# SmartPhantom (Single Fibre) Radiation Work Protocol

This work protocol covers the procedures for the measurement of a signal of a single scintillating fibre which consists of: installation of the sealed source; performing the characterisation measurements with the source; and decommissioning of the source. A 1.7MBq Sr90 beta-emitter will be attached to a motorised translation stage using a boxed source holder. The stage will be used to move the source such that a signal on the single fibre can be detected. The experiment will take place within a light-tight box that is fixed to an optical table with a lid that is secured (by padlock) to the body of the box. The home position of the translation stage will place the open end of the source in front of an aluminium block that will effectively close off the source. Nitrile gloves must always be used when handling the source. Monitoring of the source, equipment and environment will be done using a Mini 900/44B and records of these measurements will be attached to the light-tight box alongside a copy of this protocol. When the source is installed signage will be posted on all sides of the box stating “This box contains a radioactive source. Do not open, move or dismantle without contacting HT Lau on ext 40905 or Ken Long on ext 47812 first.”. The RPS must be informed prior to any relocation of the light-tight box whilst the source is installed and the source must be decommissioned before dismantling the experiment.

## Installation of the source

1. The Sr90 source should be transported in a sealed box from its safe to room 527 in the Blackett Lab escorted by the RPS. The box must always remain sealed during transport.
2. Place the sealed box next to the light-tight box.
3. Check background radiation around the optical table, within the light-tight box and around the sealed box. Record the readings.
4. Remove the source from the box by holding it at the lipped end and place it on the bench, ensuring the other end (the face with the source opening) is always pointing downwards. Leaving the source on the bench, inspect the source to make sure the housing is sound.
5. Using the contamination monitor, check around the source and record the readings.
6. Place the source on top of the source holder already attached to the translation stage, ensuring the opening of the source always points away from the user during the procedure. Secure the lid of the source holder which is secured in place by two screws.
7. Move the translation stages to the home position.
8. Survey the radiation around the source. Record the readings.
9. Seal the lid of light-tight box.
10. Survey the radiation around the light-tight box. Record the readings.
11. Take a copy of the readings and place original record in the sleeve attached to the light-tight box.

## Detector Characterisation Measurements

The operation of the experiment is done remotely with the source inside the light-tight box. The walls and lid of the light-tight box is made of 5mm thick aluminium. Thus emissions from the source (and secondaries) should be contained within the light-tight box. In the event of an equipment failure that requires opening the light-tight box, which then reveals the source has not been returned to its home position, the steps for decommissioning 5-8 will be followed. During the period of repairing the failure, the storage box containing the source will be placed in the light-tight box and the lid sealed at any time when the operator needs to leave room 527.

## Decommissioning

1. Ensure the translation stage is in the home position by checking the readback from the translation stage controllers.
2. Remove the lid of the light-tight box.
3. Remove the screws on the lid of the source holder and remove the lid.
4. Pick up and remove the source on the lipped end. Ensure the opening of the source always points away during the procedure.
5. Inspect the housing of the source to ensure it has not been damaged.
6. Place it back into the storage box for transportation back to its safe.
7. Check background radiation around the optical table and within the light-tight box. Record the readings.
8. Compare these readings with the initial measurements. Inform the local RPS immediately of any differences.
9. Take a copy of the readings and place original record in the sleeve attached to the light-tight box.
10. Transport the sealed box back to its safe, escorted by the RPS.

## Exposure Summary

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| --- | --- | --- | --- |
| **Action** | **Time** | **Activity** | **Type** |
| Source installation | 5 mintues | 1.7 MBq |  |
| Experiment operation | 0 | 0 MBq | N/A |
| Source removal (either for an intervention or decommissioning) | 5 minutes | 1.7 MBq |  |

## Contacts

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