Getting Started with your SciAps XRF Analyzer

SciAps

X550-Pb
Radiation and
Product Training

SciAps
ANALYZE YOUR WORLD

Training Topics

Introduction:

1. What's in the Case?
2. Quick Overview of the Electromagnetic Spectrum and X-Ray Fluorescence
3. Radiation Safety Training , Safe Operation, and ALARA
4. User Interface of the Instrument

Basic Testing:

1. Lead Paint with Test Information

Additional Features & Topics:

1. Data Management
2. Additional applications Factory installed

Getting Started

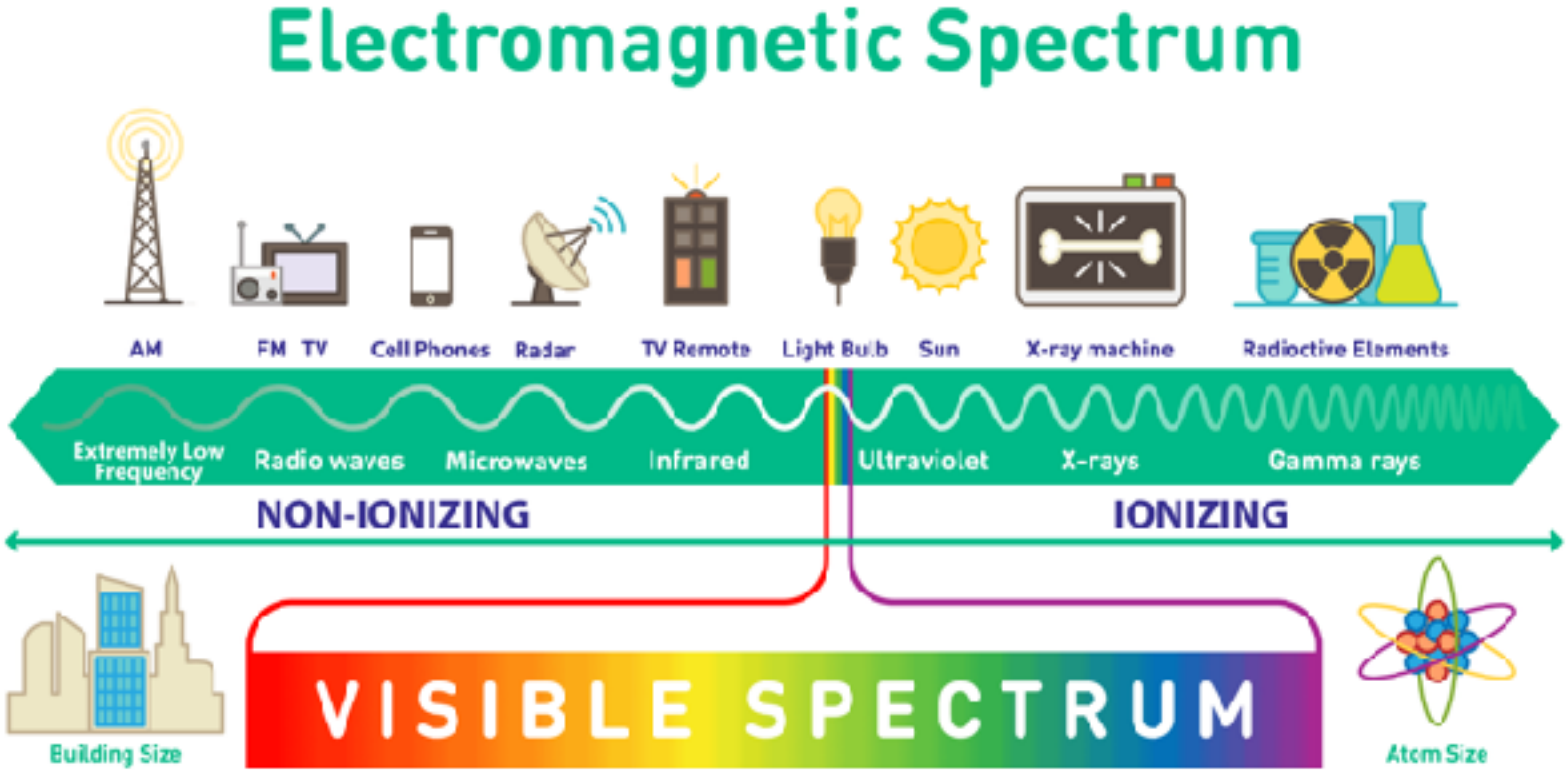
What's in the Case?

- (1) XRF Unit
- (1) Battery Charging Station & Country Appropriate Cord
- (2) Li Ion Batteries
- Kapton Windows (in addition to 1 already in the unit)
- (1) Micro USB Cable – to connect instrument with computer
- (1) SciAps USB Drive with digital copy Quick Start Guide, Manual and desktop software
- (1) Screwdriver
- (1) Calibration Clip (316 Stainless Steel)
- (1) PCS Cal Block

Overview, Safety & UI

Radiation in the Electro Magnetic Spectrum

- Shorter wavelengths, higher frequency, greater biohazard.
- X-ray & Gamma Ray are on the shortest end of the spectrum; using X-ray energy for industrial, medical, or research purposes is common & requires proper handling and regulatory compliance



Two Types of Radiation; Non-ionizing and Ionizing

- **Non-ionizing (Sound to Visible Light)**
  - Not enough energy to detach electrons
  - Does not cause radiation poisoning
  - Can Cause Burns (or cook your food!)

- **Ionizing (UV light to X & Gamma Rays)**
  - High enough energy to detach electrons
  - Damages cells
  - Interferes with cell replication
  - Can Cause Radiation Poisoning

