

**NITON XLp 300 SERIES
ANALYZER**

User's Guide

Version 5.2.1 P/N 500-926



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Chapter 0 About This User's Guide



WARNING! Do not attempt to use this analyzer without first reading and understanding the entire User's Guide! ♦

Unpacking and Assembling Your Niton XLP XRF Analyzer

- Inspect the shipping carton for signs of damage such as crushed or water damaged packaging. Immediately notify the shipping company and Thermo Scientific, in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460, if there is any visible damage to the shipping container or any of its contents.
- Open the packing carton. If your analyzer is not packed in its carrying case, please call Thermo Scientific immediately, in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460.
- Verify the contents of the shipping container against the enclosed packing list. If there are any discrepancies between the actual contents of the shipping container and the enclosed packing list, please notify Thermo Scientific immediately, in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460.
- Open the carrying case and visually inspect the analyzer for damage before removing it from the case. Call the shipper and Thermo Scientific if you find any damage to the case or its contents.
- Save the shipping carton and all packing materials. Store them in a safe, dry area for reuse the next time that you ship the analyzer.

The Niton XLp XRF Analyzer Overview

The Niton XLp Analyzer is a single unit, hand held, high performance portable x-ray fluorescence (XRF) elemental analyzer.

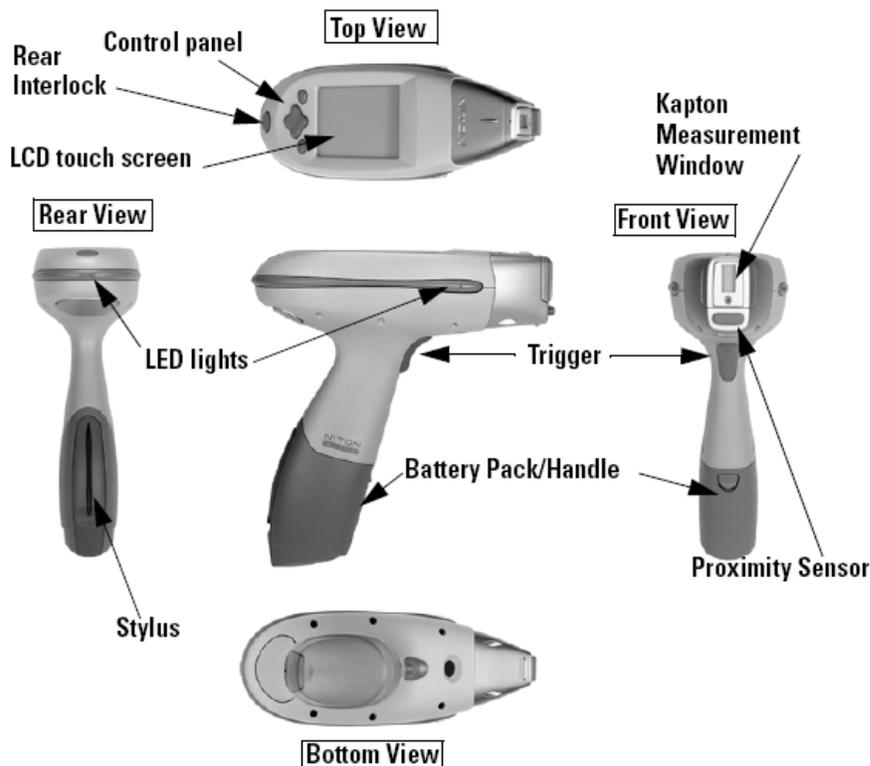


Figure 0-1. Analyzer Overview

The Control Panel

The control panel is located on the analyzer's top housing, directly below the LCD touch screen (see [Figure 0-1](#)). The control panel consists of a 4 way touch pad and two control buttons, one on each side. Using either the control panel or the touch screen (with or without the Niton standard touch screen stylus accessory that clips in the XLp battery pack) you may navigate through all of the analyzer's screens and menus. You can control the movement of the screen cursor by pressing the four way control pad in one of four directions to highlight each of the menu options. The enter button on the right side of the four way touch pad is used to select highlighted menu options. The on/off/escape button both controls the power to the analyzer and serves as an "escape" button. When the on/off/escape button is pushed and immediately released, it functions as an "escape", and brings you back to the Main Menu from the current screen in the menu system.

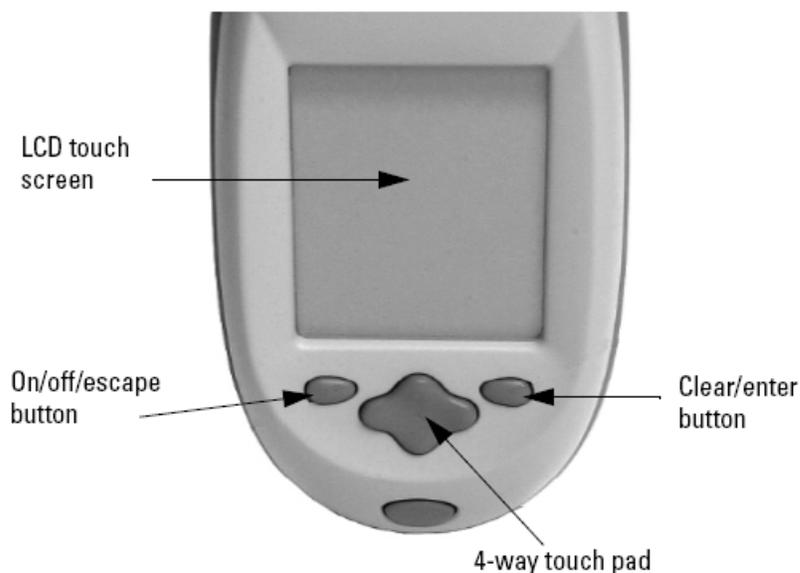


Figure 0-2. The Control Panel

Push and hold the **on/off/escape** button for at least 3 seconds to turn the analyzer on. A 'beep' will sound as the power comes on. Push the **on/off/escape** button and hold it down for about 10 seconds to shut off power to the analyzer from any screen in the menu system. The analyzer will 'beep' as it shuts down.

You also have the option of operating the analyzer, including navigating the menu system, by using the built in touch screen with or without the stylus. To select a menu option with the stylus, tap on the icon once. The touch screen icons have the same functionality as the four way touch pad, the **on/off/escape** button, and the **enter** button. This User's Guide will refer to the process of choosing a course of action by selecting an icon from a menu, either using the touch screen or using the control panel buttons, as "selecting."

Selecting the **Return** icon works everywhere throughout the User Interface to bring you back to the previous menu from the current menu in the menu system. Use the on/off/escape button to return to the **Main Menu**.

Instrument Startup

To turn on the analyzer, depress the **on/off/escape** button on the control panel for approximately 3 seconds, until you hear a beep.

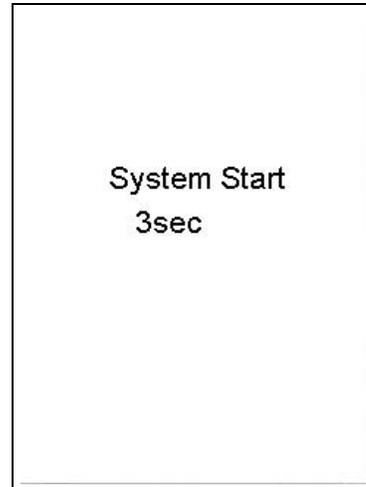


Figure 0-3. System Start Screen

On startup, the screen will be replaced by a **Restart** screen (see [Figure 0-3](#)) which will automatically count down from 9 to 0 in increments of one second.



Figure 0-4. Logon Screen

When the **Restart** is complete, the **Restart Screen** will be replaced by the **Logon** screen (see [Figure 0-4](#).) Tap anywhere on this screen to continue.

The **Logon Screen** will be replaced by a **Warning Screen**, advising you that this analyzer produces radiation when the lights are flashing. You must acknowledge this warning by selecting the "Yes" button before logging on. Selecting the "No" button will return you to the **Logon Screen**.

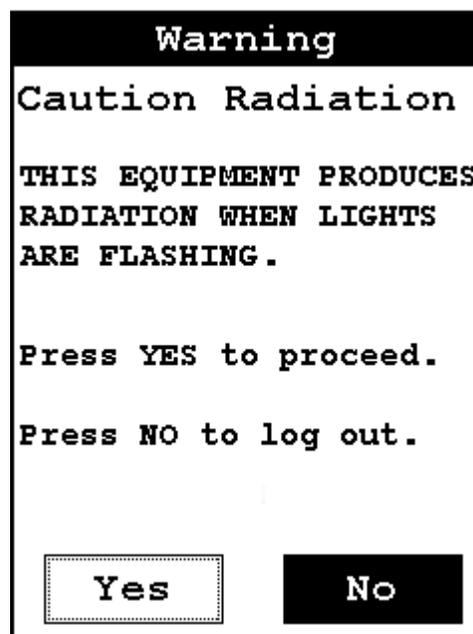


Figure 0-5. Warning Screen

After selecting the “Yes” button, the **Virtual Numeric Keypad** becomes available for you to log onto the analyzer.

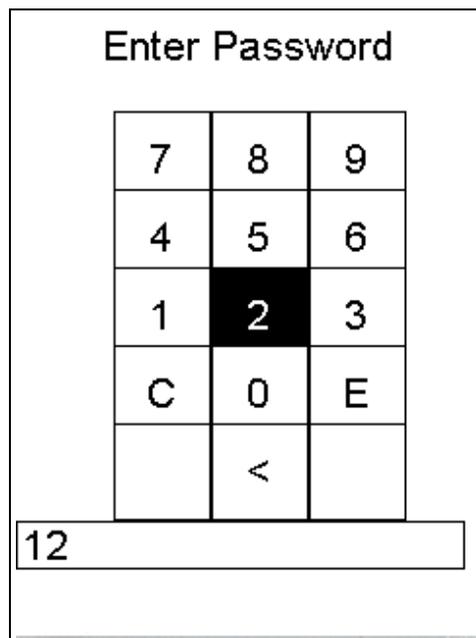


Figure 0-6. Virtual Numeric Keypad for Logon

Select your 4 digit security code, followed by the enter (E) key. The temporary password assigned by default is 1-2-3-4, followed by the “E” key. After you have completed the log on procedure, the word "USER" will appear on the bottom of the screen, then the **Main Menu** will appear. Note that security codes are editable. Please see the NDT manual for instructions on creating user-definable passwords.

Check the **date/time**. The time should be set correctly for accurate and verifiable record keeping (see **Set Time and Date** on page 2-9).

Your analyzer can be stored safely in temperatures of up to 122°F (50°C) and is designed to operate at temperatures of up to 122°F (50°C). You will not be able to take a measurement if the analyzer overheats. If it is hot to the touch, you should allow it to cool before testing.

Screen Contrast

To adjust the contrast of your analyzer's touch screen display, press and hold the left and right ends of the 4 way Touch Pad until a beep sounds. After the beep, you may press the up portion of the 4 way Touch Pad to darken the screen, and the down portion to lighten the screen. When you have the display adjusted so that it is best for you, press the “Enter” button to save the current setting.

Chapter 1 Radiation Safety



CAUTION NITON Analyzers are not intrinsically safe analyzers in regard to sparking. All pertinent Hot Work procedures should be followed in areas of concern. ♦

The NITON XLp Analyzer was designed so that virtually no measurable radiation external to any part of the instrument can escape when the shutter is closed. When the instrument is used in accordance with its instructions, it is completely safe, that is, there is minimal radiation exposure, even with the shutter open.

NITON XLp Analyzers contain sealed ^{109}Cd and/or ^{55}Fe and/or ^{241}Am radioactive isotope sources. The source is designed to remain secure even under extreme conditions, so that even if the instrument is broken, crushed or burned, there should be no leakage of radioactive material.

During manufacturing, each sealed isotope source is locked in place in a solid tungsten alloy source holder. The source is completely secure in its housing because the aperture at the closure end of the housing is smaller than the source and is completely sealed. The source assembly is secured in the instrument's case, which is fitted with tamper-proof screws.

Human exposure to radiation is typically measured in REMs, or in one-thousandths of a REM, called milliREMs (mREM). For a given source of radiation, three factors will determine the radiation dosage you receive from the source:

1. Duration of Exposure

The longer you are exposed to a source of radiation the more radiation strikes your body and the greater the dose you receive. Dosage increases in direct proportion to length of exposure.

2. Distance from The Source

The closer you are to a source of radiation, the more radiation strikes you. The dosage increases in inverse-squared relation to your distance from the source of radiation. For example, the radiation dose one inch from a source is nine times greater than the dose three inches from the

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source, and 144 times greater than the dose one foot (12 inches) from the source. For another example, the radiation dose one meter from the source of radiation is 100 times lower than the dose at 10 cm from the source of radiation. Keep your hand and all body parts away from the front end of the analyzer when the shutter is open to minimize your exposure.

3. Shielding

Note Your instrument emits virtually no radiation with the shutter closed because the ^{109}Cd and/or ^{55}Fe and/or ^{241}Am sources are thoroughly shielded in every direction. This shielding absorbs nearly all of the radiation produced by the source – except when the shutter is open during testing. With the shutter open, the instrument emits a maximum directed radiation beam of approximately 315 mREM/hr intensity. Always hold your instrument so that the radiation beam is not aimed at yourself or at anyone else. Supplied or optional test stands add shielding for analysis. Wearing a dosimeter badge does not protect you against radiation exposure. A dosimeter badge measures your exposure. ♦

Note Pregnant workers may want to take special precautions to reduce their exposure to radiation. Qualified scientists have recommended that the radiation dose to pregnant women should not exceed a total of 500 mREM/gestation period. See U.S. NRC Regulatory Guide 8.13 "Instruction Concerning Prenatal Radiation Exposure". ♦

Table 1-1 lists typical radiation doses encountered in daily life and lists the annual occupational radiation dosage limits for adults set forth in 105CMR 120.200.

Table 1-1. Typical Radiation Dosages (NCRP, 1987)

Category	Dose in mREMs	Dose in mSv
Average total dose in US (annual)	360 mREM	(3.6 mSv)
Average worker exposure (annual)	210 mREM	(2.1 mSv)
Average exposure for underground miner (annual)	400 mREM	(4.0 mSv)
Exposure for airline crew (1,000 hours at 35,000 ft)	500 mREM	(5.0 mSv)
Additional from living in Denver at 5300' (annual)	25 mREM	(0.25 mSv)
Additional from 4 pCi/l radon in home (annual)	1,000 mREM	(10.0 mSv)
Typical chest x-ray	6 mREM	(0.06 mSv)

Table 1-1. Typical Radiation Dosages (NCRP, 1987)

Category	Dose in mREMs	Dose in mSv
Typical head or neck x-ray	20 mREM	(0.2 mSv)
Typical pelvis/hip x-ray	65 mREM	(0.65 mSv)
Typical lumbar spine x-ray	30 mREM	(1.3 mSv)
Typical upper G.I. x-ray	245 mREM	(2.45 mSv)
Typical barium enema x-ray	405 mREM	(4.05 mSv)
Typical CAT scan	110 mREM	(1.10 mSv)
Minimum detectable dose on a standard film badge	5 mREM/QTR	(0.05 mSv)
Annual occupational dosage limits:		
Maximum allowable for the general public (annual)	100 mREM	(1.0 mSv)
Annual Occupational Dose Limits for Adults:		
Whole body	5,000 mREM/yr	(50 mSv)
For a pregnant worker (during gestation period)	500 mREM	(5.0 mSv)
For a minor	500 mREM	(5.0 mSv)
Eye dose equivalent	15,000 mREM	(150 mSv)
Shallow dose equivalent to the skin or any extremity or organ	50,000 mREM	(500 mSv)

As noted above, the allowable limit in the U.S. for occupational exposure is 5,000 mREM/year (50 mSv/year) for a whole-body and 50,000 mREM (500 mSv) for shallow penetration of extremities. Extremity exposure from a properly used NITON XRF analyzer will be less than 100 mREM per year, (1.0 mSv per year) even if the analyzer is used as much as 2,000 hours per year, with the shutter open continuously.

Note NCRP is the National Council on Radiation Protection and Measurements. ♦

HOW TO USE YOUR NITON XLp

The NITON XLp was designed to be as safe as possible. However, we strongly recommend that you follow these precautions to insure your safety and the safety of those around you.



WARNING! Always be aware of the location of your instrument's radioactive sources and the direction of their beam of X-rays. The location of the sources is at the front end of the instrument. ♦

Note Open the shutter only to analyze a sample. The shutter can only be opened after the user has logged on to the analyzer using the password. ♦

During testing, a strong beam of radiation is continuously emitted through the kapton window at the front of the analyzer (see [Figure 1-1](#)). There will be some radiation at the front and top-front of the analyzer. There is negligible radiation at the handle of the analyzer.



Figure 1-1. Direction of x-ray beams.



WARNING! Always treat radiation with respect. Do not hold your analyzer near the Kapton Measurement Window during testing. Never point your analyzer at yourself or anyone else when the shutter is open. ♦

SHUTTER SAFETY

Note Under no circumstances should the shutters be open when the instrument is not in use!

The 3 warning lights on your instrument will go on when one of the shutters is open and stay on as long as one of the shutters remains open.



WARNING! In the unlikely event that the shutter becomes stuck in the open position, remove the battery (see Battery Pack and Battery Charger - Routine Maintenance Guidelines - Note: All shutters should close immediately and remain locked in the closed position when the battery pack is not attached to the instrument), replace the instrument in its shielded holster, place the holster in the shielded carrying case, and call Thermo Scientific's Service Department at (800) 875-1578 or +1-978-670-7460. ♦



WARNING! If your LCD Touch Screen displays the message "SHUTTER DOES NOT OPERATE", remove the battery (see Battery Pack and Battery Charger - Routine Maintenance Guidelines - Note: All shutters should close immediately and remain locked in the closed position when the battery pack is not attached to the instrument), replace the instrument in its shielded holster, place the holster in the shielded carrying case, and call Thermo Scientific's Service Department at (800) 875-1578 or +1-978-670-7460. ♦

Monitoring your Radiation Exposure

There is virtually no measurable radiation from a NITON XLp analyzer when its shutters are closed. The maximum dosage to which you are exposed when properly operating your NITON XLp is <0.1 mREM/hr on the fingers of the hand holding the instrument, with the shutters open.

As an additional precaution to ensure that your radiation exposure is always minimal, NITON recommends that you determine and follow your state or country's specific regulations concerning radiation monitoring. A dosimeter badge is usually worn close to the parts of your body that are most sensitive to radiation, including your reproductive organs and your eyes. These badges are available from many companies. Two companies offering dosimeters in the USA are:

Landauer, Inc.

2 Science Road

Glenwood, IL 60425-9979.

Proxtronic

5795-B Burke Centre Highway

Burke, VA 22015

These companies are listed for information purposes only. NITON does not endorse the services of these companies.

NITON recommends you ask your radiation dosimeter badge supplier for a quarterly schedule. Monthly schedules are also available.

Leak Tests

The radioisotope source shielding on your NITON XLp analyzer is designed to hold up even under extreme conditions, including the instrument being crushed or burned. The continued effectiveness of the instrument's radiation shielding should be tested every six months by performing a thorough leak test.

In the USA, this is a regulatory requirement: Thermo Scientific's license requires that leak tests be repeated once every six months. Leak test kits, which include complete instructions for performing the test, are available

from several vendors. These vendors typically remind you when it is time to perform the next leak test on your instrument. Please follow the test kit instructions carefully, and promptly mail the test samples to the laboratory.

The diagram in [Figure 1-2](#) shows the test wipe locations.

All source shutters must be closed while performing a leak test!

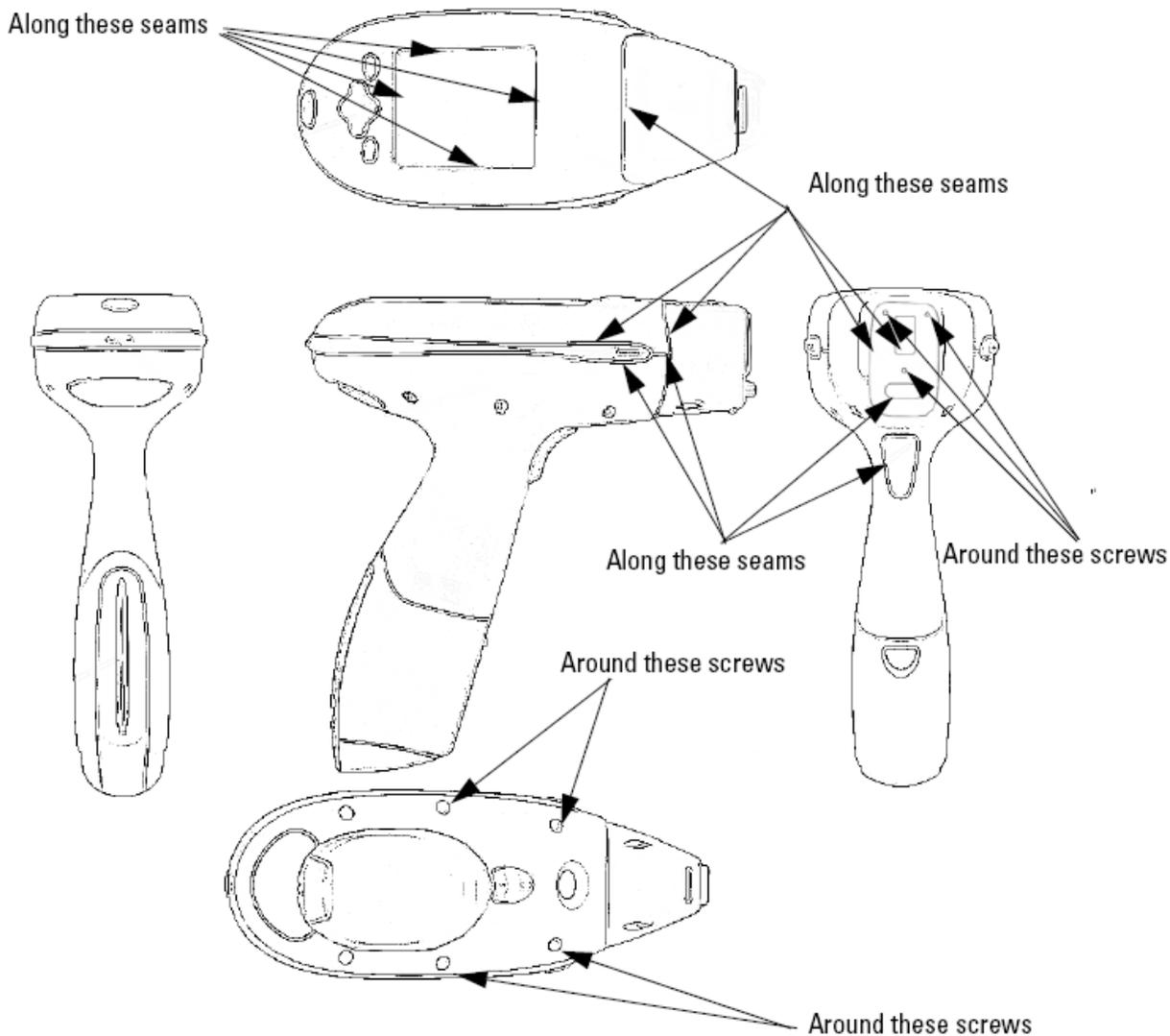


Figure 1-2. Locations of seams for leak testing

The following laboratories supply leak test kits:

Applied Health Physics

2986 Industrial Blvd.

Bethel Park, PA 15102

Tel: (412) 835-9555

Stan A. Huber Consultants

200 N. Cedar Road

New Lennox, IL 60451

Tel: (800) 383-0468

Valley Safety Services

330 Old Enfield Road

Belchertown, MA 01007

Tel: (413) 323-9571

Please check with your local NITON representative if you are located outside the USA

Procedures for Analyzer Loss or Damage

IN THE USA

If your analyzer is damaged, destroyed, lost, or stolen, call:

The Office of Radiological Safety for your state's Dept. of Health.

Telephone: _____

OUTSIDE THE USA

If your analyzer is damaged, destroyed, lost, or stolen, call:

The proper authorities for your location.

Telephone: _____

Also, notify the NITON Analyzer service department using one of the numbers below:

During Regular Business Hours

Calling from within the USA - (800) 875-1578 (toll-free)

Calling from outside the USA - +1-978-670-7460

During Evenings and Weekends, From Anywhere

CALL ONLY WHEN YOU HAVE A RADIOLOGICAL EMERGENCY

- Ken Martin - Mobile Phone Number - +1 (617) 901-3125
- Jim Blute - Mobile Phone Number - +1 (978) 790-8269

If your analyzer is lost, stolen, or damaged in a car accident, also, immediately notify your State Police Department:

Telephone: _____

If your instrument is damaged in a fire or an explosion, also immediately, notify your local Fire Department.

