESS-2972939) [3], this document addresses the issues of sample management for the ESS user program. To combine the best practices, the procedures and processes from several (reactor- and accelerator-based) neutron sources were taken into account.

The main goals of the sample management procedure are to:

- Ensure no sample comes into the ESS Experimental Halls for neutron scattering experiments without authorisation.
- Ensure hazards connected to samples and sample handling will be analysed before the experiment so that necessary provisions and controls are put into place.
- Ensure no irradiated sample leaves the ESS facility without authorisation.
- Provide the framework for an operational implementation that ensures safety while allowing the ESS user community to perform a large range of experiments.

2. PROCEDURE APPLICABILITY

The procedure is applicable to the management of all samples that are brought to ESS or made at ESS for the ESS user program and used during experiments.

3. SAMPLE MANAGEMENT PROCEDURE

3.1. Procedure map



The ESS Sample Management Procedure consists of two separate procedures that are defined in the *Experiment Safety Review Procedure* (ESS-0024107) [4] and the *Sample Handling Procedure* (ESS-0024112) [5]. The outcome of the sample management process is the documentation of the experiment from the start (submission of the proposal) to the end (sample disposal) in the form of an Experimental Safety Report (ESR).

This procedure encompasses evaluating the potential hazards of samples, including sample environment equipment. An experiment safety review will be held prior to performing experiments and appropriate protection for workers will be implemented to the level needed in each case. The safety review defines the handling of samples prior to, during, and after the experiment. Additional training may be required for personnel and users, depending on the hazards of the specific experiments. Before a sample is placed into a neutron beam at ESS, its activation in the beam will be estimated.

A plan to address the final disposition ('retirement') of the sample, be it shipping to the home institution or transferring it to waste management, will be developed. Depending on the level of

residual radioactivity, the sample can be (i) stored at appropriate areas (radioactive sample storage cabinet on the instrument or the dedicated sample storage area in building D08), (ii) handled at appropriate laboratories (instrument preparation area, general user laboratories, sample environment workshops or RML), (iii) disposed or (iv) shipped. Personnel, including users, are involved in handling the samples as defined by the conditions set out during the safety review. A shipment of samples, activated and non-activated, needs to follow standard transportation rules.

3.2. Procedure details

When submitting a scientific proposal, the proposal team is required to provide information on the materials to be investigated as well as the hazards connected to the materials and the activities during their stay at ESS. This is done via an ESS Experiment Safety Form (ESF). ESS does not solely rely on the statements of the proposal team in the ESF but also has an Experiment Safety Review Procedure focussing on the radiological, chemical, biological and conventional hazards of samples and the sample environment used during an experiment. Once the scientific review and experimental feasibility review have come back confirming that the proposal is approved, the sample management process starts with the Experiment Safety Review Procedure (see the light blue box in Figure 3-1). It starts with the ESF as input and generates an Experimental Safety Document (ESD) as an output. The ESD summarises the hazards and controls as determined by the Safety Review Committee (SRC). The ESD determines the handling of the sample from cradle to grave and covers the experimental hazards. It is the input for the Sample Handling Procedure. Note that the Safety Review Procedure always precedes the Sample Handling Procedure.

