NEPTUNE EMISSIONS SURVEY

612-00002

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Rev.	Description of Change	Name	Date
A	Initial release.	James Wachala	2023–06-16
B	Added diagram to slide 17	Maeve Moylan	2023-09-21
C	Change process name and number for flat bom	Chris Barrett	2025-02-03

Controlled Tools & Jigs

Number	Part Name
451P	Fluke Emissions Survey Meter
-	Laptop
-	Scatter Object (Ream of Paper)
-	Android tablet

Symbol Glossary

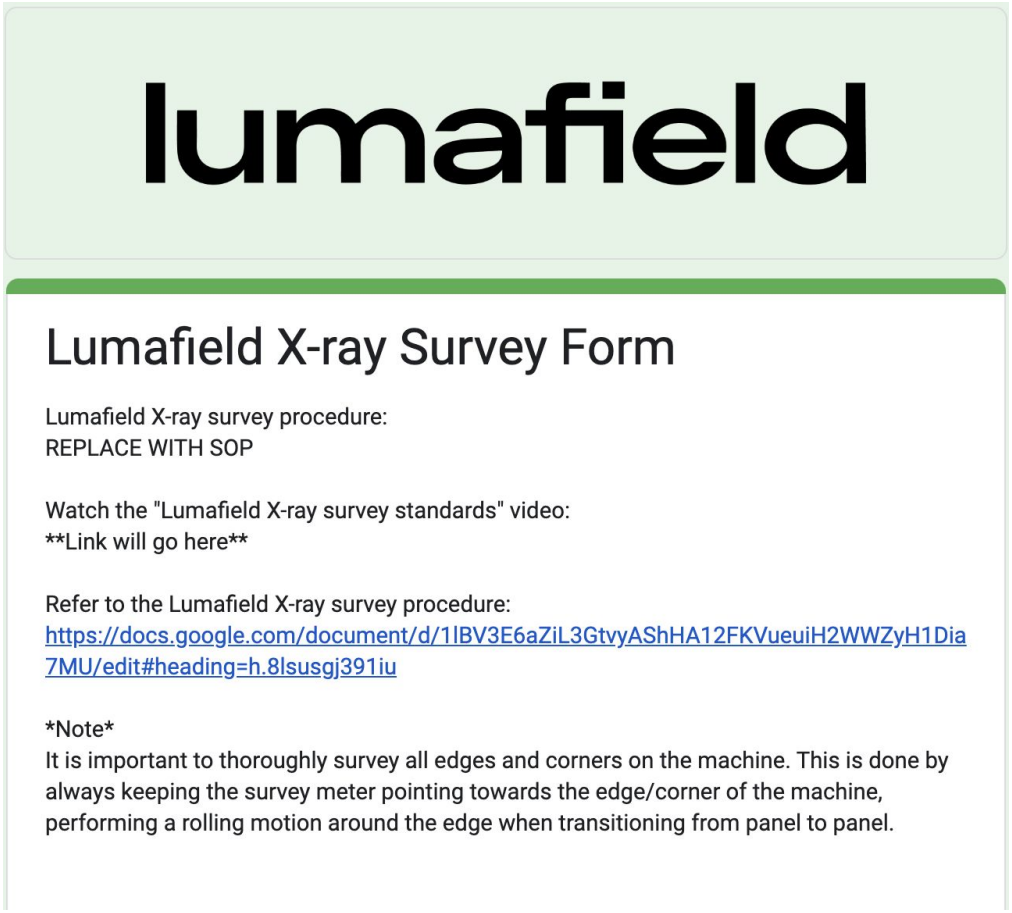
1	Step Indicator
1	Step that includes a Quality Check.
	Take Notice
B	Revision Change Highlight (Letter should match the latest revision)
	Apply Thread Locking Fluid (accompanied by product *Number and Color*)
	Torque Specification
	Finger Tight
	PPE: Hard Hat
	PPE: Safety Glasses
	PPE: Cut Resistant Gloves
	PPE: Nitrile Gloves
	PPE: Safety Toe Shoes
	Team Lift (for awkwardly shaped, large/long, or heavy (>50 lbs) objects)

Unless otherwise specified, all fasteners shall be tightened to a snug fit.

Open up the Survey Form on your Laptop or Tablet

Click Here to Open the Survey Form

Scan here to access the Lumafield X-ray Survey Form



lumafield

Lumafield X-ray Survey Form

Lumafield X-ray survey procedure:
REPLACE WITH SOP

Watch the "Lumafield X-ray survey standards" video:
Link will go here

Refer to the Lumafield X-ray survey procedure:
https://docs.google.com/document/d/1lBV3E6aZiL3GtvyAShHA12FKVueuiH2WWZyH1Dia7MU/edit#heading=h.8lsusgj391iu

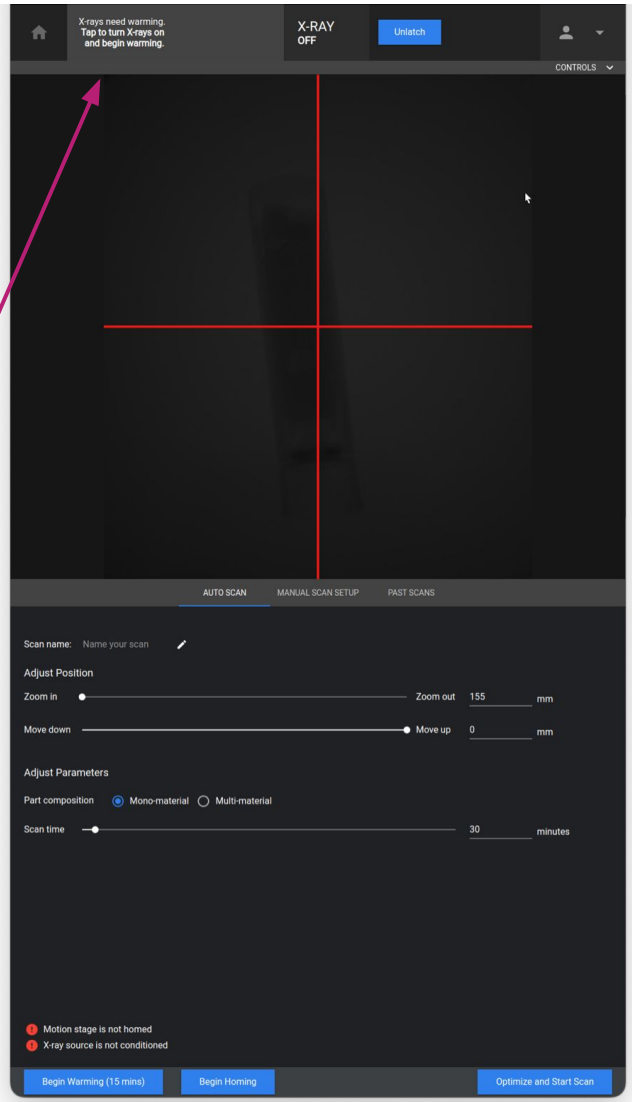
Note
It is important to thoroughly survey all edges and corners on the machine. This is done by always keeping the survey meter pointing towards the edge/corner of the machine, performing a rolling motion around the edge when transitioning from panel to panel.

Scanner Prep

1. Ensure the filter array and all exterior cosmetic panels are in place.

2. Power on the scanner (switch is on the back) and log into Seah
    a. Tap on the lock screen to unlock the scanner
    b. Type in the password. The password is **lookwithin**
    c. Click the blue submit button (pressing enter does not work!)

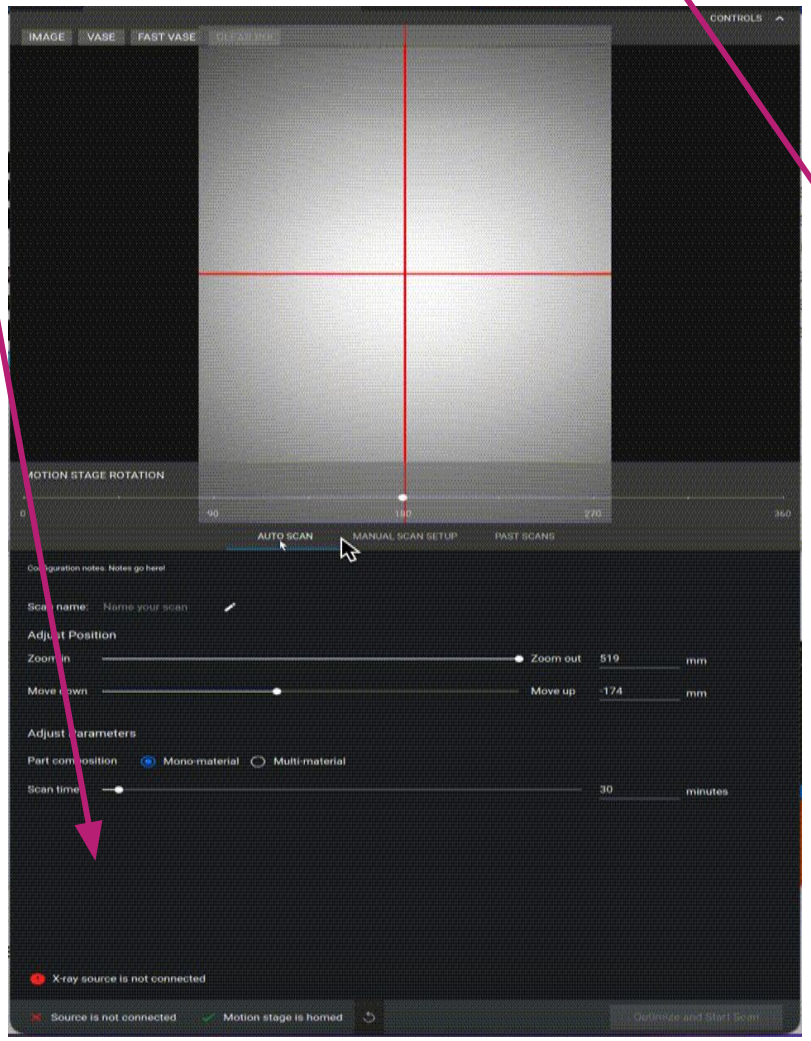
3. If the source is not conditioned, start conditioning by tapping here (this will take 17 minutes - 62 minutes)
    a. Once conditioned and ready, the button in the upper left will show green and allow you to turn on the X-rays.

