

X-Ray Image Logger Radiation Survey Form

- [Introduction](#)
- [Survey Instructions](#)
- [Safety Circuit Instructions](#)
- [Survey Forms](#)
- [Survey Maps](#)
- [Archive Versions](#)

Introduction

The CP120B x-ray source can be operated using IMS. The operator should be familiar with the x-ray source operation and safety procedures before beginning a survey. See the IMS X-ray user guide for further instructions on software and source operation. The survey meters are kept in the Laboratory Officers office on bridge deck.

Survey Instructions

- Surveys are made with the Fluke 451P-RYR in **integration mode**. Read the manual and be familiar with the survey meter's operation.
- Check that the Calibration date is valid. The calibration information is available on the side of the Fluke 451P-RYR

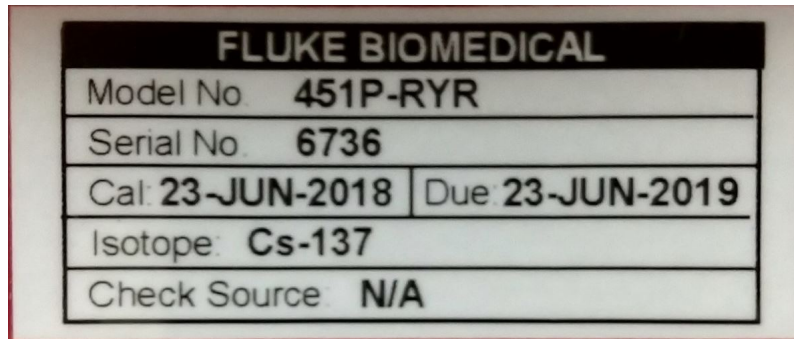


Figure 1- Survey meter calibration information found on the survey meter

- Wait at least 5 minutes (or more) after turning the meter on before using. Room temperature must be stable.
- ALWAYS remember to move slowly! Sudden movements will increase the meter's value, wait and let the values settle.
 - ALWAYS remember that the value on the meter is based on a 30-sec integration values. This means that for measurements at a point wait at least 30 sec. For surveys that use the term "along" or "around", move the detector slowly keeping the same orientation and record the highest value seen.
- Surveys are done with the source powered at **120kV** and **1mA**. It is likely that you will have to set the area monitor high alarm to something near 10Kcps in order to perform the survey at the 120Kv and 1mA settings. Counts less than 10Kcps are still a fraction of the safe limit. When the survey is complete, restore the high alarm to twice background.
- Surveys of the Load Shield or Unload Shield are done with a whole round water standard with its end half-way into the beam with empty half toward the shield being measured (**Figure 2**).
- Use the attached forms and location diagrams to record your survey results.

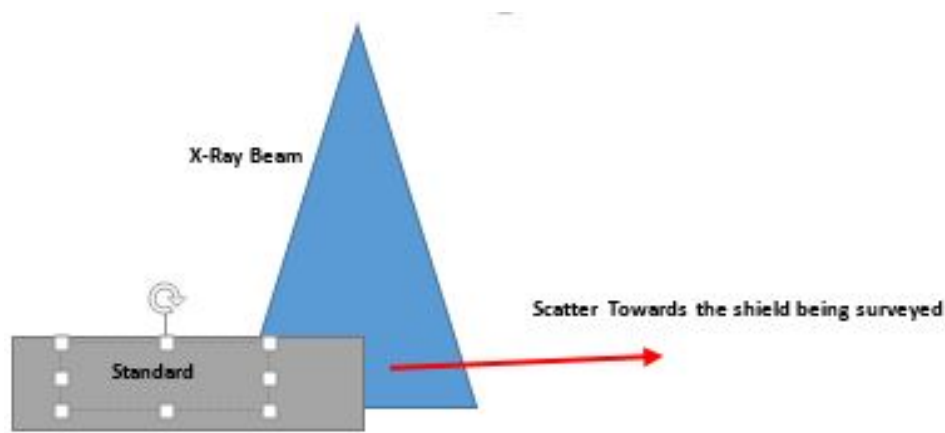


Figure 2-Direction of radiation scatter when standard is centered in the beam path