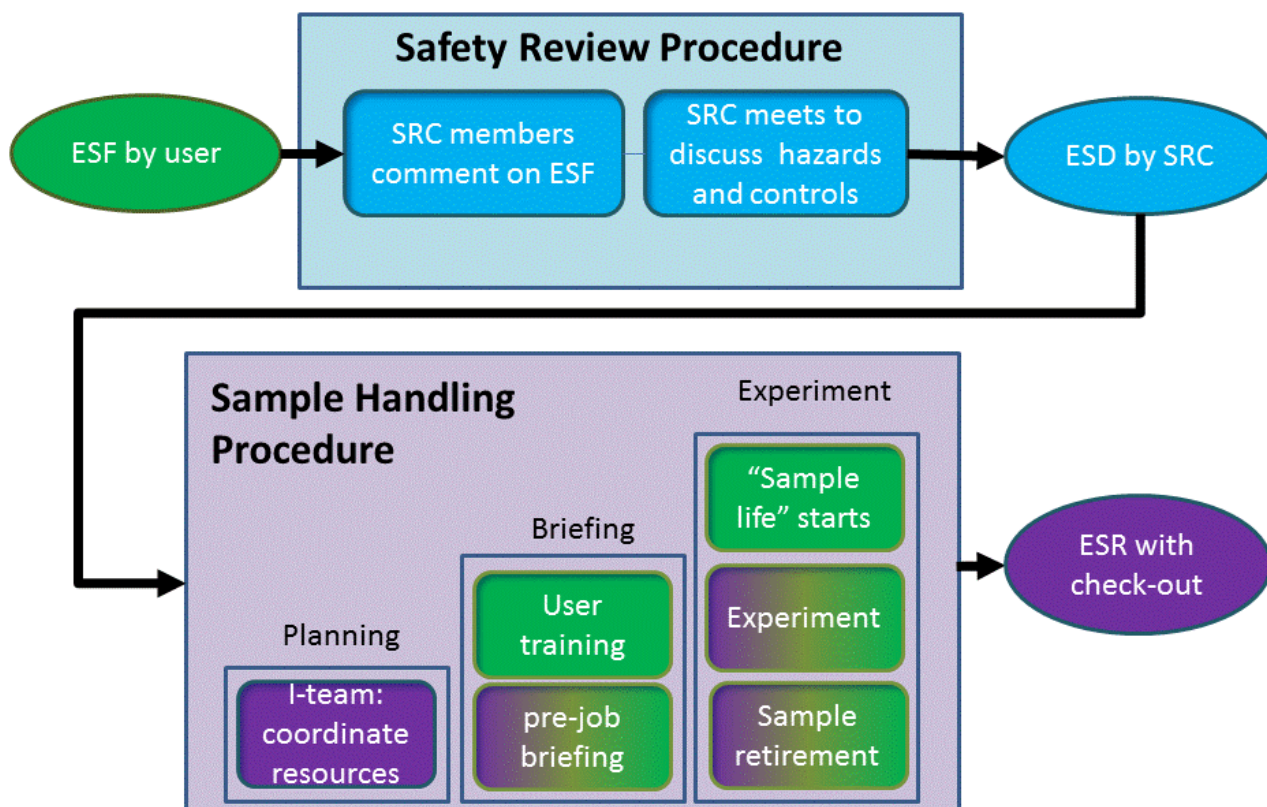



Figure 3-1 Flow chart showing the steps involved in the ESS Sample Management Procedure

3.2.1. Input


When a scientific proposal is submitted to ESS, an ESS Experiment Safety Form (ESF) is generated with the information provided by the proposal team that covers the materials as well as the hazards connected to activities and experiments during their stay at ESS. When the scientific review by the ESS science review panel and the experimental feasibility review by the ESS instrument team has confirmed an experiment will be performed at ESS, the sample management process starts with the ESF as input.

3.2.2. ESF information from the proposal team

<p>The proposal team confirms the Experiment Safety Form (ESF) to be correctly filled out (last chance for modifications to samples and equipment within the scientific scope). This is the input for the Experiment Safety Review Procedure.</p>	<p>Responsible: Proposal team</p> 
---	--


Output/product	ESF is distributed to the safety review committee (SRC) members
-----------------------	---

3.2.3. Experiment Safety Review Procedure: pre-screening of the ESF

<p>The members of the Safety Review Committee (SRC) review the ESF with a special focus on their area of expertise (radiological, chemical, biological, general hazards) and give comments in written form to the head of the safety review committee. They also check for missing information in the ESF, and if known add it, if unknown, they contact the instrument team for more information.</p>	<p>Responsible: SRC</p> 
--	--

Output/product	Written draft of ESDs sent to members of the SRC and head of SRC.
-----------------------	---

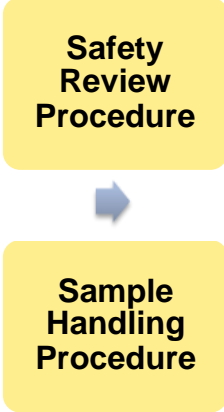
3.2.4. Experiment Safety Review Procedure: SRC meeting

<p>The SRC meets to identify the hazards of the experiment in detail and decide on the requirements needed to run the experiment safely. The SRC chair-person produces an Experimental Safety Document (ESD) that contains all the information regarding hazards, rules and requirements for the experiment. The ESD is signed by all SRC members.</p>	<p>Responsible: SRC chair-person</p> 
--	---

Output/product	Completed ESD with signatures by SRC members.
-----------------------	---


3.2.5. Transition from Experiment Safety Review Procedure to Sample Handling Procedure

<p>The signed Experimental Safety Document (ESD) is made available to the instrument teams. This concludes the Experimental Safety Review Procedure. The ESD informs the instrument team and proposal team of any requirements ahead of time, e.g., prior to scheduling an</p>	<p>Responsible: SRC chair-person</p>
--	---

<p>experiment and shipping any samples. This is the input for the Sample Handling Procedure.</p>	<div style="text-align: center;">  <p>Safety Review Procedure</p> <p>➔</p> <p>Sample Handling Procedure</p> </div>
--	---


Output/product	ESD is available to instrument teams prior to scheduling an experiment.
-----------------------	---

3.2.6. Sample Handling Procedure: Planning

<p>The instrument team is responsible for coordinating the safety resources needed for the experiment. The instrument team shall provide necessary controls and coordinate with the respective groups to make sure additional requirements, personnel and controls are in place. They also communicate with the proposal team on requirements that might have to be fulfilled on their side. Prior to shipping any sample and based on the ESD conditions, the users and instrument team implement any provisions for sample retirement, which can mean the samples are shipped back to the users, stored at ESS for further use or put into the waste stream.</p>	<p>Responsible: Instrument Team</p> <div style="text-align: center;">  </div>
--	--