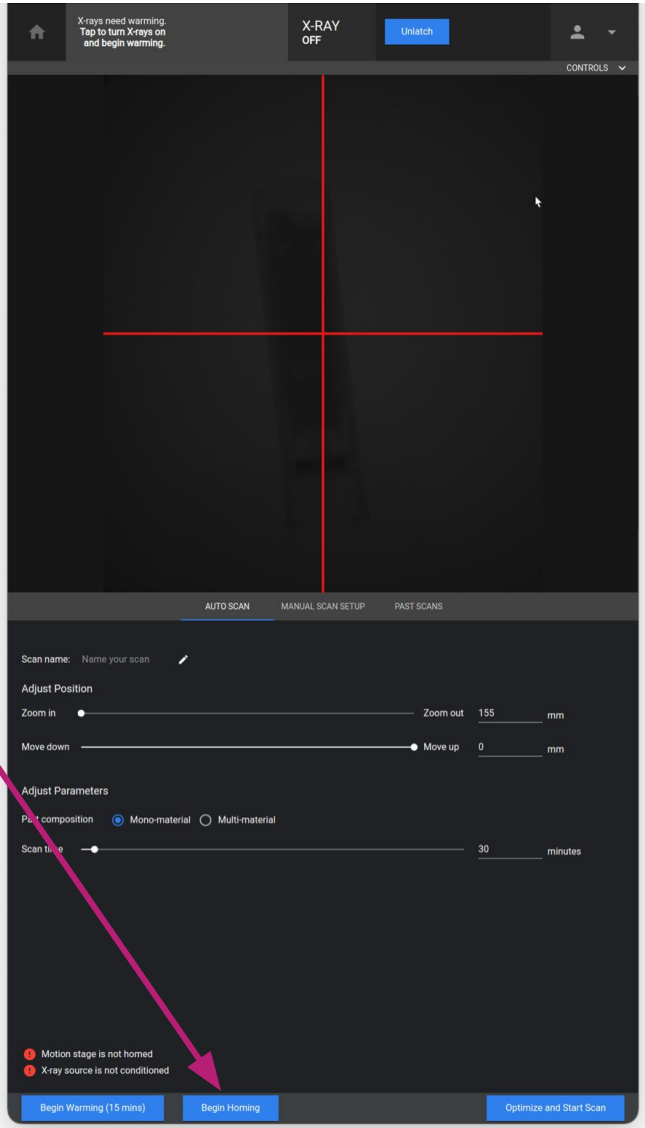


Scanner Prep (Continued)

1. Open the door using the **Unlatch** button and Home the motion system if it isn't already

2. Tap on **MANUAL SCAN SETUP** tab Check the filter array is set to the **none** position

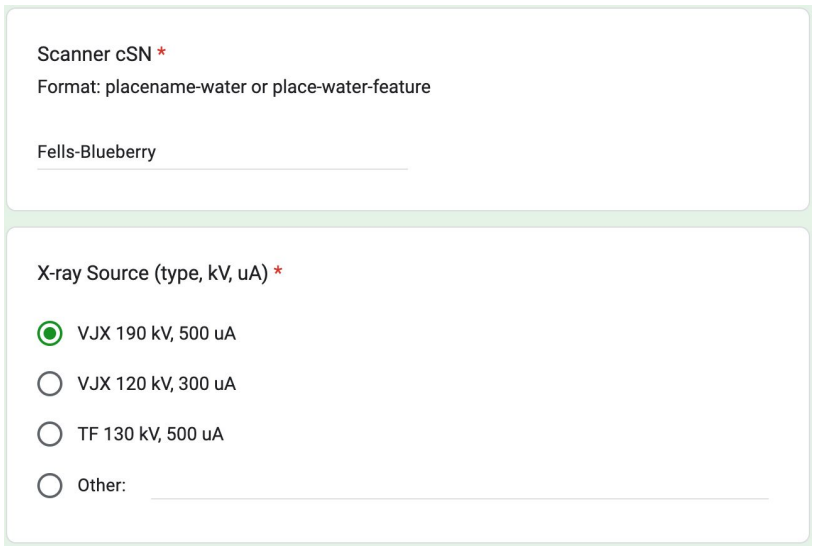


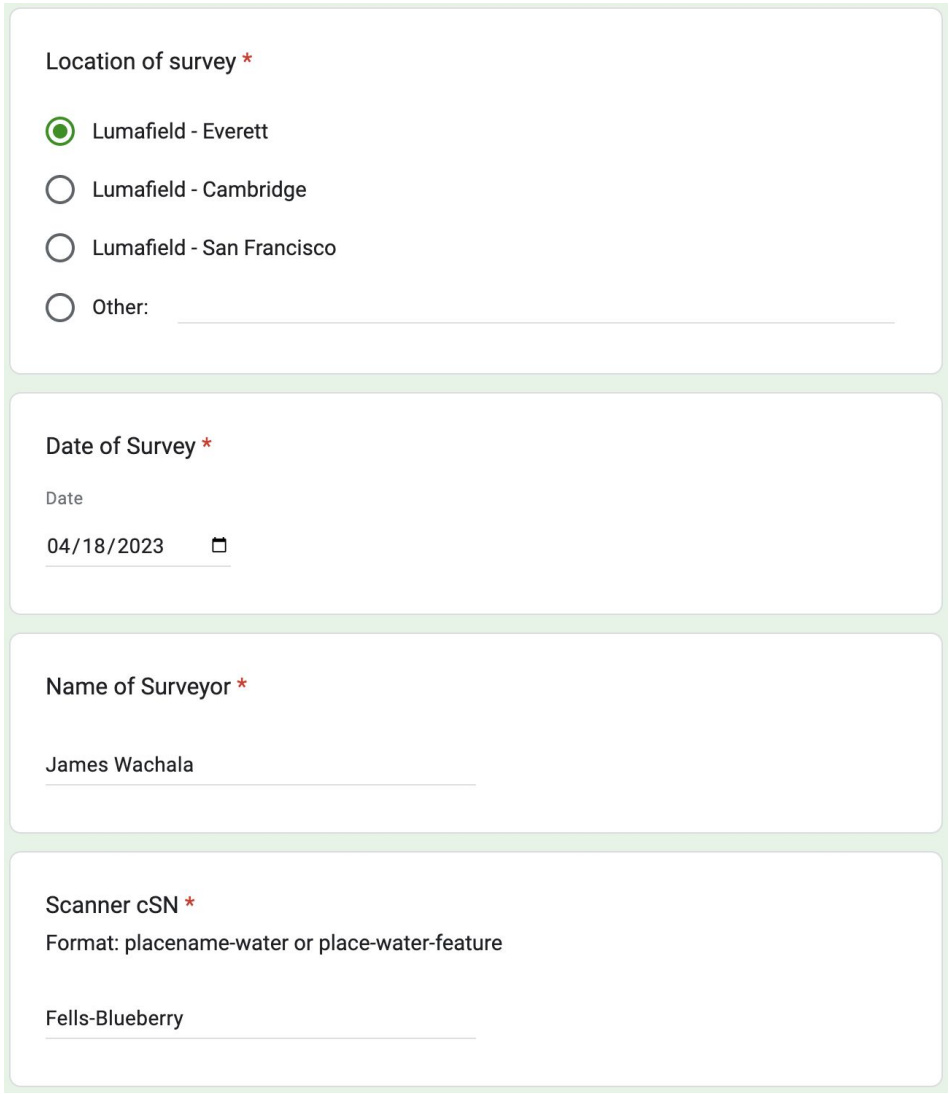


Fill out the General Survey Information and Scanner Information (Page 1 of Form)

1. Fill out the Survey Record information
   a. Location of Survey
   b. Date of Survey (click the calendar icon)
   c. Name of Surveyor (you)