Safety Circuit Instructions

1. Warning lights: Confirm that...

- a. Amber light is lit when the x-ray source is connected to power.
- b. Green light is lit when the load and unload doors are closed, FPD access door is closed, and the emergency shut off switch is **not** engaged.
- c. Red light is lit when x-rays are generated. The light will blink quickly as it powers on and then slowly once the kV and mA are stable.

If these lights are not working, do not conduct further tests until the issue has been resolved.

For the following tests, the area must be secured with only the test personnel in the space. Also, make sure that the Load/Unload and Emergency Off tests (steps 2 and 3) are successful before you start the Area Monitor tests because you may need to use the doors or X-Ray off switches to power down the X-Ray source should the Area Monitor fail to shut down the system!

For the following tests, power the X-ray source at minimal levels (80kV, 0.8mA).

2. Door switches: With the X-rays on, open the Load end door a few millimeters and verify that the X-Rays shut down. The vinyl lead shielding must continue to cover the gap! Repeat above for the other unload end door.

3. Emergency Off: With the X-rays on, press the Emergency X-Ray OFF button (found above the load end) and verify that the X-Rays shut down.

4. Area Monitor Alarm :

- a. The Low level alarm should set at ~1.0 kcps above the background and the high level alarm ~1.2 kcps. *Only the high level alarm will shut down the X-Ray source. The low level alarm will trigger an audible alarm, but the X-ray source will remain on.*
- b. Remove the vinyl lead shielding as shown from the Load end (**Figure 3**), power the X-Rays and move to the unload end of the track and be prepared to open the Unload door.
- c. X-ray system should immediately shut down once the X-rays are on (slow blinking red light). If the system does not shut down immediately kill the x-rays by opening the unload door. If the test failed, adjust the high level alarm as necessary.
- d. Repeat steps b and c for the unload end removing the vinyl lead shielding as shown (**Figure 3**). Stand by the load end.
- e. When done, make sure to restore the lead vinyl shielding properly to ensure there are no leaks
- f. Power up the X-rays to full power to confirm that the shielding has been restored. The area monitor should not give a high or low level alarm when the shielding is in place.



Figure 3- Lead vinyl shielding removed for testing the area monitor alarm. The image on the left is the load end shielding and the image on the right is the unload end.

Survey Forms

Location	Description	$\mu\text{R/hr}$	notes
Starboard-Aft Survey Form - Standard should be placed with blue end centered on the detector and the remaining core toward the unload end of the x-ray system			
1	Along the top seam		
2	Along the door seam		

3	At the end just under the keyboard countertop		
4	Along the door seam		
5	Along the join between the MS-GRA shield and door		
6	Along the outer side corner		
7	Center of side panel, 40 cm from the top		
8	Along the outer side corner		
9	Along the outer side corner		
10	Along the outer top corner		
Port-Aft Survey Form- Standard should be placed with blue end centered on the detector and the remaining core toward the load end of the x-ray system			
11	Along the join of the Source and MS-GRA shields		
12	Center of side panel, 40 cm from the top		
13	Along the outer top corner		
14	Top panel		
15	Along the outer side corner		
16	Along the seam between the unload shield and the source shield		
17	Center of side panel, 40 cm from the top		
18	Along the door seam		
19	Along the top of the door		
20	Center of center panel		

Port-Forward Survey Form- Standard should be place with blue end centered on the detector and the remaining core toward the load end of the x-ray system

21	Along the door seam		
22	Along the outer side corner		
23	Center of side panel, 40 cm from the top		
24	Along the join between the MS-GRA shield and door		
25	Along the outer side corner		
26	At the center of the panel		
27	Along the outer side corner		
28	Along the center of the panel		

Bottom Survey Form- These measurements are taken below the countertop.