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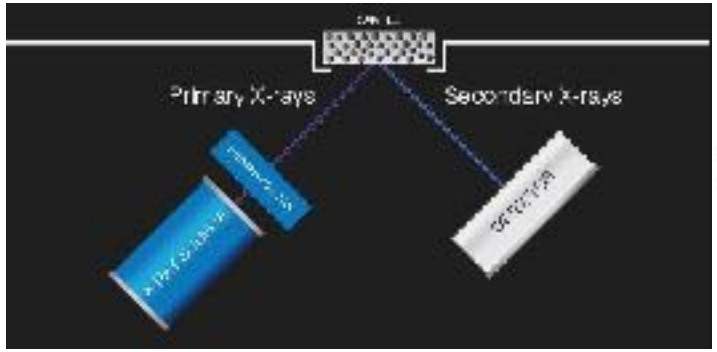
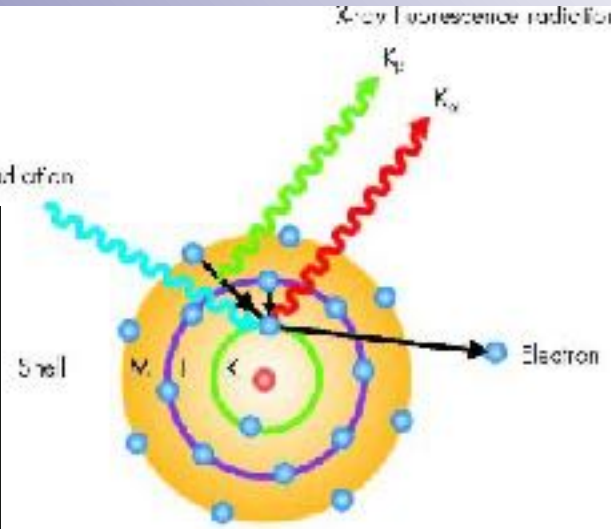
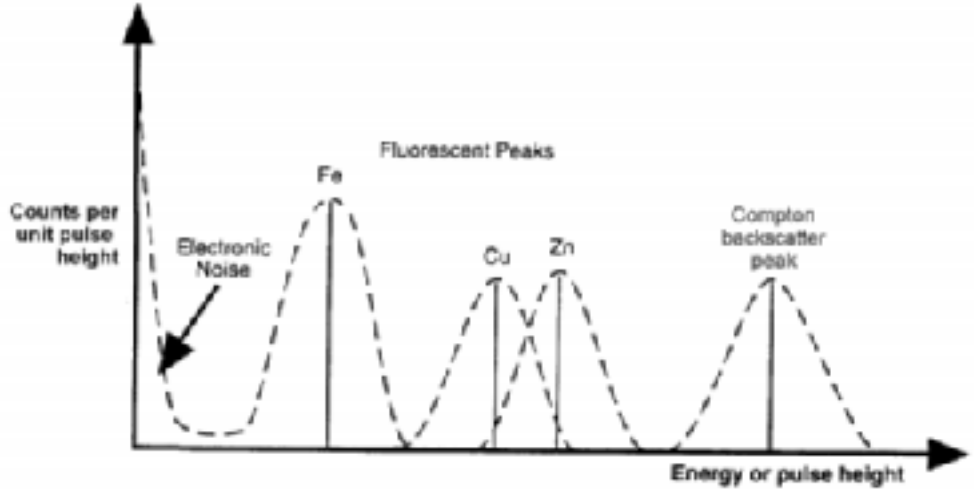
Introduction to HH XRF – How it works

1. X-Ray Tube generates photons that are directed towards the sample
2. Sample is excited and emits characteristic photon
3. These characteristic photons are captured and counted by the detector creating a spectrum
4. Peak height is proportional to concentration







OSHA Exposure Limits

US Units of Measure

- **RAD** = Radiation Absorbed Dose
  - Metric measurement of Dose
- **REM** = Roentgen Equivalent Man
  - Measure of Radiation's hazard to people
    - 1 REM = 1000mR

OSHA Limits

- **5 Rem** or 5000 mR (millirem)
  - Whole Body: Head & trunk, active blood forming organs, lens of eyes, or gonads
  - Body Badge to measure
- **50 REM** or 50,000 mR (millirem)
  - Hands & forearms, feet & ankles
  - Ring Badge to measure
- **0.5 Rem** or 500 mR
  - Pregnant woman / woman of childbearing age

source: www.osha.gov

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Examples of Radiation Exposures

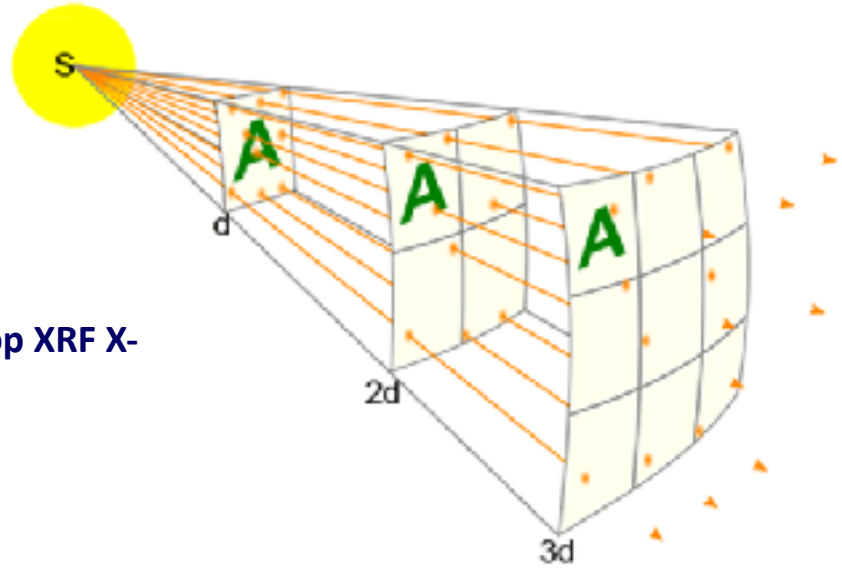
Source of Radiation	Quantity	Comment
Smoking a pack a day	1300 millirem – 1.3 REM per year	26% of OSHA limit
CT Scan – Chest	700 millirem	Highest body part value for a CT Scan
Dental X-ray or cross country flight	< 3 millirem	
Nuclear Plant Worker	700 millirem per year	
XRF User	< 50 millirem per year	With proper use, < 20 millirems is possible

Best Practices for Safe XRF Operation

- **Built in safeguards**
  - Beam Status Lights
    - Password required to arm X-ray Tube (Factory PW = 12345)
    - Solid green light – beam is armed
    - Flashing red – beam is active
  - Sample detection Interlock
    - If there is no sample in front of the window, tests aborts
    - If the sample is removed from the window during an active test, the test aborts
    - Tests have a max time setting. So, all tests stop automatically at the end of the selected test time.
  - Trigger Modes
    - Touch on / Touch off allows user to end test at any time
    - "Dead man" trigger stops test when trigger is released
    - Two Handed Mode
      - Hold Trigger and hold Start button on scree; to avoid user from holding sample.