2. From the traveler,
   a. Fill out the Scanner-mSN
   b. X-ray Source (type, kV, uA)



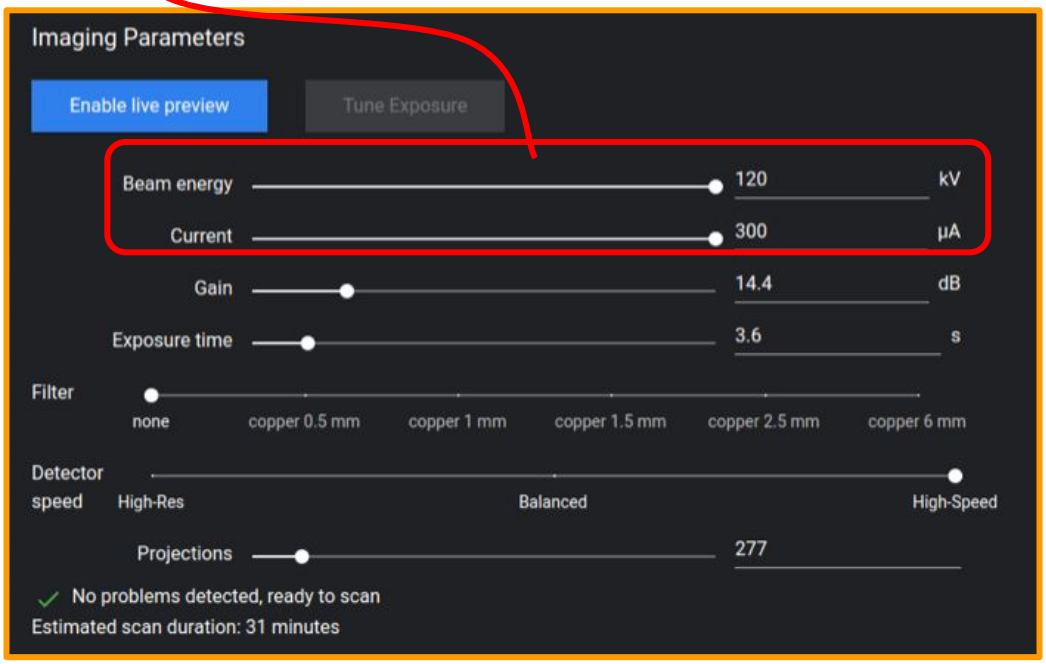


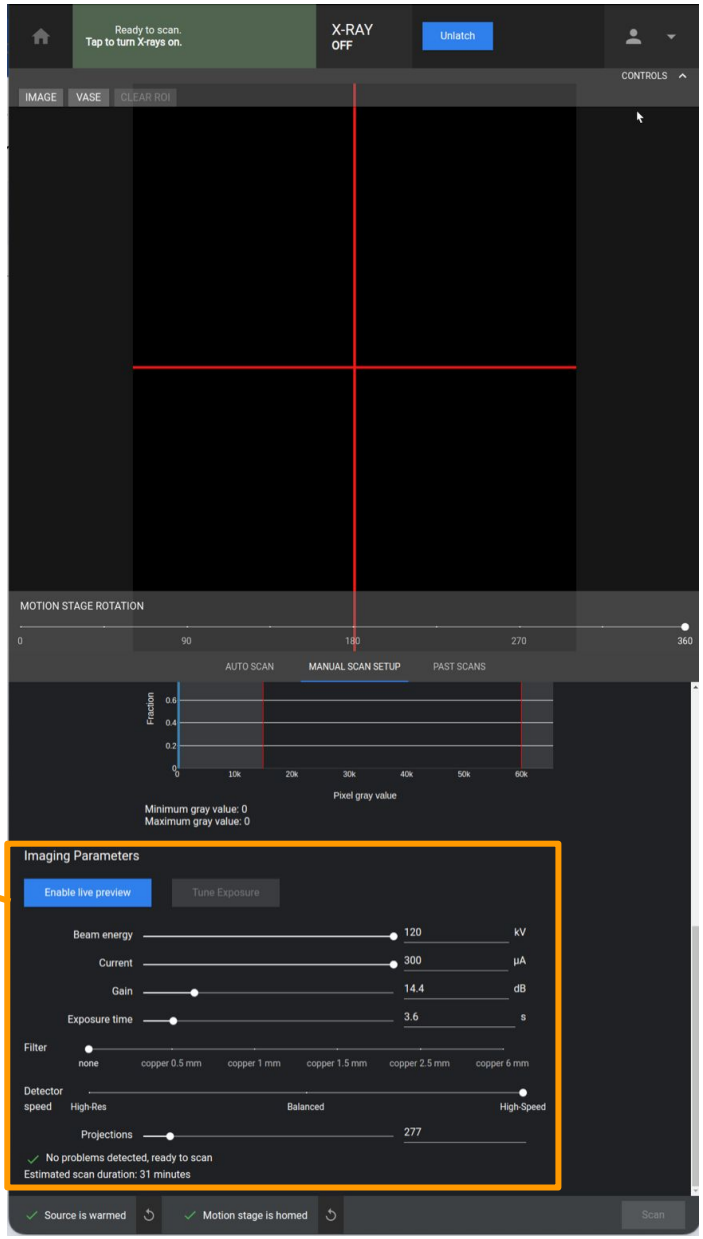
Fill out and Set Scanner Beam Energy information and (Page 1 of Form)

1. Close scanner door

2. Using the Seah screen on the scanner, tap on **MANUAL SCAN SETUP**
   a. using a finger to swipe up, scroll down to the **Beam energy** and **Current** sliders
   b. Slide both sliders all the way to the right to the maximum value

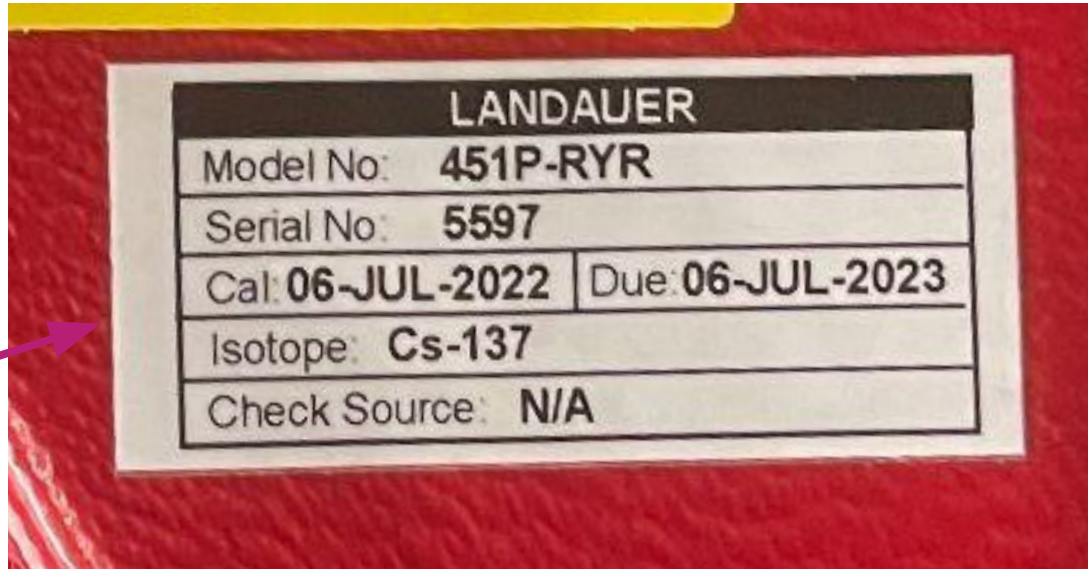
3. Fill out the Scanner information
   a. Numerical X-ray Beam Energy (kV) setting value
   b. Numerical X-ray Tube Current (uA) setting value





Fill out the Survey Meter Information (Page 2 of Form)

1. Fill out the Survey Meter Information (**On the Side of the Survey Meter**)
   a. Serial Number
   b. Calibration Date
   c. Calibration Due Date
   d. Measurement Units are **uR/hr** for the Fluke



2. **Ensure that the survey meter calibration due date is in the future (i.e. after today's date)**

⚠ **If the calibration due date has passed (i.e. calibration is expired), stop and get a supervisor.**

Prep the Survey Meter

1. When ready to survey, turn on the Fluke Survey Meter using the power button next to the handle.

2. Tilt the Fluke so it is sitting vertically and wait 5 minutes until the meter stabilizes somewhere between 0 - 40 uR/hr.
   a. Once stable, the meter may fluctuate ±6 uR/hr. This is normal operation.

3. Record Fluke's reading once stabilized as **Background Level** on page 2 of the form.

Background radiation reading *

10

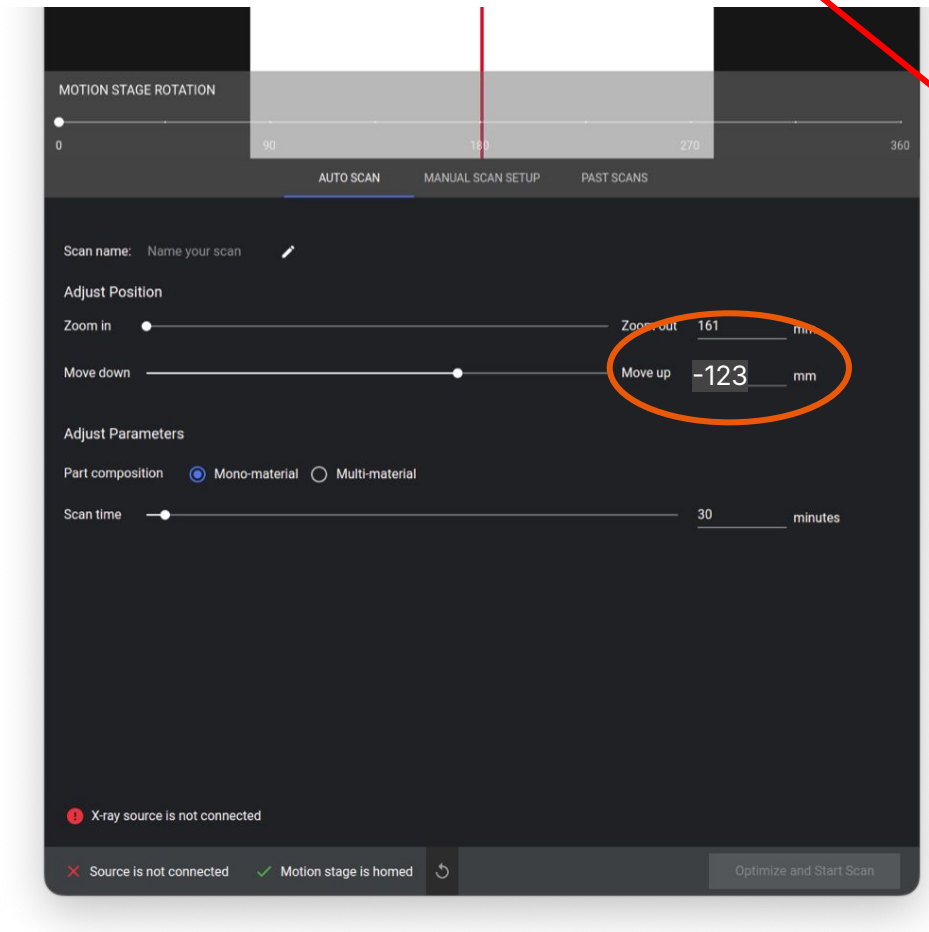
The Background Value typically falls between 0-40 uR/hr.