Telephone: _____

Note Please fill in the phone numbers on these pages today. Keep copies where you can find them in case of an emergency. ♦

XLp Radiation Dose Profile - Wood Substrate

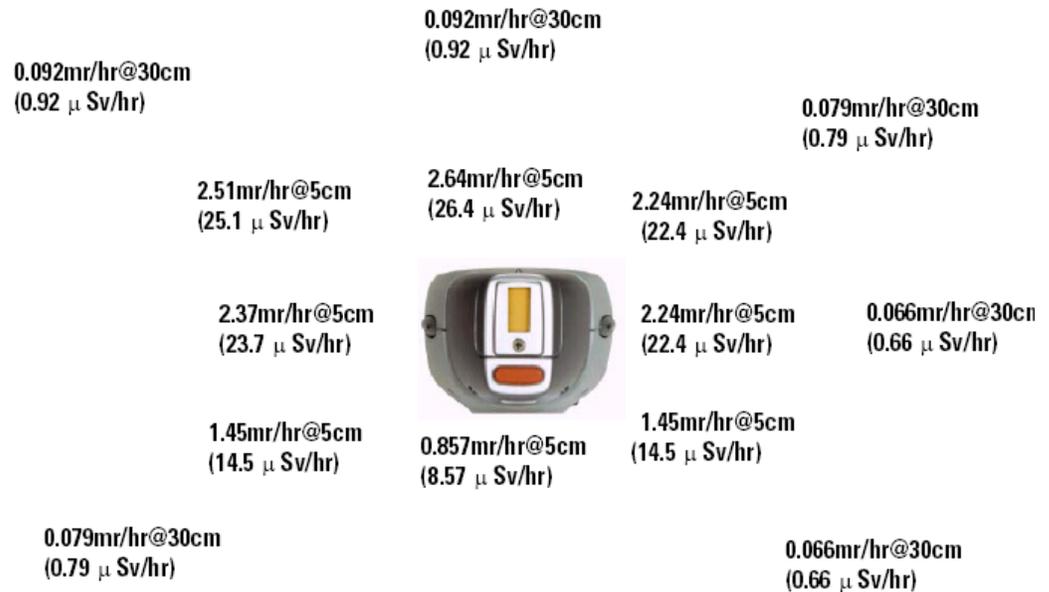


Figure 1-3. XLp 300 series radiation profile

Table 2: XLp 300A/700A Series In-Beam Dose Rates - Shutter Open

Isotope	Activity	5 cm	30cm	100 cm	Trigger
Cd-109	50	369	14.8	1.71	0.053

Note Not to scale. ♦

Note Profile conducted by: James Blute, CHP, Corporate RSO, 04/05/04. ♦

Note Substrate 3/4" thick pine. ♦

Note Profile was taken with the strongest source and the least dense substrate to show the worst case scenario. Any other combination of source strength and substrate would result in lower dose rates from scatter radiation. ♦

Radiation Safety
XLp Radiation Dose Profile - Wood Substrate

Chapter 2 The Menu System

The Niton XLP Menu System enables you to perform critical tasks, including taking readings and viewing data, with a minimum number of steps. Menus are presented as small pictures called icons which, when selected, will do one of three things:

- Toggle between two different functions or views, such as turning backlighting on or off.
- Present a subsidiary or sub-menu which will allow you access to more choices.
- Present a screen which allows you to view data, change settings, or control the analyzer.

Icons which appear on your Niton analyzer screen display in dark gray (grayed out) represent features which are not enabled, and therefore cannot be selected. In order to enable features on your Niton analyzer which are currently not enabled, please contact Thermo Scientific in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460, or your local Authorized Niton Analyzer Service Center.

Icons which appear on your Niton analyzer screen display with a diagonal line through them represent features which are currently turned off. When an icon with a diagonal line through it is selected, the diagonal line through that icon will automatically be erased, and the feature corresponding to that icon will become enabled.

The NAV Menu

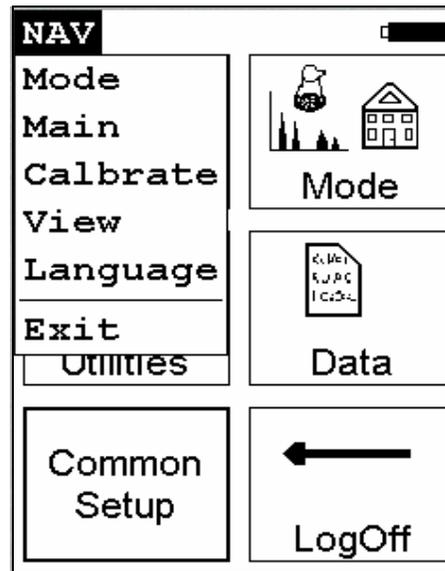


Figure 2-1. The NAV Menu

The Navigation Menu, or NAV Menu, is available in all screens, though only through the touch screen interface. Within a menu, the particular options available from the NAV Menu may change with the context. For example, within the **View Menu**, the **NAV Menu** changes options depending on the mode you are currently using.

Access the **NAV Menu** by selecting the word **NAV** in the screen. A drop-down menu of choices will appear. Selecting an option from the **NAV Menu** will take you directly to a particular menu, no matter where you are in the menu hierarchy. Selecting the “**View**” option from the **NAV Menu**, for example, will bring you directly to the Data Menu.

Selecting the “**Language**” option will load the **Language Screen**, allowing you to change the language from the default English to French, Spanish, Portuguese, or German.

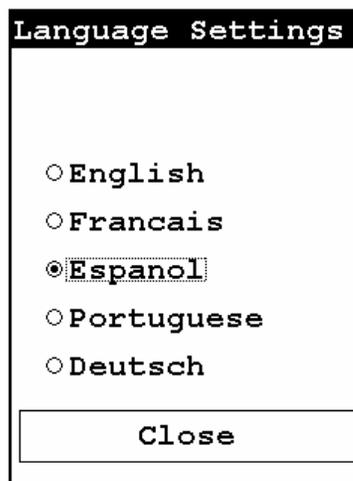


Figure 2-2. The Language Setting Screen

Select the language you want from the Nav Menu.

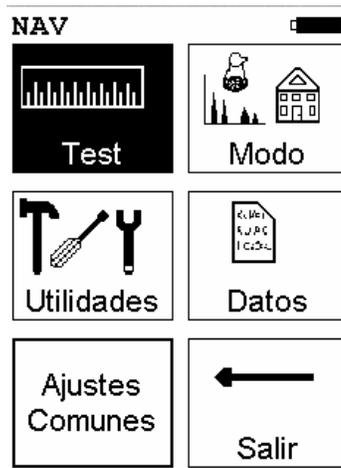


Figure 2-3. The Main Menu in Spanish

The **NAV Menu** cannot be selected through the Control Panel.

The Battery Life Indicator

The Battery Life Indicator is visible on all screens in the menu system. The indicator is visible in the top right portion of the screen, and graphically shows you how much battery life is left, enabling you to change batteries as needed to avoid unexpected shutdowns.

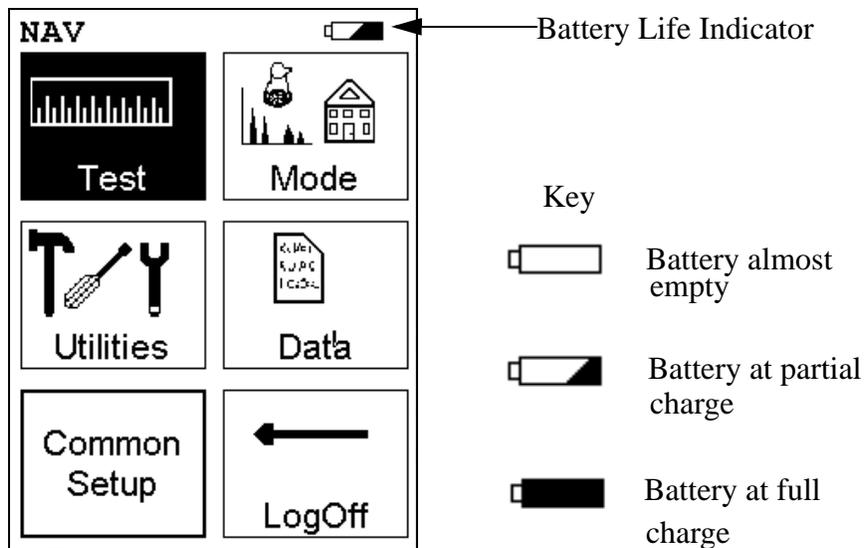


Figure 2-4. Battery Life Indicator

The more black visible in the indicator, the higher the charge. The more white visible in the indicator, the lower the charge. It's best to charge one battery while using the other, to avoid work slowdowns or stoppages due to battery charge conditions.

The Main Menu

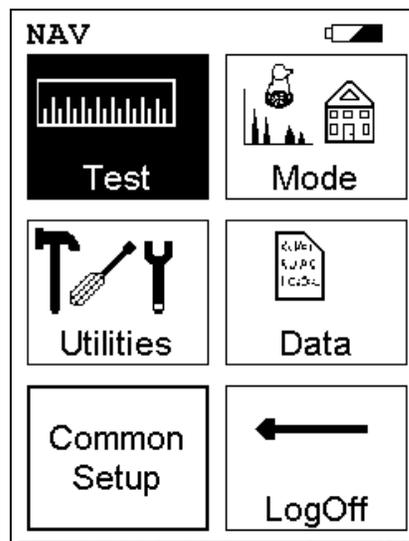
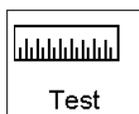
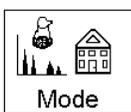


Figure 2-5. The Main Menu

All Niton XLp analyzers functions are accessible from the Main Menu and subsidiary menus. Each of the analyzer's functions represented by an icon on the **Main Menu** screen (Test, Mode, Utilities, Data, and Common Setup) may be selected by choosing the appropriate icon. When one of these Main Menu icons is selected, the function specific sub-menu appropriate to that icon will be displayed.



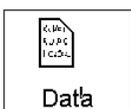
In order to test samples in the previously used test mode, simply select the **Test** icon. Your Niton XLp analyzer will operate in the testing mode that is currently selected. Choose an appropriate test mode for the samples you are testing by selecting a mode from the **Mode Menu**.



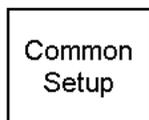
Access the **Mode Menu** by selecting the **Mode** icon from the **Main Menu** screen. The analyzer will remember the last mode used on the analyzer, and will use that mode by default unless another mode is selected.



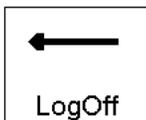
Access the **Utilities Menu** by selecting the **Utilities** icon from the **Main Menu** screen. The **Utilities Menu** enables you to view analyzer specifications; set the date and time; and auto-calibrate the analyzer electronics and the touch screen display.



Access the **Data Menu** by selecting the **Data** icon from the **Main Menu** screen. The **Data Menu** allows you to view readings, and allows you to view the alloy library and stored signatures.



Access the **Common Setup Menu** by selecting the **Common Setup** icon from the **Main Menu** screen. The **Common Setup Menu** allows you to turn on or off the liquid crystal display backlight, turn on or off the integrated bar code scan engine, to enable and configure source utilization, and to enable or disable the printer.



Return to the **Logon screen** by selecting the **Logoff** icon. The **Logon Screen** logs you out and allows you to login again, preventing casual unauthorized access to your analyzer.

The Mode Menu

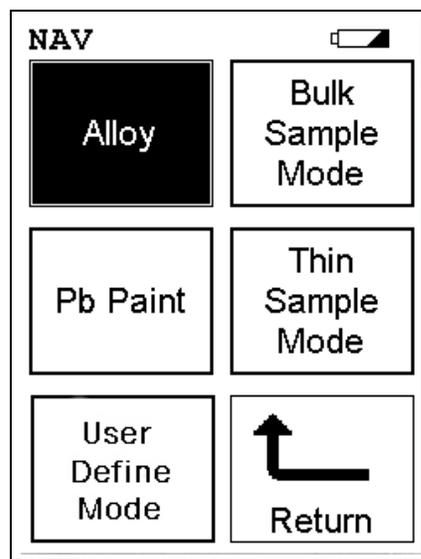
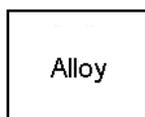
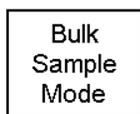


Figure 2-6. The Mode Menu

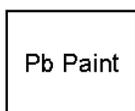
The **Mode Menu** enables you to select any one of the sample test modes that have been installed on your Niton XLP analyzer.



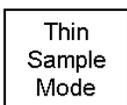
Select the **Alloy** icon to access any one of the alloy testing modes. The Alloy Modes enable you to test metal alloys for chemical composition and/or alloy identification. The Alloy Testing Modes are detailed in Chapter 3 of this User's Guide.



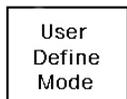
Select the **Bulk Sample Mode** icon to access Bulk Sample Mode. The **Bulk Sample Mode** allows you to analyze plastics, electronics, soil, mining, and other thick samples for metallic composition and/or contamination. The **Bulk Sample Mode** is detailed in Chapter 6 of this User's Guide.



The **Pb Paint Mode** allows you to determine lead (Pb) loading in paint samples in units of mg/cm^2 , and to determine if paint samples are above or below the user-defined action level for lead in the shortest time possible. The **Pb Paint Mode** is detailed in Chapter 4 of this User's Guide.



Select the **Thin Sample Mode** icon to access the **Thin Sample Mode Menu**, where you may choose a thin sample testing mode appropriate to the samples you will be testing. The Thin Sample Testing Modes allow you to analyze thin samples, such as dust wipes and air filters, and coatings for elemental analysis. The Thin Sample Test Modes are detailed in Chapter 5 of this User's Guide.



Select the **User Definable Mode** icon to access **User Definable Mode**. The **User Definable Mode** allows you to create your own protocols and methods for your own use. The User Definable Mode is detailed in Chapter 7 of this User's Guide.

The Utilities Menu

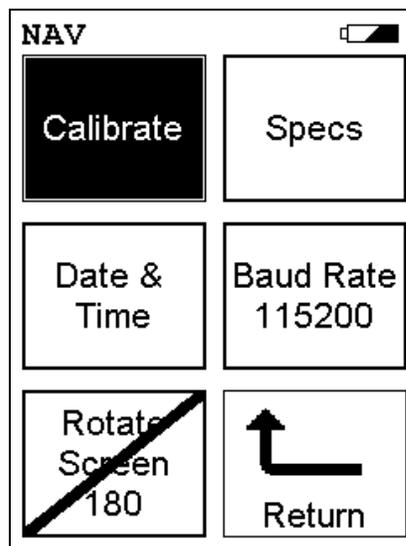
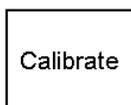


Figure 2-7. The Utilities Menu

To access the **Utilities Menu**, select the **Utilities** icon from the **Main Menu** display. The **Utilities Menu** enables you to view your Niton analyzer specifications, set the date and time, auto-calibrate your Niton analyzer's detector or touch screen display, Rotate the display on the LCD screen, or change the communication (baud) rate for the RS-232 port.



Select the **Calibrate** icon to access the **Calibrate Menu**. The Calibrate Menu allows you to calibrate the detector or to calibrate the touch screen interface.



Select the **Specs** icon to display the analyzer's specifications. These specifications include your Niton XLP's serial number, software and firmware versions, temperature, bias, and data coprocessors. Press the Close button to return to the Utilities Menu.



Select the **Date & Time** icon to set the date and time as needed for different time zones, daylight savings time, or any other reason. The date and time are factory preset prior to shipping. The format used is month/day/year - MM/DD/YY, and hour/minute - HH/MM, for the 24 hour clock.

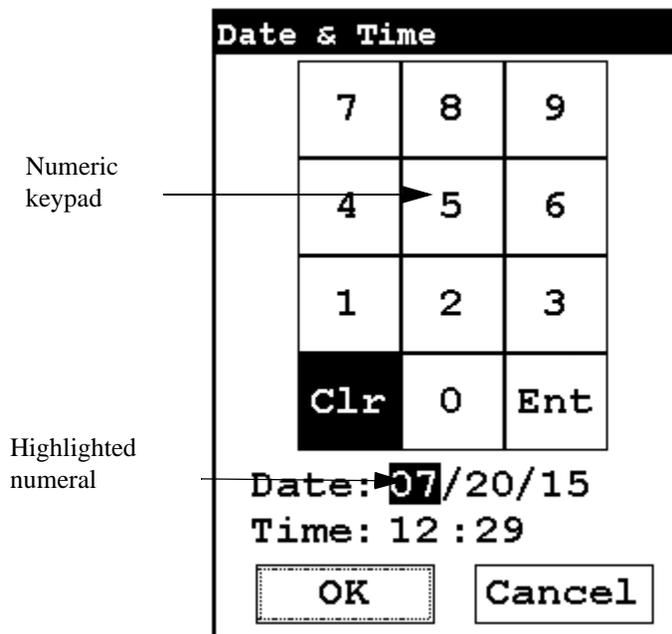


Figure 2-8. Setting the Date & Time

When the **Date & Time** icon is selected, the **Date & Time Screen** comes up on your XLP's LCD Screen. Initially, the first character of the month is highlighted in reverse video (white on black), as in the sample display shown here. To change a character, select the digit you want to replace the character with from the virtual numeric keypad displayed on the screen, then select the Enter (Ent) character from the virtual numeric keypad. Your Niton XLP will then accept the entry and automatically advance to the next digit. To skip a character, simply select the Enter (Ent) character from the virtual numeric keypad without selecting a replacement character.

For example, on the sample display, if you wish to change the "06" of the month to "07", the display appears with the first character (0) highlighted. Select the Enter (Ent) character to skip the zero. The "6" will now be highlighted. Select the "7" digit from the virtual numeric keypad, then select the Enter (Ent) key from the virtual numeric keypad. The change is accepted and the next digit is highlighted. Continue to select the Enter (Ent) symbol from the virtual numeric keypad to skip over the remaining characters of the date and time until the last character is reached. When you select the Enter (Ent) key from the virtual numeric keypad to confirm the last character, the word "SUCCESS" will appear beneath the Time field, and you will be returned to the Main Menu. The date is given in month/day/year format.

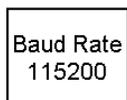


CAUTION Your XLP analyzer must have the correct time and date set in order to test samples correctly using the ^{109}Cd radioisotope source. Please make sure that the time and date are set correctly before testing. ♦

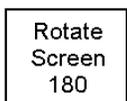


WARNING! It is important that the date and time information displayed on the **Date and Time Screen** is correct. If either the date or time is incorrect, the information stored with your readings will be incorrect. In addition, an incorrect date prevents the instrument from properly compensating for normal source decay - causing erroneous analysis results for instruments equipped with ^{109}Cd . This information must be correct before proceeding with testing. ♦

Note The analyzer will automatically return you to the **Main Menu** when the entry is complete. ♦



Select the **Baud Rate** icon to change the communications rate for the RS-232 port. Selecting the **Change Baud Rate** icon will toggle the communications rate between 115 kbaud and 38 kbaud. The default 115 kbaud rate may be too fast for some older computers, and dropping the rate to 38 kbaud will insure proper communications between your PC and your Niton XLP Analyzer.



Select the **Rotate Screen 180** icon to toggle the orientation of the screen between right side up and upside down.

This is used primarily when your analyzer is placed in the NITON Environmental Test Stand, because the analyzer is inverted when properly installed in the Test Stand.

The Data Menu

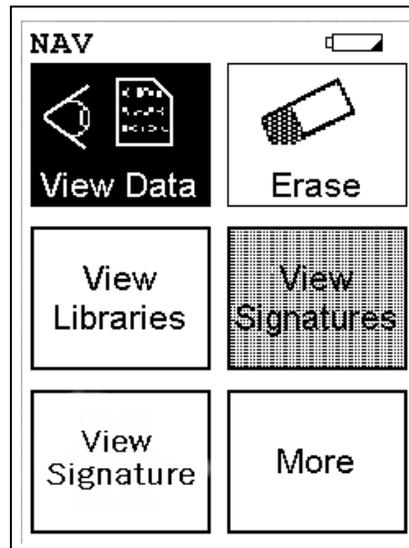
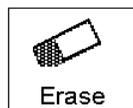


Figure 2-9. The Data Menu - First Page

To access the **Data Menu**, select the **Data** icon from the **Main Menu** display. The **Data Menu** enables you to access readings and libraries, for viewing or manipulation.



Select the **View Data** icon in order to access data from readings you have already taken. Selecting the **View Data** icon will bring you to the **Data Screen**.



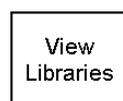
Select the Erase icon to access the **Erase Menu**. The **Erase Menu** allows you to erase your data.



CAUTION Never turn off the analyzer while data is being erased! ♦



WARNING! Do not attempt to take measurements while downloading readings! This will generate an error requiring a system reset, and may corrupt your stored readings, requiring all stored readings to be erased. ♦



Select the **View Libraries** icon to access the **Library View Menu**. The **Library View Menu** allows you to view data in the Alloy Grade Library as well as the Superlib and Superstds libraries.



Select the **View Signatures** icon to view data saved as reference sample signatures in Signature ID Mode. When the **View Data** icon is selected, the Results screen of your most recent test is shown on the LCD display.



Select the **More** icon to access the second page of the **Data Menu**.

The Data Menu - Second Page

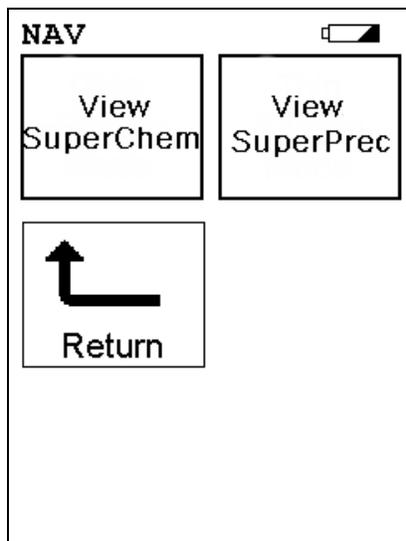
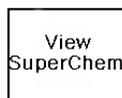
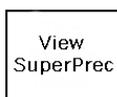


Figure 2-10. The Data Menu - Second Page

To access the **Data Menu Second Page**, select the **More** icon from the **Data Menu** display. The **Data Menu** enables you to access readings and libraries, for viewing or deleting.



Select the **View SuperChem** icon in order to view your SuperChem data. The **View SuperChem** icon allows you to view your **SuperChem Mode** data, and also allows you to delete individual readings. When the **View Data** icon is selected, the Results screen of your most recent test is shown on the LCD display.



Select the **View SuperPrec** icon in order to view your SuperPrec data. The **View SuperPrec** icon allows you to view your **SuperPrec Mode** data, and also allows you to delete individual SuperChem standards. When the **View Data** icon is selected, the Results screen of your most recent test is shown on the LCD display.

The Data Screen

Use the **Data Screen** to view previously taken test result readings. When the **View Data** icon is selected, the Results screen of your most recent test is shown on the LCD display.

Ele	%	+/-
Mo	2.41	0.08
Ni	12.06	0.50
Fe	64.68	0.66
Mn	1.69	0.29
Cr	18.45	0.39

Figure 2-11. The Results Screen

Using the buttons on the control panel, you may view different readings or additional data for individual readings.

Scrolling Down Through the Complete Listing of Elements

Pressing the "Left" position on the 4-way touch pad of your Niton analyzer will display the previous reading, or if the first reading is currently displayed, the last reading. Pressing the "Right" position on the 4-way touch pad will display the next reading, or if the last reading is currently displayed, the first reading in memory. Niton analyzers can store between 3000 to 6000 readings.

You can also look at the complete x-ray spectra for each reading stored in the analyzer's memory.

Sorting Elements

The Sort Buttons, which double as column headings, can be used to re-sort the data in different ways. The **Data Screen** always begins as a Standard Sort, as you have defined it. Selecting the appropriate sort button once

toggles the sort order to High-to-Low. Selecting the sort button again toggles the sort order to Low-to-High. To return to the Standard Sort, view a different reading and return.

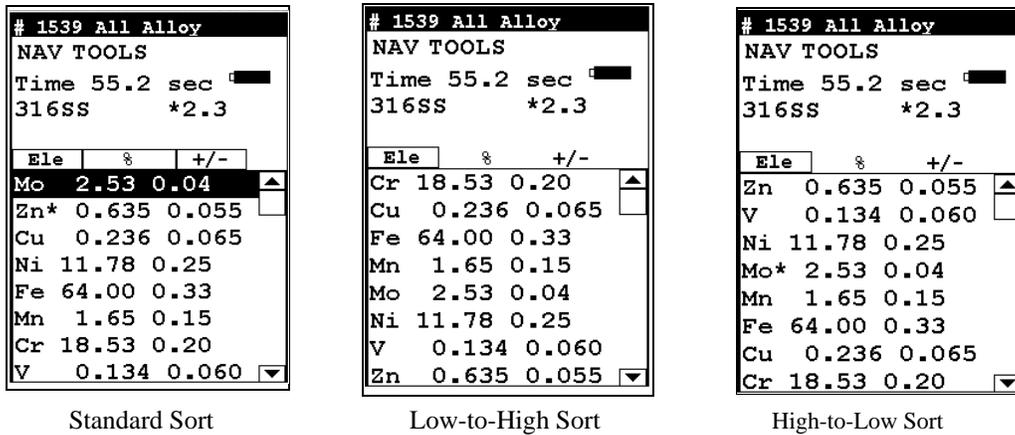


Figure 2-12. Element Sorts

Element Sorts Element sorts are performed alphanumerically based on the element name.