Best Practices for Safe XRF Operation

- **Common Sense Items**
  - **Pay attention** to where the beam is pointed
  - Only **trained operators** should use the system
  - Store the analyzer in a **safe and secure location**
- **Time**
  - **Radiation Exposure (mR) = (mR /hour) x hours**
    - Therefore, less time = less exposure
- **Distance**
  - **The "Inverse Square Law"**
    - 2 x the distance ➔ 1/4 the intensity
    - 4 x the distance ➔ 1/16 the intensity
    - 10 x the distance ➔ 1/100 the intensity
- **Shielding**
  - **Steel & other dense alloys absorb & stop XRF X-rays**
- **The goal is ALARA**



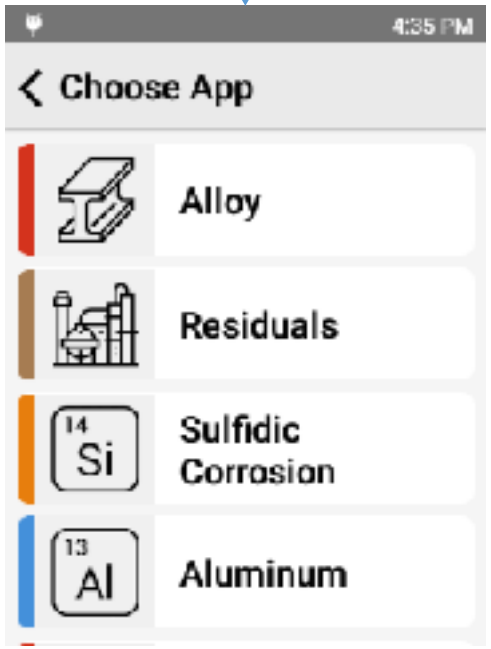
ALARA = Time+Distance+Shielding+Common Sense

ALARA – As Low As Reasonably Achievable

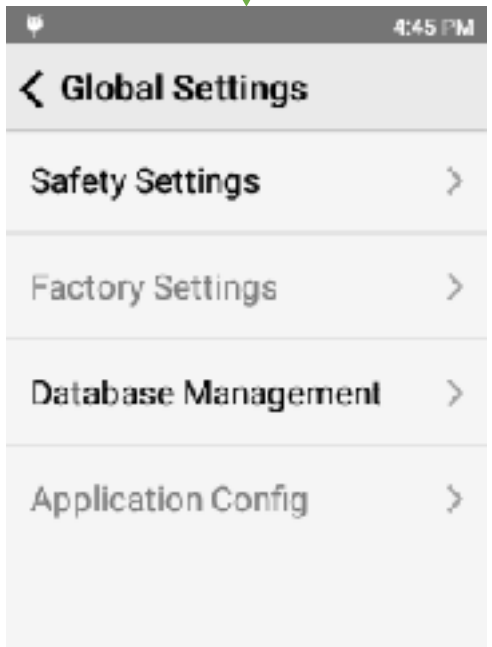
- This is the goal, but remember:
  - With proper usage, the exposure level is near background;
  - The commonsense application of Time, Distance, & Shielding further minimizes exposure;
- Said another way – **just be *SMART!!***
  - Cover the entire window with the sample
  - Keep your hands and face away from the window
  - Keep your buddies behind you
  - Be safe with thin, small, low density samples
  - Never try to repair the unit or run it with any of the shielding or safety interlocks removed

Getting Around

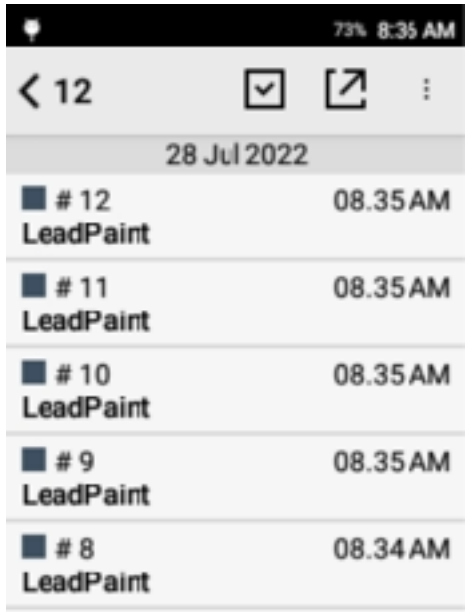
Home Screen – Fast access to all of your everyday Apps



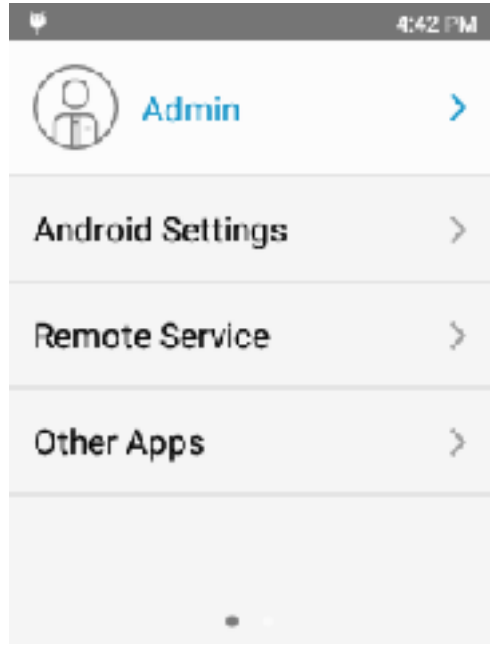
Analyze – Full list of all installed Acquisition Apps