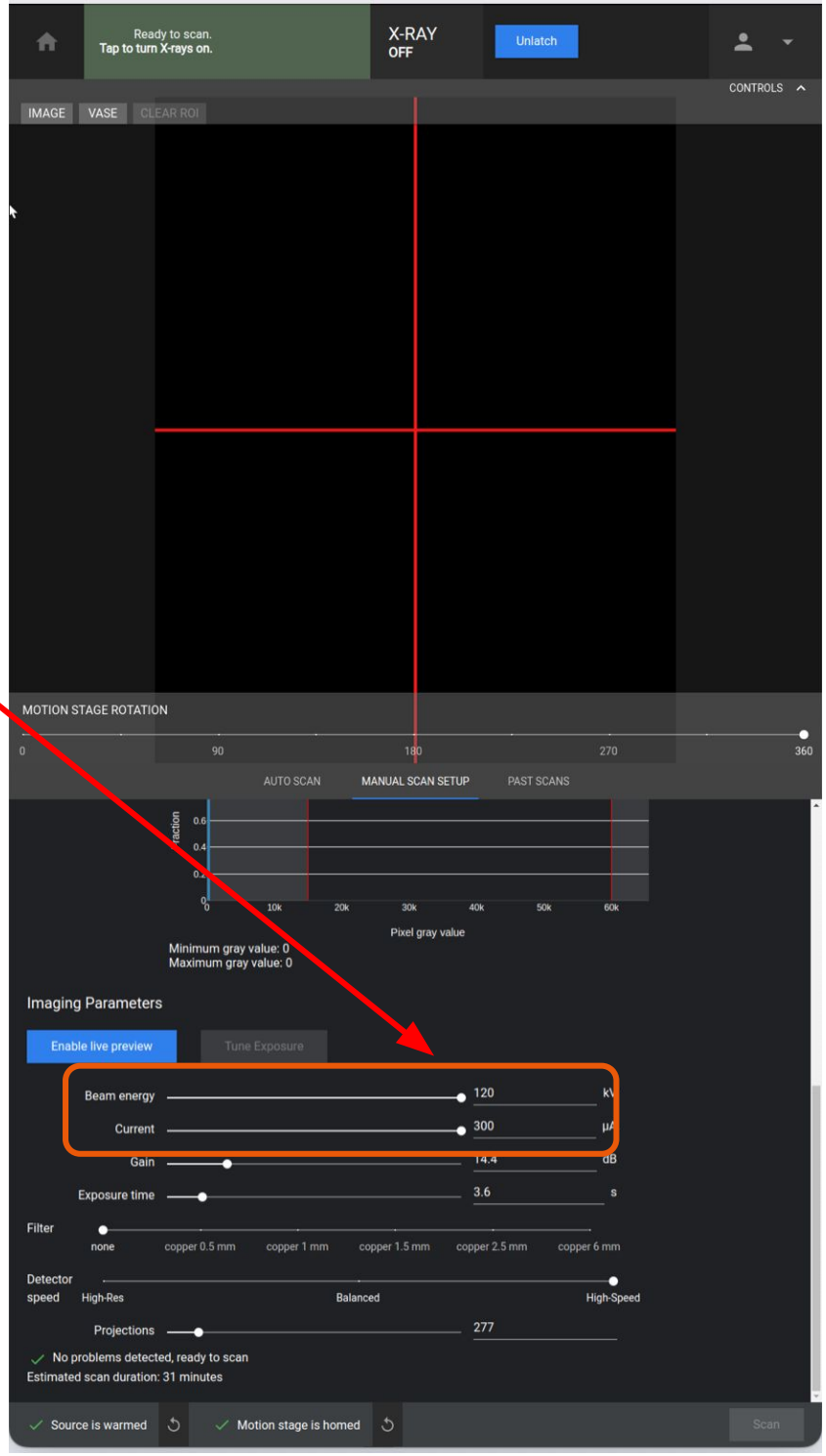
4. **Check that survey meter does not have LOW BATTERY warning.**

Position the Motion Stage

1. Move the vertical position down to -123 mm using the Move Up/Down slider.

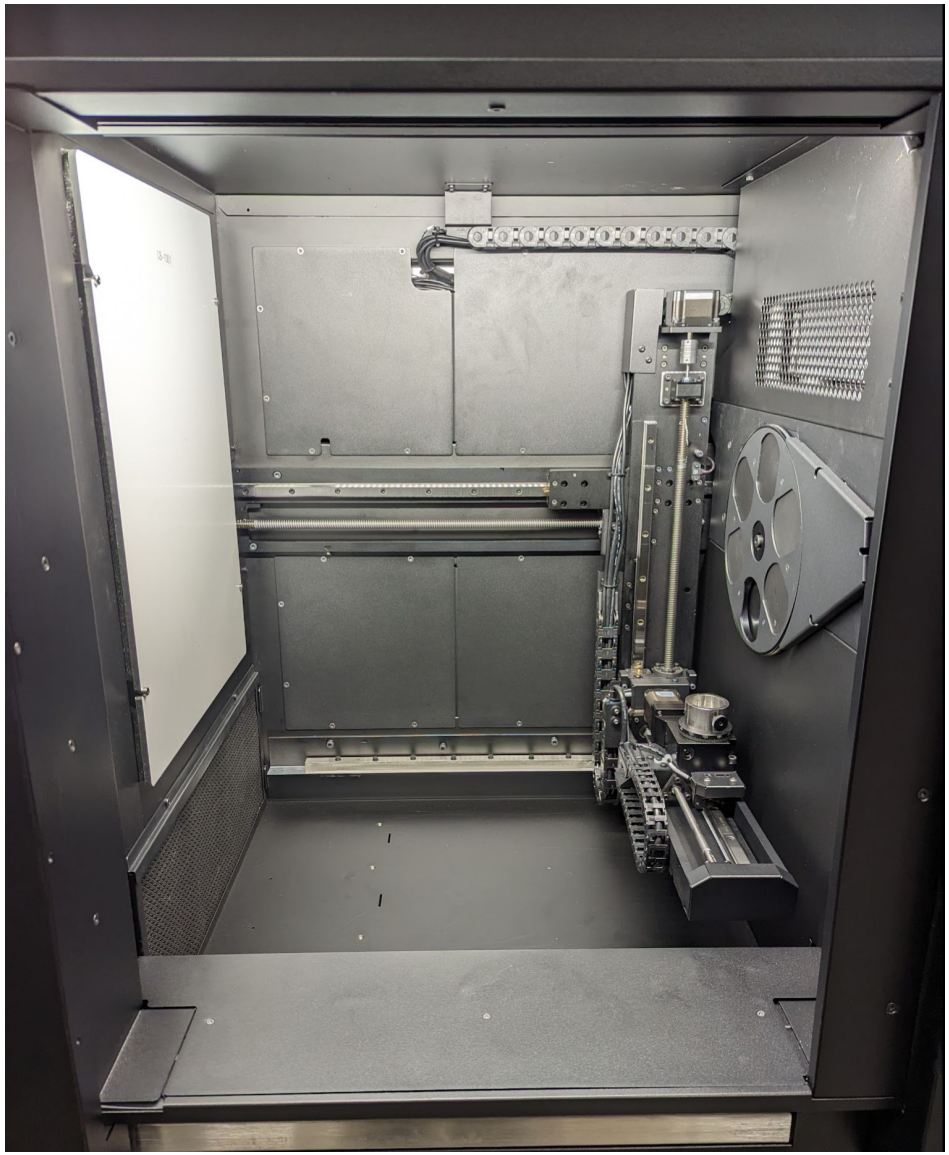
2. Verify the **Beam Energy** and **Current** are set to the max values on the sliders.





Survey Condition 1 (Page 3 of Form)

1. The first survey for new scanners is done with an empty scanner.
   a. The motion stage should have nothing on it, and it should be positioned out of the X-ray source's beam.



