

- I. Instrument Name: KeveX X-ray Fluorescence System (XRF)
- II. Suggested Uses: Non-destructive elemental analysis of trace evidence such as glass, larger metal fragments, powders, other bulk evidence, and certain liquids.
- III. Operating Procedures (Consult KeveX Delta XRF Analyst System Manual)
  - A. Start-up and calibration procedures

Start Up Procedure:

1. Spin up the system disk in Drive 0 (also the disk in Drive 1 if applicable).
2. Depress HELP/CLEAR from the firmware keys simultaneously two times in order to perform the cold start.
3. After the old start is completed, the x-rays will have been turned off. If samples need to be loaded into the chamber, they should be loaded at this time. After this has been done, press the X-RAY ON button.
4. Press PROGRAM key and select Option 5 (system setup) followed by the RETURN key. Then select Option 5 (boot DEC Computer) from the next menu followed by the RETURN key. Then press RETURN at the boot prompt.
5. At the next menu, select X (Run Toolbox II) and press RETURN key.
6. At the next menu, select option 1 (770) followed by the RETURN key.
7. The toolbox prompt key \* will then appear on the screen.

Calibration: (This procedure is to be done once a month)

1. Load or locate stainless steel 316 sample in the sample chamber.
2. Press X-RAY ON button.
3. Set target to number 3 (Silver target).
4. Set KV to 30.
5. Set MA to 1.0.
6. From the toolbox prompt \*, type in Run CALADC (followed by pressing

RETURN key).

7. Press the RETURN key again to continue to the following series of statements. The number in brackets at the end of each statement will be selected by pressing RETURN after each statement.. (For example, the MCA Energy Range in A below should be 20. By pressing RETURN, 20 will be selected automatically):
  - A. Enter MCA Energy Range (10, 20, 40kebv) [20]=
  - B. Enter Low Energy Calibration Peak (Kev) [6.400]=
  - C. Enter High Energy Calibration Peak (Kev) [17.443]=
  - D. Enter the minimum calibration peak separation (Kev) [5.000]=
  - E. Enter the desired accuracy (Kev) [0.003]=
  - F. Enter the maximum number of iterations for calibration [20]=
  - G. Enter acq. time for each iteration (sec) [30]=
  - H. Do you wish to change any of the above variables [n]?
8. After the calibration has been completed, the toolbox prompt \* will appear. Type the following: SAV/SYS KEV 770 (follow this by pressing RETURN)
9. Set shaping index to number 3 (4.5 microseconds); press ACQUIRE from the firmware keys. After acquisition, type in SAV/SPE cal316 (followed by pressing RETURN).
10. Make sure the printer is on and at the top of the page. Press CTRL-P for a hard copy of the spectra.
11. Place the hard copy in the XRF CALIBRATION NOTEBOOK.

B. Collection and storage of data

1. Set appropriate conditions for the sample(s).
2. Set shaping index to number 3 (4.5 microseconds).
3. Preset time for 100 seconds.
4. Press ACQUIRE firmware key.
5. After acquisition, type in:  
SAV/SPE (followed by return).  
The system will prompt you for a file name (20 alphanumeric). After you enter the filename, press RETURN key. System will then ask you for comments, which are optional. After entering any comments,

press RETURN to save the spectra.

6. For a hard copy, press CTRL-P.

#### C. Shut-down Procedures

1. From the \* prompt, type in: RUN IDLE (followed by pressing the RETURN key).
2. From the \*prompt, press CTRL-C.
3. At the menu, press CTRL-Z.
4. At the .prompt, press SHIFT-BRK. A @ sign will then appear on the monitor.
5. Unspin the disk(s) in the drive(s).
6. turn the monitor off or turn down the brightness and contrast settings.

#### D. Safety Concerns

The greatest safety concern is radiation from the x-ray tube. NEVER operate the x-ray tube without the x-ray shield in place or with any of the x-ray panels removed. The x-ray system is monitored for leaks on a regular basis. Radiation badges are provided for each user.

Liquid nitrogen used to cool the detector of the XRF can be dangerous to the skin and eyes if exposed for prolonged periods. It is recommended to use safety gloves and eye protection when filling the dewar of the XRF system.

Ethylene glycol is used to cool the x-ray tube. If the coolant spills, flush the spill area with water. If the coolant is accidentally swallowed, induce vomiting immediately and call a physician.

Beryllium is used to cover the exit window of the x-ray tube and the entrance window of the detector. Beryllium metal is highly toxic. If breakage of the beryllium windows occurs, avoid inhaling or accidentally swallowing the particles. Do not allow the particles to come into contact with skin or clothing.

#### IV. Other Information