Global Settings – Quick access to safety settings and database management



Results – Quick access to connectivity settings and instrument levels

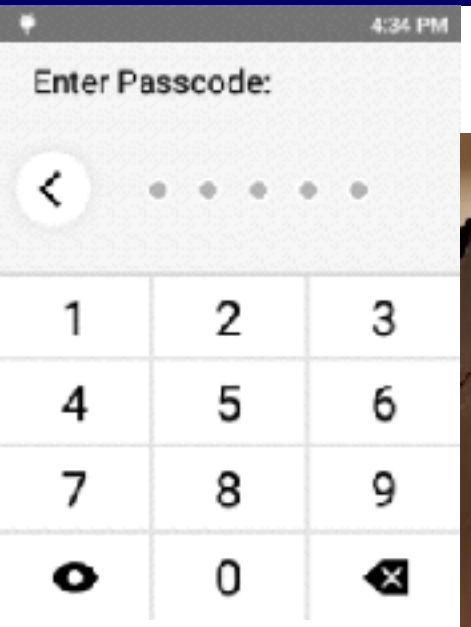


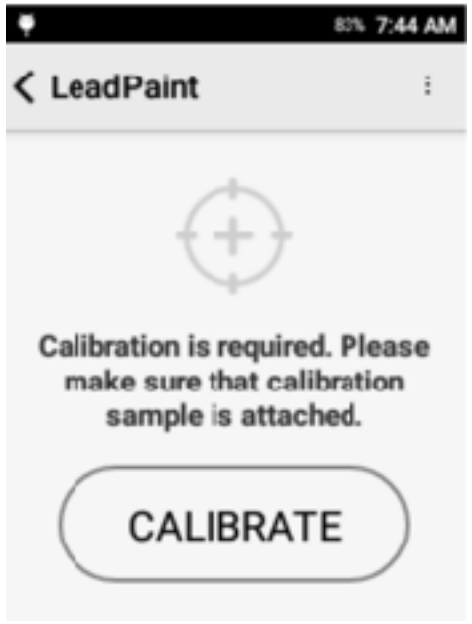
Settings Dashboard – Swipe right on home screen to access instrument user levels, connectivity settings and other apps

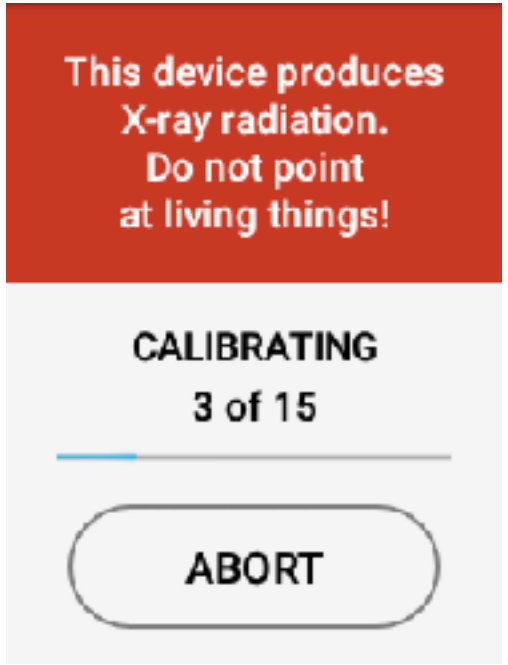
Testing

Lead Paint

Lead Paint Startup



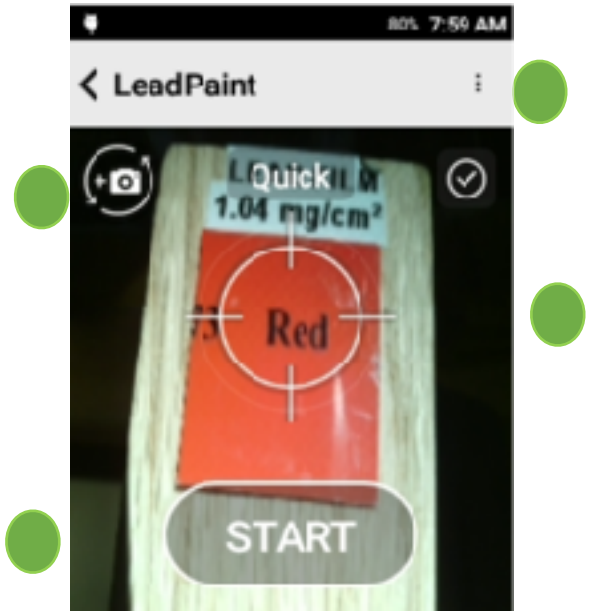


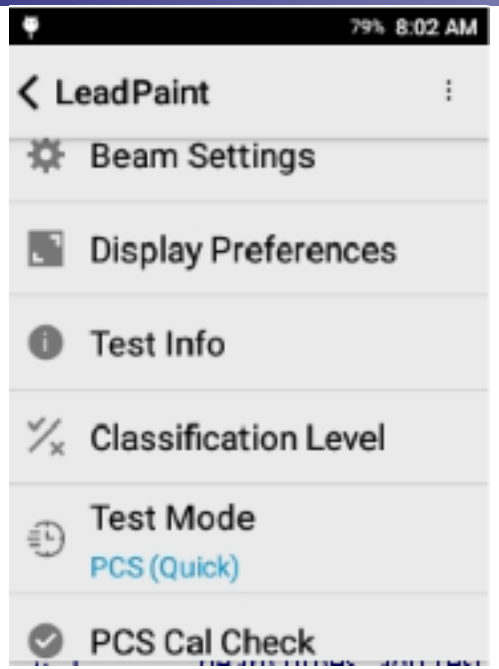


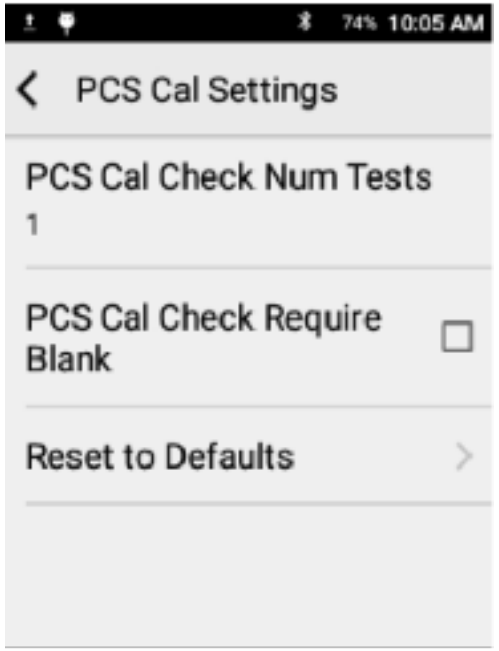
- **PIN Protected Startup**
  - **Factory PIN: 12345**
- **Energy Calibration**
  - **Instrument will prompt Energy Calibration after turned on.**
    - **You can also manually Energy cal**
  - **Instrument uses external clip standardization coin**

1. **Attach Energy Cal Clip, or use 316 SS Sample**
2. **Select “3 dots menu”**
3. **Select Energy Calibration**
   1. **Ensure only trained operators use analyzer**
   2. **Red LED indicator will flash when tube is emitting x-rays**

Lead Paint Mode







1. Settings or “3 dots menu”
2. Attach Picture to test
3. Targeting Recital
4. Start Test (or use trigger)

“3 dots menu”