Surveying (Physical) Form

The survey meter is to be held with the bottom parallel to the measuring surface

When surveying it is critical to maintain a distance of not more than 5 cm (2 inches) away from the exterior surface of the scanner at all times

Move the survey meter smoothly (not abruptly) at a speed of no more than 4 cm/s (1.5 in/s) while conducting a survey. Covering the entire scanner body should take approximately 30 minutes to complete one condition of an entire survey.

To thoroughly survey all edges and corners on the machine, alway keep the survey meter pointing towards the edge/corner of the machine. Perform a smooth rolling motion around the edge when transitioning from panel to panel.

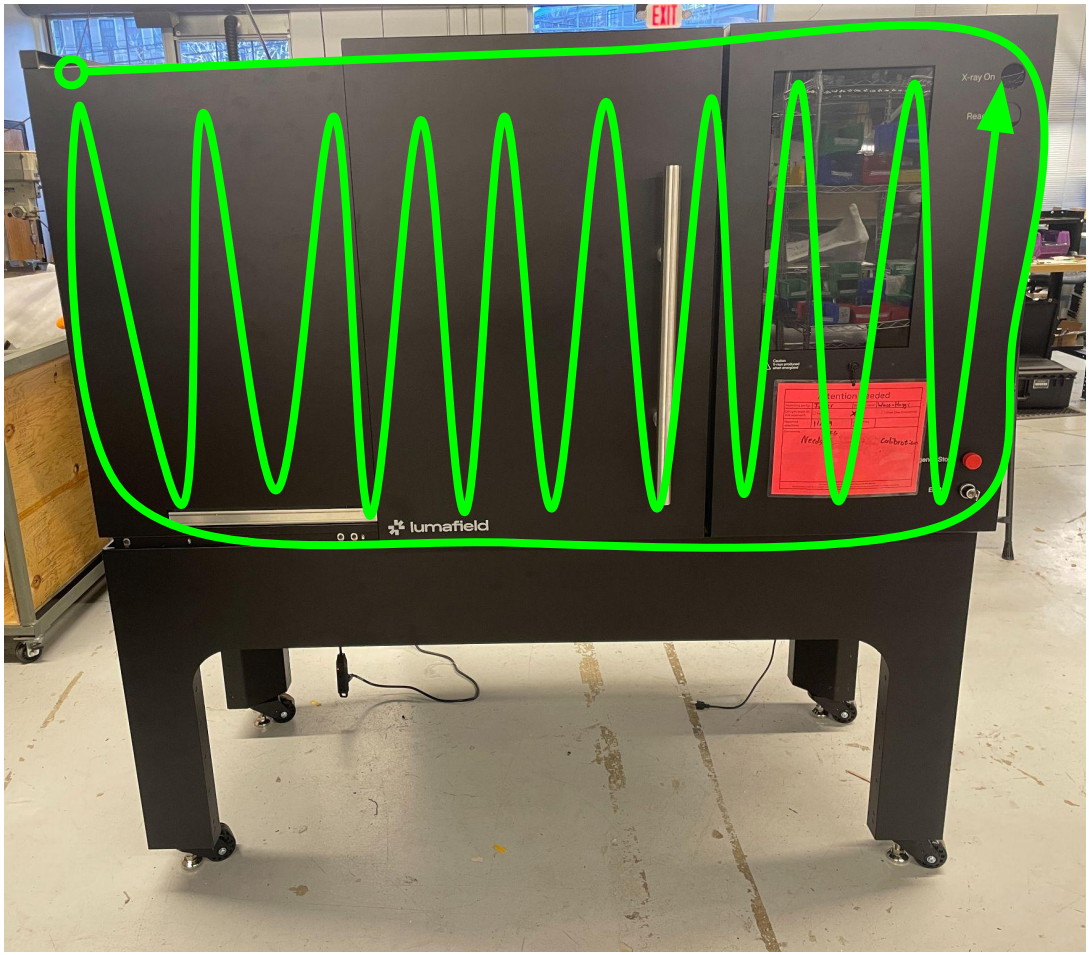
Survey Position: Front Side ~5 minutes

1. On the scanner, shut the door and turn on the X-Rays using the green button in the top left corner of the User Interface

2. Pick up the Fluke and move the Upper Right corner of the Front of the Scanner
   a. Wait 5-10 seconds for the Fluke to stabilize

⚠ **Make sure there is a slight overlap between up/down paths when pathing across the scanner for ALL SURVEYS**

3. Follow the Perimeter of the scanner and then follow the pathing shown

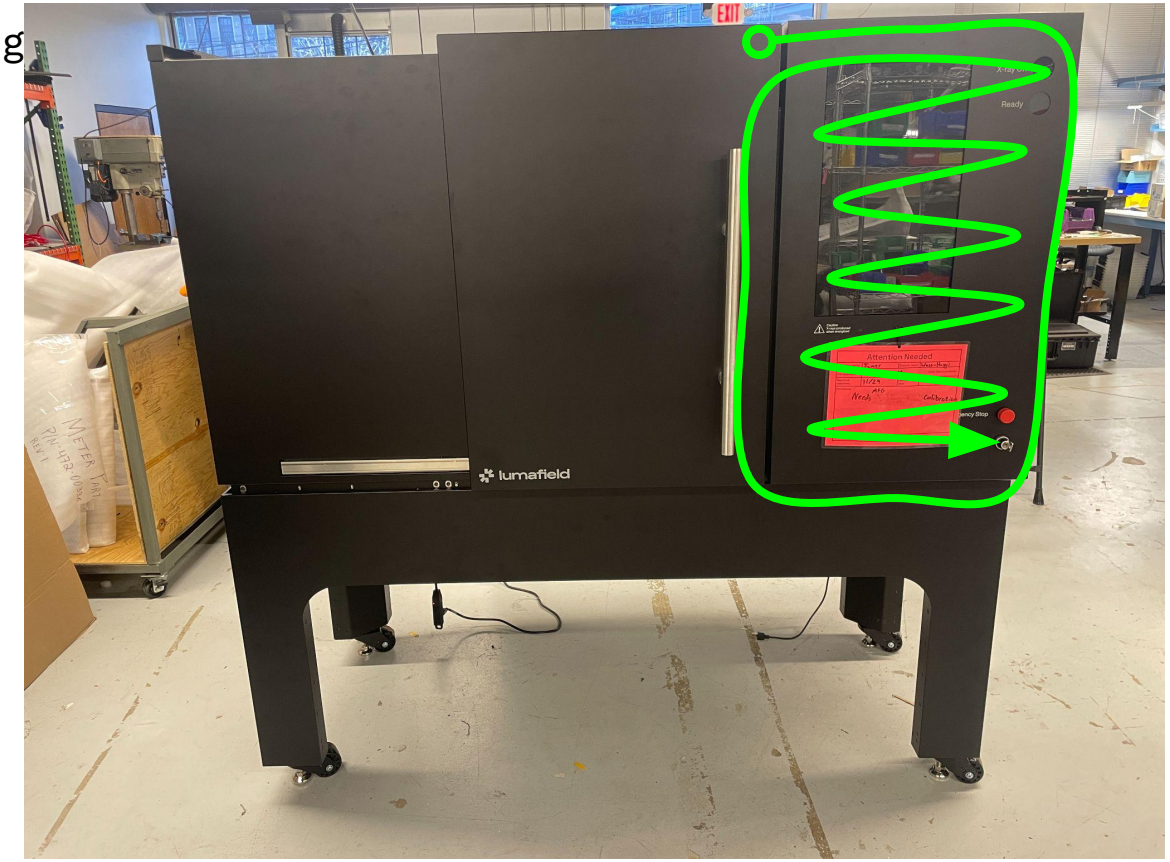


!! CRITICAL INFORMATION - PLEASE READ !!

⚠ **Mentally keep track of the MAXIMUM Dose rate the Fluke displays. If the Fluke increases by more than 8 uR/Hr, stop and backtrack over the spot where the increase was seen. If the dose rate goes back down while checking over the spot, continue the survey and do not record that value. If the dose rate stays high, record where that position is and how high the dose rate was.** ⚠

Survey Position: Operator Position ~2 minutes

The Operator Position is the area to the right of the door handle. A survey is done for a second time here as this is the most likely location for a user to be using the scanner.