Output/product	Planning, scheduling, and organising controls prior to the experiment.
-----------------------	--

3.2.7. Sample Handling Procedure: Briefing


<p>Upon arrival of the users for their experiment, the instrument team hosting the experiment goes over the ESD with the users to make sure the users have taken the required training, are informed about the safety requirements for their experiment and understand them. The Instrument Team and users sign the ESD to acknowledge the briefing.</p>	<p>Responsible: Instrument Team, Users</p> <div style="text-align: center;">  </div>
--	--

Output/product	ESD is signed off by the participating users and instrument team.
-----------------------	---

3.2.8. Sample Handling Procedure: Experiment

<p>The user can now start the experiment and handle the sample in accordance with the ESD regulations. Note that an experiment might include synthesising or characterising a sample as documented in the ESD ("life of the sample starts"). The ESD is posted at the place(s) of work until the end of the experiment when the sample is retired. After</p>	<p>Responsible: Instrument Team, Users</p> <div style="text-align: center;">  </div>
--	--

the experiment, the instrument team makes sure the samples are retired after an RP radiological survey.	
Output/product	Completed ESD with signatures by SRC members and sent to instrument teams.

<i>3.2.9. Experiment Safety Report</i>	
The ESD is completed with the check-out procedure of the user including a post-job briefing and the survey results of the samples. It is then called an Experiment Safety Report (ESR). It will be kept on file for future reference.	Responsible: ESH 
Output/product	The ESR is filed and kept for reference.

3.2.10. Output

After the experiment has been completed and the samples have been retired, an Experiment Safety Report (ESR) will be created. The ESR includes the original ESD, a user check-out form completed by the instrument team, the RP radiological survey results of the samples and a comment from the user office on how the sample left ESS. The final-ESD will be kept at least until the successful end of the run cycle.

4. RULES, REGULATIONS, CONSTRAINTS, GUIDELINES

The Experiment Safety Review [4], providing the detailed rules, regulations, and constraints involved, always has to precede the Sample Handling Procedure [5].

Slight alterations to an experiment might still be possible for some experiments provided they are done with written permission through the SRC chair-person or someone appointed by the SRC chair-person. The SRC chair-person would supply a written comment to the ESD why the minor alterations are acceptable. It is up to the SRC chair-person to decide if additional subject matter experts are needed, if the safety review procedure has to be performed again or if the alterations are simply not possible. All alterations must be documented in the ESD and communicated to the instrument team and other involved personnel by the SRC chair-person before the changes take place.

This procedure will not necessarily be applicable to long-term experiments by staff members or visitors performing experiments outside of the scope of the ESS user program and not involving irradiation on any of its instruments.

Experiments such as measurements of instrument-specific standards, that reoccur and are repeated several times a year, should be covered once by an ESD that then will stay on the instrument. Depending on the standard, a time limit might be set by the SRC chair person. If any changes in the experimental setup occur, the instrument team shall initiate an ESD update reviewed by the SRC chair-person.

5. GLOSSARY

Term	Definition
ESD	Experiment Safety Document *
Experiment Safety Form (ESF)	Information on materials, materials hazards and activities for proposed experiment *
ESH	Environment, Safety & Health
ESS	European Spallation Source, ERIC
ESS Users	Scientists and engineers using ESS scientific services.
Instrument Team	ESS scientists and engineers hosting an experiment on a specific instrument.
NSS	Neutron Scattering Systems
OHS	Occupational Health and Safety
Principal Investigator (PI)	Main proposer identified on the experiment proposal.
Proposal Team (PT)	Everyone designated by the PI with the right of access to ESS scientific services.
RP	Radiation Protection
SD	Science Directorate
SRC	Safety Review Committee

(*) The described procedure, forms and documents can be supported in digital form as needed.

6. REFERENCES

- [1] NSS Concept of Operations ([ESS-0005817](#))
- [2] Neutron Scattering Systems - System Design Description ([ESS-0377817](#))
- [3] Neutron Scattering Systems - Radiological Hazards and Radiation Safety Provisions for Operations and Maintenance ([ESS-2972939](#))
- [4] Experiment Safety Review Procedure ([ESS-0024107](#))
- [5] Sample Handling Procedure ([ESS-0024112](#))

DOCUMENT REVISION HISTORY

Revision	Reason for and description of change	Author	Date
1	First issue	Monika Hartl	2015-08-10
2	Reissued to correct problem with the document header – quality correction only,	Monika Hartl	2016-04-29
3	Update of template, references and some amendments related to sample retirement and digitalisation. Corrections and acceptance of changes	Monika Hartl	2023-05-11