



**EUROPEAN  
SPALLATION  
SOURCE**



# Experimental Safety Review @ESS

Presentation to STAP – April 2026

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# Experiment Safety Review



# Experiment Safety Review

A collaboration



# Appropriate Specialists

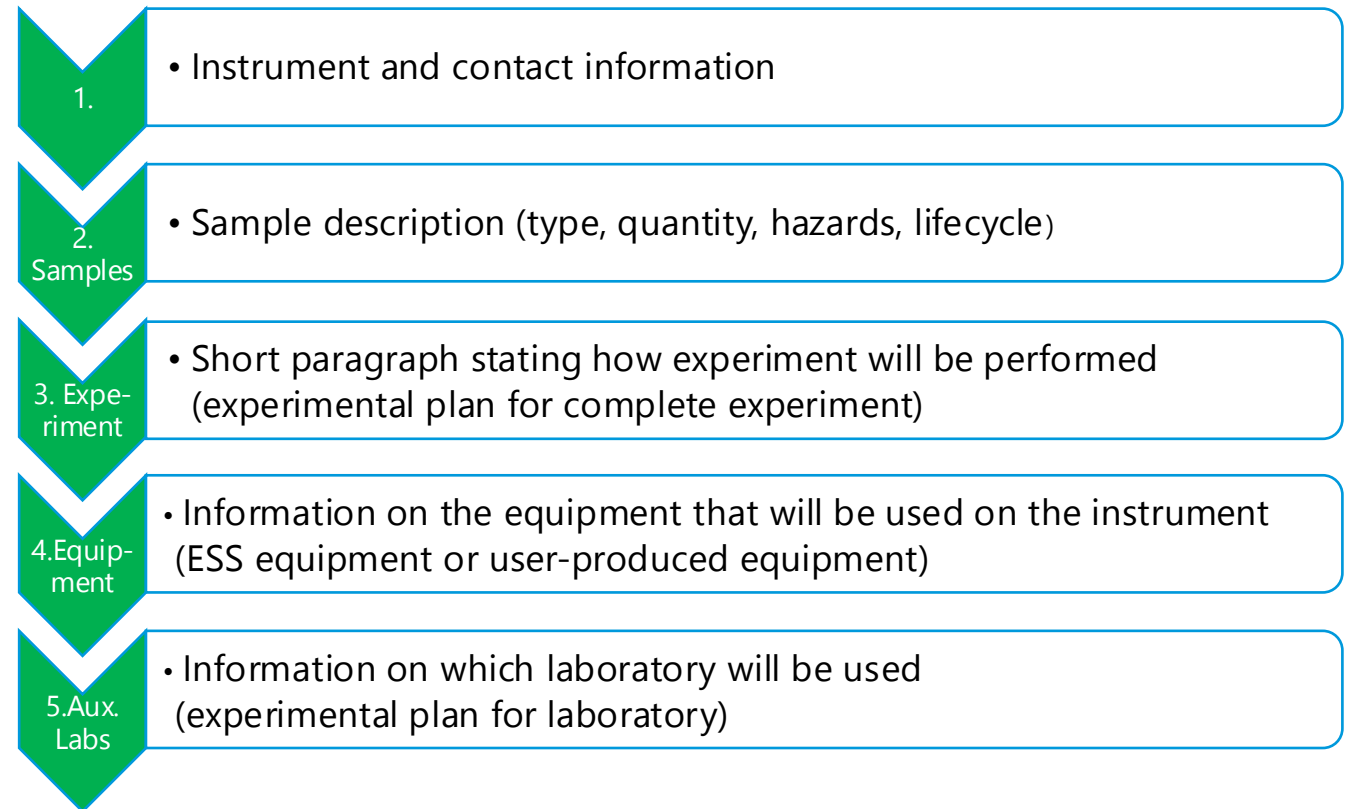
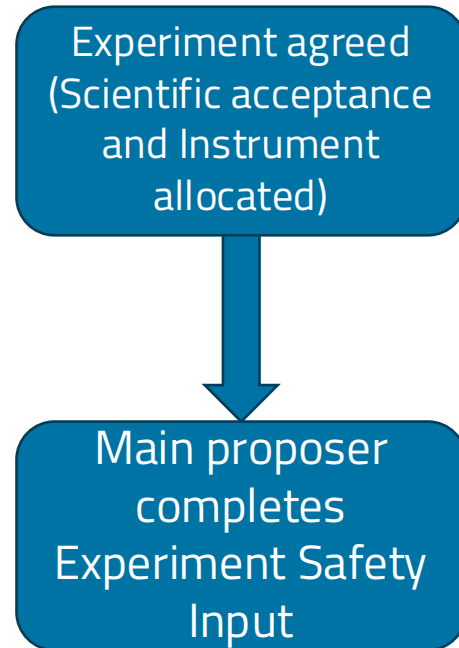