Customize Test info

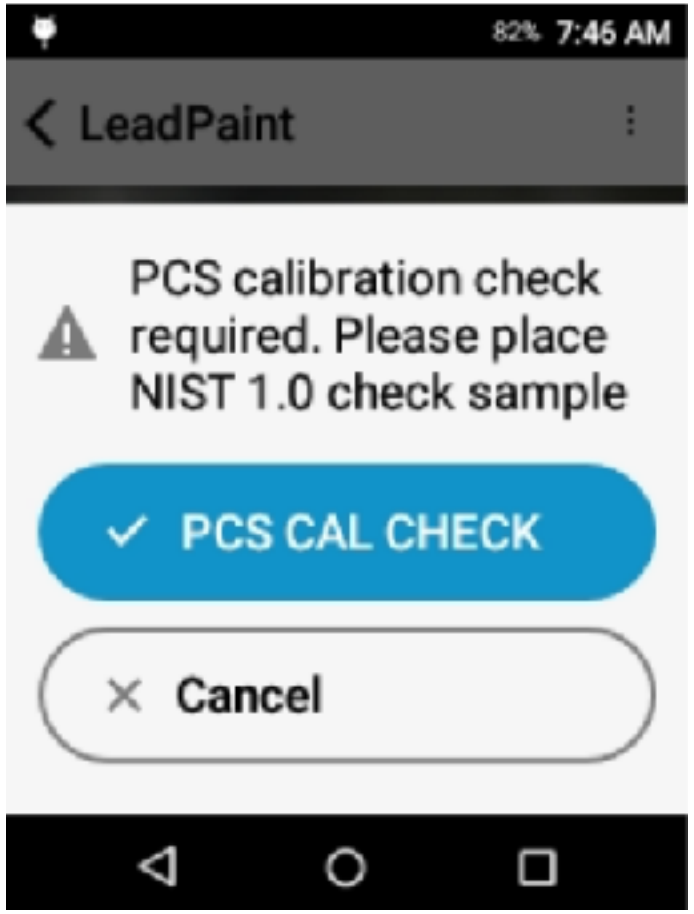
Classification level; 1.0, .7, .5

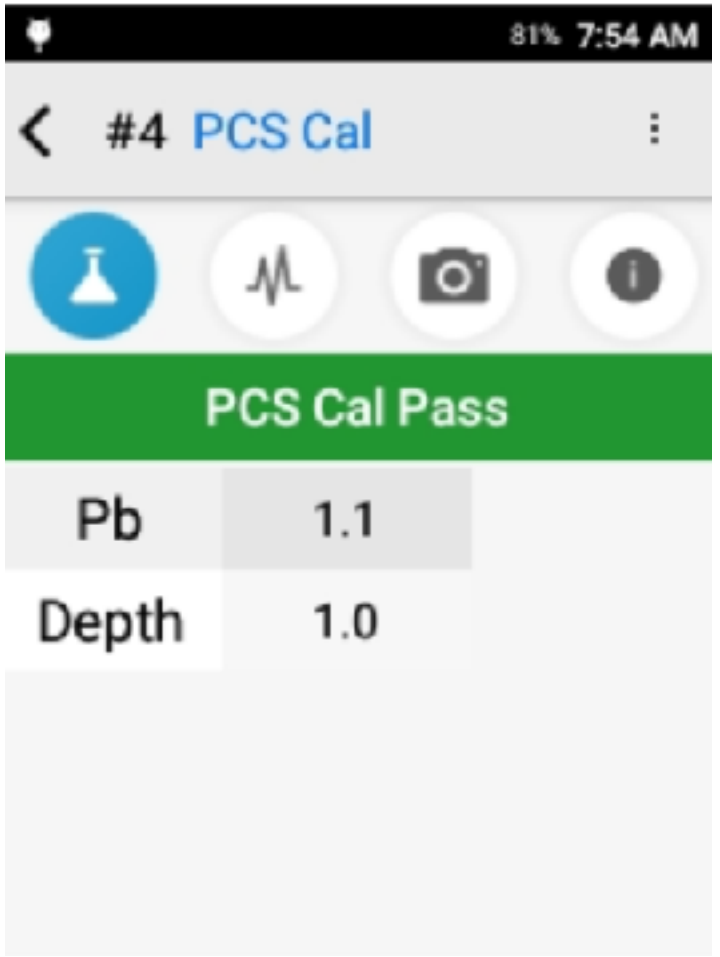
Test mode – Quick or Timed

PCS Cal check

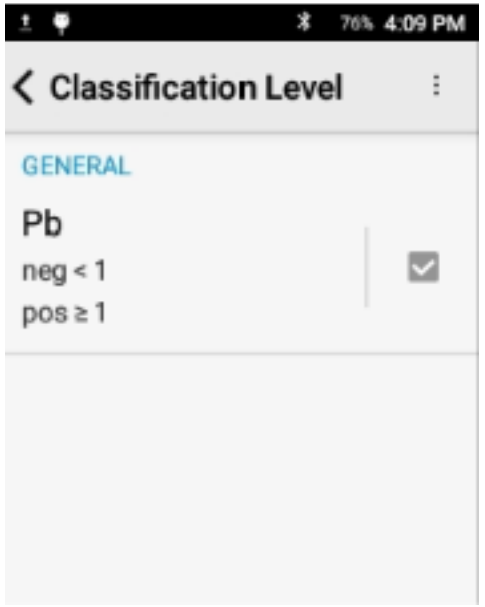
PCS Cal Settings

Lead Paint PCS Cal Check





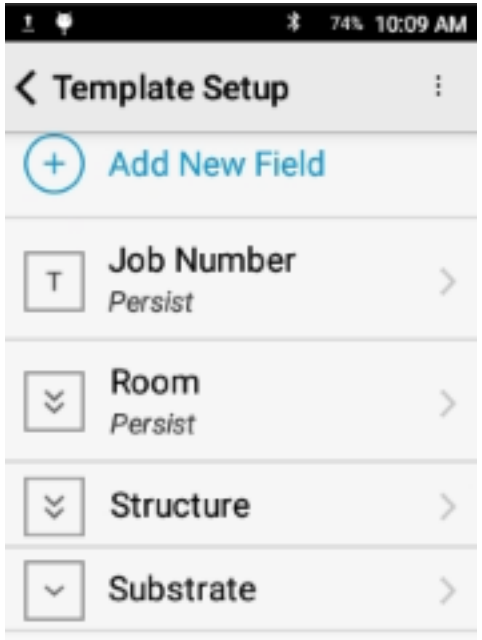
Lead Paint Settings



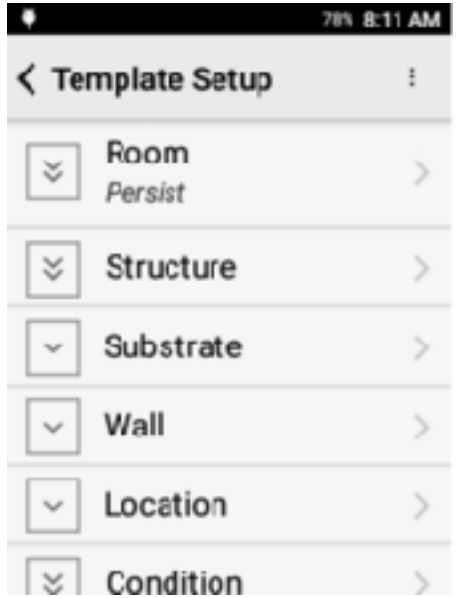
Classification Level