Composition Sorts Composition sorts are performed numerically based on the percentage of composition.

Error Sorts Error sorts are performed based on the range of error in the reading.

Spectrum Graph For any reading result, simply use the **NAV Menu** to gain access to the reading's spectrum graph. Selecting Spectra will show a graphed spectrum of this reading, called SpectraView. SpectraView can be a useful tool for rapid, qualitative analysis of sample chemistries. See "SpectraView" on page A-7 for details.

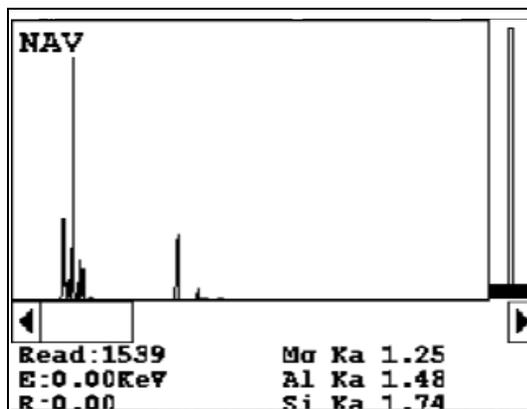


Figure 2-13. The SpectraView Screen

The Data Entry Screen

Selecting **Data Entry** will access the identifying criteria for each reading. In this scrolling screen, you can see the identifying criteria you input into the **Data Entry Screen** describing the conditions of the reading analysis sample and other data concerning the reading. The parameters are context sensitive - they change depending on the current mode.

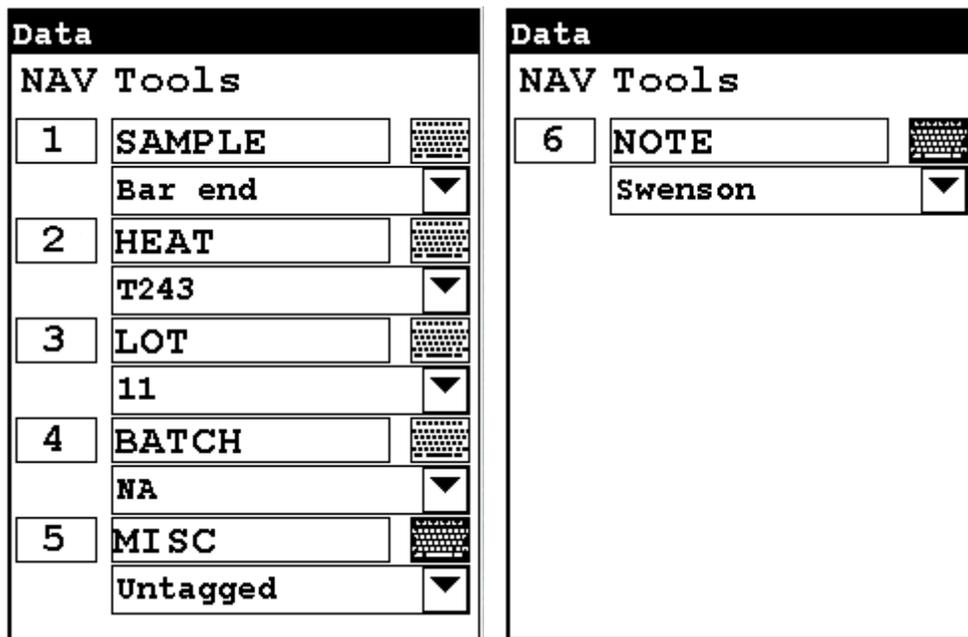


Figure 2-14. Sample Setting Parameters - Alloy Mode

The Calibrate Menu

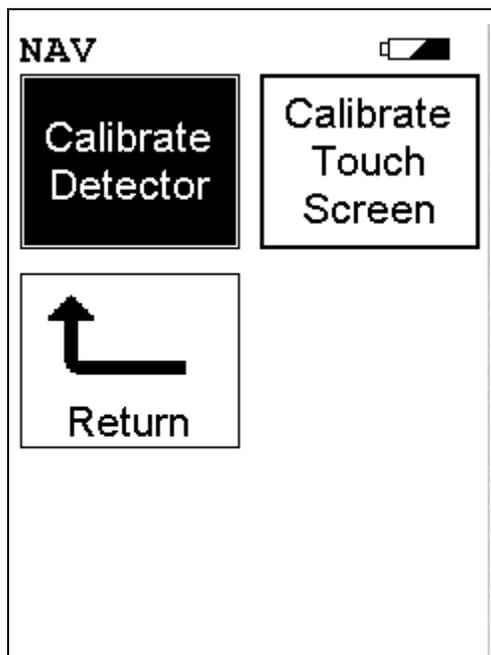


Figure 2-15. The Calibrate Menu

To access the **Calibrate Menu**, select the **Calibrate** icon from the **Utilities Menu**. The **Calibrate Menu** enables you to calibrate your analyzer's electronics.



Select the **Calibrate Detector** icon to begin a standard calibration of your analyzer's detector. Once you select the **Calibrate Detector** icon, calibration will begin immediately. The analyzer is programmed to calibrate for a specific, predetermined period in order to ensure proper operation of your Niton XLp analyzer in the field.



CAUTION Avoid any vibration, loud noise, strong electronic fields, or other possible interference when your analyzer is calibrating its detector. ♦

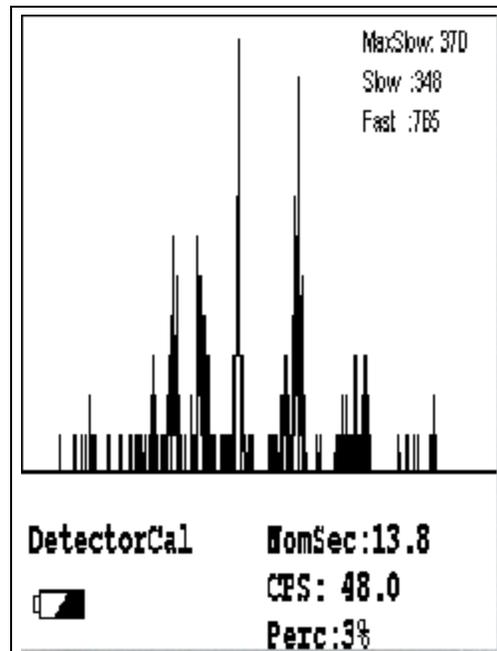


Figure 2-16. Detector Calibration Screen

The analyzer calibration screen will be displayed until calibration is complete. After the calibration has finished, the calibration results will be displayed. Press the on/off/escape button or the **Return** icon to return to the **Main Menu**. In order to insure good test results, it is essential that you calibrate your Niton XLP300 Series Lead-based-Paint Analyzer's detector daily, and if a check sample test reveals discrepancies in the reading.

Calibrate
Touch
Screen

Select the **Calibrate Touch Screen** icon to re-calibrate the analyzer's touch screen display. This procedure establishes the display boundaries for the touch screen interface. When the **Calibrate Touch Screen** icon is selected, the display will show the message: "Calibrate Touch Screen". There will be a small cross in the upper left-hand corner of the display. Tap on this cross with the stylus, and the cross will disappear and reappear in the lower left-hand corner of the screen. Tap on the cross again, and it will reappear in the lower right-hand corner of the screen. Tap on the cross again and it will reappear in the top right-hand corner of the screen. Tap on the cross once more, and you will be presented with the **Calibrate Menu**

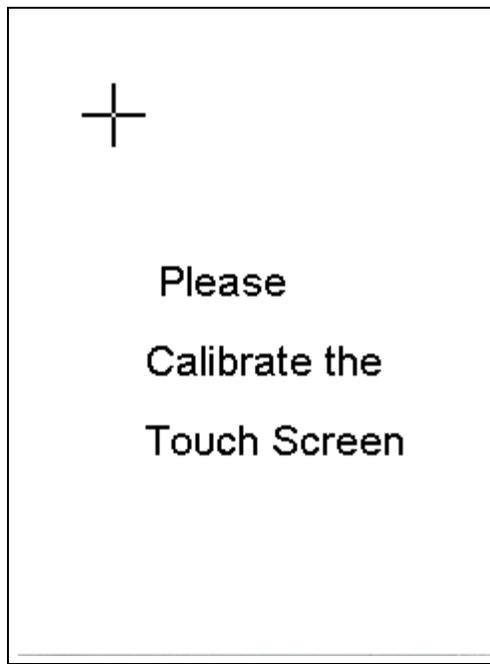


Figure 2-17. The Touch Screen Calibration Screen

The View Libraries Menu

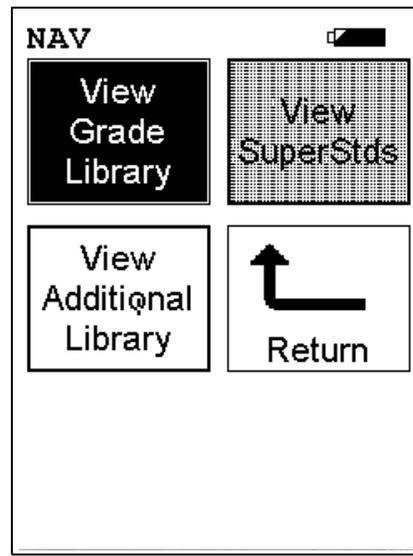
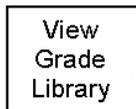


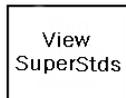
Figure 2-18. The View Libraries Menu

To access the **View Libraries Menu**, select the **View Libraries** icon from the **Data Menu**. The **View Libraries Menu** enables you to view reference data from your analyzer's libraries.

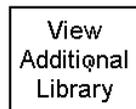
Select the **View Grade Library** icon to view your default Alloy Grade Library, which is set by Thermo Scientific. The entries in the Grade Library serve as a reference for chemistry based analysis. The library entries allow the analyzer to work properly “out of the box” without needing time-consuming pre-analysis. Please refer to the NDT User Guide for information on modifying the Grade Library.



Select the **View SuperStds** icon in order to view your SuperStds Alloy library.



Select the **View Additional Library** icon in order to view your Additional Library alloys, which you may have uploaded to your Analyzer with the NDTI utility. If you have not uploaded an additional library, the **View Additional Library** icon will be grayed-out and the View Additional Library function will be unavailable.



The Common Setup Menu

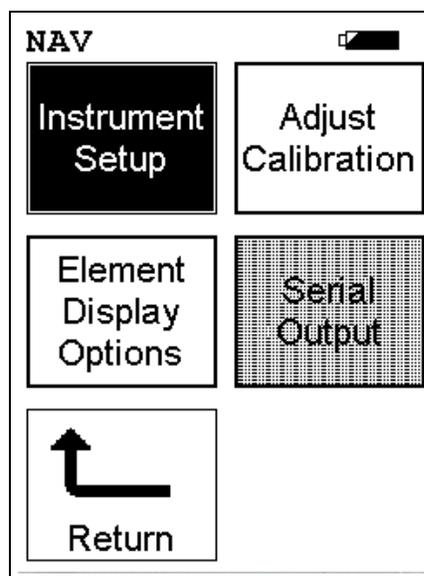
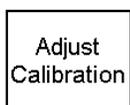


Figure 2-19. The Common Setup Menu

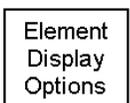
To access the **Common Setup Menu**, select the **Common Setup** icon from the **Main Menu** display. The **Common Setup Menu** gives you access to various Niton XLP analyzer functions, including touch screen display backlighting and the built in bar code scanner, and enables you to configure the way the sources contained in your Niton XLP analyzer are used in sample testing.



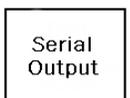
Select the **Instrument Setup** icon to access the **Instrument Setup Menu**. The **Instrument Setup Menu** enables you to toggle the display backlight on or off, configure the Bluetooth wireless connection, configure trigger/proximity button use, or configure sources.



Select the **Adjust Calibration** icon to access the **Calibration Adjustment Setup Screen**. The **Calibration Adjustment Setup Screen** enables you to recalibrate your analyzer for more effective analysis in the various different modes available to you. This option is only recommended for use after consulting with Niton Applications



Select the **Element Display Options** icon to bring up the **Element Display Menu**. The **Element Display Menu** enables you to control the sorting of elements in the sample display, and the pass-fail threshold for sample analysis.



Select the **Serial Output** icon to access the **Serial Output Menu**. The **Serial Output Menu** allows you to adjust the parameters for downloading data across a serial line to a computer, printer, or other computing device.

The Element Display Menu

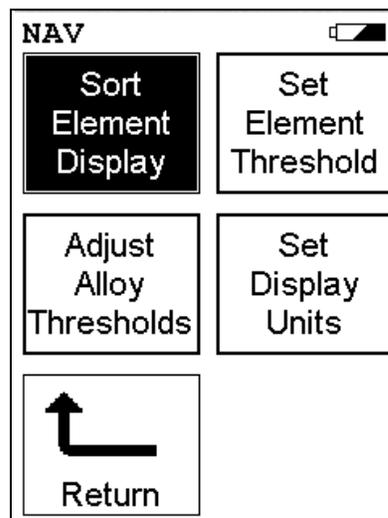
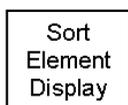


Figure 2-20. The Element Display Menu

To access the **Element Display Menu**, select the **Element Display** icon from the **Common Setup Menu**. The **Element Display Menu** enables you to control element sorting parameters and adjust elemental thresholds.



Select the **Sort Element Display** icon to configure sorting criteria used for analysis display. Selecting the **Sort Element Display** icon opens up the **Sort Criteria Screen**. Select the mode you wish to change, and the **Sorting Options Screen** will appear.

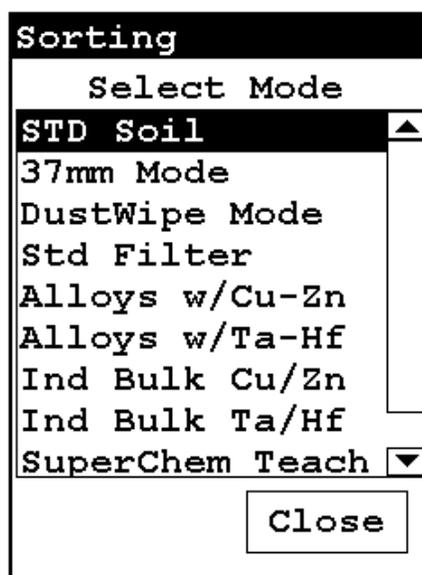


Figure 2-21. The Sort Element Display

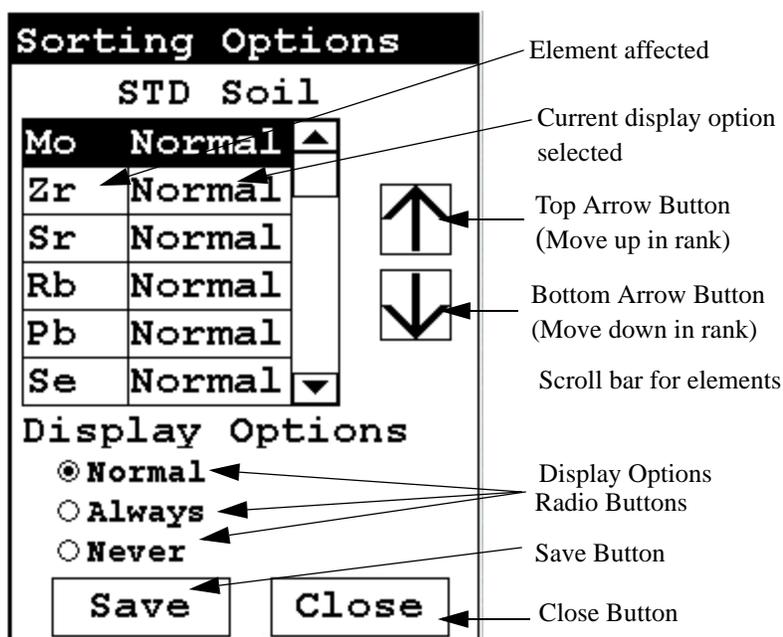


Figure 2-22. The Sorting Options Screen

On the left of the display are elements, each with its currently selected display option beside it to the right. The element list is ranked by importance, with the most important element on top, and each one lower down of less importance than the one above it.

By selecting an element and using the arrow buttons to the right of the list, you can change its ranking. Use the Top Arrow Button to move an element one rank closer to the top with each click. Use the Bottom Arrow Button to move an element one rank closer to the bottom with each click.

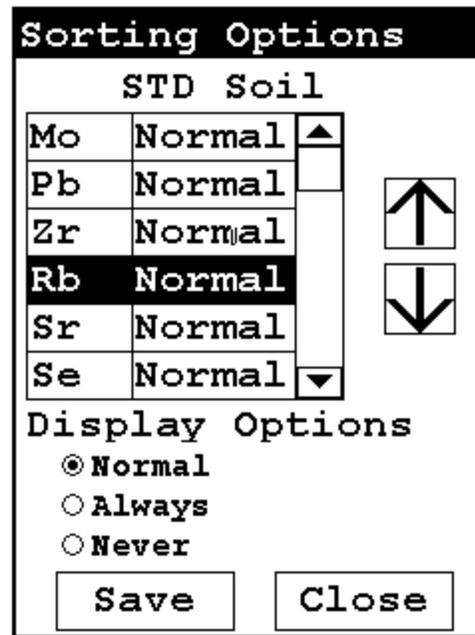


Figure 2-23. Changed Sort Order

The Display Options Radio Buttons allow you to change the display status of any element to one of three states:

- Normal - The standard state. Element displays only when the elemental value is greater than the limit of detection.
- Always - Always display the results for this element. Use this state for elements critical to all of your analyses.
- Never - Never display the results for this element. Use this state for elements which are unimportant to your work. This makes your instrument display less complex.

Select the element you want to change, then select the radio button corresponding to your choice of display status. The currently selected element is displayed in white on black.

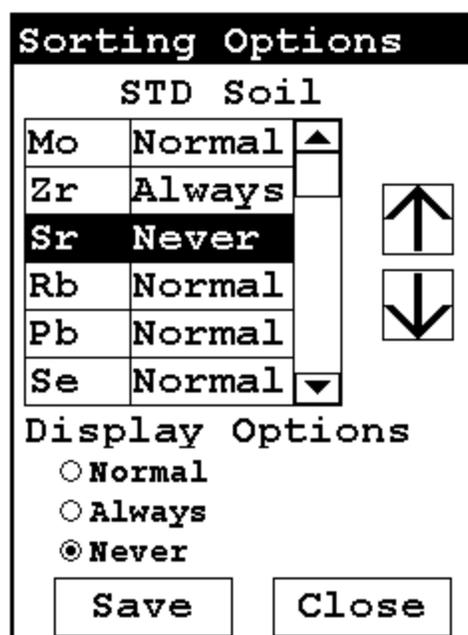


Figure 2-24. Changed Display Options

Select the Save Button to save your current status as the new default. After saving, you will go back to the **Element Display Menu**.

Select the Close Button to exit without saving. When you select the Close Button after changing the display state of any element, a screen will open asking you if you want to save the changes you made. Selecting “Yes” will save these changes as the new default. Selecting “No” will return you to the **Element Display Menu** without saving the changes.

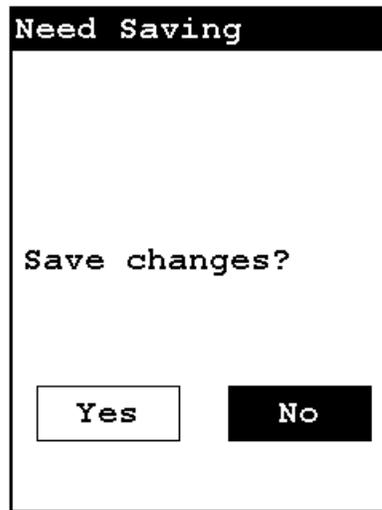
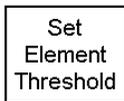


Figure 2-25. Save Changes



Select the **Set Element Threshold** icon to configure pass and fail criteria for elemental analysis. Selecting the **Set Element Threshold** icon opens the **Set Threshold Screen**.

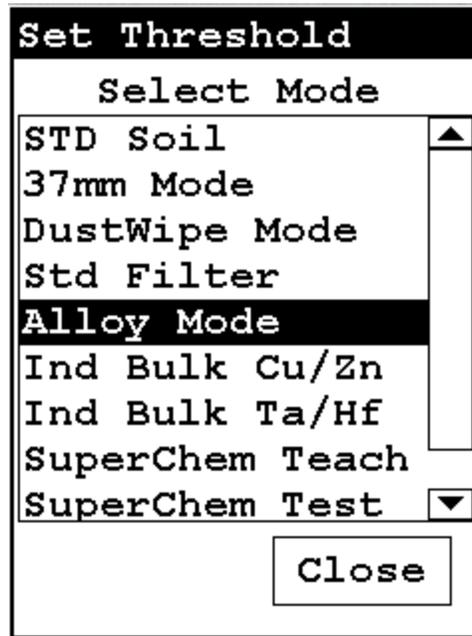


Figure 2-26. Set Threshold Screen

Select the mode you wish to work with from the scrollable list. This will open up the **Pass/Fail Settings Screen** for that mode.

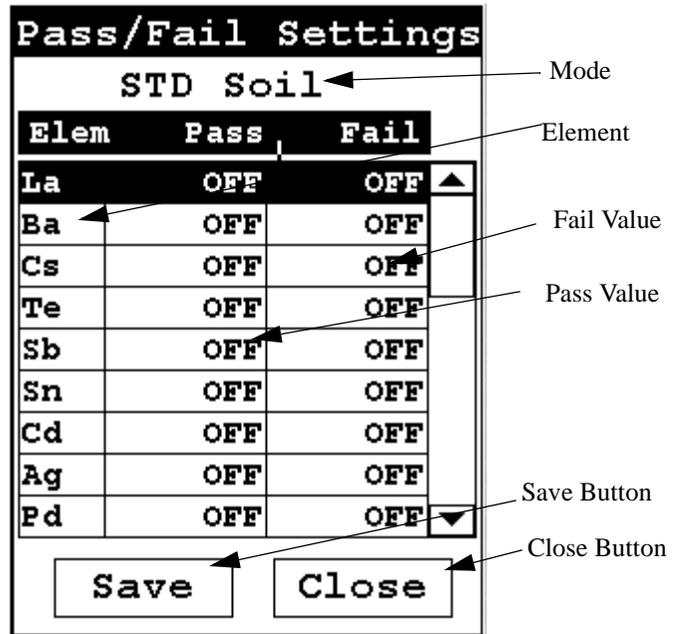


Figure 2-27. Pass/Fail Settings Screen

Selecting the Pass Value will open up the Pass Editor for the selected element.

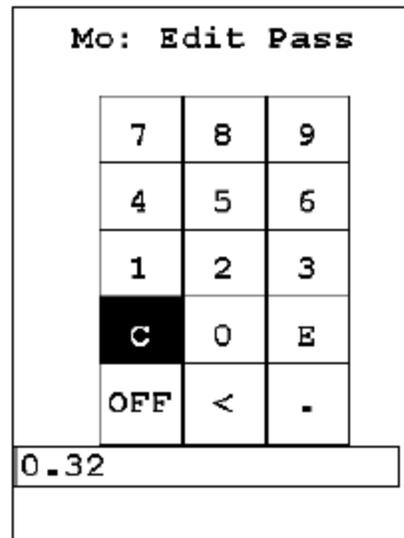


Figure 2-28. The Pass Editor

The Pass Editor is very similar to the Logon Screen. The “C” button clears the field, and the “<” button clears the last numeral. Select the numerals you want, then press “E” to enter the number. “OFF” resets the value to “OFF”

Selecting the Fail Value will open up the Fail Editor for the selected element.

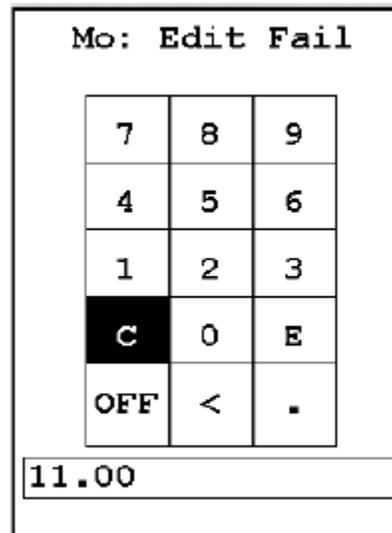


Figure 2-29. The Fail Editor

The Fail Editor works the same as the Pass Editor.

When you press the “E” button in either editor, you are returned to the Pass/Fail Settings Screen, with your new values in place.

Selecting the “OFF” button not only sets the value to “OFF” but also saves the new value.

