TITLE: SCIAPS XRF COMPONENT ANALYZER- X550

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1.0 SCOPE AND APPLICATION

1.1 The SciAps X550 component analyzer uses a powerful X-ray tube, to determine all alloy types including aluminum in about 1 second. The X-ray tube generates photons that are directed toward the sample. The sample is excited and emits characteristic photons back. These characteristic photons are captured and counted by the detector creating a spectrum and the peak height is proportional to the concentration of the alloy.

2.0 METHOD SUMMARY AND DEFINITIONS

2.1 After addresses have been approved employees will go out into the field to locate and verify service lines are ready to be analyzed. The X550 component analyzer uses X-ray technology to determine different alloy types on pipes of service lines. After reading is taken the data is logged by address, along with any comments needed about the site, and a picture of the pipe. This is done for both the private side of the meter box, and the public side of the meter box. Once testing is complete data is collected from the analyzer and stored in a database.

2.2 RAD- Radiation absorbed dose

2.3 REM- Roentgen equivalent man

3.0 HEALTH AND SAFETY

This analyzer emits X-rays while energized. Do not point this analyzer at any living being, or at any parts of your body.

3.1 OSHA limits for X-ray exposure:

- 3.1.1 5 Rem- whole body: head and trunk, active blood-forming organs, the lens of eyes, or gonads
- 3.1.2 50 Rem- hands and forearms, feet, and ankles. * ring badge to measure
- 3.1.3 0.5 Rem- pregnant woman/ woman of childbearing age

3.2 XRF user with proper use <.020 Rem exposure

3.3 Built-in safeguards for use:
3.3.1 Beam Status Light
3.3.2 Sample Detection Interlock
3.3.3 Trigger Modes

3.4 Always pay attention to where the beam is pointed, **only trained operators should use the system.** Store the analyzer in a safe and secure location.

3.5 Never try to repair the unit or run it with any of the shielding or safety interlocks removed.

4.0 HANDLING, AND STORAGE

4.1 The analyzer is kept in a secure location while not in use. The analyzer has a storage case that it should be always kept in while not in use.

4.2 Do not leave the analyzer in extreme temperatures.

4.3 The analyzer is water resistant but not waterproof. Be careful when handling in wet environments.

4.4 While handling the analyzer under no circumstances, point it at any living thing. Treat the analyzer as if it could take an X-ray at any time. Be mindful to not point it at your feet or hands.

5.0 INTERFERENCES

5.1 Ensure that pipes are free and clear of most dirt and debris to get the most accurate reading, this also helps when taking pictures of the service lines.

5.2 The analyzer cannot be used if water is present in the meter box.

5.3 Make sure that the analyzer is in almost direct contact with the pipe that you are reading, or the results will be inaccurate.

6.0 EQUIPMENT AND SUPPLIES

6.1 XRF unit
6.2 Battery chagrining station
6.3 Li Ion Batteries
6.4 Calibration Clip
6.5 Hand shovel/ regular shovel

6.6 Screwdrivers
6.7 Towels

6.8 Flashlight
6.9 Handheld magnets
7.0 Radiation rings/ badges
7.1 Pumps
7.2 GPS unit

7.0 CALIBRATION/ GPS connect

7.1 When the analyzer is turned on (power button on top of instrument) username must be entered (operator). Also turn GPS power on by holding button until light flashes green. Blue light flashing also means it is ready to be connected by Bluetooth.

7.2 Passcode must be entered PIN: 12345

7.3 Warning screen will come on, which will take you to the home screen. Here connect the GPS by going to settings/scroll down to GPS connection/push connect button. Green connected banner should appear when the GPS is connected to the XRF. Then exit GPS connection. Exit global settings. Go back to home screen that has analyze on it.

7.4 Select analyze, and then choose the app “alloy”.

7.5 The calibration screen will come on. Take the external metal clip standardization coin associated with the analyzer and slide it over the top of the analyzer reader.

7.6 Hit the “calibrate” button and wait for all 15 points of calibration to complete. During the calibration, the LED indicator will be red while the tube is emitting X-rays

8.0 PROCEDURE
These steps are to be completed after the meter box has been cleaned out and pipes are exposed and ready to be analyzed. (If necessary)

8.1 Start at the home screen of the XRF component analyzer.

8.2 Select the analyze option and choose the app “alloy.”

8.3 Place the analyzer as close as possible to the pipe needing to be analyzed. Use the line at the side of the nose of the XRF to show were to place XRF on pipe.

8.4 Pull the trigger or tap the start button to begin the alloy determination.

8.5 While the analyzer is in use the LED indicator will be flashing red.

8.6 After the analyzer is finished, the LED indicator will remain solid red while the instrument is still energized. Be mindful when it is solid red, as it could emit an X-ray at any time the device button is engaged.

8.7 The alloy list will populate with the results of the reading and accuracy.

8.8 When accurate reading is complete tap the camera button to get a photo of the pipe.

8.9 When activating the camera, if the picture displayed does not match what the user is pointing the analyzer at, hit the camera calibration button in the upper left-hand corner. This will switch the view of the camera. Use the zoomed out version to capture the whole box.

8.10 To take a picture of the pipe hit the white circle at the bottom of the screen. After the picture is complete you have the option to save the photo or retake the photo.

8.11 Move to the information tab (the “i” icon). Enter the user (name of the operator), then the address, and “WSL component” which is a drop-down menu to choose either the house side or the street side of the meter box.

8.12 Tap on the material observed and select the main source of the pipe. (See Data Dictionary for Details.)

8.13 If the sample is not a valid sample, (for example a meter box that cannot be accessed properly) type in the comment section.

8.14 When finished with that meter box move the screen back to the home screen before moving to the next location.

8.15 Turn off the analyzer, remove the battery and store the analyzer in its case when complete.

9.0 DATA ANALYSIS

9.1 Go to the results viewer tab and click on export data. Data must be exported in Excel and PDF format.

9.2 The analyzer may be connected by either a USB wire or Wi-Fi.

9.3 Data will be uploaded to GIS system to help determine the unknown nature of the service lines in our service area. Accurate address and GPS points affect locational accuracy of readings.

10.0 REFERENCES

10.1 SciAps X550 Operation and Safe-Use Training also applies to SciAps X5
10.2 SciAps X-ray Radiation Safety Training

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Attachment I: Revision History

Current Version:

Version	Date	Description of Revisions
1	8/18/2023	Original SOP written
2	9/8/2026	Updated to include GPS equipment, X-5 model, photo clarifications, and reference to data dictionary

Superseded Versions:

This document supersedes the following:

Version	Date	Description of Revisions