At ESS we have already identified specialists in the following areas (legal roles in red):

- Radiation Protection (**Radiation Protection Expert**)
- General Occupational Health and Safety
- Flammables and explosives (**Flammables and Explosive Officer**)
- Chemical
- Electrical (**Electrical Compliance Officer**)
- Pressure (**Pressure Compliance Officer**)
- Laser (**Laser Safety Advisor**)
- Dangerous goods transport (**Dangerous Goods Safety Advisor**)
- Physical protection

# Initial information

## Experiment Safety Input (ESI)



2

Sample description (type, quantity, hazards, lifecycle)



The samples for the neutron scattering experiment are listed along with information on their hazards, their physical state, and how they will arrive at ESS

- Chemical formula of the sample, sample description
- Mass/volume of the sample, and density if possible
- Physical State (solid, powder, liquid, thin film, nanoparticle, gas, other)
- Sample Disposition (retained and stored at ESS, disposed through ESS, shipped to home institution, other)
- Will the sample arrive in a sample container suitable for neutron scattering?
- Will the sample be contained during the neutron experiment?
- Chemical hazards of the sample
- Biohazards (1-4)
- Radiological hazards



4

Information on the equipment that will be used on the instrument

- Sample environment equipment to be used from ESS (picked from a list of available items or confirmed with instrument team)
- Experimenter-provided sample environment to be brought in shall be tested in advance by an ESS specialist and, if necessary, modified to meet ESS requirements .