Pass/Fail Settings			
STD Soil			
Elem	Pass	Fail	
Pd	OFF	OFF	▲
Mo	0.32	11.00	
Zr	OFF	OFF	
Sr	OFF	OFF	
Rb	OFF	OFF	
Pb	OFF	OFF	
Se	OFF	OFF	
As	OFF	OFF	
Hg	OFF	OFF	▼

Figure 2-30. The Pass-Fail Settings Screen with new parameters

Select the Save Button to save your current status as the new default. After saving, you will go back to the **Element Display Menu**.

Select the Close Button to exit without saving. When you select the Close Button after changing the display state of any element, a screen will open asking you if you want to save the changes you made. Selecting “Yes” will save these changes as the new default. Selecting “No” will return you to the **Element Display Menu** without saving the changes.

Need Saving

Save changes?

Figure 2-31. Save Changes Screen

Adjust Alloy Thresholds

Select the **Adjust Alloy Threshold** icon to configure pass and fail criteria for alloy analysis. Selecting the **Adjust Alloy Threshold** icon opens the **Alloy Threshold Screen**.

Set Display Units

Select the **Set Display Units** icon to choose between ppm (parts per million) and percentage (hundredths of whole) displays when taking readings. Selecting the **Set Display Units** icon opens the **Display Units Screen**.

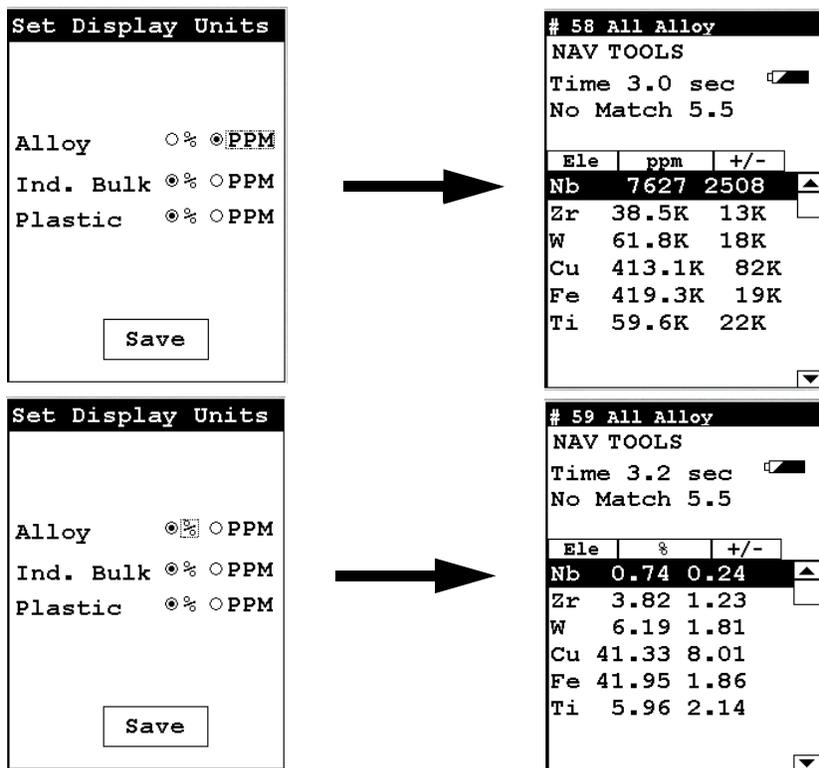


Figure 2-32. Display Units Screen and Associated Results Screens

The Display Units Screen

The **Display Units Screen** allows you to select either PPM or Percentage display on the **Results Screen** for **Alloy**, **Industrial Bulk**, or **Plastic Modes**. Select the radio button for the preferred display unit, then select the Save button, and subsequent results will be shown in that unit type.

Note Readings will retain the unit type used when the reading was taken, even if the units are changed. ♦

Cutoff numbers set the allowable limits in identifications of analyzed samples. The higher the cutoff is set, the easier a match can be made in the Alloy Analysis, Signature ID, and SuperChem modes.

The Erase Menu

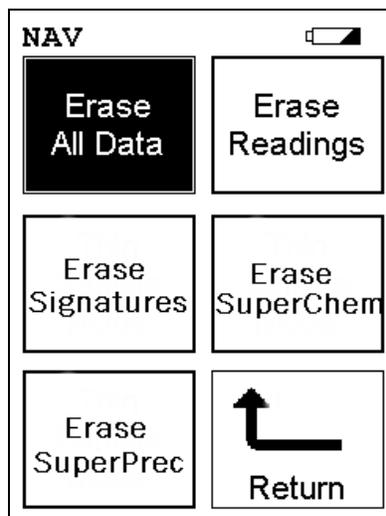
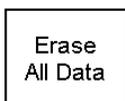


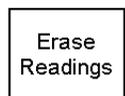
Figure 2-33. The Erase Menu

To access the **Erase Menu**, select the **Erase** icon from the **Data Menu**. The **Erase Menu** enables you to delete data from your analyzer, allowing you to gain storage space for more recent data. You should only erase data which you have already transferred to permanent storage, or when requested to do so by Thermo service personnel.

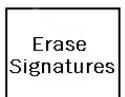
Select the **Erase All Data** icon to erase all data, including signatures and SuperChem reference readings, from your analyzer. Selecting the **Erase All Data** icon will bring up a confirmation screen [Figure 2-34](#)) asking you “Are you sure?” with options to select “YES” or “NO”. Selecting “YES” will erase all reading data from your analyzer. Selecting “NO” will return you to the **Erase Menu**.

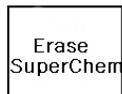


Select the **Erase Readings** icon to erase all accumulated test readings from your analyzer. Selecting the **Erase Readings** icon will bring up a confirmation screen [Figure 2-34](#) asking you “Are you sure?” with options to select “YES” or “NO”. Selecting “YES” will erase all test reading data from your analyzer. Selecting “NO” will return you to the **Erase Menu**.

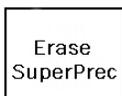


Select the **Erase Signatures** icon to erase all accumulated alloy signatures from your analyzer. Selecting the **Erase Signatures** icon will bring up a confirmation screen [Figure 2-34](#) asking you “Are you sure?” with options to select “YES” or “NO”. Selecting “YES” will erase all signature data from your analyzer. Selecting “NO” will return you to the **Erase Menu**.





Select the **Erase SuperChem** icon to erase accumulated SuperChem reference readings from your analyzer. Selecting the **Erase SuperChem** icon will bring up a confirmation screen [Figure 2-34](#) asking you “Are you sure?” with options to select “YES” or “NO”. Selecting “YES” will erase all SuperChem reference reading data from your analyzer. Selecting “NO” will return you to the **Erase Menu**.



Select the **Erase SuperPrec** icon to erase accumulated SuperPrec reference readings from your analyzer. Selecting the **Erase SuperPrec** icon will bring up a confirmation screen [Figure 2-34](#) asking you “Are you sure?” with options to select “YES” or “NO”. Selecting “YES” will erase all SuperPrec reference reading data from your analyzer. Selecting “NO” will return you to the **Erase Menu**.

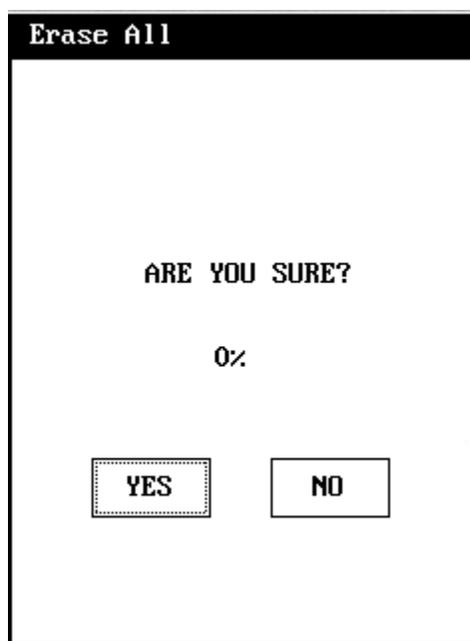
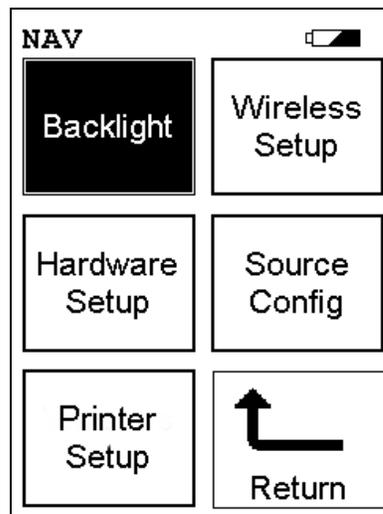


Figure 2-34. Confirmation Screen

The confirmation screen has a progress meter which tells you how far along your erasure is at any given time.

The Instrument Setup Menu



Select the **Backlight** icon to toggle the display backlight on or off.



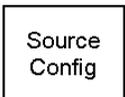
CAUTION Enabling the backlight will reduce your battery pack operating time, requiring more frequent recharges. ♦



Select the **Wireless Setup** icon to access the **Wireless Setup Menu**. The **Wireless Setup Menu** enables you to configure the Bluetooth wireless networking for your analyzer.



Select the **Hardware Setup** icon to access the **Hardware Setup Screen**. The **Hardware Setup Screen** enables you to configure trigger, safety interlock, and proximity button use.



Select the **Source Config** icon to access the **Source Config Screen**. The **Source Config Screen** enables you to completely configure parameters and use of your analyzer's excitation sources.



Select the **Printer Setup** icon to access the **Printer Setup Screen**. The **Printer Setup Screen** enables you to configure printer parameters.

The Hardware Setup Screen

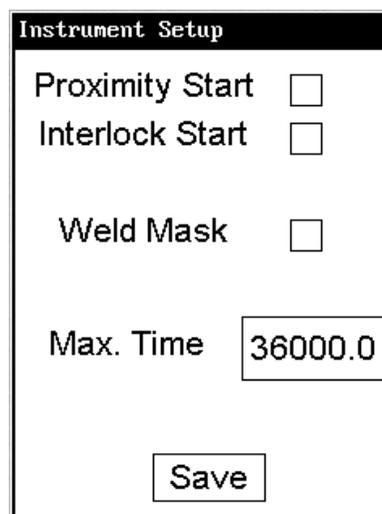


Figure 2-35. The Hardware Setup Screen

The **Hardware Setup Screen** enables you to toggle various options on or off, as well as select certain hardware dependant modes. Selecting an empty checkbox enables the option and places a check in the box. Selecting a checked box disables the option and clears the box.

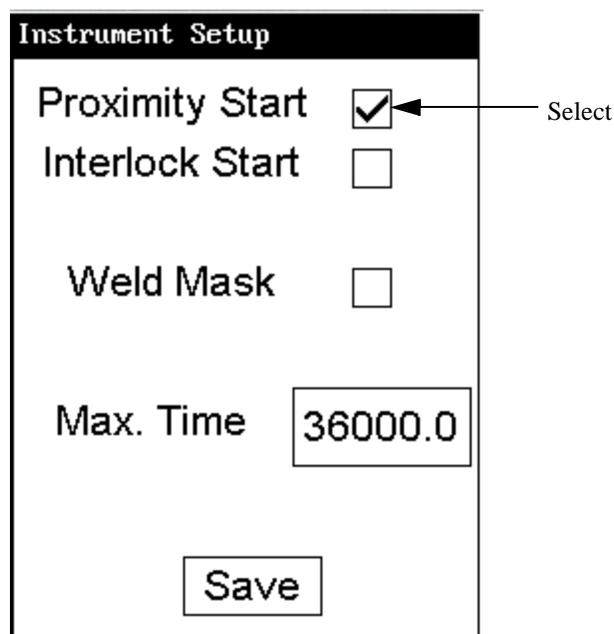


Figure 2-36. Selecting Options

Select the Proximity Start checkbox to toggle the use of the front proximity button. This enables the proximity button to be used to start taking a sample on contact. Some nations have laws or regulations which prohibit use of this feature. In this case, the feature will be disabled before shipping.

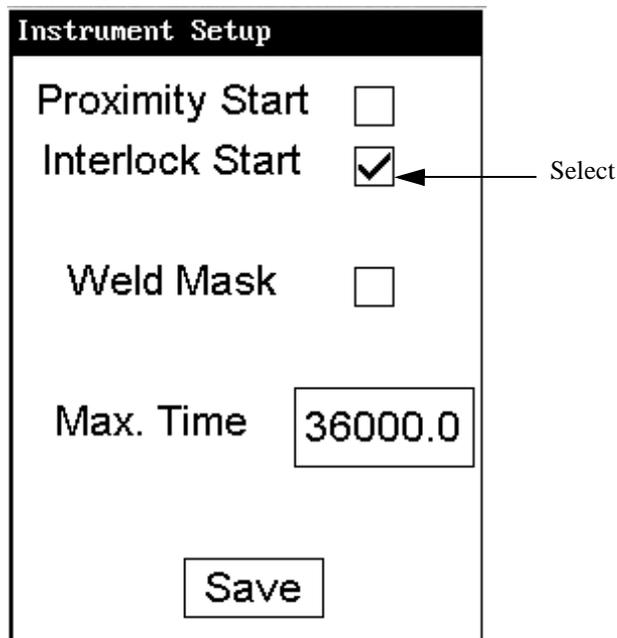


Figure 2-37. Selecting Other Options

Select the Interlock Start checkbox to toggle the use of the rear interlock button. This requires the interlock button to be used to start taking a sample on contact. Enabling the "Interlock Start" feature allows the user to start an analysis by depressing the rear interlock button on the analyzer.

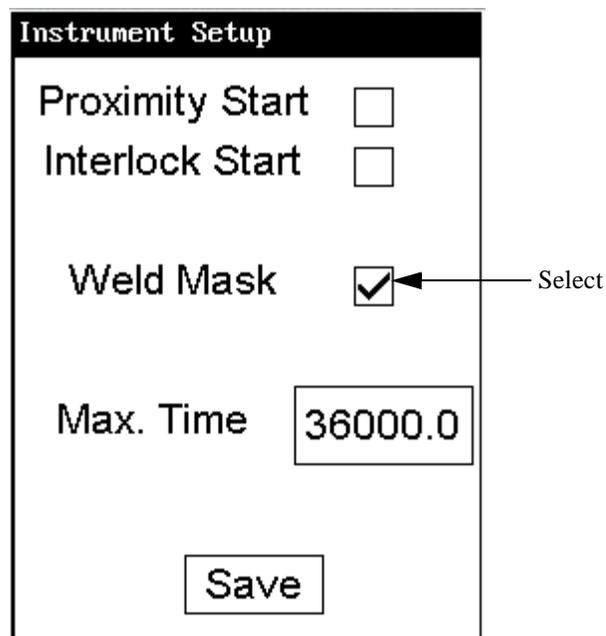


Figure 2-38. Select the Welding Mask Checkbox

Select the **Weld Mask** checkbox to toggle the use of the Welding Mask function. This reconfigures the calibration of the analyzer, enabling you to take readings using the Welding Mask.

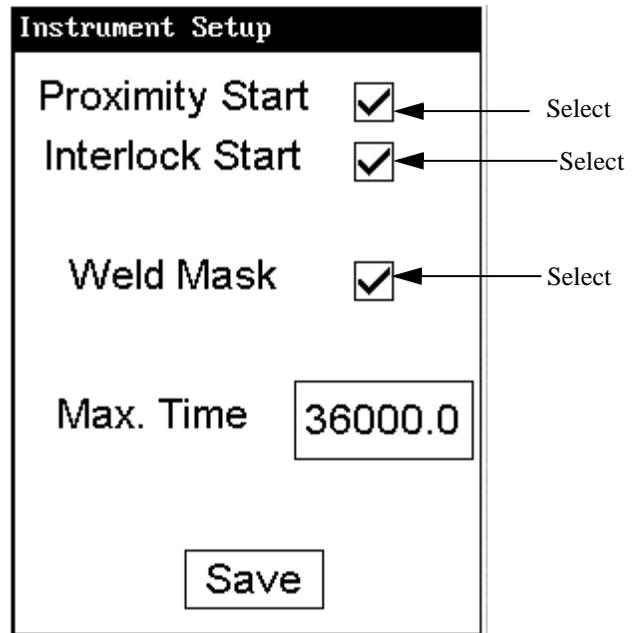


Figure 2-39. Selecting Option Combinations for Multiple Effects

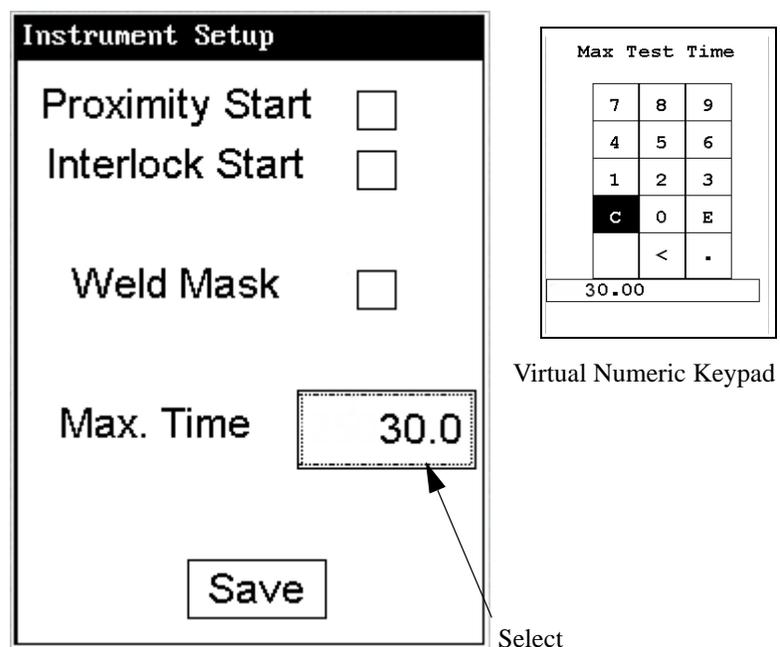


Figure 2-40. Changing the Max Time Parameter

Select the numbers box in the Max Time field to change the maximum seconds per reading. A virtual numeric keypad will appear, allowing you to set the number to whatever value you want, up to the maximum of 36000. When the max testing time is reached during an analysis, the analyzer reading will be automatically ended. Your analyzer will continue switching filters as needed until you terminate the reading or the Max Time is reached.

The Source Config Screen

Multi-source tests are used to either preferentially excite specific elements for increased sensitivity, or to cover a wider element range.

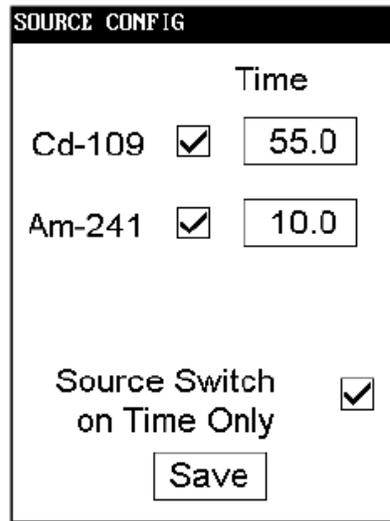


Figure 2-41. The Source Config Screen

The **Source Config Screen** enables you to directly enable or disable any source, or control the time that a source irradiates the sample before auto-switching to another source.

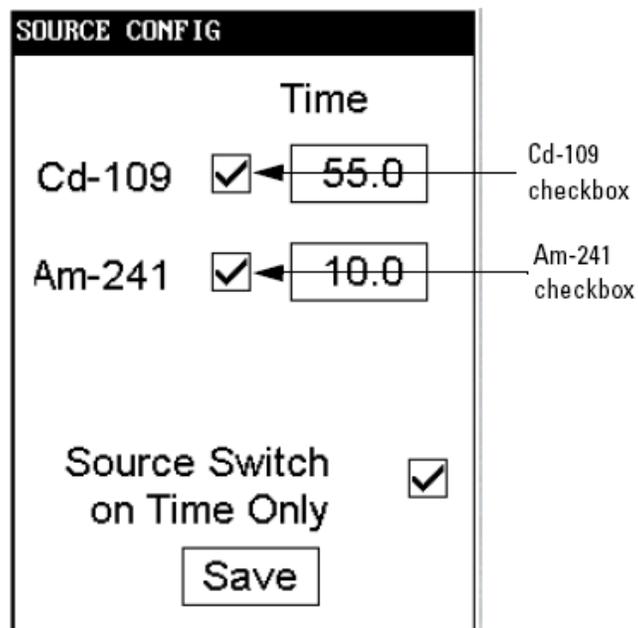


Figure 2-42. The Source Checkboxes

Select the checkbox next to the source you want to use to determine exactly which of the sources contained in your Niton Analyzer is used for sample testing. Selecting an empty checkbox will enable that source and place a check into the box as an indicator. Selecting a checked box will disable the source and clear the box.

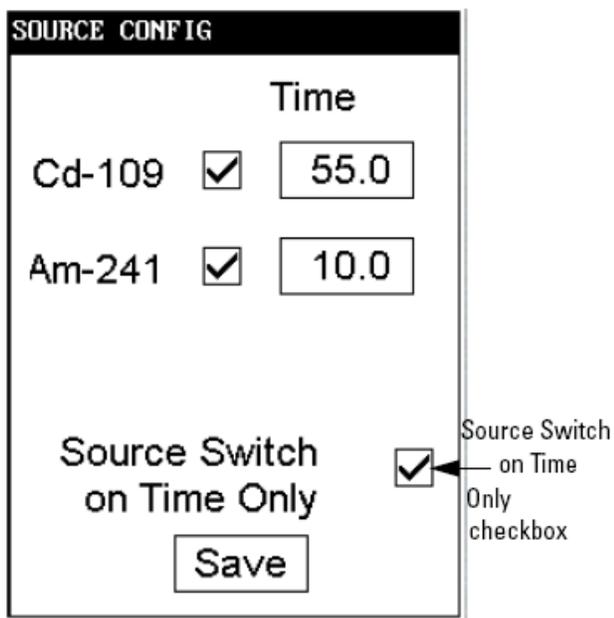


Figure 2-43. The Source Switch on Time Only Checkbox

Select the Source Switch on Time Only checkbox to toggle **Time Switch Only Mode** on or off. In **Time Switch Only Mode**, the Niton XLp analyzer will ignore the Alloy Library and only switch sources according to the time interval you set in the Time field for each source.

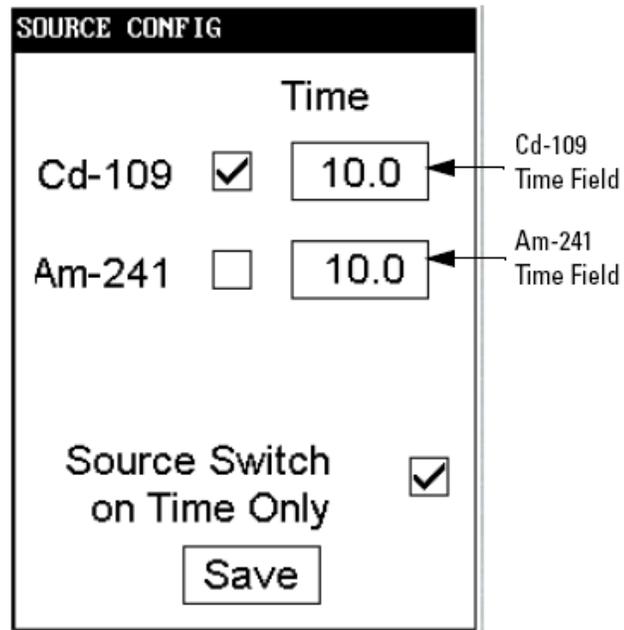


Figure 2-44. The Source Time Fields

Select the Time field for the intended source to change the source switch time for that source. This enables you to set the number of seconds each enabled source is allotted before auto-switching will occur when needed during sample testing. Your Niton XL analyzer will auto-switch from one source to another when the testing time for that source is greater than or equal to the time you have chosen, and the identified alloy is flagged as needing the switch in the Niton Alloy Library.

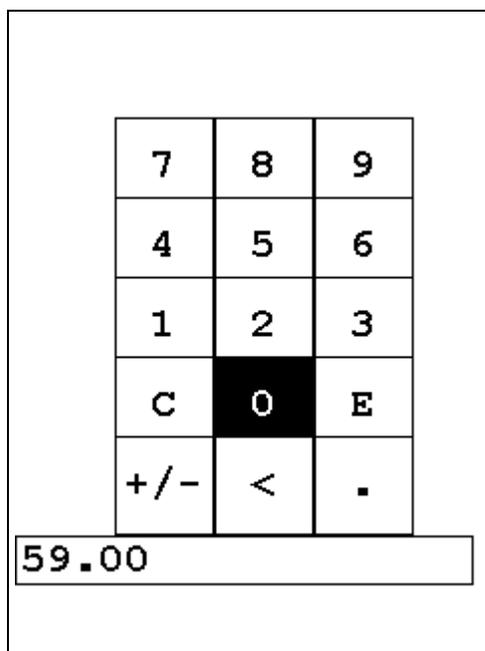


Figure 2-45. The Source Time Editor

Select the “C” key to clear the current time, then from the virtual numeric key pad, select each digit you want to input, then select “E” to enter.

