

## **ESAF Instruction Guide**

The ESAF has different tabs that will appear once the user has identified the hazards of a particular experiment. The user must complete all tabs that appear on an ESAF in their entirety.

### **General Tab**

Most of the information on the General Tab will populate from the GUP system. However, the user generating the ESAF must complete a few items on the General Tab. These items include answering if U.S. government classified work will be performed (on the right-hand side of the tab), selecting the techniques(s) that will be used (see below for information on submitting an ESAF for Non-X-Ray Work), answering if this is a proprietary experiment, and answering if the work involves R&D for the civilian nuclear fuel cycle. Selecting 'Yes' for a proprietary experiment opens a popup window requesting cost code(s) to pay for the proprietary beam time.

NOTE: If a user wants to submit an ESAF for Non-X-Ray work (for lab work or experiment setup, etc.), the user must select the second option 'Create New No X-Ray ESAF' on the ESAF main menu page. DO NOT select the first option, 'Create New ESAF for Scheduled or Allocated Beam Time' for Non-X-Ray work.

### **Experimenters Tab**

There are six types of experimenter types available for selection on the Experimenters Tab of the ESAF: On-Site, Remote, Mail-In, Off-site/Co-Proposer, Observer, Beamline Staff

Click the 'Find' button to search for a user to add to the Experimenters Tab.

The user submitting the ESAF must list all individuals who have contributed to the research, regardless of their on-site presence at the APS, on the Experimenters Tab.

- On-Site experimenters are users that are present at the APS for the execution of the ESAF.
- The Remote experimenter type is for experimenters that will be operating the experiment remotely (i.e., protein crystallography experiments). All other individuals that will not be on-site and are involved with experiments that are NOT protein crystallography related should be marked as Off-site/Co-Proposer.
- Mail-In is for users who are mailing their samples to the APS. Only beamline staff will run these samples and the users have no remote involvement in the experiment.

- Off-site/Co-Proposer experimenters are individuals that are a part of the research collaboration but that will not be on-site at the APS.
- Observers are users that will be on-site at the APS for the experiment but are NOT involved with the execution of the experiment. Observers CANNOT perform sample prep, mount samples, manipulate computers, or collect any data. Observers CAN observe the actions of those performing the research.
- Beamline Staff experimenters are local beamline staff who provide experimental support only (sample loading, setup assistance, etc.) but are not part of the experiment team or collaboration on the project. Users visiting the APS should NOT use this experimenter type. The Beamline Staff experimenter is for APS beamline staff ONLY.

On the Experimenters Tab, users to whom the remote/site access end dates apply must ensure they update their site access prior to arriving at the APS if their access date will expire prior to the start of their experiment.

All users, except for Mail-In and Off-Site/Co-Proposer users, must complete all APS core training requirements online prior to the start of the experiment (excluding Sector Orientation, which is completed onsite). Listed next to each experimenter's name are training expiration dates. Training that has expired will note the expiration date in red font. Training that has not been taken previously but that is required will have a blank field. Training in a gray field indicates training that is not required.

Remote users must complete ESH223U (cyber security training) prior to the APS granting experimental approval. Even if the samples for an experiment are on-site, the ESAF will not receive APS approval unless all remote users have completed ESH223U.

All ESAFs are required to have a spokesperson (SP). The SP does NOT have to be the same person as the PI. Indicate whom the SP is by checking the box in the SP column on the Experimenters Tab next to the person(s) who will be the spokesperson(s) for the experiment. The SP should be limited to one or two people in charge of the experiment. It is important to ensure the SP is reachable by email. The APS Experiment Safety Review Board will contact the SP via email if there are any questions regarding the experiment.

All ESAFs, except for Mail-In, require either an in person or electronic signature. Electronic signatures are only for experiments conducted remotely. Off-Site/Co-Proposer users cannot provide electronic signatures. If an electronic signature is not provided for a remote experiment, the APS will not grant approval.

## **Description**

The user submitting the ESAF must accurately select the beamline and station, start date/time, and end date/time on the top of the Description Tab.

The ESAF submitter must also provide a SHORT description of the details of the experiment in the box on the Description Tab. DO NOT paste or attach the experiment proposal to the Description Tab as the 'science' behind the experiment has already been approved. The description should cover the execution of the experiment, samples that will be analyzed, equipment that will be used (lasers, cryogenics, furnaces, glovebox, gases, etc.), hazard mitigation practices (engineered and administrative), the environment in which the experiment will be conducted (vacuum, air, ambient temperature, high pressure, etc.). A description of the PPE used in the experiment should be included as well.

Any supplemental documents (SOPs, manuals, experiment setup diagrams, etc.) should be attached to the description tab by clicking on the 'click here to attach/detach files' link on the left-hand side of the tab.