1. Move the Fluke start above the door handle
   a. Wait 5-10 seconds for the Fluke to Stabilize

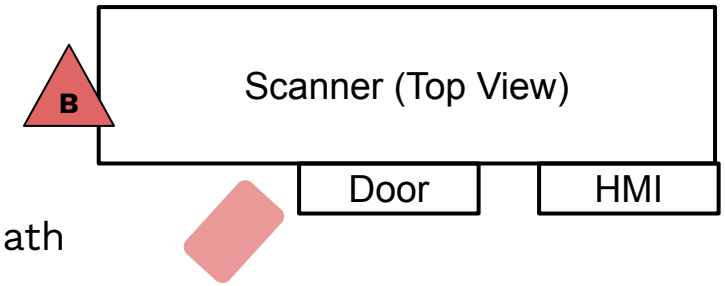
⚠ **Mentally keep track of the MAXIMUM Dose rate the Fluke displays during the survey**

2. Follow the perimeter of the operator position and then follow the pathing shown

3. Record the MAXIMUM Dose Rate for the Operator Position.

Survey Position: Door Seams

~1 minute



1. Follow the two Green lines first
   a. Wait 5-10 seconds for the Fluke to Stabilize for each path

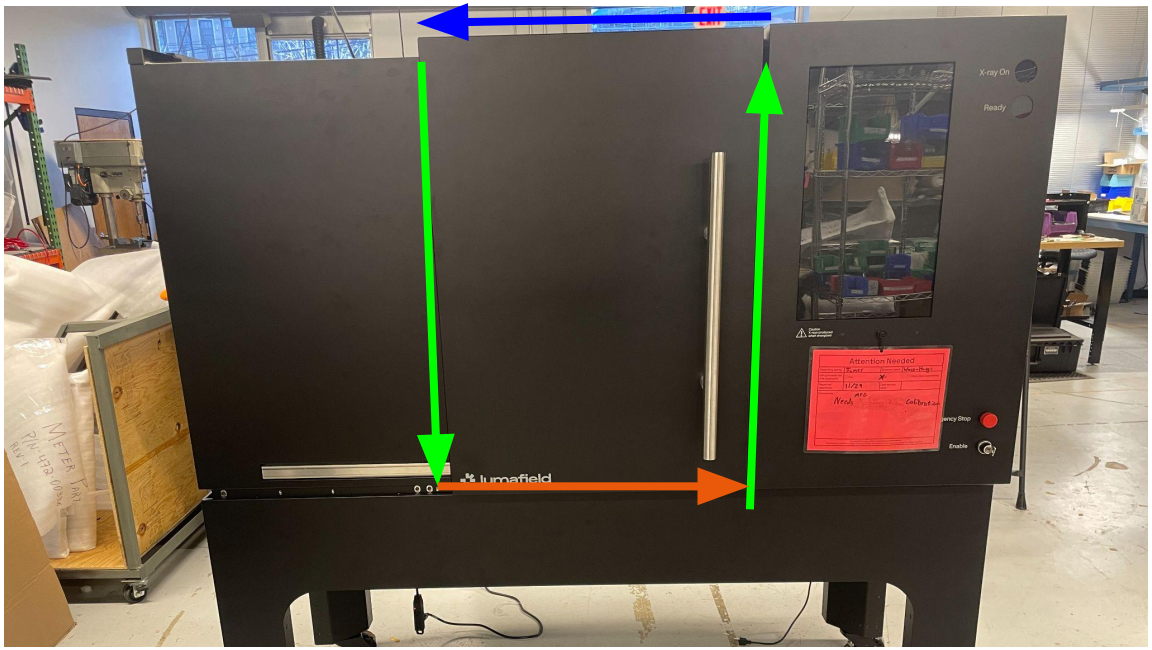
Mentally keep track of the MAXIMUM Dose rate the Fluke displays during the survey

For the left side of the door, survey with device at an angle

2. Survey the bottom of the door seam following the Orange line
   a. Wait 5-10 seconds for the Fluke to Stabilize

3. Survey the top of the door seam following the blue line.
   a. A step ladder might be needed to survey the top of the door
   b. Wait 5-10 seconds for the Fluke to Stabilize once the Fluke is horizontal on the top of the scanner

4. Record the MAXIMUM value of all four sides combined



Survey Position: Left Side (Primary Wall) ~2 minutes

1. Move the Fluke to start In the upper left corner
   a. Wait 5-10 seconds for the Fluke to Stabilize
2. Follow the perimeter of the left side and then follow the pathing shown

   ⚠ **Mentally keep track of the MAXIMUM Dose Rate the Fluke displays**
3. Record the Maximum dose rate for the Left Side

Survey Position: Right Side (Source Wall) ~2 minutes

1. Move the Fluke to start In the upper left corner
   a. Wait 5-10 seconds for the Fluke to Stabilize
2. Follow the perimeter of the right side and then follow the pathing shown

⚠ **Mentally keep track of the MAXIMUM Dose Rate the Fluke displays**

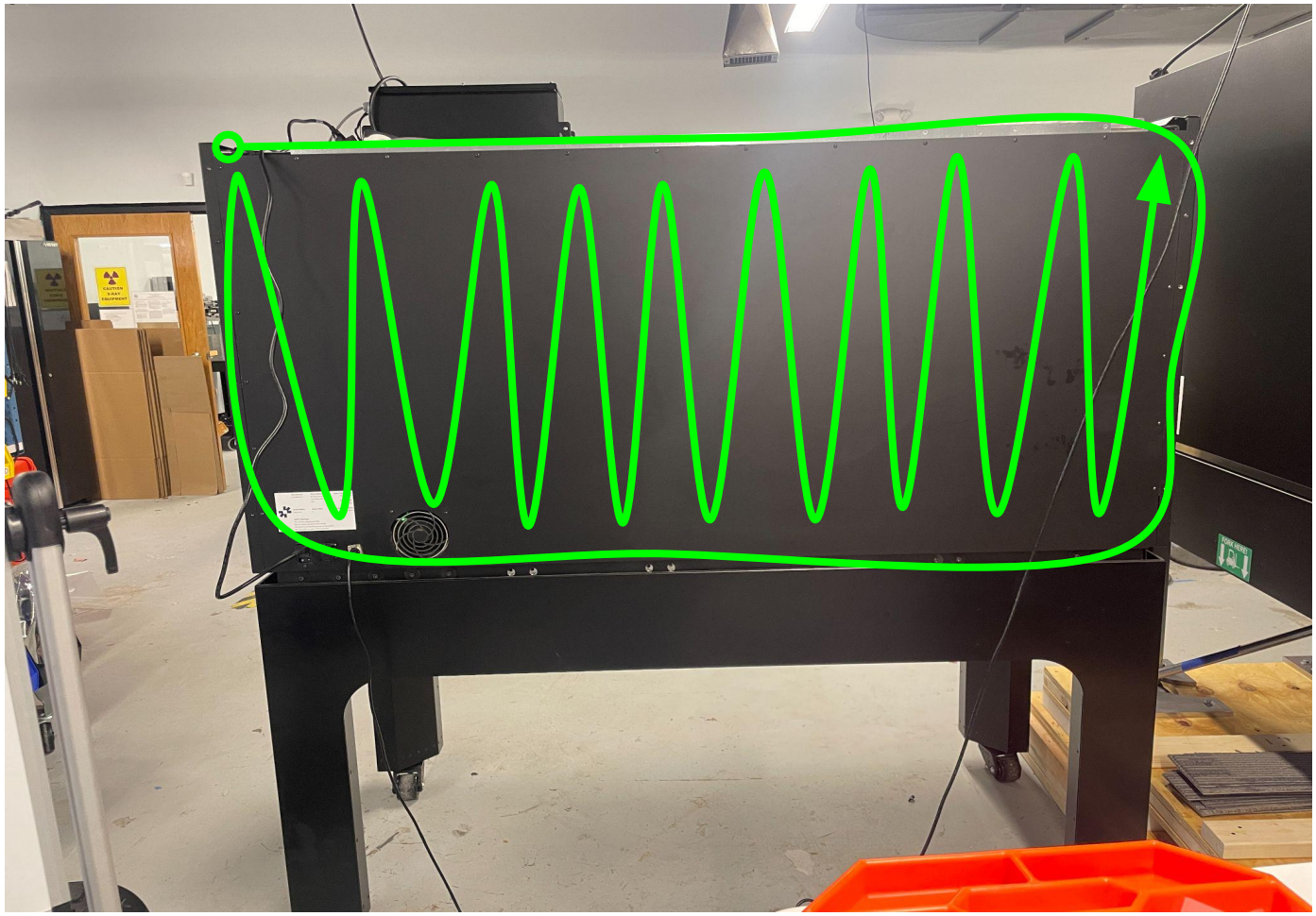
3. Record the Maximum dose rate for the Right Side

Survey Position: Back Side ~5 minutes

1. Move the Fluke to start In the upper left corner
   a. Wait 5-10 seconds for the Fluke to Stabilize
2. Follow the perimeter of the back side and then follow the pathing shown