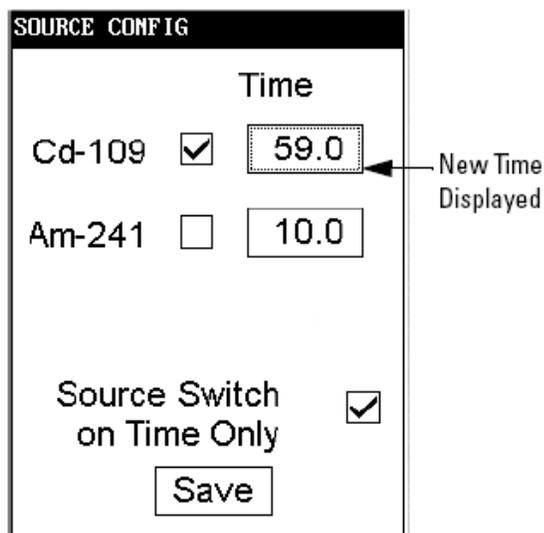


Figure 2-46. New Time Displayed

The Printer Setup Screen

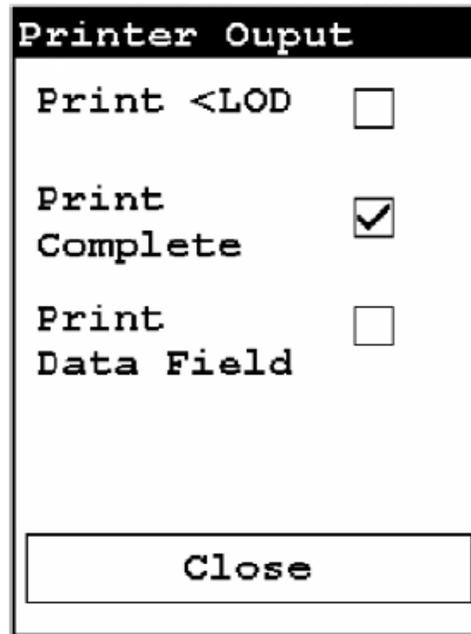


Figure 2-47. The Printer Setup Screen

The Printer Setup Screen allows you to adjust which sections of your reading data are sent to your optional printer. By default, your analyzer prints the detected list, reading number, reading length, reading mode and any applicable measurement data such as Alloy match grade names. You can select any combination of options on the Printer Setup Screen to change what is printed.

- | | |
|-------------------------|---|
| Print < LOD | Selecting this option will enable printing of readings which are lower than the Limit of Detection. |
| Print Complete | Selecting this option will enable printing of all the data fields in the reading. |
| Print Data Field | Selecting this option will enable printing of all entered data fields. |

Industrial Bulk Calibration Factors

Note Your NITON Analyzer may not be equipped with Industrial Bulk Mode. If you do not have Industrial Bulk Mode enabled on your analyzer, this section will not apply to you. ♦

Use Industrial Bulk mode when you expect that the element of interest to you will be more than 1% of the total sample. If you expect that the element of interest to you will be less than 1% of the total sample, use Standard Soil mode.

Within Industrial Bulk mode there are two sub-modes; Industrial Bulk (Cu / Zn / Pb) and Industrial Bulk (Ta / Hf / Re). Use Industrial Bulk (Ta / Hf / Re) mode only if you are specifically looking for compounds that contain those elements. If you are not specifically looking for compounds that contain tantalum, hafnium, or rhenium, then start by using Industrial Bulk (Cu / Zn / Pb) mode. This mode is more common than Industrial Bulk (Ta / Hf / Re) mode.

The XRF Analyzer can quickly identify and measure the presence of many elements, but it can not detect the lighter elements, such as carbon and silicon. However, concentrations of these lighter elements can affect the measurement of the heavier elements. Calibration factors are used to correct for the presence of these light elements in the sample matrix.

Industrial Bulk mode lets you calculate your own site-specific calibration factors and add them to the XRF Analyzer.

When you begin using the XRF Analyzer, NITON recommends that you test the XRF Analyzer against known samples of the material of interest, and add calibration factors, if needed.

When you change to a material that has a different matrix, such as moving from a matrix with high carbon content to a matrix with high silicon content, NITON recommends that you again test the XRF Analyzer against known samples. If the XRF Analyzer still provides results that are accurate enough for your needs, you can continue to use it without changing the calibration factors. However, if the change in the matrix of the sample causes a change in the results from the XRF Analyzer, such that they are no longer accurate enough for your needs, then calculate new calibration factors for the new sample type.

Displaying the Calibration Factors

To display the calibration factors:

1. From the Main menu of the XRF Analyzer, select **Common Setup**.
2. Select **Adjust Calibration**.
3. Select the mode in which to adjust the call factors.

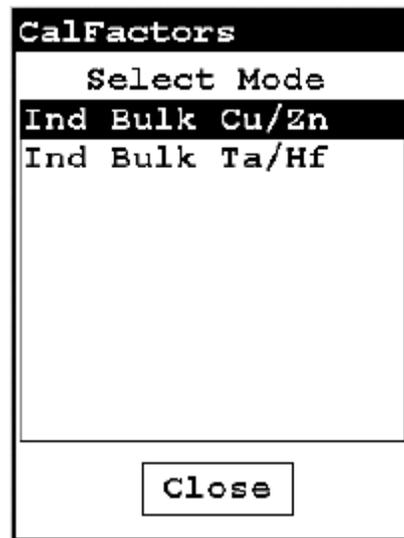


Figure 2-48. Select Mode

Once you have selected the mode you want to edit, the CalFactor Screen for that mode will appear.

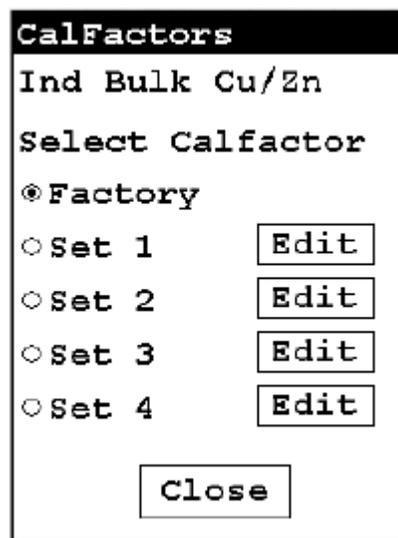


Figure 2-49. CalFactors Screen (for Industrial Bulk Cu/Zn/Pb)

There are 5 CalFactor sets, four of which you can edit. Initially, before you edit them, CalFactor sets 1 through 4 are copies of the Factory setting, which is itself not editable. Select the set you want to edit, then select the EDIT button. An information screen pops up briefly before the editing screen appears.

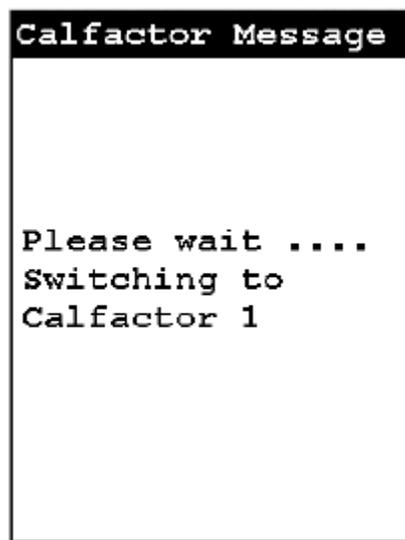


Figure 2-50. Information Screen

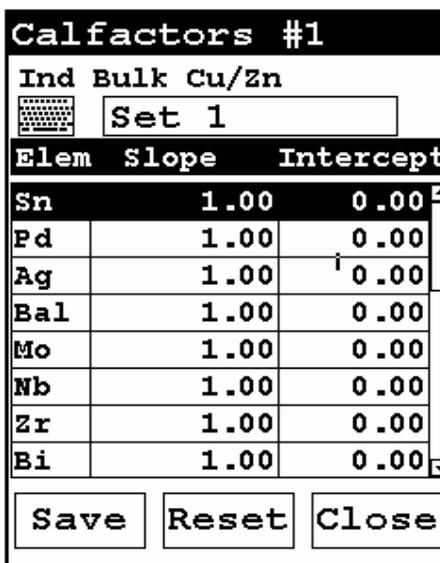


Figure 2-51. CalFactors Edit Screen

The Calibration Factors Edit Screen

To edit the element you are interested in, select the intersection of the row of that element with the Slope or Intercept columns - for example, if you want to edit the slope of Selenium, select the 1.00 default slope appearing in the Sn row. A Slope Editor for that element will appear.

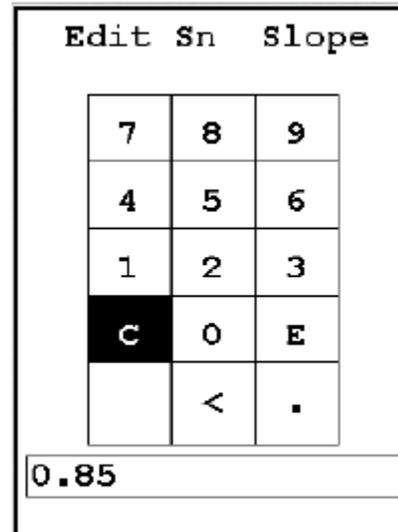
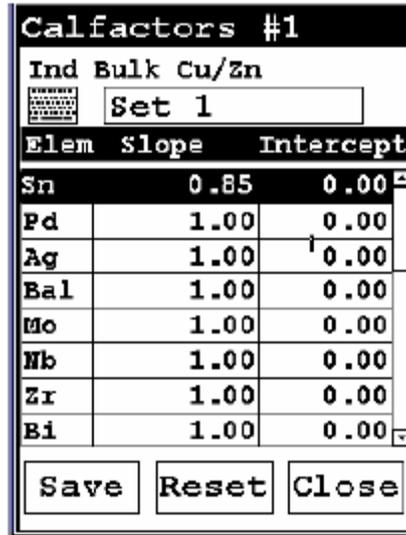


Figure 2-52. Slope Editor (Selenium)

The Slope Editor is a virtual numeric keypad, which works much like the login keypad. Clear the default or old data from the box with the “C” key, select the numbers to input the new slope, and select the “E” key to save the new value. You will be returned to the CalFactors Screen, and the new slope will be there.



The screenshot shows a terminal window titled "CalFactors #1". At the top, it displays "Ind Bulk Cu/Zn" and a text box containing "Set 1". Below this is a table with three columns: "Elem", "Slope", and "Intercept". The table lists elements Sn, Pd, Ag, Ba1, Mo, Nb, Zr, and Bi with their respective slope and intercept values. At the bottom of the screen are three buttons: "Save", "Reset", and "Close".

Elem	Slope	Intercept
Sn	0.85	0.00
Pd	1.00	0.00
Ag	1.00	0.00
Ba1	1.00	0.00
Mo	1.00	0.00
Nb	1.00	0.00
Zr	1.00	0.00
Bi	1.00	0.00

Figure 2-53. New Slope as Edited

Like the Slope Editor, the Intercept Editor is a virtual numeric keypad, which works much like the login keypad. Clear the default or old data from the box with the "C" key, select the numbers to input the new intercept, and select the "E" key to save the new value. You will be returned to the CalFactors Screen, and the new intercept will be there.

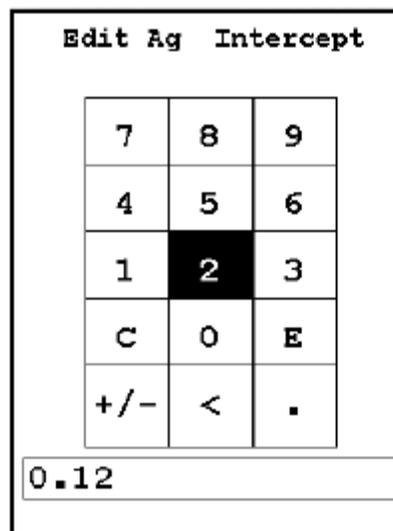


Figure 2-54. Intercept Editor

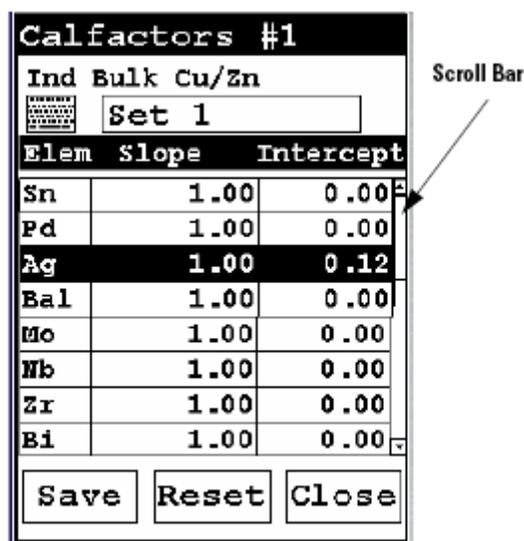


Figure 2-55. Intercept as Edited

- You can use the scroll bar to mover around in the list of elements.

- Selecting the Save button will save the new CalFactor set.
- Selecting the Reset Button will copy the Factory Setting over the current setting, resetting the CalFactors back to Factory Standard.
- Selecting the Close button will exit the CalFactors Edit screen and return you to the CalFactors screen.

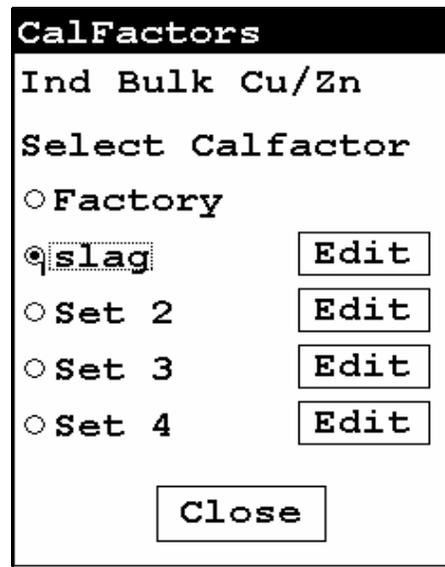


Figure 2-56. Renamed CalFactor Set

To change the name of the set, select the keyboard icon to load the Virtual Keyboard at the top of the CalFactors Edit Screen, and rename the set. Set names can be up to 9 characters long.

Adjusting the Calibration Factors

Calibration factors are used to adjust for consistently high or consistently low readings from the XRF Analyzer.

They are calculated by graphing the data points created by plotting the percentage of each element as indicated by standard samples, against the percentage of each element as reported by the XRF Analyzer.

Then the linear regression function is used to calculate the slope and intercept for a straight line that best fits these data points. The slope and intercept of this line are the calibration factors.

Calculating calibration factors requires several steps:

- 1. Resetting the Calibration Factors**
- 2. Measuring Standard Samples**
- 3. Calculating Calibration Factors**
- 4. Adding the Calibration Factors to the XRF Analyzer**

These steps are described in detail below.

Resetting the Calibration Factors

To reset the calibration factors to the defaults:

- 1. Display the calibration factors. See “[Displaying the Calibration Factors](#)” on [page 2-48](#) for detailed instructions.**
- 2. Press the Escape button to switch to the Calibration Factors Menu.**
- 3. Press RES on the Calibration Factors Menu. The XRF Analyzer resets the calibration factors to the defaults.**

Measuring the Standard Samples

Use the XRF Analyzer to take readings of samples for which you already know the composition of the sample. It is important that the known composition of these samples be accurate. These samples provide the baseline to which the XRF Analyzer is adjusted. If the known composition is inaccurate, the XRF Analyzer will also be inaccurate.

For each sample, take a reading of at least 120 seconds. Make a note of the reading numbers for these samples.

For each sample, the XRF Analyzer reports the percentage by weight for the elements present in the sample. With the calibration factors set to the defaults, these percentages will differ from the known percentages, but are used to calculate the calibration factors.

Note Readings from only three samples are required for each element, but increasing the number of readings also increases the accuracy of the results.

Calculating Calibration Factors

Using the data that you collected by measuring the standard samples, you now need to plot the percentage of each element as indicated by the standard samples, against the percentage of each element as reported by the XRF Analyzer. Then use the linear regression function to calculate the slope and intercept for a straight line drawn through a graph of those data points.

The slope and intercept for this line are the calibration factors for the element.

You may use any tools that you prefer to make this calculation. This document shows one possible method, using Excel.

Note The XRF Analyzer reports percentages of elements, and the calibration factors are based on percentages of elements. If your standard samples indicate percentages of oxides, see [“Oxide Conversion”](#) on [page 2-63](#) to convert percentages of oxides to percentages of elements.

Calculating Calibration Factors Using Excel

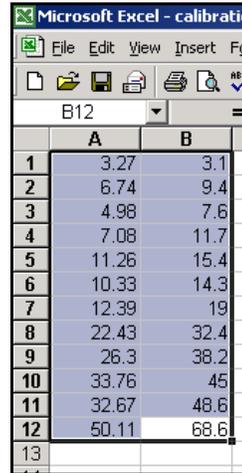
Note NITON also provides CorrectCalc™, an Excel-based software program that calculates the calibration factors. It also provides some additional calculations and a graph of your data. For more information, see the CorrectCalc Manual, which is provided as a PDF file on the NDT Software CD.

To calculate calibration factors:

1. Open Excel. To do this:

- a. Click the Start button.
- b. Select Programs.

2. In the second column, enter all the percentages by weight for the element as indicated by each standard.
3. Use the cursor to highlight all the numbers in both columns.



The screenshot shows a Microsoft Excel window titled "Microsoft Excel - calibration". The spreadsheet has two columns, A and B, and rows numbered 1 through 13. The data in column A is: 3.27, 6.74, 4.98, 7.08, 11.26, 10.33, 12.39, 22.43, 26.3, 33.76, 32.67, 50.11. The data in column B is: 3.1, 9.4, 7.6, 11.7, 15.4, 14.3, 19, 32.4, 38.2, 45, 48.6, 68.6. The cells containing these numbers are highlighted in blue.

	A	B
1	3.27	3.1
2	6.74	9.4
3	4.98	7.6
4	7.08	11.7
5	11.26	15.4
6	10.33	14.3
7	12.39	19
8	22.43	32.4
9	26.3	38.2
10	33.76	45
11	32.67	48.6
12	50.11	68.6
13		

Figure 2-59. Setting Up the Chart



4. Click Chart Wizard.
5. Select the Scatter Chart with data points that are not connected by lines.

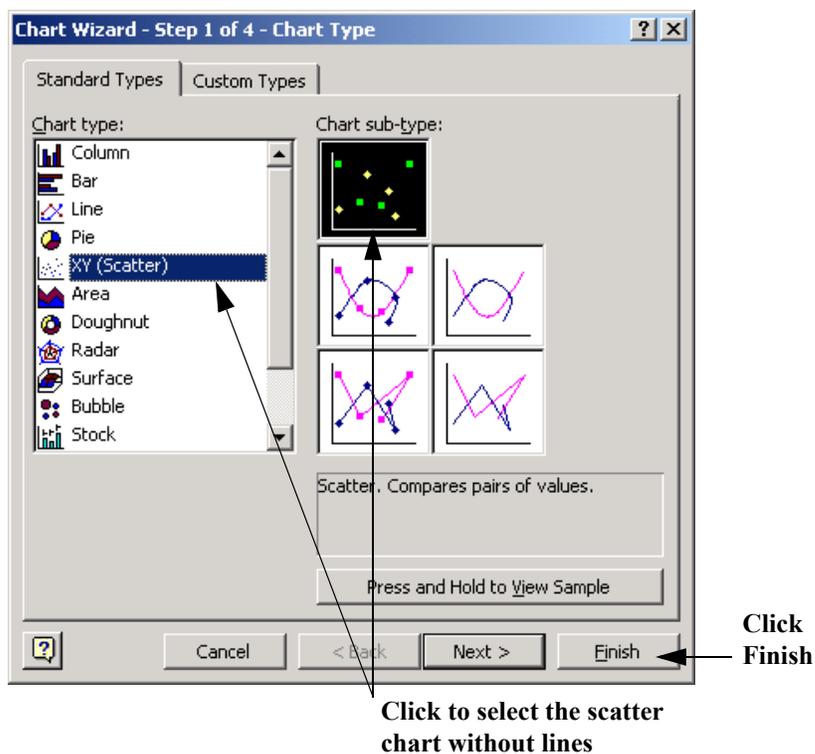


Figure 2-60. Selecting the Scatter Chart

6. Click Finish.
7. Right-click on one of the data points.
8. Click Add Trendline on the pop-up menu.



Figure 2-61. Adding the Trendline

Note If you do not have Add Trendline as an option on this menu, see “Adding the Analysis ToolPak to Excel:” on page 2-64 for instructions.

- a. On the Type tab, click Linear.

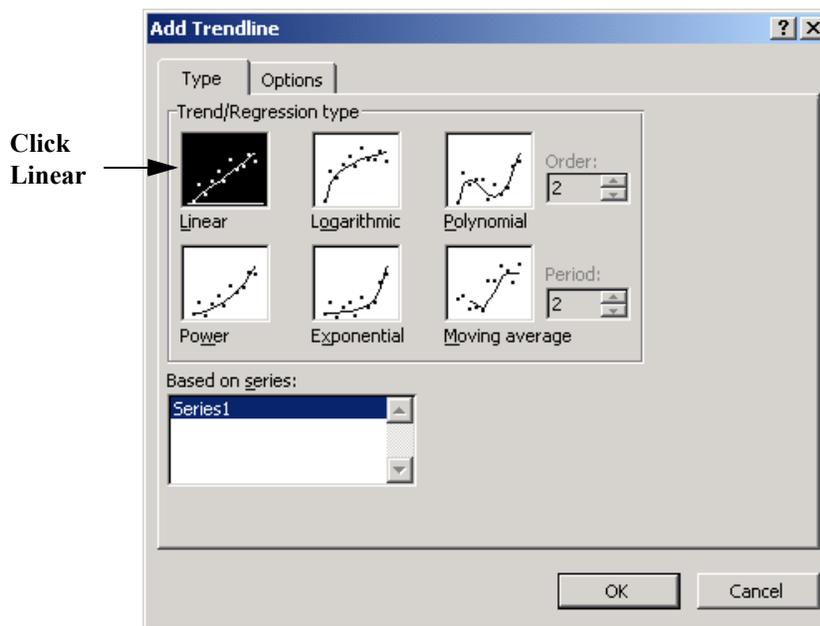


Figure 2-62. Selecting Linear Trendline

- b. On the Options tab, check the boxes for “Display equation on chart” and “Display R-squared value on chart.”

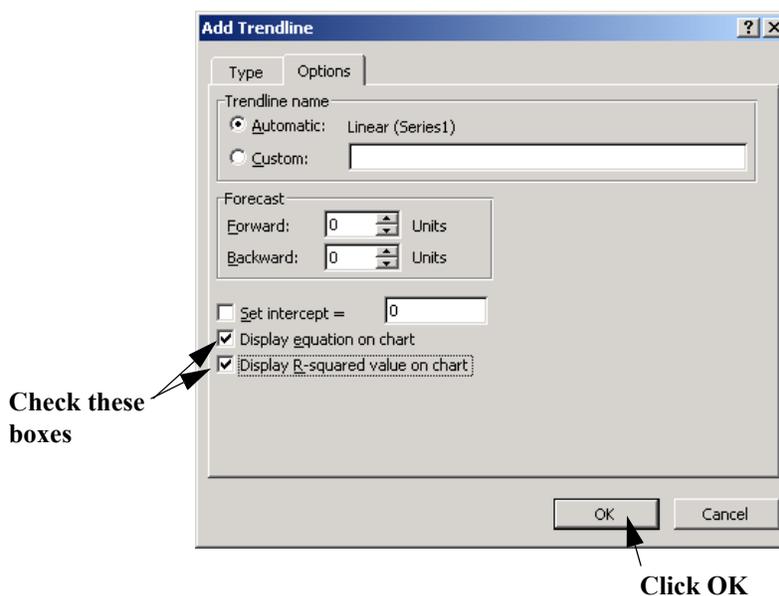


Figure 2-63. Selecting Options

- c. Click OK.
- d. The equation shows the slope and intercept for the trend line. These are the calibration factors that you enter into the XRF Analyzer.

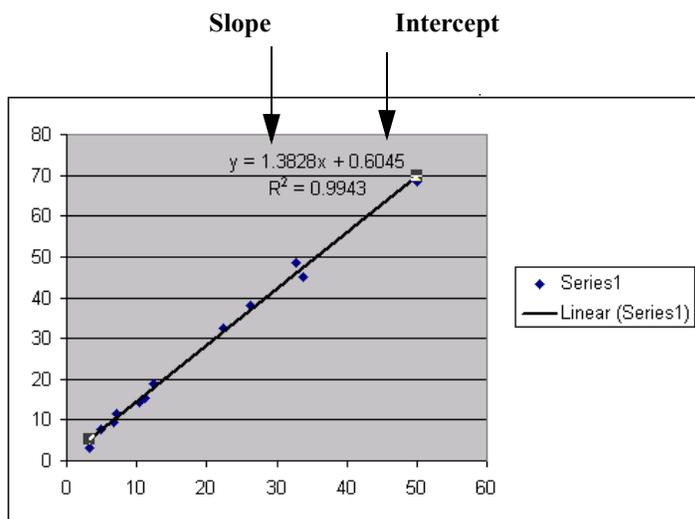


Figure 2-64. Slope and Intercept Displayed

Note If the intercept is negative in the equation, be sure that you enter the intercept as negative in the XRF Analyzer.