### **Experiment Setup**

The Experiment Setup Tab should describe any equipment used to setup the experiment or requirements needed to setup the experiment (rigging needs, unpacking of crates, etc.). Additionally, provide in detail any experiment specific apparatuses (pressurized cells, vacuum chambers, high voltage apparatuses, etc.).

### **Materials**

List all samples and chemicals brought to and/or used at the APS. This includes all materials used for sample preparation. Chemical formulas in and of themselves are not adequate. Spell out all chemical names in their entirety and include the formula if applicable (example: Sodium Chloride, NaCl). All proteins must include the expression system(s) of the proteins (bacteria, yeast, mammalian cells, etc.). If expression system(s) are not provided, the APS will not grant approval.

List the quantity of each material used in the experiment in the quantity column. Provide the exact quantity, no matter how small (micrograms, picocuries, milliliters, etc.), for radioactive samples, energetic materials, chemicals, solvents, and any other materials used. Provide the number of protein crystals analyzed or the number of battery cells used in the quantity column if applicable.

Include the CAS number, if available, for all applicable materials.

Identify all hazards of each material by selecting 'Y' from the drop-down menu under each hazard class (flammable, corrosive, oxidizer, etc.). Leave the drop-down menu marked 'N' if the hazard does not apply to a specific material.

Identify the biohazard safety level (BSL1, BSL2, or BSL3), if applicable, from the biohazard drop-down menu. Nearly all experiments analyzing biological materials at the APS are BSL1.

If using nanomaterials in the experiment, select the type of nanomaterial (Solid Matrix, Liquid Suspension, or Unbound Powder) from the drop down-menu in the Nano column. Leave the column marked 'N' if not using nanomaterials.

If a material has hazards beyond those listed on the materials page, mark the other column 'Y' and answer the last question on the bottom of the page, 'If "Other" above is "YES", please specify hazard' by filling in the blank field to the right of the statement.

Identify all materials that will be disposed at the APS by selecting 'Y' from the drop-down menu in the Dispose ANL column.

Identify all materials that will be used in the lab by selecting 'Y' from the drop-down menu in the Lab Use column. Selecting 'Y' will trigger the Lab Use Tab (see below for Lab Use Tab instructions).

If the material names are confidential, mark the material with a 'Y' in the Confidential column. Identifying the material as confidential will display the material as Sample 1, Sample 2, etc. on the ESAF report. However, the chemical name will still display as written (example: Sodium Chloride) on the Materials Tab.

The user submitting the ESAF must answer the six questions on the lower half of the materials information tab. Select 'N' (No) or 'Y' (Yes) for the following questions:

- Will you require using beamline laboratory facilities to prepare samples or perform other work? Selecting 'Y' will trigger the Lab Use tab (see Lab Use below for further instructions).
- Will you be bringing human tissue/materials/cell lines to the APS? Selecting 'Y' will trigger the Human Materials tab (see Human Materials below for further instructions).
- Have your samples been irradiated with neutrons or ion beams? Selecting 'Y' will trigger the Radioactive Samples tab and Irradiated Samples tab (see Radioactive or Irradiated Samples below for further instructions).
- Will you be bringing radioactive sealed sources to the APS? Select 'Y' or 'N'.
- Will you be bringing live animals to the APS? Select 'Y' or 'N'.
- Will you be bringing regulated foreign or domestic soil to the APS? Selecting 'Y' will trigger the Soil tab (see Soil below for further instructions).

## **Equipment**

Check the appropriate box next to all applicable equipment used in the experiment. Check the 'Bringing to APS' box on the far-left hand side of the page to identify equipment brought to the APS that is not part of the permanent beamline setup or that is not beamline owned equipment. Describe new equipment brought to the APS for the first time on the Description Tab. Additionally, describe any equipment identified as 'Other' on the Description Tab.

## **Explosive (if applicable)**

Identifying a material as explosive in the table on the Materials Tab requires completion of the Explosive Tab. Refer to the 'Experiment Hazard Class 6.7 webpage' link at the top of the Explosive Tab for requirements and information regarding required training, shipment of explosive and energetic materials to the APS, and use of explosive and energetic materials at the APS. Each experiment using explosive and/or energetic materials at the APS must have at least one certified explosive handler present. The handler is required to complete the required explosive safety training at their home institution prior to their work with explosive and energetic materials at the APS. It is required to provide the name and phone number of at least one certified explosive handler for the experiment in the table on the Explosive Tab.

## **Soil (if applicable)**

Indicating on the Materials Tab that regulated foreign or domestic soil is a component of an ESAF requires completion of the Soil Tab. The Soil Tab provides further information regarding the APS requirements for regulated soil samples. Included in this information are links to determine if the USDA regulates the soil samples in question. In some cases, regulated soil can present other chemical hazards beyond what is in the soil. Identify these chemical hazards in the table on the Materials Tab of the ESAF. If the user has a USDA Permit to Receive Regulated Soil, attach the permit to the Description Tab of the ESAF.