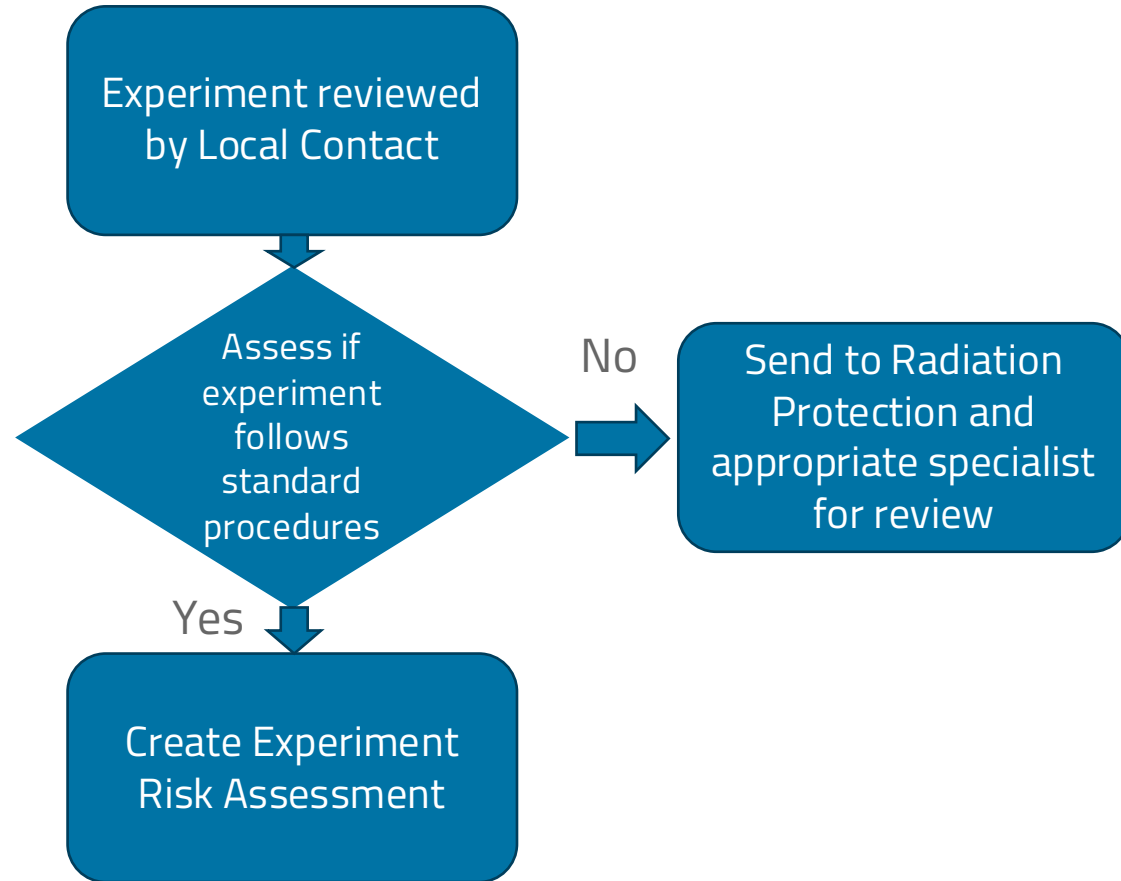
5

## Information on which laboratory will be used

Auxiliary Laboratory usage requires a detailed plan, with the best of the Experimenter's knowledge, that explains which samples will be moved between the experimental hall and the chemistry laboratories.

- Will the sample be loaded into a sample holder at the ESS?
- Will sample preparation (procedures before the sample goes into the beam) be performed at ESS?
- Will sample modification (procedure during the beamtime after the sample went into beam) be required?
- What type of laboratory is required during the experiment?
- What type of chemicals/laboratory equipment are required?
- What type of chemicals/equipment are brought on site? Will they stay at ESS for longer periods of time?
- What type of work will be performed?