Set HUD Level

1.0 .7 .5

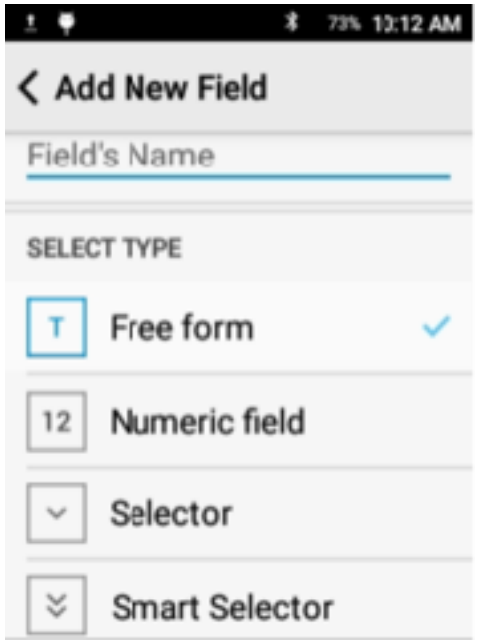


Test Info Settings



Test Info Template

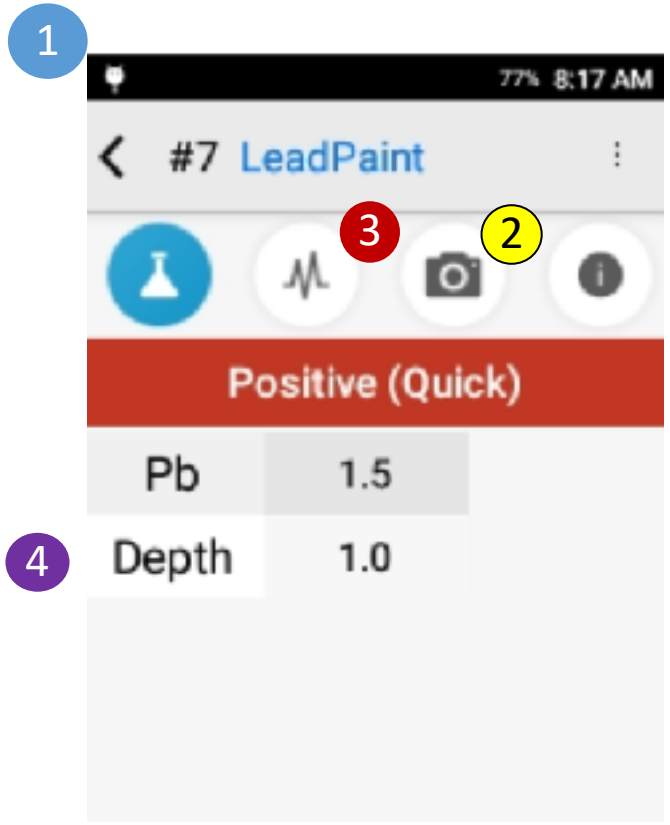
Continued

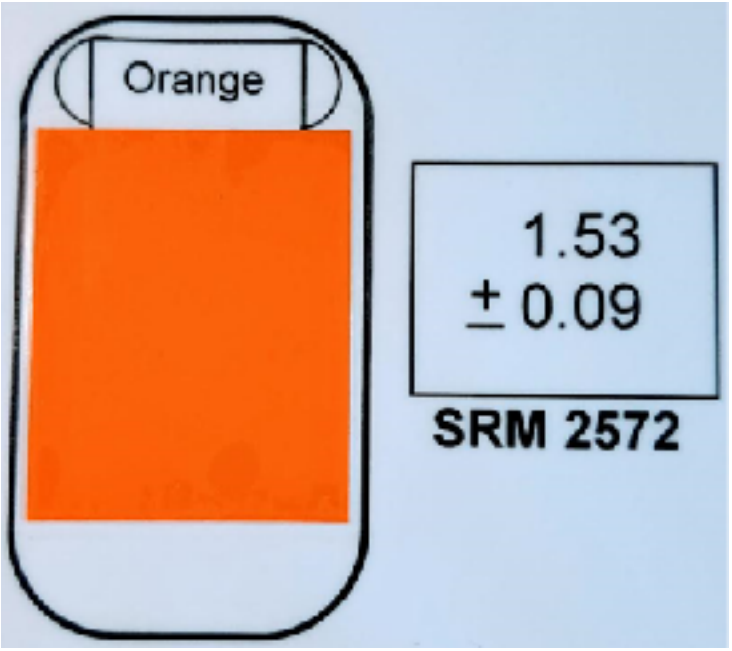


Add a New Field

Results: Basics

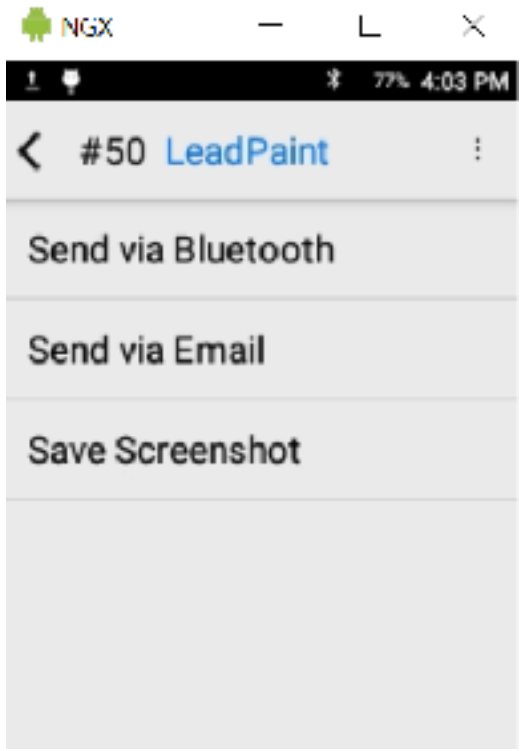
1. Test ID, Number & Time
2. Add Picture to the test
3. Test Information and View spectrum
4. Depth