## **Electrical Inspection (if applicable)**

Indicating on the Equipment Tab that the user will bring electrical equipment to the APS triggers the Electrical Inspection Tab. The US Department of Energy requires that all electrical equipment NOT approved by a Nationally Recognized Testing Laboratory (NRTL) be inspected prior to use of the equipment. Non-commercial or homemade electrical equipment is NOT NRTL approved. For full details of the electrical inspection program, refer to the link in the last sentence of the first paragraph on the Electrical Inspection Tab 'Electrical Equipment Inspection'.

Check one of the four boxes on the Electrical Inspection Tab to indicate the type of electrical equipment brought to the APS. Modified NRTL equipment, non-NRTL equipment or unsure NRTL, or equipment that was previously inspected but has now left ANL require an electrical inspection. Request an inspection by completing all fields on the lower half of the Electrical

Inspection Tab. Once all fields are completed, click the 'Request Inspection' button. Filling in the required fields but failing to click the 'Request Inspection' button will not schedule the electrical inspection. The APS will not approve an ESAF requiring an electrical inspection if the inspection has not been requested by the user.

NOTE: Submit a request for an electrical equipment inspection at least three (3) days prior to the start of the experiment to allow sufficient time to schedule the inspectors.

### **Lab Use (if applicable)**

The user submitting the ESAF must complete the start and end dates for the duration of lab use at the top of the Lab Use Tab. Describe in detail the planned activities for lab space use in the Activity Description box on the Lab Use Tab. Include in the Activity Description box details concerning hazards and planned hazard controls (fume hood, glovebox, PPE, chemical use, cryogen use, etc.). Include in the Description box requirements for lab bench space and activity as well as fume hood use or other lab equipment needed for the duration of the lab use portion of the experiment. Below the Activity Description box, indicate planned use of the chemical fume hood, beamline glovebox, or non-beamline supplied equipment by checking the box to the left of the applicable item. If any of these boxes (fume hood, glovebox, and/or non-beamline supplied equipment) are checked, provide details concerning the use of these items in the Activity Description box.

NOTE: If users plan to use lab space that is different from the beamline indicated on the ESAF (example: ESAF is for work at Sector 10, but lab use will occur at the Sector 12 lab), the user must submit a separate Non-X-Ray ESAF for lab use work.

### **Human Materials (if applicable)**

Indicating on the Materials Tab that human tissue/materials/cell lines are components of an ESAF requires completion of the Human Materials Tab. All six questions on the Human Materials Tab must be answered either Yes or No. The use of human materials may require review by the Argonne Institutional Biosafety Committee. Further information regarding the use of Human Materials is located online on the APS' User Safety & Training webpage.

### **Radioactive or Irradiated Samples (if applicable)**

Identifying a material as radioactive in the table on the Materials Tab or indicating irradiation of samples with neutrons or ion beams requires completion of the Radioactive Samples Tab. If samples have been irradiated, completion of the Irradiated Samples Tab is also required. Refer to the 'Using Radioactive Materials/Samples at the APS' webpage link at the top of the tab for requirements and information regarding radioactive sample required training, shipment of radioactive samples to the APS, and use of radioactive samples at the APS. Work with radioactive samples requires completion of the APS Radioactive Sample Information Form (link provided on the Radioactive Samples Tab). Attach this required form to the Description Tab of

the ESAF. The user submitting the ESAF must acknowledge the three items listed on the lower half of the Radioactive Samples Tab.

### **Requirement**

The Requirement Tab checks boxes of hazard classes that pertain to the ESAF in question based upon the content of the ESAF submitted by the user. The comments in the Experiment Safety Requirements Summary boxes list summaries of the necessary controls, procedures, etc. that are required to be in place prior to the start of the experiment. To see the complete list of APS Experiment Hazard Classes and the details of the individual classes, click on the links in the header of the hazard class table.

### **Comments Summary**

The Comments Summary Tab provides a summary of the safety comments noted by the beamline and by the APS Experiment Safety Review Board. Pay special attention to these comments and follow all directions given in the comments.

### **ESAF Submission**

Submit an ESAF at least fourteen (14) days prior to the start date of the experiment. Failing to submit an ESAF at least fourteen (14) days prior to the experiment start date could result in a delayed review of the experiment. Higher risk experiments (work with radioactive samples, elevated biohazard samples, explosive samples, etc.) require more time for a proper review. Submit an ESAF with high-risk materials as soon as it is possible to do so (several weeks or months prior to the start of the beamtime). After providing all experiment information and completing all ESAF tabs in their entirety, click the 'Submit' button at the bottom of the page to begin the review process.

NOTE: An ESAF can be completed over multiple sessions by clicking the 'Save' button at the bottom of the page. An ESAF approved by both the beamline and APS does not allow for any additional modifications submitted by a user. Contact the beamline or APS Experiment Safety Review Board if the approved ESAF needs modification.