# Initial Review

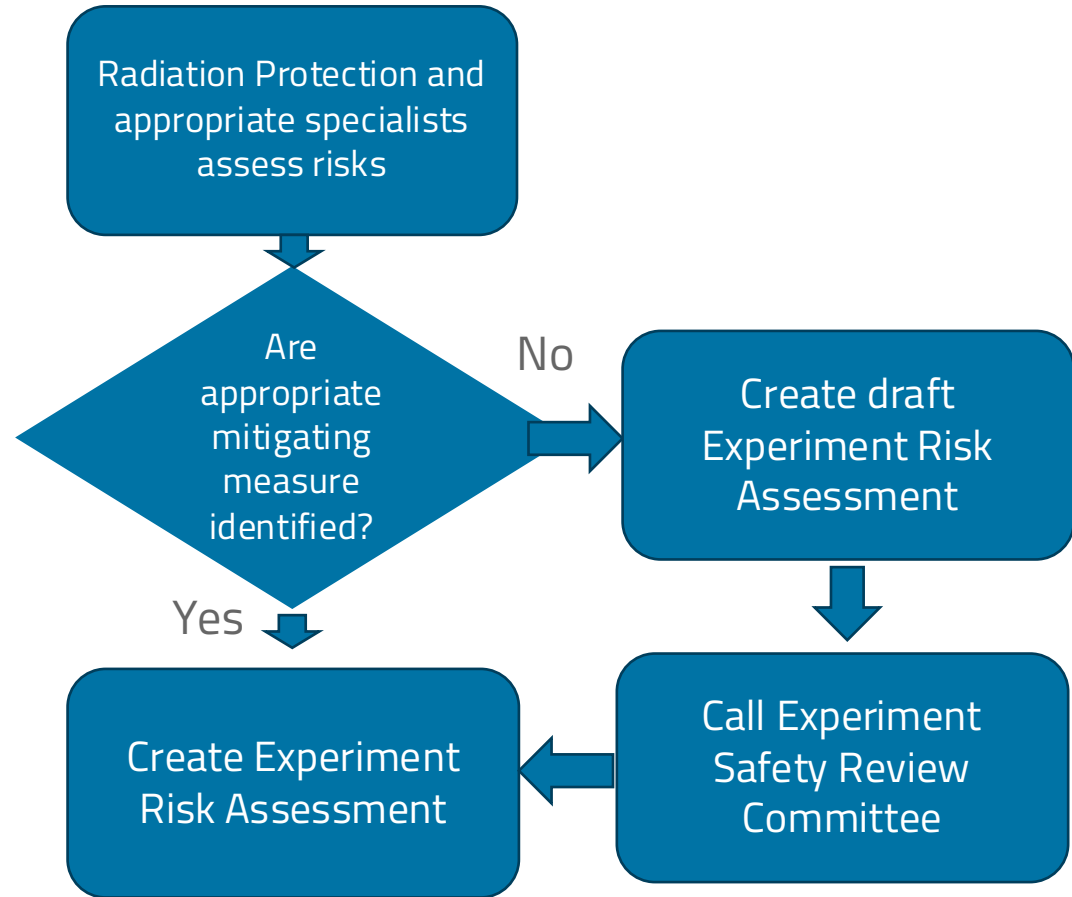


It is intended that in the future the User Office System (UOS) will run the pre-screening of the experiment:

- If it is in scope of the Standard Procedures the UOS will generate a pre-defined Experiment Risk Assessment and send information to the Local Contact.
- If outside the Standard Procedures, the UOS will send the review to Radiation Protection and the Appropriate Specialist(s).

Initially recognised that it will take time to develop these standard procedures and Radiation Protection and the appropriate specialist will review all experiments.

# Review by Radiation Protection and appropriate specialist



Analyse the hazards on his/her specialty

Contact Local Contact or the Experimenter/Main Proposer in case of more questions

Identify the safety mitigations for the experiment

If appropriate mitigating measures identified – send it to Local Contact to create the Experiment Risk Assessment

If more questions – send it to Experiment Safety Review Committee (ESRC) for consideration

# ESRC

## Experiment Safety Review Committee



**Complex cases** are discussed in an ESRC meeting.

The purpose of this is to get the relevant experts together to agree on how the experiment can be conducted safely.

The ESRC chairperson shall be responsible for calling the ESRC meeting and for supplying the draft Experiment Risk Assessments to the ESRC members.

The Local Contacts are required to attend the safety review meeting of their experiments.

If approved – the information with the safety mitigations are sent to the Local Contact to create the final Experiment Risk Assessment.

If not approved – experiment rejected.

Complex cases: an experiment proposal that involves high hazard or more than one medium-level hazard. It requires escalation for additional review (e.g., by the ESRC and/or Appropriate Specialist(s)), including the documentation of risk mitigations proposed by one or more persons, before the Experiment Risk Assessment can be completed and the experiment approved.

# Experiment Risk Assessment



1

Instrument / Contact info/ ESI /Signatures

2

Sample hazards (radiological, chemical, biological, ...)

3

Equipment hazards (pressure, temperature, electrical, magnets,...)

4

Engineering and administrative controls

5

Roles and responsibilities (if different from standard)

6

Experiment hazard classification  
Tracking of sample

# Risk Levels

## Green



Low Level risks for experiment/sample if the following apply:

- a) Uses low risk procedures, ESS equipment and sample environment - conventional safety (electrical hazards, noise, pressure, cryogenics, etc.)
- b) Sample has low risk (chemical, biological and/or radiological) that are known and well understood, easy to control.