⚠ **Mentally keep track of the MAXIMUM Dose Rate the Fluke displays**

3. Record the Maximum dose rate for the Back Side

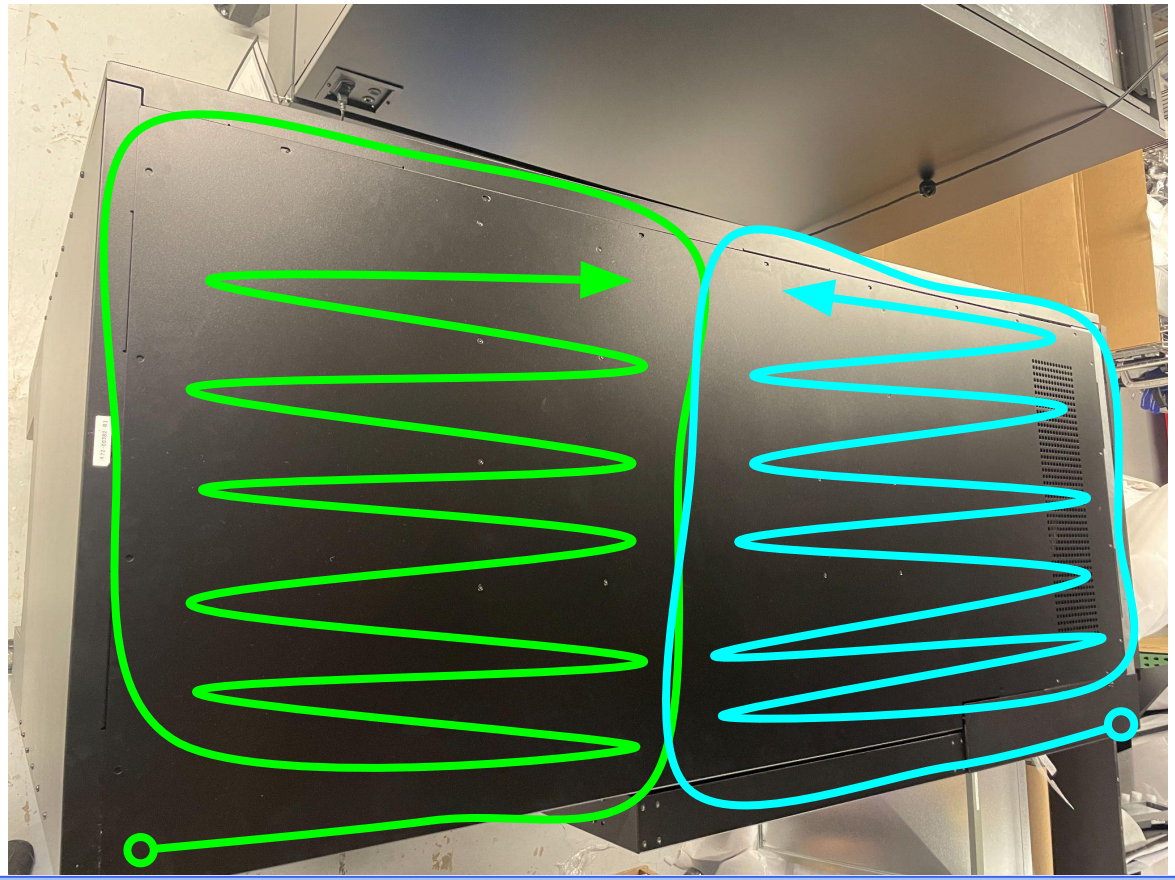


Survey Position: Top ~5 minutes

1. Move the Fluke to start In the front left corner for the green path
   a. Wait 5-10 seconds for the Fluke to Stabilize
2. Follow the perimeter of the green path and then follow the pathing shown

⚠ **Mentally keep track of the MAXIMUM Dose Rate the Fluke displays**

3. Move the step stool over and repeat on the blue path
4. Record the Maximum dose rate for the Top



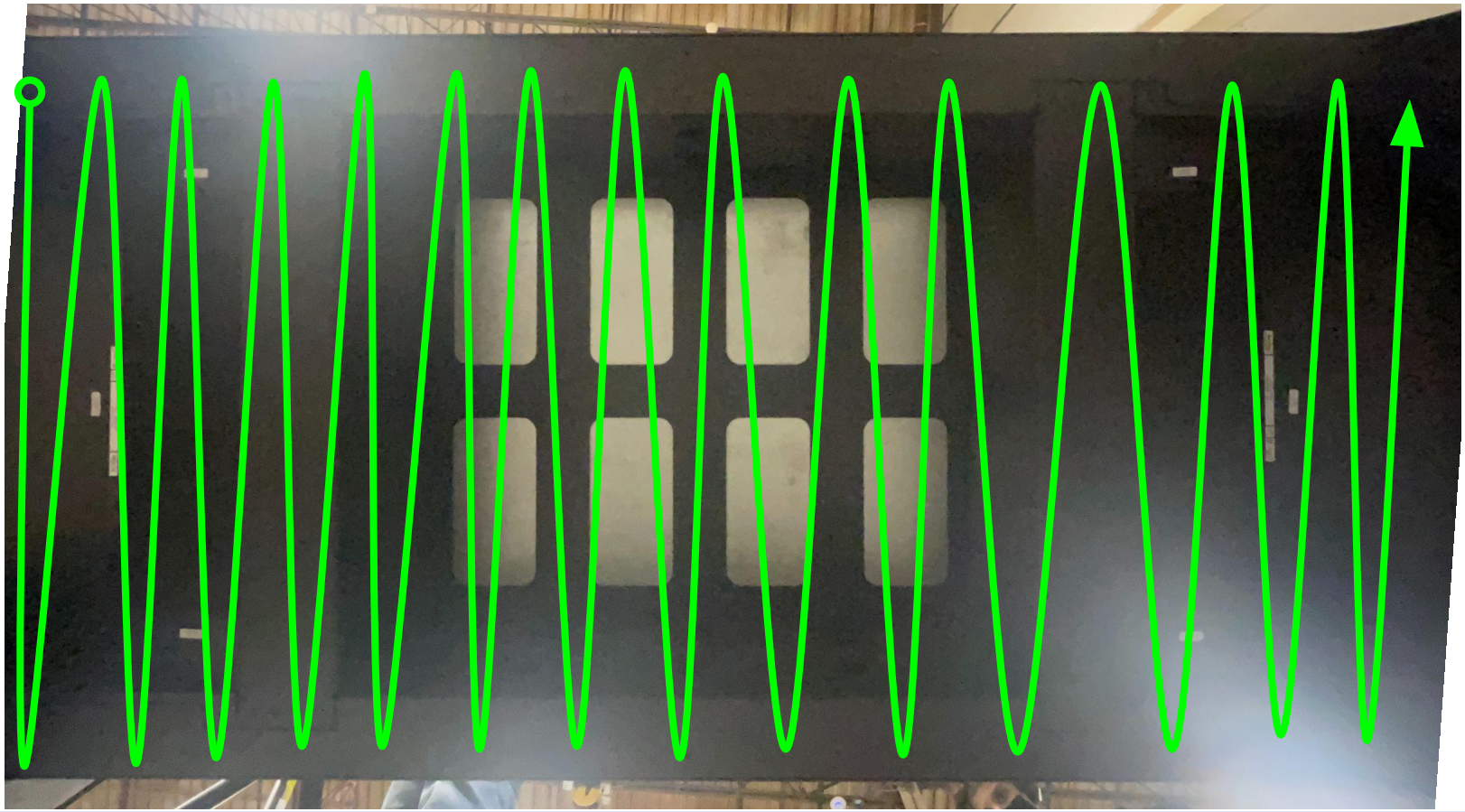
Survey Position: Bottom

~5 minutes

1. Using a creeper, Move the meter to start in the front left corner of the scanner holding the meter upside down
   a. Wait 5-10 seconds for the meter to Stabilize
2. Follow the perimeter of the green and then follow the pathing shown

Mentally keep track of the MAXIMUM Dose Rate the meter displays

3. Record the Maximum dose rate for the Bottom



Survey Condition 2 (Page 4 of Form)

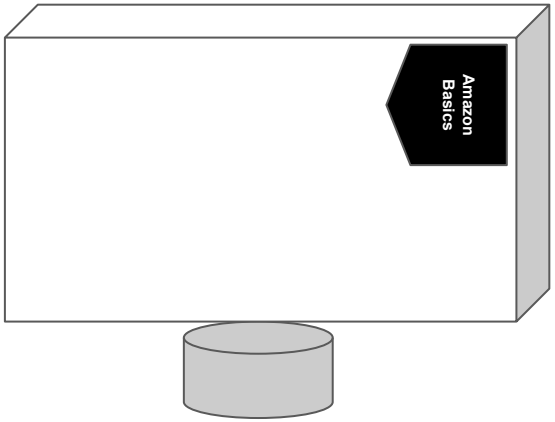
1. Move the Motion System to the **Highest Zoomed In Position** (Motion stage far right, and the zoom slider to the far left) and -123 mm vertically using the position sliders

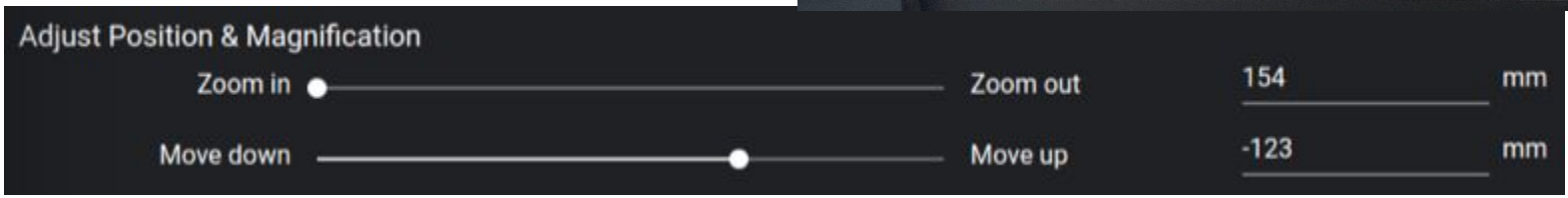
2. Place scatter object on the motion stage like so:

3. Repeat Pages 16-23 with the scatter object installed as described in Step 1 and 2 above

4. Record the Dose Rate values on Page 6 of the survey form for Survey Condition 4

Orientation of the Scatter Object on the Rotation Stage:





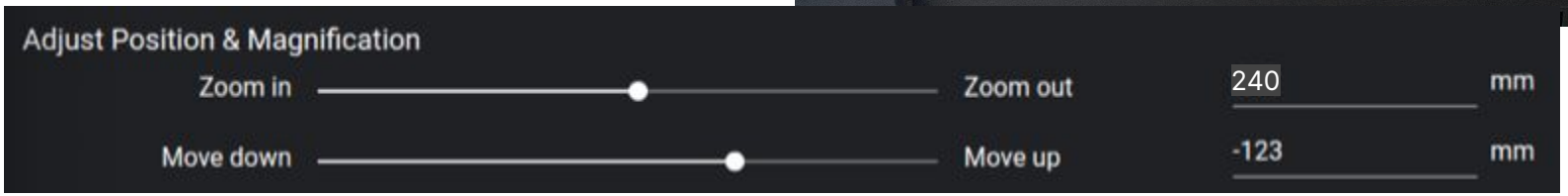
Survey Condition 3 (Page 5 of Form)