- 9. Repeat these steps to find the slope and intercept for every element that you are interested in.**

Oxide Conversion

If the composition of your standard sample is specified in percentage of oxide, multiply that percentage by the conversion factor in the table to find the percentage of the element. For example, if the standard sample contains 4% TiO₂, it contains 2.398% Ti:

$$4 * 0.5995 = 2.398$$

Table 2-1. Table of Oxide Percentages

Oxide	Conversion Factor
TiO ₂	0.5995
V ₂ O ₅	0.5602
Cr ₂ O ₃	0.6842
Mn ₃ O ₄	0.7203
MnO	0.7745
Fe ₂ O ₃	0.6994
FeO	0.7773
Co ₃ O ₄	0.7342
NiO	0.7858
CuO	0.7988
ZnO	0.8034
PbO	0.9283
Fe ₂ O ₃	0.6994
Bi ₂ O ₃	0.8970
ZrO ₂	0.7403
MoO ₃	0.6665
WO ₃	0.7930
Ta ₂ O ₅	0.8190
Nb ₂ O ₅	0.6990
SnO ₂	0.7876

If your standard sample contains a compound that is not listed in the table, you can calculate the percentage of the element using this formula:

$$\frac{(\text{molecular weight of the element})}{(\text{molecular weight of the compound})} * (\% \text{ of compound}) = (\% \text{ of element})$$

Adding the Analysis ToolPak to Excel:

1. Within Excel, select Add-Ins from the Tools menu.

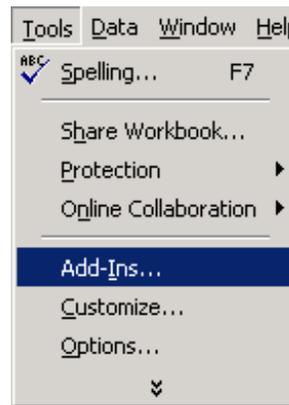


Figure 2-65. Selecting Add-Ins

2. Click the box for Analysis ToolPak

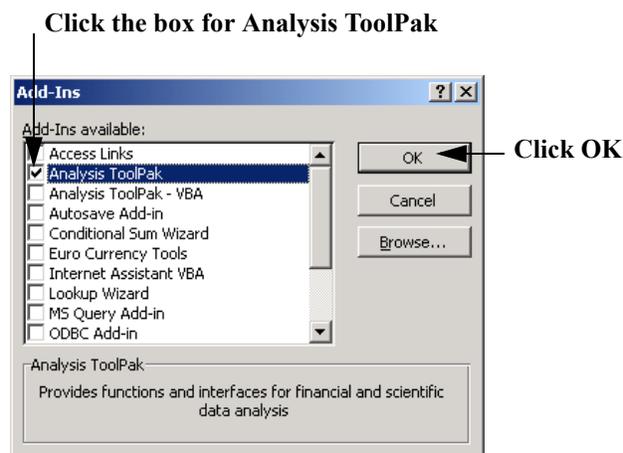


Figure 2-66. Selecting Analysis ToolPak

3. Click OK.

Note If you need more information about the Analysis ToolPak, see the documentation for Excel.

Certified Values for Bulk Standards

The three NIST soil samples included with your bulk testing kit (Low, Medium, and High) are certified to the following specifications in these selected elements:

Table 2-2. Low Standard - NIST #2709 (Discontinued)

Element	Mass Fraction %	Variation %	Element	Mass Fraction $\mu\text{g/g}$	Variation $\mu\text{g/g}$
Aluminum	7.50	± 0.06	Antimony	7.9	± 0.6
Calcium	1.89	± 0.05	Arsenic	17.7	± 0.8
Iron	3.50	± 0.11	Barium	968.0	± 40
Magnesium	1.51	± 0.05	Cadmium	0.38	± 0.01
Phosphorus	0.062	± 0.005	Chromium	130.0	± 4.0
Potassium	2.03	± 0.06	Cobalt	13.4	± 0.7
Silicon	29.66	± 0.23	Copper	34.6	± 0.7
Sodium	1.16	± 0.03	Lead	18.9	± 0.5
Sulphur	0.089	± 0.002	Manganese	538.0	± 17.0
Titanium	0.342	± 0.024	Mercury	1.40	± 0.08
		\pm Nickel		88.0	± 5.0
		\pm Sel	enium	1.57	± 0.08
		\pm Si	lver	0.41	± 0.03
		\pm S	trontium	231.0	± 2.0
		+	Thallium	0.74	± 0.05
		\pm V	anadium	112.0	± 5.0
			Zinc	106.0	± 3.0

The complete Certificate of Analysis can be obtained from the NIST web site at: <http://patapasco.nist.gov/smcatalog/certificates/2709.pdf>

Table 2-3. Non-Certified Values - NIST Standard 2709 (Discontinued)

Element	Mass Fraction %	Element	Mass Fraction µg/g
Carbon	1.2	Cerium	42.0
		Cesium	5.3
		Dysprosium	3.5
		Europium	0.9
		Gallium	14.0
		Gold	0.3
		Hafnium	3.7
		Holmium	0.54
		Iodine	5.0
		Lanthanum	23.0
		Molybdenum	2.0
		Neodymium	19.0
		Rubidium	96.0
		Samarium	3.8
		Scandium	12.0
		Thorium	11.0
		Tungsten	2.0
		Uranium	3.0
		Ytterbium	1.6
		Yttrium	18.0
		Zirconium	160.0

Table 2-4. Medium Standard - NIST # 2711 (Discontinued)

Element	Mass Fraction %	Variation %	Element	Mass Fraction $\mu\text{g/g}$	Variation $\mu\text{g/g}$
Aluminum	6.53	± 0.09	Antimony	19.4	± 1.8
Calcium	2.88	± 0.08	Arsenic	105.0	± 8.0
Iron	2.89	± 0.06	Barium	726.0	± 38.0
Magnesium	1.05	± 0.03	Cadmium	41.7	± 0.25
Phosphorus	0.086	± 0.007	Copper	114.0	± 2.0
Potassium	2.45	± 0.08	Lead	1162.0	± 31.0
Silicon	30.44	± 0.19	Manganese	638	± 28.0
Sodium	1.14	± 0.03	Mercury	6.25	± 0.19
Sulphur	0.042	± 0.001	Nickel	20.6	± 1.1
Titanium	0.306	± 0.023	Selenium	1.52	± 0.14
		$\pm \text{Si}$	Iver	4.63	± 0.39
		$\pm \text{S}$	trontium	245.3	± 0.7
		$\pm \text{Tha}$	llium	2.47	± 0.15
		$\pm \text{V}$	anadium	81.6	2.9
		+	Zinc	350.4	4.8

The complete Certificate of Analysis can be obtained from the NIST web site at: <http://patapasco.nist.gov/smcatalog/certificates/2711.pdf>

**Table 2-5. Non-Certified Values - NIST Standard 2711
 (Discontinued)**

Element	Mass Fraction %	Element	Mass Fraction µg/g
Carbon	2.0	Bromine	5.0
		Cerium	69.0
		Cesium	6.1
		Chromium	47.0
		Cobalt	10.0
		Dysprosium	5.6
		Europium	1.1
		Gallium	15.0
		Gold	0.03
		Hafnium	7.3
		Holmium	1.0
		Indium	1.1
		Iodine	3.0
		Lanthanum	40.0
		Molybdenum	1.6
		Neodymium	31.0
		Rubidium	110.0
		Samarium	5.9
		Scandium	9.0
		Thorium	14.0
		Tungsten	3.0
		Uranium	2.6
		Ytterbium	2.7
		Yttrium	25.0
		Zirconium	230.0

Table 2-6. High Standard - NIST # 2710

Element	Mass Fraction %	Variation %	Element	Mass Fraction $\mu\text{g/g}$	Variation $\mu\text{g/g}$
Aluminum	6.44	± 0.08	Antimony	38.4	± 3.0
Calcium	1.25	± 0.03	Arsenic	626.0	± 38.0
Iron	3.38	± 0.10	Barium	707.0	± 51.0
Magnesium	0.853	± 0.042	Cadmium	21.8	± 0.2
Manganese	1.01	± 0.04	Copper	2950.0	± 130.0
Phosphorus	0.106	± 0.015	Lead	5532.0	± 80.0
Potassium	2.11	± 0.11	Mercury	32.6	± 1.8
Silicon	28.97	± 0.18	Nickel	14.3	± 1.0
Sodium	1.14	± 0.06	Silver	35.3	± 1.5
Sulfur	0.240	± 0.006	Vanadium	76.6	± 2.3
Titanium	0.283	± 0.010	Zinc	6952.0	± 91.0

The complete Certificate of Analysis can be obtained from the NIST web site at: <http://patapasco.nist.gov/smcatalog/certificates/2710.pdf>

Table 2-7. Non-Certified Values - NIST Standard 2710

Element	Mass Fraction %	Element	Mass Fraction $\mu\text{g/g}$
Carbon	1	Bromine	6
		Cerium	57
		Cesium	107
		Chromium	39
		Cobalt	10
		Dysprosium	5.4
		Europium	1
		Gallium	34
		Gold	0.6
		Hafnium	3.2
		Holmium	0.6
		Indium	5.1
		Lanthanum	34
		Molybdenum	19
		Neodymium	23
		Rubidium	120
		Samarium	7.8
		Scandium	8.7
		Strontium	330
		Thallium	1.3
		Thorium	13
		Tungsten	93
		Uranium	25
		Ytterbium	1.3
		Yttrium	23

Table 2-8. NITON Analyzers Soil Standards Substitutions Comparisons

Element	NCS DC 73308	NIST Low	Element	TILL-4	NIST Medium
Ag	0.27 +/- 0.02	0.41 +/- 0.03	Ag		4.6 +/- 0.4
As	25 +/- 3	17.7 +/- 0.8	As	111	105 +/- 8
Au (0.3)			Au	5 ppb	(0.03)
Ba	42 +/- 7	968.0 +/- 40.0	Ba	395	726 +/- 38
Be	0.9 +/- 0.2		Be	3.7	
Bi	0.38 +/- 0.04		Bi	40	
Br	2.4 +/- 0.5		Br	8.6	(5)
Ca (%)	0.28	1.89 +/- 0.05	Ca (%)	0.89	2.88 +/- 0.08
Cd	1.1	0.38 +/- 0.01	Cd		41.7 +/- 0.25
Ce	38 +/- 4	(42)	Ce	78	(69)
Co	15.3 +/- 1.1	13.40 +/- 0.70	Co	8	(10)
Cr	136 +/- 10	130.00 +/- 4.00	Cr	53	(47)
Cs	2.3 +/- 0.5	(5.3)	Cs	12	(6.1)
Cu	22.6 +/- 1.3	34.6 +/- 0.7	Cu	237	114.0 +/- 2.0
Eu	0.47 +/- 0.04	(0.9)	Eu	<1.0	(1)
Er	1.3 +/- 0.2		Er	3.2	
Fe (%)	2.7	3.50 +/- 0.11	Fe (%)	3.97	2.89 +/- 0.06
Ga	6.4 +/- 0.7	(14)	Ga		(15)
Gd	2.2 +/- 0.2		Gd		
Ge	0.40 +/- 0.06		Ge		
Hf	1.8 +/- 0.4	(3.7)	Hf	10	(7.3)
Hg	0.28 +/- 0.03	1.4 +/- 0.08	Hg		6.3 +/- 0.2
I	1.6 +/- 0.3		I		
In	0.067 +/- 0.016		In		(1.1)
K (%)	1041 ppm	2.03 +/- 0.06	K (%)	2.70	2.45 +/- 0.08
La	13.0 +/- 0.9	(23)	La	41	(40)
Li	13.0 +/- 0.5		Li	30	
Mn	1010 +/- 29	538.0 +/- 17.0	Mn	490	638 +/- 28
Mo 1.2	+/- 0.1	(2.0)	Mo 16		(1.6)
Nb	6.8 +/- 1.3		Nb	15	

Table 2-8. NITON Analyzers Soil Standards Substitutions Comparisons

Element	NCS DC 73308	NIST Low	Element	TILL-4	NIST Medium
Nd	11.8 +/- 1.1		Nd	30	
Ni	30 +/- 2	88.0 +/- 5.0	Ni	17	20.6 +/- 1.1
P	271 +/- 15	0.062% +/- 0.005%	P	880	0.086% +/- 0.007%
Pb	27 +/- 2	18.9 +/- 0.5	Pb	50	1162 +/- 31
Rb	9.2 +/- 1.5	(96)	Rb	161	(110)
S (%)	(90 mg/kg)	0.089 +/- 0.002	S (%)	0.08	0.042 +/- 0.001
Sb	6.3 +/- 0.6	7.9 +/- 0.6	Sb	1	19.4 +/- 1.8
Sc	4.1 +/- 0.4	(12.0)	Sc	10	(9.0)
Se		1.57 +/- 0.08	Se		1.5 +/- 0.1
Si (%)	41.55	29.66 +/- 0.23	Si		
Sm	2.4 +/- 0.2		Sm	6.1	
Sr	25 +/- 3	231.0 +/- 2.0	Sr	109	245.3 +/- 0.7
Ta	0.44 +/- 0.12		Ta	1.6	
Tb	0.42 +/- 0.07		Tb	1.1	
Th	5.0 +/- 0.3	(11.0)	Th	17.4	(14.0)
Ti (%)	0.127 +/- 0.007	0.342 +/- 0.024	Ti (%)	0.484	0.306 +/- 0.023
U	2.1 +/- 0.2	(3.0)	U	5	(2.6)
V	107 +/- 5	112.0 +/- 5.0	V	67	81.6 +/- 2.9
W	1.6 +/- 0.3	(2.0)	W	204	(3.0)
Y	14 +/- 2	(18.0)	Y	33	(25.0)
Yb	1.2 +/- 0.2		Yb	3.4	
Zn	46 +/- 4	106.0 +/- 3.0	Zn	70	350.4 +/- 4.8
Zr	70 +/- 6	(160.0)	Zr	385	(230.0)

values in mg/kg unless otherwise specified
 uncertified values in parentheses

Replacement Standards for Discontinued NIST Samples

Table 2-9. Low Standard - NCS DC 73308 (Replaces NIST 2709)

Element	Mass Fraction μg/g	Variation μg/g
Ag	0.27	± 0.02
As	25	± 3.
Au		±
B	26	±4
Ba	42	±7
Be	0.9	± 0.2
Bi	0.38	± 0.04
Br	2.4	± 0.5
Cd	1.12	± 0.08
Ce	38	± 4
Cl	[53]	±
Co	15.3	± 1.1
Cr	136	± 10
Cs	2.3	±0.5
Cu	22.6	+1.3
Dy	2.2	± 0.3
Er	1.3	± 0.2
Eu	0.47	± 0.04
F	149	± 25
Ga	6.4	± 0.7
Gd	2.2	± 0.2
Ge	0.40	± 0.06
Hf	1.8	± 0.4
Hg	0.28	± 0.03
Ho	0.45	± 0.07
I	1.6	± 0.3
In	0.067	± 0.016
La	13.0	± 0.9
Li	13.0	± 0.5
Lu	0.19	± 0.03
Mn	0.41010	± 29

Table 2-9. Low Standard - NCS DC 73308 (Replaces NIST 2709)

Element	Mass Fraction μg/g	Variation μg/g
Mo	1.2	± 0.1
N	[360]	±
Nb	6.8	± 1.3
Nd	11.8	± 1.1
Ni	30	± 2
P	271	± 15
Pb	27	± 2
Pr	3.2	± 0.4
Rb	9.2	± 1.5
S	[90]	±
Sb	6.3	± 0.6
Sc	4.1	± 0.4
Se	0.28	± 0.05
Sm	2.4	± 0.2
Sn	1.4	± 0.3
Sr	25	± 3
Ta	0.44	± 0.12
Tb	0.42	± 0.07
Te	0.08	± 0.02
Th	5.0	± 0.3
Ti	1270	± 70
Tl	0.21	± 0.05
Tm	0.20	± 0.03
U	2.1	± 0.2
V	107	± 5
W	1.6	± 0.3
Y	14	± 2
Yb	1.2	± 0.2
Zn	46	± 4
Zr	70	± 6

Data enclosed in brackets [x.y] are reference values.

Table 2-10. Medium Standard - TILL-4 (Replaces NIST 2711)

Element	Mass Fraction %	Element	Mass Fraction $\mu\text{g/g}$
Fe	3.97	As	111
LOI (500°C)	4.4	Au	0.005
S	0.08	Ba	395
		Be	3.7
		Bi	40
		Br	8.6
		Ce	78
		Co	8
		Cr	53
		Cs	12
		Cu	237
		Eu	<1.0
		Er	3.2
		Hf	10
		La	41
		Li	30
		Lu	0.5
		Mn	490
		Mo	16
		Nb	15
		Nd	30
		Ni	17
		P	880
		Pb	50
		Rb	161
		Sb	1.0
		Sc	10
		Sm	6.1
		Sr	109
		Ta	1.6
		Tb	1.1

Table 2-10. Medium Standard - TILL-4 (Replaces NIST 2711)

Element	Mass Fraction %	Element	Mass Fraction μg/g
		Th	17.4
		Ti	4840
		U	5.0
		V	67
		W	204
		Y	33
		Yb	3.4
		Zn	70
		Zr	385

The Menu System
Certified Values for Bulk Standards

Chapter 3 Alloy Testing

Using Alloy Testing Mode

Alloy Testing Mode is not enabled on your NITON XLp analyzer. For more information on this feature please contact NITON's Customer Service Department in the United States, Toll free, at (800) 875-1578, or outside the United States at + 1-978-670-7460 or your authorized NITON Service Center.

Alloy Testing
Using Alloy Testing Mode

Chapter 4 Pb Paint Mode

Using Pb Paint Mode

Your NITON XLp-300 Series Lead-in-Paint Analyzer is designed to detect and quantify the amount of lead present in painted surfaces. Your analyzer also tracks important information about your site readings using the integrated bar-code scanner or the analyzer's control panel.

Lead Paint inspection guidelines and protocols are specific to the country and state in which the testing is being performed. For the HUD testing guidelines and the NITON Analyzer Performance Characteristic Sheet (PCS), please go to www.hud.gov

The Pb Paint Mode Menu

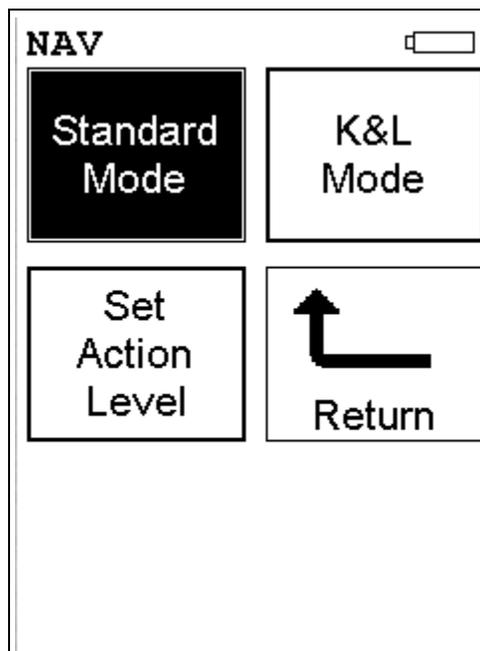
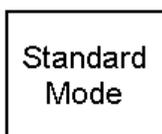
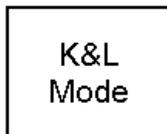


Figure 4-1. The Pb Paint Mode Menu

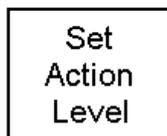
All NITON XLp-300 Series Lead-in-Paint Analyzer Mode functions are accessible from the Pb Paint Mode Menu and subsidiary menus. Each of the instrument functions represented by an icon on the Pb Paint Mode Menu screen may be selected by choosing the appropriate icon. When one of these Pb Paint Mode Menu icons is selected, the function specific sub-menu appropriate to that icon will be displayed. All Lead-In-Paint modes use both L and K shell analysis simultaneously.



The Standard Mode icon allows you to select the Lead-in-Paint Standard Mode. Standard Mode is a qualitative analysis designed for 95% confidence level as to whether the sample is above or below the Action Level. This mode tends to give very fast readings, as it terminates the test as soon as 95% confidence has been achieved.



The K+L Mode icon allows you to select the Lead-in-Paint K+L Mode. K+L Mode is a quantitative analysis which allows you to determine the statistical confidence of the reading to a 95% Confidence Level while allowing you the flexibility of continuing the test for as long as you wish up to the (user-definable) maximum test time.



The Set Action Level icon allows you to set the action level for Lead-in-Paint to match the official action level of your locality.

The Standard Mode Menu

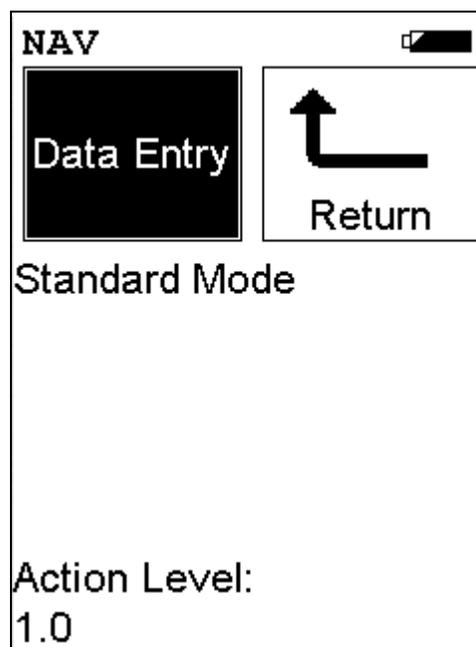


Figure 4-2. The Standard Mode Menu

All NITON XLp Standard Mode functions are accessible from the Standard Mode Menu and subsidiary sub-menus. From the **Standard Mode Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **Standard Mode Menu** to go to the “[The Data Entry Screens](#)” on [page 4-10](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



The K+L Mode Menu

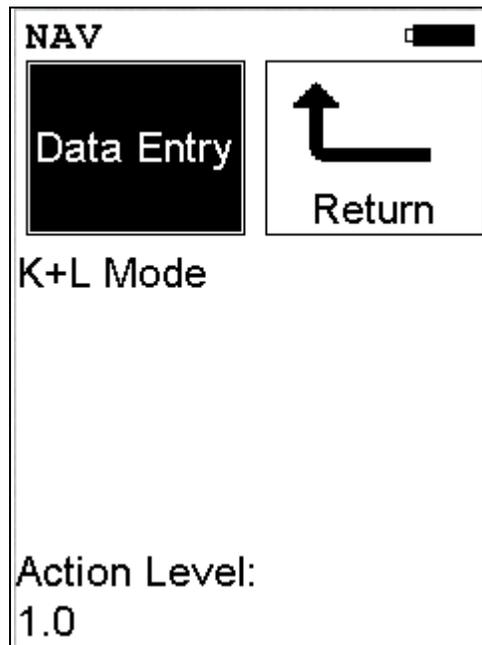
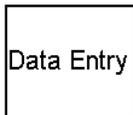


Figure 4-3. The K+L Mode menu

All NITON XLp K+L Mode functions are accessible from the K+L Mode Menu and subsidiary sub-menus. From the **K+L Mode Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **K+L Mode Menu** to go to the “[The Data Entry Screens](#)” on [page 4-10](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



The Set Action Level Screen

The Set Action Level Screen is accessible from the Paint Mode Menu. When the Set Action Level icon is selected, the Set Action Level Screen will be displayed.

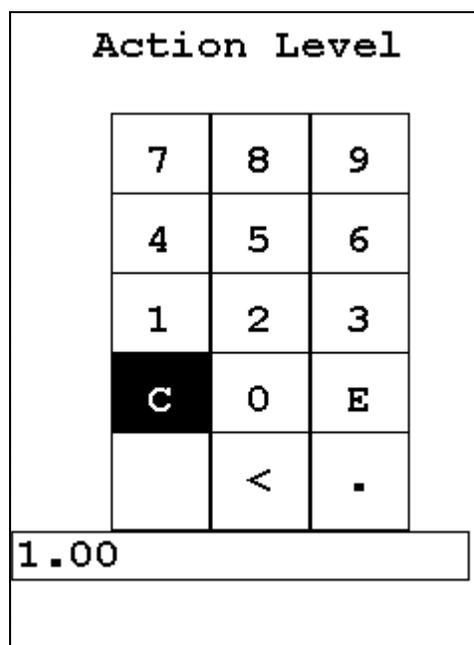


Figure 4-4. The Set Action Level Screen

To change the preset Action Level to match the Action Level set by your locality, select the “C” key from the Virtual Numeric Keypad to clear the current Action Level value, select the new Action Level value using the numeric keys, then select “E” to enter the new Action Level value. The Action Level will be changed to the new value.