29	Center of the MS-GRA Shield		
30	Directly under the detector (Source Shield)		
31	Around the detector (Source Shield)		

Area Alarm Sensors and Safety Circuit Check

At The Area Detectors			
Location	Description	µR/hr	notes
Strbd	Next to detector		
Port	Next to dector		
BKGND	X-Rays Off		
Location		kcps	notes
Area Monitor w/X-Rays OFF			
Area Monitor w/X-Rays ON			
High Alarm Setting			

Low Alarm Setting		
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Switch/Interlock	Passed
Emergency X-Ray OFF switch	
Load Door Interlock	
Unload Door Interlock	
Area Monitor Interlock	

Survey Date: _____

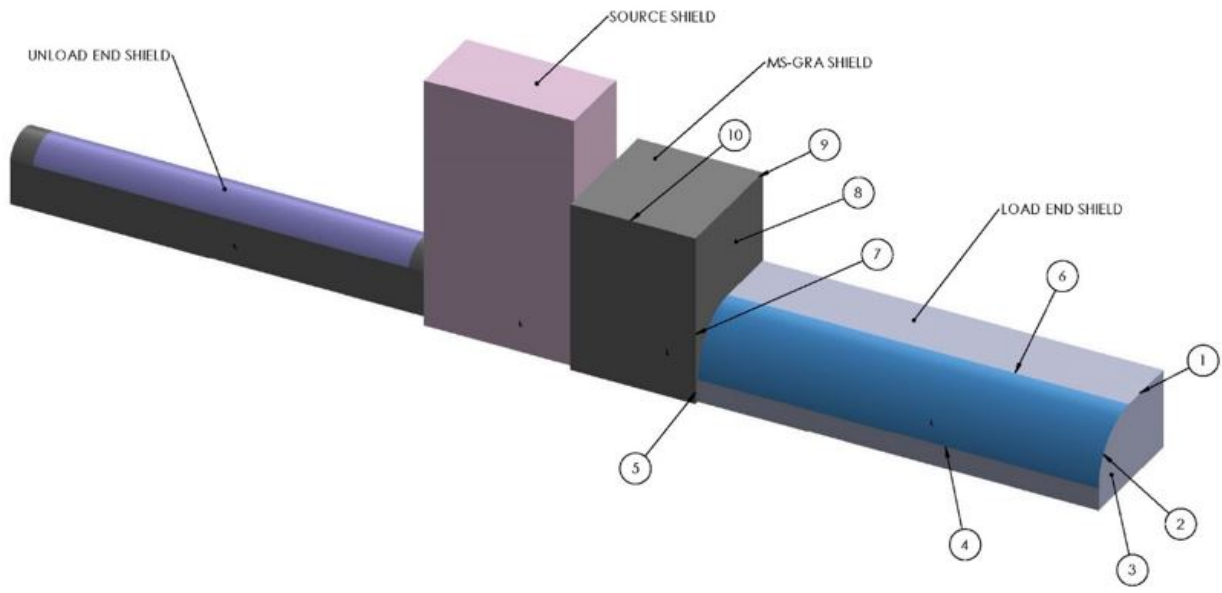
Associated Expedition (optional):----- _____