1. Move the Motion System to the **Middle Zoom Position** (Motion stage middle, and the magnification slider middle) and -123 mm vertically using the position sliders

2. Place scatter object on the motion stage like so (at approximately 240 mm):

3. Repeat Pages 16-23 with the scatter object installed as described in Step 1 and 2 above

4. Record the Dose Rate values on Page 5 of the survey form for Survey Condition 3



Survey Condition 4 (Page 6 of Form)

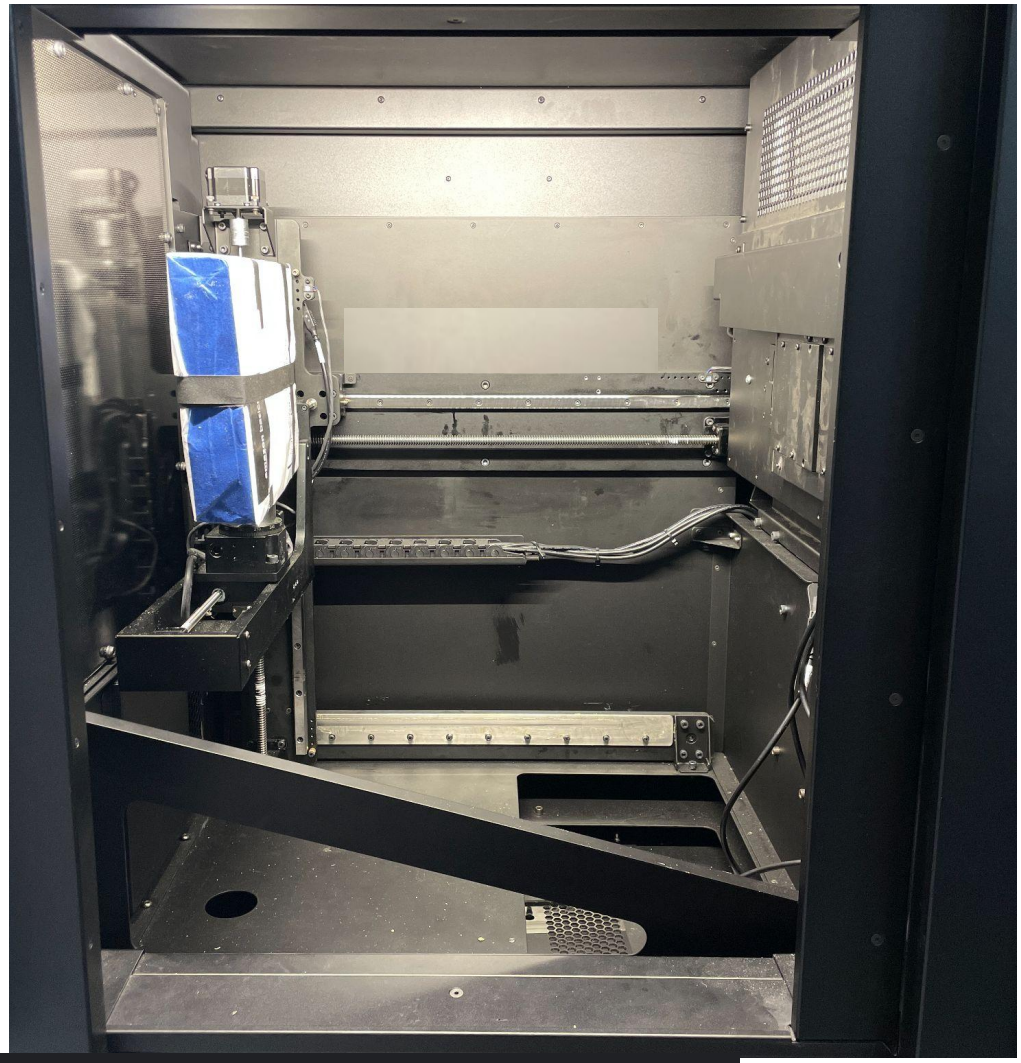
1. Move the Motion System to the **Most Zoomed Out Position** (Motion stage far left, and the magnification slider to the far right) and -123 mm vertically using the position sliders

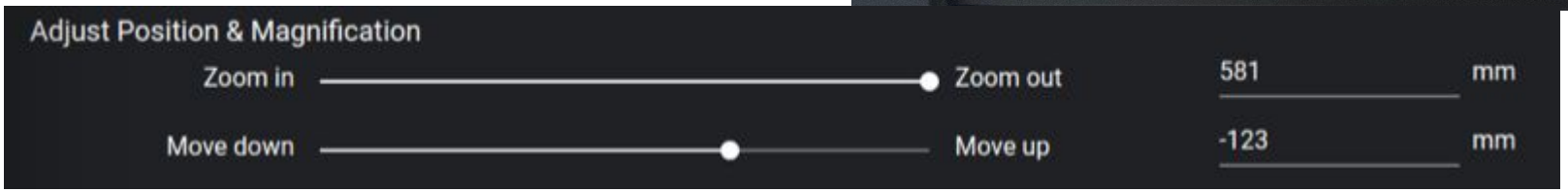
b. Place scatter object on the motion stage like so:

2. Repeat Pages 16-23 with the scatter object installed as described in Step 1 and 2 above

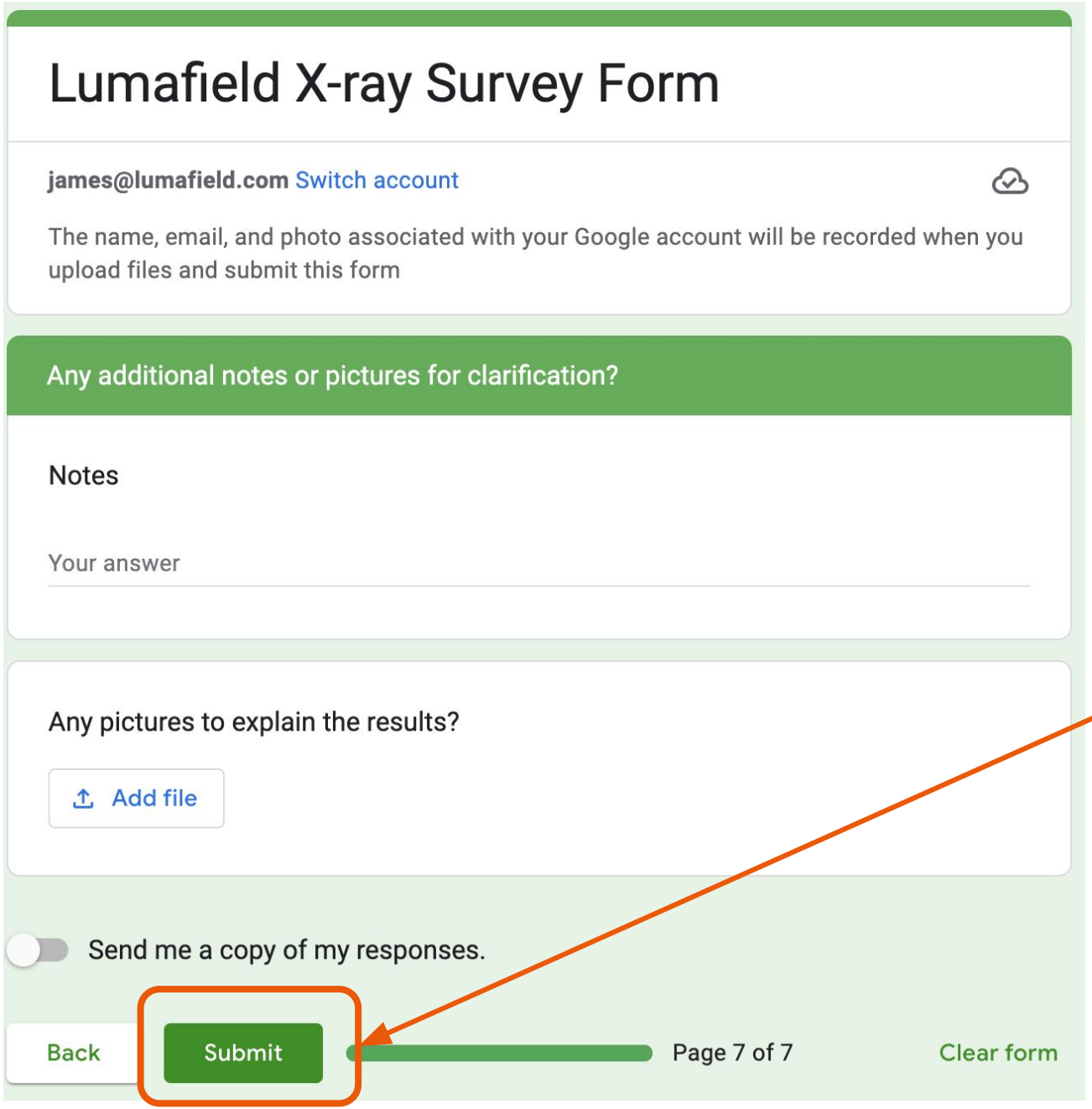
3. c. Record the Dose Rate values on Page 4 of the survey form for Survey Condition 2

4





Add any Additional Notes (Page 7 of Form)



Click Submit when complete.

Work Instruction Finished