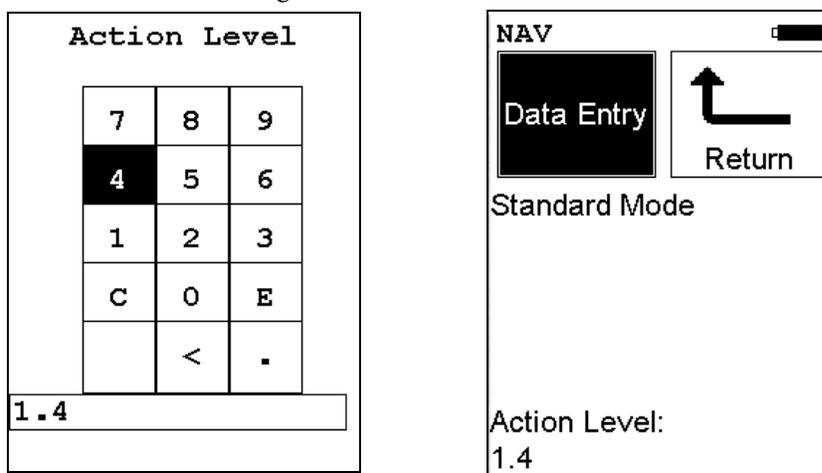


Figure 4-5. Changing the Action Level

Taking a Reading



CAUTION After being powered on, the NITON 300 Series Analyzer will perform an internal re-calibration before an analysis is initiated. It is recommended that you let your instrument warm up for ten minutes after start up, before testing is begun. ♦

There are five different methods of operation for taking a sample measurement, and your analyzer will be configured to use one of those methods, depending on the regulatory requirements of your locality. These methods are:

- **Trigger-Only method.** With the Trigger-Only method, you only need to place the measurement window close to the sample to be analyzed and pull the trigger for sample analysis to be initiated.
- **Trigger-and-Proximity-Sensor method.** With the Trigger-and-Proximity-Sensor method, you must place the measurement window against the sample to be analyzed to engage the proximity sensor on the front of the instrument, then pull the trigger for sample analysis to be initiated.
- **Momentary-Trigger-Touch-and-Proximity-Sensor method.** With the Momentary-Trigger-Touch-and-Proximity-Sensor method, you must place the measurement window against the surface to be analyzed to engage the proximity sensor on the front of the instrument, then pull the trigger.
- **The trigger may be released and the reading will continue until you release the proximity button, or other criteria (such as Max Time) are reached.**
- **Trigger-and-Interlock method.** With the Trigger-and-Interlock method, you need to place the measurement window close to the sample to be analyzed, press and keep pressing the interlock button at the rear of the instrument with your free hand, then pull the trigger for sample analysis to be initiated.
- **Trigger-Interlock-and-Proximity-Sensor method.** With the Trigger-Interlock-and-Proximity-Sensor method, you must place the measurement window against the sample to be analyzed to engage the proximity sensor on the front of the instrument, press and keep pressing the interlock button at the rear of the instrument with your free hand, then pull the trigger for sample analysis to be initiated.

With any of these methods, analysis will stop if any one of the preconditions are violated. For example, with the Trigger-Interlock-and-Proximity-Sensor method, if the trigger or the Proximity Sensor or the Interlock is released, the reading will stop immediately, and the shutters will close.

After your NITON XLp analyzer is calibrated, initiate a sample reading using the appropriate method. If you attempt to initiate a sample reading using a different method, the analyzer will inform you that one or more of the preconditions need to be met in order for sample analysis to begin.

Note The three LED lights will blink during calibration or whenever there is a shutter open. ♦



WARNING! The preconditions for operation must be continued for the duration of the reading. If the preconditions are violated, all the shutters will close, and the measurement will end. The three LED lights will stop blinking, the shutters will close, and the measurement will end. The flashing of the LED lights is not synchronized to minimize power consumption. ♦



WARNING! The three LED warning lights are designed to blink only during a measurement, where one or more of the shutters are open and the trigger depressed. If the LED lights blink at any other time, disconnect the battery pack immediately, place the instrument in its shielded holster, place the holster in the shielded carrying case, and call Thermo Scientific's Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460, or your local Authorized NITON Analyzers Service Center. ♦

Your NITON Analyzer will display the Results Screen throughout the duration of each reading, The Results Screen is updated regularly throughout the reading. When the reading is complete, a final screen update will appear, and your NITON analyzer will display the final results of the measurement which has just been completed.

Standard Mode Results Screen

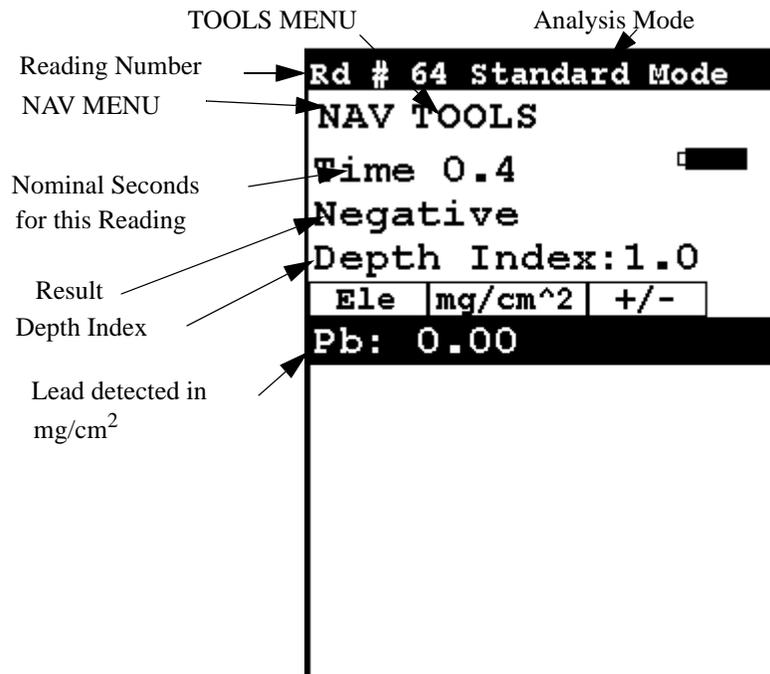


Figure 4-6. Standard Mode Results Screen

Before the analyzer has reached a determination, the result will be shown as “Inconclusive”. Your analyzer will beep twice when a result is reached then terminate the reading. The display will change from “Inconclusive” to show the result, either “Positive” for lead detected above the action level, or “Negative” for no lead or lead below the action level. It will also display the amount of lead detected in mg/cm².

The Depth Index is a numerical value indicating the amount of non-lead paint covering the lead (if any) detected by the analyzer.

- A Depth Index of less than 1.5 indicates a reading very near the surface.
- A Depth Index between 1.6 and 4.0 indicates a moderate depth.
- A Depth Index of greater than 4.0 indicates a deeply buried reading.

K+L Mode Results Screen

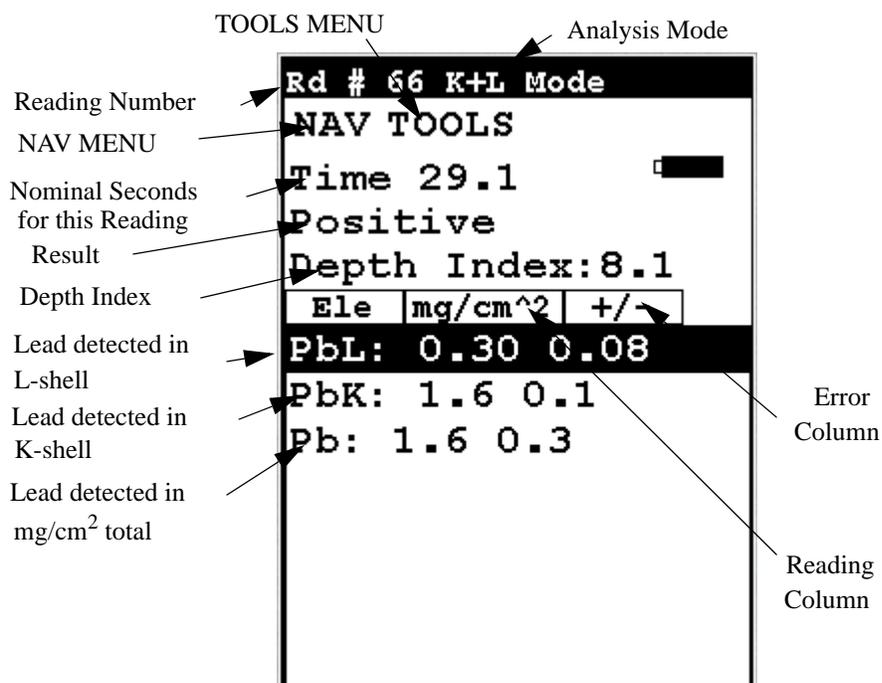


Figure 4-7. K+L Mode Results Screen

The K+L Mode Results Screen will show the same basic display throughout the reading. Your analyzer will beep twice to indicate it has reached a conclusion, and the Result field will change from “Inconclusive” to “Positive” or “Negative”, but the reading will continue for as long as you continue to hold down the trigger and depress the Proximity Sensor.

The K+L Results Screen shows the reading results and error for both K and L-shell readings. The “Lead Detected in mg/cm² total” field is the result of the judgement of your analyzer as to which reading, K or L-shell, best represents the true condition.

The **Depth Index** is a numerical value indicating the amount of non-lead paint covering the lead (if any) detected by the analyzer.

- A Depth Index of less than 1.5 indicates a reading very near the surface.
- A Depth Index between 1.6 and 4.0 indicates a moderate depth.
- A Depth Index of greater than 4.0 indicates a deeply buried reading.

The Data Entry Screens

The Data Entry Screens allow you to set the values for various parameters tracked by the system along with the actual analysis results. This screen allows you to input data in several different fields, or categories, concerning your sample, in several different ways:

- By selecting the Virtual Keyboard button and typing the parameter in using the **Virtual Keyboard**.
- By scanning in the parameter name using the integrated bar code scanner.
- By creating a new, or editing your analyzer's existing, '.ndf' file through the NDT program. You can then select from the various custom options you have created using the Drop-down List button.

These fields are saved along with the subsequent reading, and allow you to associate important information about the sample directly with the reading, so that you have a full description of the sample tied into the reading itself.

These parameters all describe the particular test target to be analyzed. The location of the target in the site, the type of target, the surface and substrate, the condition of the surface, and the inspector performing the test are some of the parameters tracked by the analyser.

Navigating the Data Entry Screen

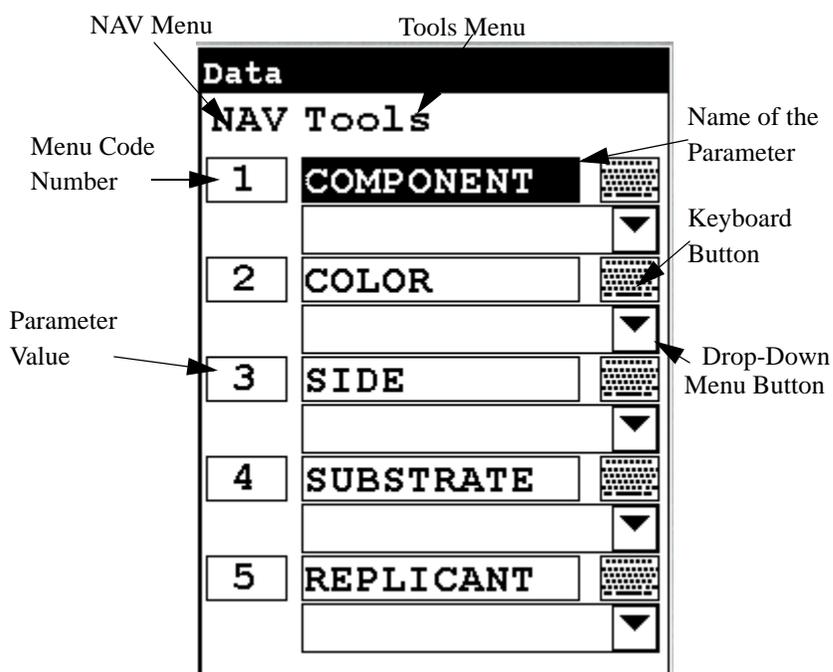


Figure 4-8. Navigating the Data Entry Screen

Above is a sample of the Data Entry Screen. To navigate through the Data Entry Screen and select your parameter settings, you can use the touch screen display or 4-way touch pad and control panel buttons.

Navigating the Data Entry Screen

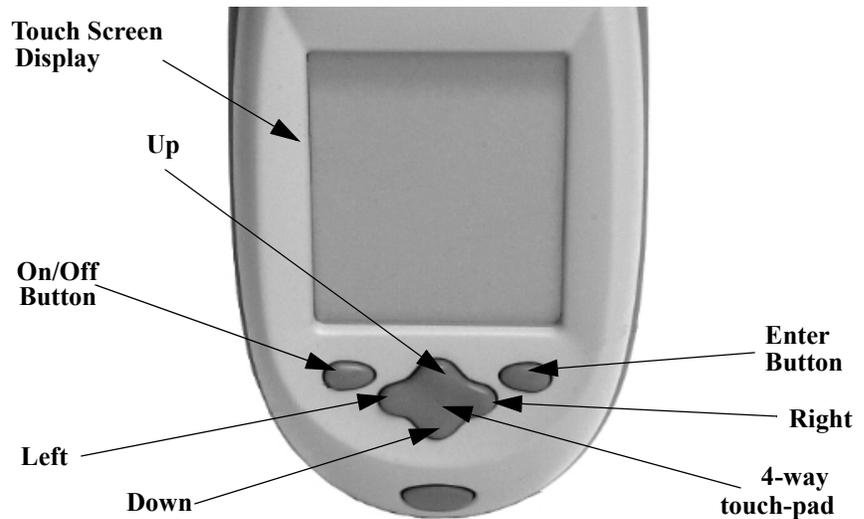


Figure 4-9. The Control Panel

The following description of screen navigation using the control panel assumes that the analyzer is held so that the display is held upright as in [Figure 4-9](#).

- To move from column to column, use the Right and Left portion of the 4-way touch pad.
- To move from row to row, use the Up and Down portions of the 4-way touch pad.
- To select the highlighted option, press the Enter button on the control panel.

The *Data Entry* Screen is divided into sections of 5 setting parameters. By using the Down portion of the 4-way touch pad when you are on the last row of a section, the display will change to the next section. By using the Up portion of the 4-way touch pad when you are on the first row of a section, the display will change to the previous section.

By selecting the *On/Off* button, you can exit the *Data Entry* Screen.

Using The Data Entry Screen

Data	
NAV Tools	
1	COMPONENT
2	COLOR
3	SIDE
4	SUBSTRATE
5	REPLICANT

Figure 4-10. The Data Entry Screen - First Section

This is the first section of the Data Entry Screen. There are five parameters in this section.

- Selecting Component allows you to input the reading location Component parameter.
- Selecting Color allows you to input the reading location Color parameter.
- Selecting Side allows you to input the reading location Side parameter.
- Selecting Substrate allows you to input the reading Substrate parameter.
- Selecting Replicant allows you to input the reading Replicant parameter.

Data			
NAV Tools			
6	SITE	[Keyboard Icon]	[Dropdown Arrow]
7	SPACE TYPE	[Keyboard Icon]	[Dropdown Arrow]
8	SPACE	[Keyboard Icon]	[Dropdown Arrow]
9	RM/FL NO	[Keyboard Icon]	[Dropdown Arrow]
10	ROOM	[Keyboard Icon]	[Dropdown Arrow]

Figure 4-11. The Data Entry Screen - Second Section

This is the second section of the Data Entry Screen. There are five parameters in this section.

- Selecting Site allows you to input the reading Site parameter.
- Selecting Space Type allows you to input reading the reading location Space Type parameter.
- Selecting Space allows you to input the reading location Space parameter.
- Selecting Rm/Fl No allows you to input the reading location Rm/Fl No parameter.
- Selecting Room allows you to input the reading Room parameter.

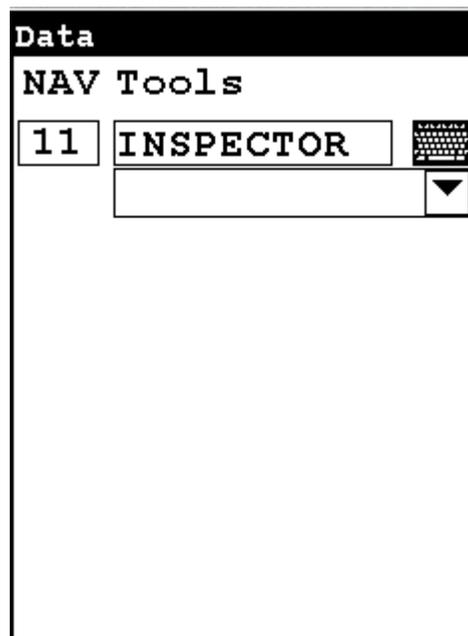


Figure 4-12. The Data Entry Screen - Third Section

This is the third section of the Data Entry Screen. There is one parameter in this section.

- Selecting Inspector allows you to input the reading Inspector parameter.
- 1**
- Selecting the Menu Code Number will initiate a bar code scan to input pre-printed bar code parameter values
- 
- Selecting the Drop-Down Menu Button will access the particular Drop-Down Menu for that parameter, allowing you to select the parameter value from a pre-determined list.
- 
- Selecting the Keyboard button allows you to input a parameter value as required using the Virtual Keyboard.

Lead in Consumer Products

Your analyzer is capable of screening toys, children's jewelry, and other consumer products for the presence of Lead (Pb). The primary goal of screening is not to accurately analyze the chemical composition of all components or parts of the product, but to identify and segregate products containing prohibited elements.

Consumer Products SOP

The following is the Standard Operating Procedure (SOP) for finding lead in consumer products.

Preparatory Tasks

- 1. Attach a charged battery to the analyzer and turn it on. Follow the screen instructions and Log On as the operator.**
- 2. Wait five (5) minutes before using the analyzer, allowing the instrument's electronics to stabilize.**
- 3. Verify that the date is set properly for data tracking purposes.**
- 4. From the Main Menu, select Utilities -> Instrument Specs. The date will be displayed for verification. To escape back to the Main Menu, press the On/Off/Escape button. If the date is incorrect, correct it prior to proceeding.**
- 5. If testing will be performed on small samples, mount the analyzer in its optional test stand. Any sample that does not completely cover the analyzer measuring window (aperture) is considered small. Also, samples that have a form of thin sheet, such as foil, paper, fabric, etc., should also be analyzed in a test stand.**

(Optional) Connect the analyzer to a computer via the included serial cable or Bluetooth wireless module. Consult the Guide to NDT_r and the Bluetooth Installation Guide document for details, if necessary.

- 6. During analysis and detector calibrations, it is important to ensure that the analyzer is not exposed to strong electromagnetic fields, including those produced by computer monitors, hard drives, cellular telephones, walkie talkies, etc. Keep a minimum two (2) feet (0.7 meters) distance between the analyzer and electronic devices.**

7. From the Main Menu, select Utilities‡ Calibrate -> Calibrate Detector.

- a. Detector calibration standardizes the detector. After starting the process, no further user interaction is required during this operation. Note the “Res” figure displayed following the detector calibration. This number, usually <500eV, is an evaluation of the detector resolution and should be consistent with past calibration results. This data will download as a stored reading if the user chooses to download readings, so it can be saved for tracking the instrument’s performance
- b. If the “Res” number is consistent with past detector calibration results, continue to step 8.
- c. If the “Res” figure varies by more than 20 percent over the average of multiple detector calibrations, move the analyzer away from potential interference sources (as discussed in item 6 above), and repeat the detector calibration steps. If the resolution does not return to its standard range, please contact Thermo Scientific Niton Analyzers toll-free at (800) 875-1578 (US only), +1 978 670-7460 (outside US), via email at niton@thermofisher.com, or your local Niton Analyzer representative for assistance.

Plastics 8. From the Main Menu, select Mode -> Consumer Goods Mode -> Plastics Mode.

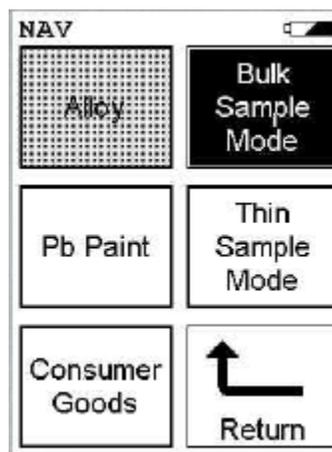


Figure 4-13. Mode Screen

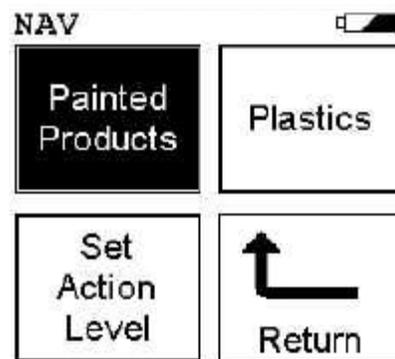


Figure 4-14. Consumer Goods Mode

- a. Place the Reference Sample (PN 180-619) in the test stand for analysis, or set the reference sample on a clean surface. The unlabeled side should be presented to the analyzer. Place the front end of the instrument against the sample with the window centered on the sample. Due to the length of this check measurement, it is recommended that a test stand be used. It can be difficult to hold the analyzer steady on the reference sample for the required length of time.
- b. Take one to three 60-second measurements on this reference sample. Ensure that the analyzer has the maximum test time set to 60 (seconds). From the Main Menu, select Common Setup -> Instrument Setup -> Hardware Setup. Edit the Max. Time dialog box to the proper setting. Average the results. Results can be averaged via the TOOLS drop down menu.
- c. Compare the averaged results with the acceptable ranges as listed in Table 1. The averaged results should fall within these specified values.

Table 4-1. Plastic “Reference Sample in PE Matrix” Nominal Concentrations and Allowable Ranges

Element	Nominal Concentration* (mg/kg)**	Acceptable Range (±% Rel)	Acceptable Range (mg/kg)
Pb 1	50	15%	127-173

*Please refer to the certificate accompanying the reference sample for actual elemental composition data as the concentration may vary from batch to batch.

** Please note that mg/kg is a unit of measure of concentration equal to ppm by mass, i.e., 1000 ppm is equivalent to 1000 (mg/kg) = 0.1%.

- d. If the analyzer reports values within the acceptable ranges of the reference values, it is ready for measurement of unknown samples. Proceed to Analysis of Unknown Samples section.
- e. If the analyzer reports values outside the acceptance tolerance ranges specified in Table 4-1, repeat the detector calibration described in step 7, then repeat the reference sample analysis in step 8a
- f. If the analyzer again fails to meet the acceptance tolerance ranges specified in Table 4-1, please contact Thermo Fisher Scientific or your local representative for assistance.

If lead is in a surface coating the Painted Products mode should be used.

Caution Only use Painted Products mode for consumer goods (toys, apparel, etc). Do not use Standard Mode or K+L Mode for analysis of painted samples not associated with building materials. Do not use Painted Products mode for analysis of building materials.

Follow the procedure outline in step 8.1, but using the Painted Products standard.

Table 4-2. Painted Products “Lead Reference Sample” Nominal Concentrations and Allowable Ranges

Element	Nominal Concentration* (micrograms/cm ²)**	Acceptable Range (±% Rel)	Acceptable Range (micrograms/cm ²)
Pb 3	00	15%	255-345

*Please refer to the certificate accompanying the reference sample for actual elemental composition data.

** Please note that the standard used (green paint) is reported in milligrams/cm². 0.30 milligrams/cm² is equal to 300 micrograms/cm².

Action Levels Painted Products mode allows the XRF instrument to be used to its full advantage, namely as a rapid and non-destructive test. This mode enables a direct positive/negative comparison against the new alternative standard of 2 micrograms/cm². The value of the action level can be set from 2 micrograms/cm² to 9 micrograms/cm², with 2 micrograms/cm² set by default. To change the default value follow the following procedure:

From the Main Menu, select Mode -> Consumer Goods -> Set Action Level

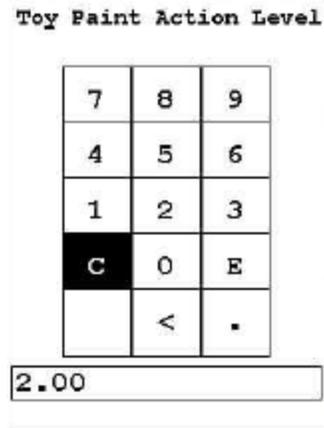


Figure 4-15. Toy Paint Action Level Screen

There is no correlation between micrograms/cm² and ppm, although some research indicates that the value of 1 micrograms/cm² to 9 micrograms/cm² roughly correlates to Pb concentrations in dried paint of 50 ppm to 600 ppm, respectively. However it is important to point out that these are alternate measurements set by the regulators, which means that they don't have to agree with each other to be valid.