Name of Surveyor: _____

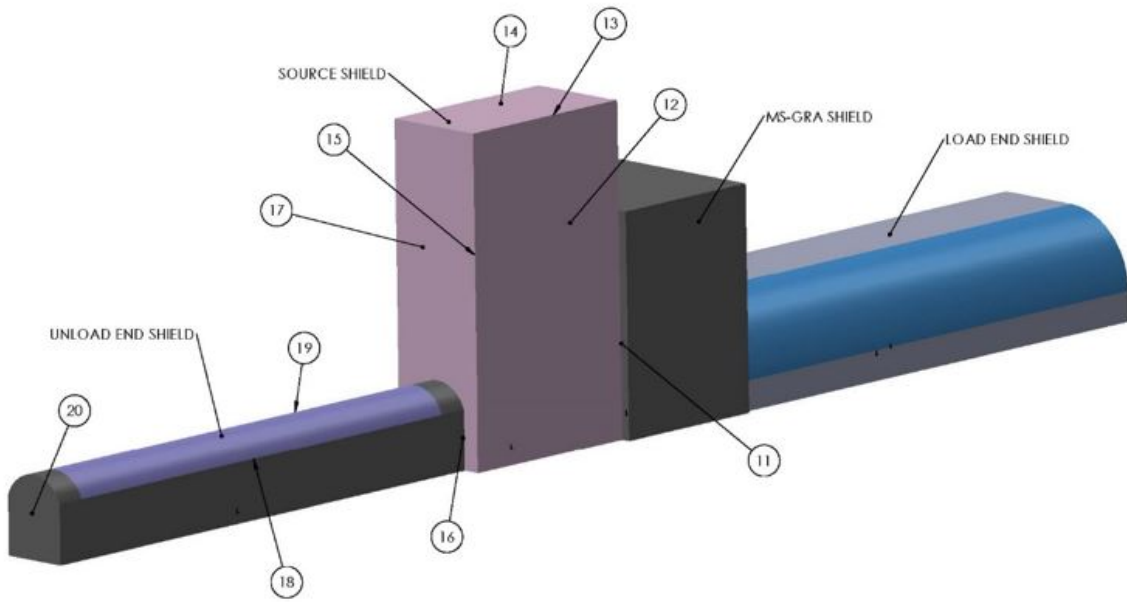
Surveyor's Signature: _____

Survey Maps

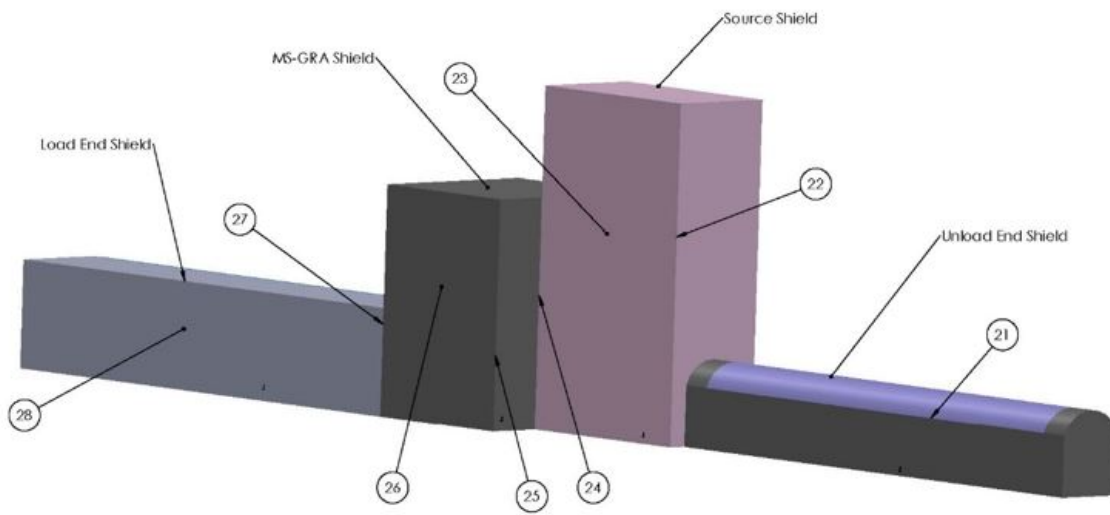
**X-IMAGER Radiation Survey Map
Starboard-Aft**



**X-IMAGER Radiation Survey Map
Port-Aft**



**X-IMAGER Radiation Survey Map
Port-Forward**



**X-IMAGER Radiation Survey Map
Bottom**