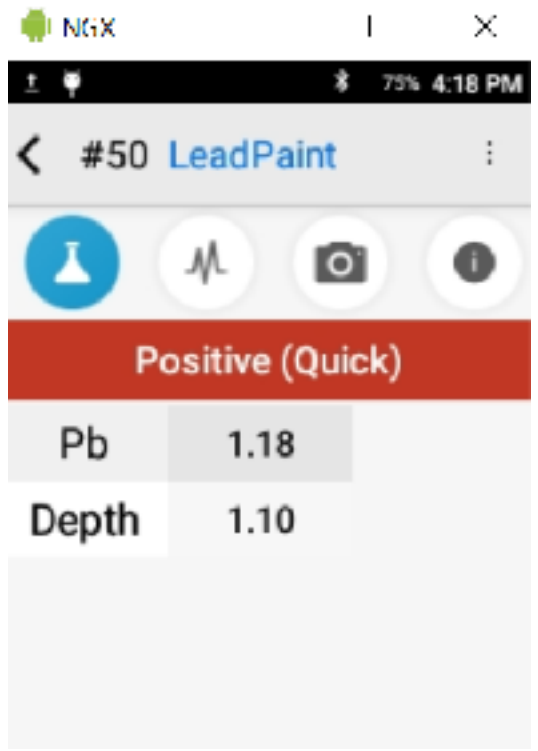


Results Viewer: Display Preferences

- **Print Result Via Bluetooth Printer**
- **Send to Cell phone via Bluetooth**
- **Send to email account**
- **Save screenshot (found in export folder**



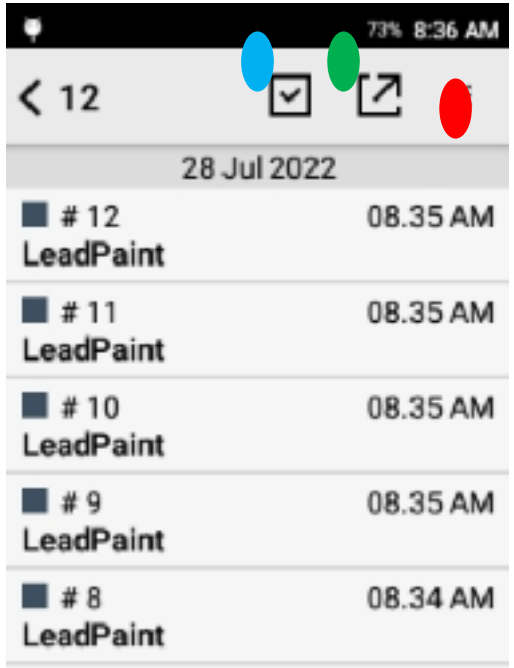
3 Dots – Share Screen



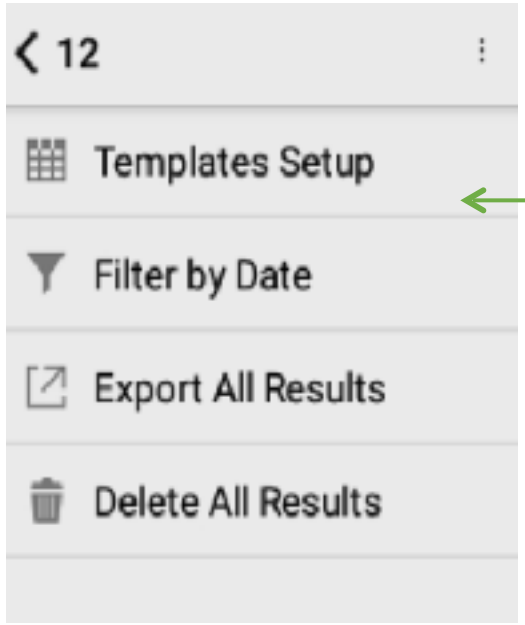
Screenshot

Data Management

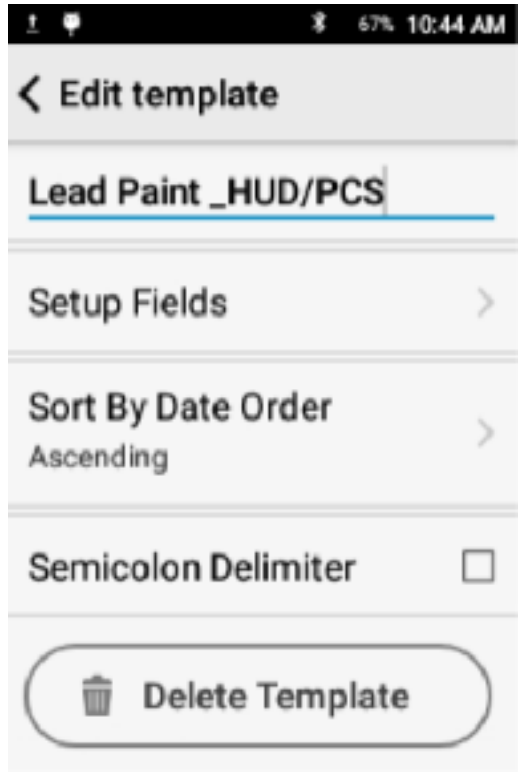
Results Viewer: Exporting results



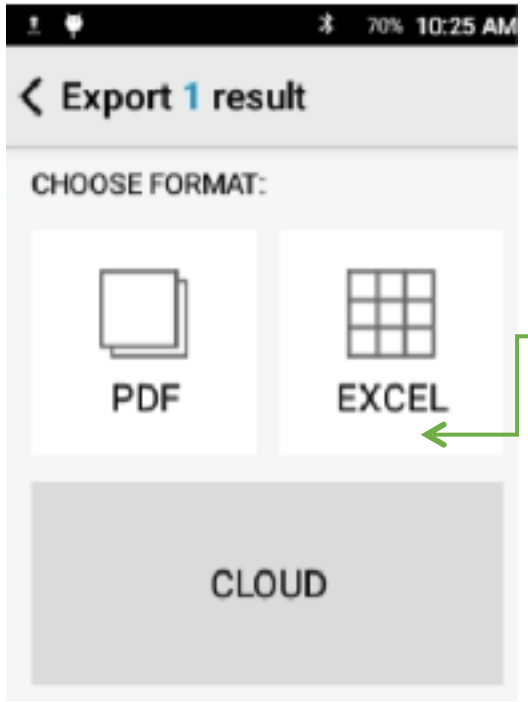
1. Select individual results to Export
2. Select all Results to Export
3. Filter and Template setup menu