This experiment is allowed to be done:

- Experiment allowed with standard precautions under the general supervision of the instrument team, laboratory or sample environment personnel might also be involved).
- Handling of the sample is defined in the safety document and is allowed to be performed under standard precautions
- Loss or spill of the sample would cause contamination less than 40 kBq/m<sup>2</sup> for  $\beta$  and  $\gamma$  emitters and less than 4 kBq/m<sup>2</sup> for  $\alpha$  emitters or for fine powder (<10  $\mu$ m) samples that would cause air contamination <0.005 DAC. So even if an accident happens, contamination stays within the requirements for a supervised area.
- The chemical and biological risks can be minimised using PPE and appropriate containment.
- General hazards are within the scope of normal operation.

# Hazard Levels

## Yellow



Medium Level Hazard experiment/sample if any of the following apply:

- a) Uses more complex procedures or equipment,
- b) Uses samples with medium risk hazard (chemical, biological and/or radiological risks) and the experiment needs more safety controls
  - Additional administrative and engineering controls that are not standard on the given instrument but are not unusual.
  - The required controls will reduce the possible contamination in case of an accident to be less than 40 kBq/m<sup>2</sup> for  $\beta$  and  $\gamma$  emitters and less than 4 kBq/m<sup>2</sup> for  $\alpha$  emitters.
  - The chemical and biological hazards can be minimised by additional engineering controls such as double containment or limited handling.
  - General hazards might need additional controls, e.g., high-pressure that does not allow access near the compressor relief valve.

# Risk Levels

## Red



High risk experiment/sample if any of the following apply:

- a) Uses procedures or equipment with high risks
- b) Uses samples with high risk (chemical, biological and/or radiological risks) including samples having surface dose rates above 1 mSv/h
  - It is only possible to run this experiment safely with special precautions and controls.
  - It might require additional postings and changes in area classification, and it has additional extensive administrative and engineering controls.
  - This experiment is not allowed to run under the supervision of the instrument team only.
  - The chemical and biological risks might have to be handled in special PPE and might require additional personnel.

# Radiological Classification



Low	Medium	High
<p data-bbox="206 558 784 701">Loss or spill of the sample will not lead to contamination or health risks.</p> <p data-bbox="206 772 817 915">A possible accident could result in radiological contamination of <b>NO MORE THAN:</b></p> <ul data-bbox="206 1143 677 1243" style="list-style-type: none"><li>• 40 kBq/m<sup>2</sup> for <math>\beta</math> and <math>\gamma</math></li><li>• 4 kBq/m<sup>2</sup> for <math>\alpha</math></li></ul>	<p data-bbox="886 558 1505 701">Loss or spill of the sample might lead to contamination and/or health risks.</p> <p data-bbox="886 772 1493 1072">Additional administrative and/or engineering controls must be in place so a possible accident could result in radiological contamination of <b>NO MORE THAN:</b></p> <ul data-bbox="886 1143 1352 1243" style="list-style-type: none"><li>• 40 kBq/m<sup>2</sup> for <math>\beta</math> and <math>\gamma</math></li><li>• 4 kBq/m<sup>2</sup> for <math>\alpha</math></li></ul>	<p data-bbox="1564 558 2142 701">Loss or spill of the sample will lead to contamination and/or serious health risks.</p> <p data-bbox="1564 772 2168 1072">Extensive administrative and engineering controls must be in place so a possible accident could result in radiological contamination of <b>NO MORE THAN:</b></p> <ul data-bbox="1564 1143 2030 1243" style="list-style-type: none"><li>• 40 kBq/m<sup>2</sup> for <math>\beta</math> and <math>\gamma</math></li><li>• 4 kBq/m<sup>2</sup> for <math>\alpha</math></li></ul>



Thank you and any questions?