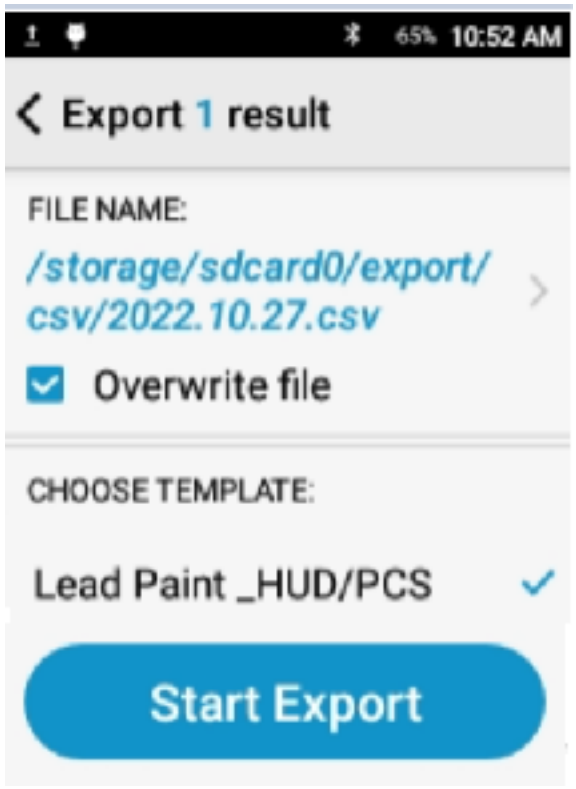


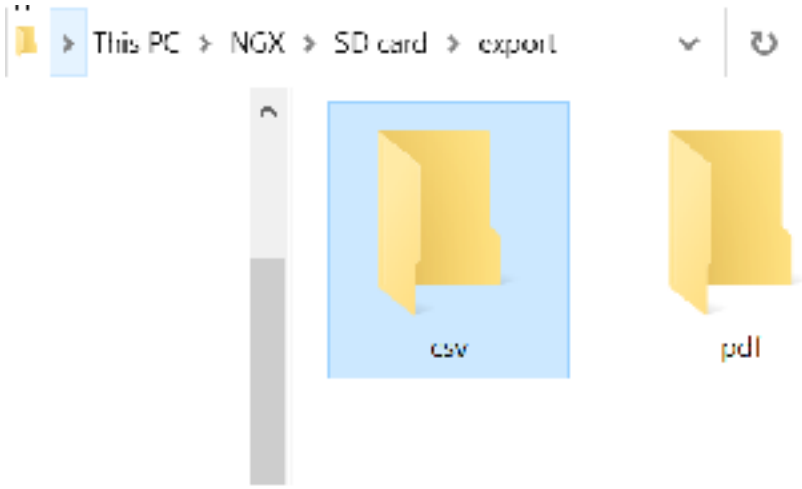
Filter Results by date and Setup Excel Template



Results Viewer: Exporting results Excel



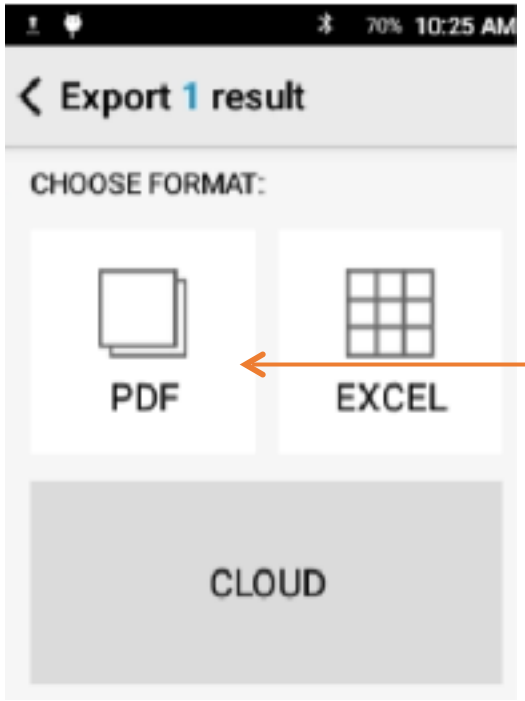


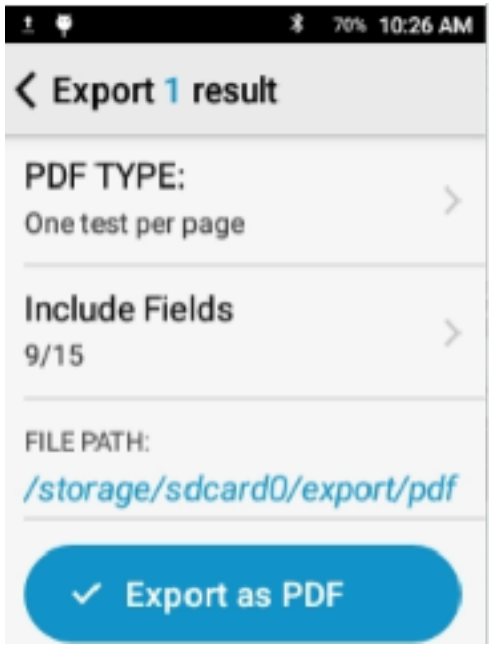


Connect X550 Pb to laptop via USB cable.

Once connected, an SD card will pop up. Select SD card, then select Export folder, then select CSV folder

Results Viewer: Exporting results PDF





By Default the PDF Report saved in "Export" Folder on SD card

Computer Connectivity - Transferring Files, Tethering

USB

- Wired connection for file transfer
  - Tethering must be turned on for the instrument to communicate with SciAps PC Profile Builder Software
- Simply connect over USB to access SD Card – displayed in File Explorer
- Mac requires tethering SW available on request

WiFi

- Wireless connection for file transfer
  - Tethering with desktop requires knowing Instrument IP address
- Can utilize wireless network or cell phone hotspot
- AirDroid for file transfer

Thank You!

SciAps, Inc.

If you have any additional questions, please do not hesitate to ask!

(339) 927-9455