When using plastics mode, results are reported in ppm (mg/kg). A pass/fail/inconclusive can be setup to correlate with a certain action levels. Based on the current regulation (as of March of 09), the action level for Pb in consumer products is 600 ppm (300 ppm in August 2009). Given the variability of the samples and the number of possible ways of presenting the sample to the analyzer, the pass criteria should be set lower than 600 ppm. While performing screening activities, we recommend that the identification of any Pb in a sample should alert the user to the need for additional testing to determine true content and location of Pb in the sample; setting the pass/fail level to 100 ppm (factory default) would allow this. To change factory default settings, follow the following procedure:

From the Main Menu, select Common Setup -> Element Display Options
-> Set Element Threshold -> Plastics Mode

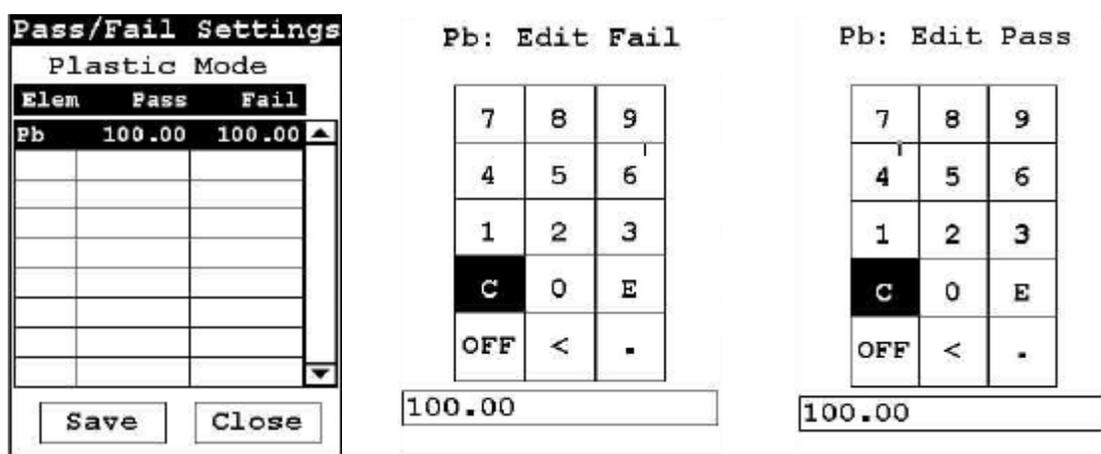


Figure 4-16. Plastics Mode Pass/Fail Action level settings

Analysis of Unknown Samples

Toys and the majority of other consumer products represent a wide variety of material composition, shapes, and functionality. Plastic, wooden, and paper goods should be tested using Plastic Mode. Products and components made of a combination of metallic and nonmetallic parts (materials) should be tested using Plastic Mode. Painted objects should be tested in the Painted Products Mode.

Note The following text applies to the use of a Niton XLp 300 Series XRF analyzer with Consumer Goods mode.

All parts of a product should be screened for the restricted element of lead using the appropriate analytical mode. The primary goal of screening is not to accurately analyze the chemical composition of all components or parts of the product, but to weed out and eliminate from the market products containing lead. Therefore, it is only logical to start testing the product “as is”, without disassembly. This is particularly true of the products that are painted because lead can typically be found in paint. Once the presence of lead is confirmed during testing “as is”, the product can be sequestered, and further testing may not be necessary. If, however, the testing of the product “as is” produces no evidence of lead, but it is suspected that it may be contained in inaccessible parts of the product for direct “as is” testing, one must consider disassembly of the product for compliance testing at the component level. If the product or its components are large enough, they may be tested directly by pressing the analyzer against their surfaces. Otherwise, measurements should be performed in a test stand.

Due to the large variety of consumer products, only general rules of testing, related mainly to proper sample selection and results interpretation, are outlined here. Detailed testing protocols should be developed for specific cases by the user.

General Testing Protocol

Large Objects

These are the objects that can easily cover the measuring window of the analyzer and are typically at least as large as the analyzer.

- 1. Remove the foam from the upper part of the Niton XLp 300 Series analyzer..s carrying case.**
- 2. Place the In-Situ Test Guard on the analyzer. This test guard is used to help enable the front proximity button as required during measurement.**
- 3. Select the areas or fragments of the sample that is to be tested.**
 - a. Based on the type of material, select appropriate analytical mode:
 - i. Plastic Mode for all nonmetallic materials (or if uncertain of material)
 - ii. Painted Products mode for painted surfaces on materials.
- 4. Place the measuring window of the analyzer flush within the area identified on the toy or product for analysis and pull the trigger to start measurement.**
- 5. Figures 4-17, 4-18 and 4-19 show examples of positioning the materials to be measured.**
- 6. Continue the measurement until the display says PASS or FAIL. While a FAIL may appear immediately when a sample contain high levels of Pb, it is advisable to analyze all samples for a minimum amount of time for consistency purposes. The minimum time may be 30 to 60 source seconds. Experience with continued sampling can help determine what is best for your application.**

7. Figures 4-20 to 4-23 show the results screen for each mode.
8. When testing larger surfaces, it is advisable to take several measurements at different locations. This is especially important if the surface tested is partially painted, plated, or otherwise appears different from location to location, including areas with different color paints. This will help in identifying the location of any Pb found during the screening, whether in the substrate, paint, or both.
9. If the foam is not used for the measurement, insure that the surface holding the object being tested does not contain lead by testing the surface prior to screening unknown samples.
10. The object being tested should be at least one inch (2 centimeters) in thickness.
11. Continue the measurement as planned.



Figure 4-17. Screening a larger object.



Figure 4-18. One possible way of screening a toy.



**Figure 4-19. The sweater is placed on the table for measurement.
Ensure the table has no lead by first measuring it with the analyzer.**

Rd # 10 Painted Product		
NAV TOOLS		
Time 3.6		
Positive		
Ele	ug/cm ²	+/-
Pb	327.5	21.04

Figure 4-20. The results screen shows a positive result for lead in paint.

# 16 Non-PVC Mode		
NAV TOOLS		
Time 2.3 sec		
Non-PVC Type		
Inconclusive		
Ele	ppm	+/-
Pb	1778	166

Figure 4-21. Inconclusive reading for this plastic item. A high levels of Pb appears to be present but more time is needed for the measurement at the current threshold limit to conclusively determine that the result is positive.

```
# 70 Non-PVC Mode
NAV TOOLS
Time 24.4 sec
Non-PVC Type
Fail


| Ele  | ppm | +/- |
|------|-----|-----|
| Pb * | 505 | 18  |


```

Figure 4-22. The result indicates fail (action level set at 100 ppm)

```
# 101 Non-PVC Mode
NAV TOOLS
Time 8.4 sec
Non-PVC Type
Pass


| Ele | ppm  | +/- |
|-----|------|-----|
| Pb  | nd < | 9   |


```

Figure 4-23. The result indicates pass (action level set at 100 ppm)

Small Objects These are objects that are typically smaller in size than analyzer, but still large enough to cover the measuring window of the analyzer.

1. The foam may be used as in the protocol for the Large Objects.

- a. Optionally, place the object in a test stand in such a way that the area selected for testing covers the measuring aperture of the instrument as much as possible. If the toy cannot be manipulated into a position suitable for measurement, one may need to use some small objects to support the object in proper position.

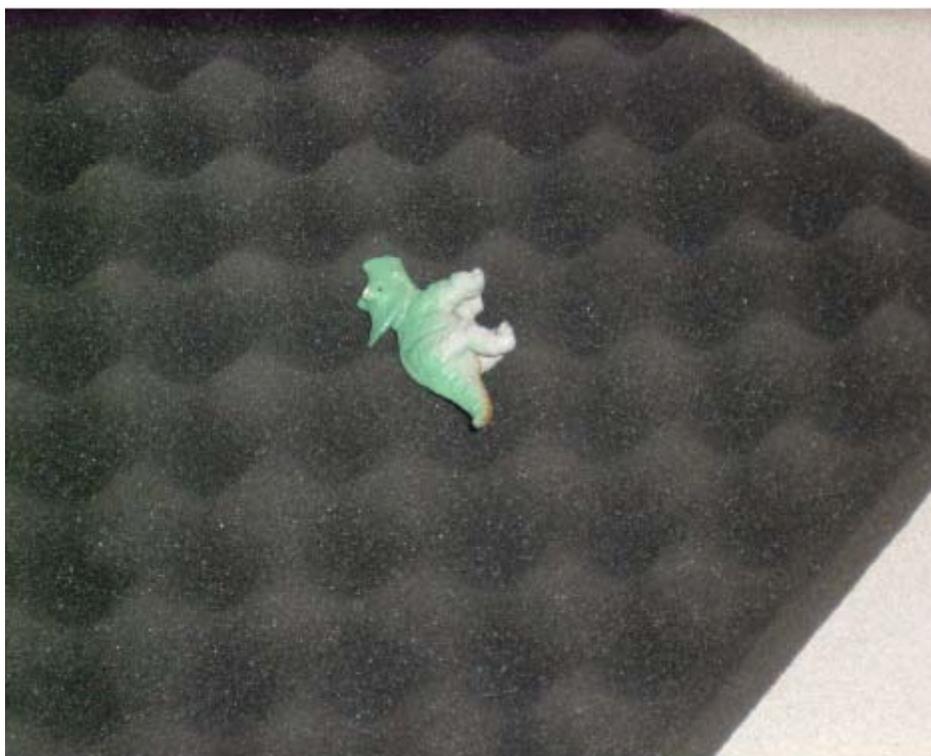


Figure 4-24. The figure is positioned so that the item in Figure 15 is balanced on its side,

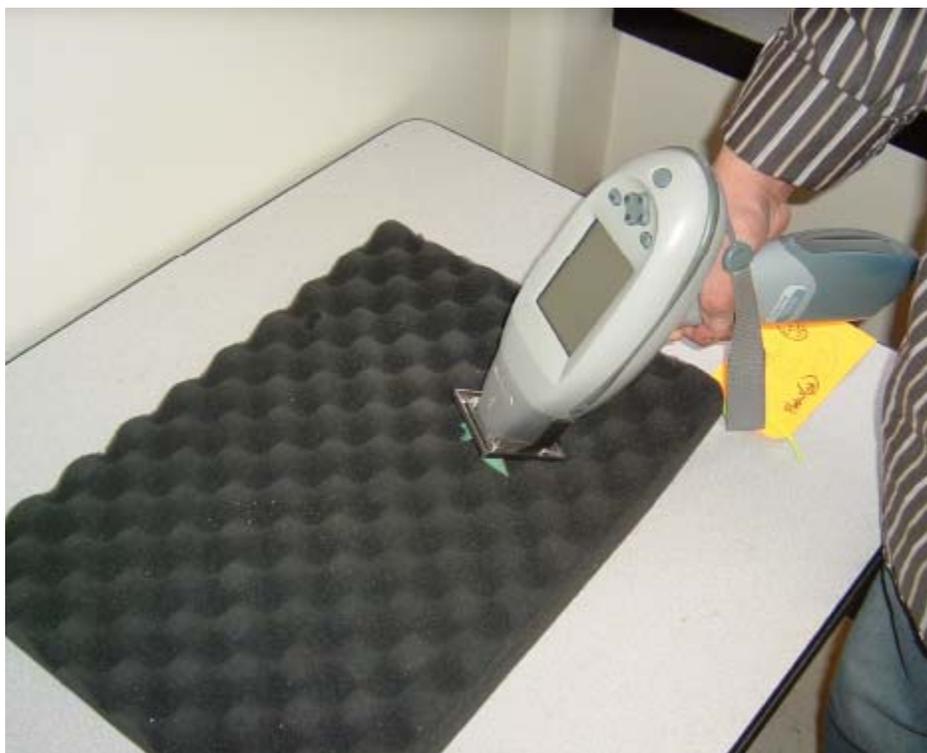


Figure 4-25. The item is placed on the foam supplied in the top of the instrument carrying case

A second option is to use a test stand (not supplied)



Figure 4-26. Niton XLP 300 Series shown with optional portable (part #500-961) and bench-top (part #600-705) test stands

- b. First select the areas or fragments of the object that are to be tested.
- c. Mount the analyzer in a test stand and connect the analyzer to a PC (via Serial Cable, or via Bluetooth). Start the NDT_r Program on PC.
- d. Place the object in a test stand in such a way that the area selected for testing covers the measuring aperture of the instrument as much as possible. If the toy cannot be manipulated into a position suitable for measurement, one may need to use some small objects to support the object in proper position. Common, small rubber erasers were found suitable and convenient for such task. Care must be taken to not allow any part of the support to be within the perimeter of the measuring window of the analyzer. Figures 4-27 and 4-28 show examples of how the object can be manipulated into proper testing position.
- e. Based on the type of material, select appropriate analytical mode:
 - i. Plastic Mode for all nonmetallic materials and combinations of nonmetallic
 - ii. Painted Products Mode for painted surfaces.
- f. Start the measurement, preferably via a PC using the NDT_r software program.
- g. Continue the measurement until the display says PASS or FAIL.
- h. If possible, take more than one measurement of the sample, preferably in a different location.

2. Continue measurements as planned.



Figure 4-27. The unpainted bulk of the dinosaur's foot



Figure 4-28. Positioning the sample for analysis may require a helping hand

Very Small Objects These are objects that are not large enough to cover the analyzer measuring window, typically less than 10 mm in any dimension, e.g., beads, small jewelry pieces, chains, etc.

- 1. Mount the analyzer in a test stand and connect it to PC (via Serial Port or Bluetooth). Start NDTr software program on user's PC.**
- 2. Stretch taut a piece of Mylar film (Part Number 187-462) over the measuring aperture of the analyzer and secure it with tape.**
- 3. Place the object in a test stand in such a way that it resides in the center of the measuring window of the analyzer. If available, it is possible to take more than one identical small item and pile a small quantity of them over the measuring window of the analyzer. However, one must be certain that these individual items are identical in composition.**
- 4. Based on the type of material, select appropriate analytical mode:**
 - a. Plastic Mode for all nonmetallic materials
 - b. Painted Products Mode for paint on consumer products.
- 5. Start the measurement, preferably using NDTr.**
- 6. Continue the measurement until the display says PASS or FAIL.**
- 7. Continue measurements as planned.**

Pb Paint Mode
Lead in Consumer Products

Chapter 5 Thin Sample Test Modes

You can use your NITON XLp Environmental Analyzer to measure a wide range of thin samples, such as:

- 25 mm and 37 mm diameter filters used for exposure monitoring and air sampling methods.
- Total Suspended Particulate (TSP) and Particulate Monitoring (PM) filters.
- Dust Wipes.
- Thin coatings, depending on the substrate.
- Filters used for capturing suspended or dissolved metals in liquids

There are specific procedures for specific applications. Methods for many of these applications have been developed and may be selected from the Thin Sample Mode Menu. Other applications, such as analyzing coatings, may require you to develop your own protocol using User-definable Thin Sample Mode, which is also available from the Thin Sample Mode Menu.

Using Thin Sample Test Modes

The methods you can select have been developed to account for the size of the sample and the distribution of the contamination to be analyzed. Contamination captured on filters or wipes is not usually deposited uniformly, and as filters and wipes are also several times larger than the 1 cm x 2 cm measurement window of the instrument, these sample types usually require reading on separate sections for accurate analysis.

Depending on the sample, the individual readings may be first weighted to account for the loading characteristics of the sampling technique, and then all the individual reading in a sequence are either summed or averaged. This result is multiplied by an adjustment factor to account for the size of the sample and the desired units of measurement, so the final results are displayed with an easily interpreted meaning. (e.g. dust wipes, which are used extensively to test for Pb dust on surfaces report in $\mu\text{g}/\text{wipe}$, which is easily converted to $\mu\text{g}/\text{foot}^2$, the units specified in state and federal regulations.) These calculations will be performed automatically when you choose the appropriate Thin Sample Mode from the Thin Sample Mode Menus.

The Tools Menu

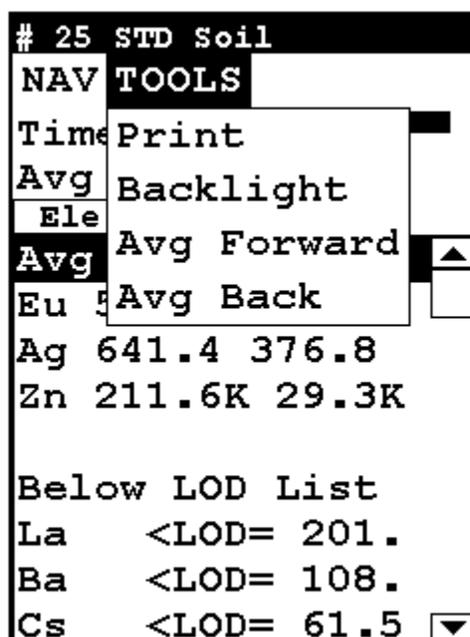


Figure 5-1. The Tools Menu

The Tools Menu enables you to perform common data-related tasks such as printing and averaging. Select a task from the drop down menu to initiate that task.

The Tools Menu, like the NAV Menu, uses context sensitive menus. The following is the most common menu set.

Print Enables you to print the sample analysis to the attached printer.

Backlight Enables you to turn backlighting on and off.

Avg Forward Enables you to average different readings together from this analysis forward. Select Avg Forward to initiate future sample averaging. Avg Forward will set up an automatic personal averaging protocol to be followed until your analyzer is shut down. To begin, select the number of readings you want to average from the virtual numeric keypad. Your analyzer will calculate an average reading after that number of tests, and continue this pattern until stopped. For example, if you select 3 on the virtual keypad, the analyzer will automatically calculate, average, and store a reading for every three tests you take.

Avg Back

Enables you to average different readings together from this analysis backward. Select Avg Back to initiate backwards sample averaging. Avg Back will take a number of readings you select and average their analytical results. The range is counted from the last reading backward by the number of readings selected. If your last reading was #15, selecting 3 would average readings #13, 14, and 15. The average is calculated, displayed, and stored into memory as the next sequential reading number.

Note You cannot average readings taken with different modes - or with different sources if they have different element lists - with either Avg Back or Avg Forward. Alloy and Mining modes use the same element lists with the different sources, so averaging works when switching between sources in either of these modes. Thin Film and Bulk modes both use different element lists for different sources, and readings with different sources cannot be averaged when using either of these modes. ♦

Note The Tools Menu is only available when viewing readings, and the menu is only accessible through the touch screen interface or NDTr. ♦

The range number is selected using a virtual keypad on your analyzer similar to the keypad used for login. Select the digits in the range number from the keypad, then select the “E” key to enter the number. “C” will clear all, and “<” will clear the last digit entered. The average will automatically be displayed.

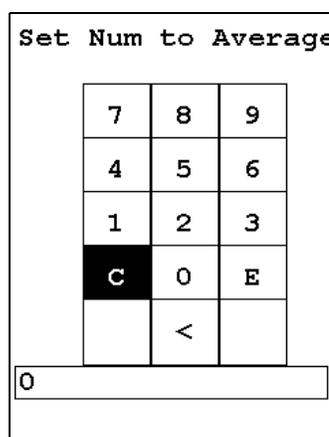
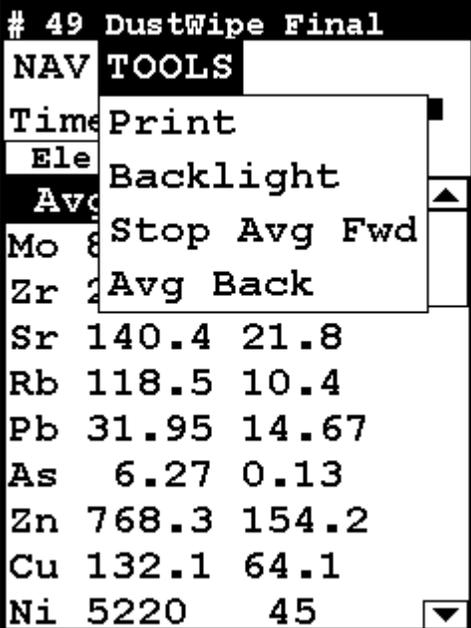


Figure 5-2. Set Range Number Screen

Stop Avg Fwd/Back



The screenshot shows a terminal window with a menu titled 'NAV TOOLS'. The menu items are: 'Time Print', 'Ele Backlight', 'Avg Stop Avg Fwd', and 'Zr Avg Back'. The 'Avg Stop Avg Fwd' option is highlighted. Below the menu, a list of elements and their corresponding values is displayed:

Element	Value 1	Value 2
Sr	140.4	21.8
Rb	118.5	10.4
Pb	31.95	14.67
As	6.27	0.13
Zn	768.3	154.2
Cu	132.1	64.1
Ni	5220	45

Figure 5-3. Stop Average Tool

Avg Back and Avg Forward are toggles. The option on the Tools Menu changes to its opposite when selected. To stop averaging, select Stop Avg Fwd or Stop Avg Back from the Tools Menu as appropriate.

Example Averaging

# 17 Std Filter		
NAV TOOLS		
Time 39.1 sec		
Ele	ug/cm ²	+/-
Zr	0.63	0.35
Sr	0.69	0.35
As	0.77	0.45
Hg	4.66	2.49
Zn	20.88	2.67
Cu	2.89	1.04
Fe	3.09	1.50
Below LOD List		
Ba	<LOD=	12.5

# 18 Std Filter		
NAV TOOLS		
Time 36.6 sec		
Ele	ug/cm ²	+/-
Sn	23.84	15.08
Mo	0.60	0.32
Zr	0.47	0.30
Pb	1.23	0.78
As	0.69	0.42
Hg	3.66	2.18
Zn	17.19	2.39
Cu	3.31	1.10
Ni	1.46	0.81
Fe	2.44	1.31

# 21 Std Filter		
NAV TOOLS		
Time 148.9 sec		
Avg of 17-20		
Ele	ug/cm ²	+/-
Avg of 17-20		
Sn	20.80	13.37
Ag	35.01	22.69
Zr	0.54	0.32
Sr	0.51	0.29
As	0.80	0.45
Hg	4.60	2.46
Zn	19.24	2.55
Cu	3.05	1.06

# 19 Std Filter		
NAV TOOLS		
Time 36.6 sec		
Ele	ug/cm ²	+/-
Sn	32.19	17.21
Ag	38.65	23.42
Zr	0.53	0.32
Sr	0.69	0.35
Pb	1.27	0.80
As	0.77	0.45
Hg	4.54	2.46
Zn	17.51	2.44
Cu	3.17	1.09
Fe	4.25	1.76

# 20 Std Filter		
NAV TOOLS		
Time 36.6 sec		
Ele	ug/cm ²	+/-
Ag	57.90	26.44
Zr	0.53	0.32
As	0.97	0.50
Hg	5.56	2.72
Zn	21.39	2.70
Cu	2.82	1.03
Ni	2.43	1.06
Co	1.86	1.04
Fe	4.98	1.90

Figure 5-4. Averaging four readings

The Thin Sample Mode Menu

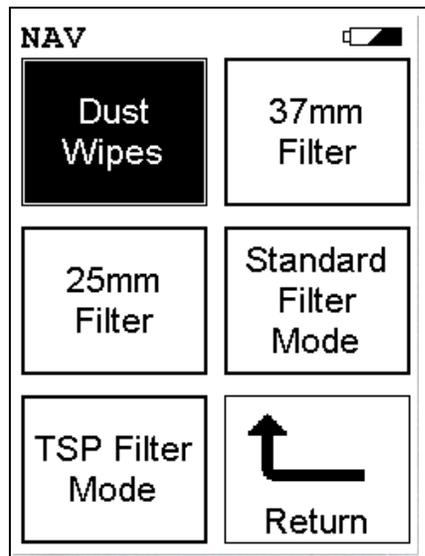


Figure 5-5. The Thin Sample Mode Menu

All NITON XLp Thin Sample Mode functions are accessible from the Thin Sample Mode Menu and subsidiary menus. Each of the instrument functions represented by an icon on the Thin Sample Mode Menu screen may be selected by choosing the appropriate icon. When one of these Thin Sample Mode Menu icons is selected, the function specific sub-menu appropriate to that icon will be displayed.



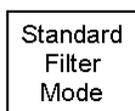
To use the Dust Wipe Testing Mode, simply select the Dust Wipe icon from the Thin Sample Mode Menu to place your instrument into Dust Wipe Testing Mode.



To use the 37mm Filter Testing Mode, simply select the 37mm Filter icon from the Thin Sample Mode Menu to place your instrument into 37mm Filter Testing Mode.



To use the 25mm Filter Testing Mode, simply select the 25mm Filter icon from the Thin Sample Mode Menu to place your instrument into 25mm Filter Testing Mode.



To use the Standard Filter Testing Mode, simply select the Standard Filter Mode icon from the Thin Sample Mode Menu to place your instrument into Standard Filter Testing Mode.

TSP Filter
Mode

To use the TSP Filter Testing Mode, simply select the TSP Filter Mode icon from the Thin Sample Mode Menu to place your instrument into TSP Filter Testing Mode. At the time this User's Guide was published, the TSP Filter Testing Mode was not available on the NITON XLp Analyzer.

For more information on this feature, please contact Thermo Scientific's Customer Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460 or your local Authorized NITON Analyzers Service Center.

Dust Wipe Testing Mode Menu

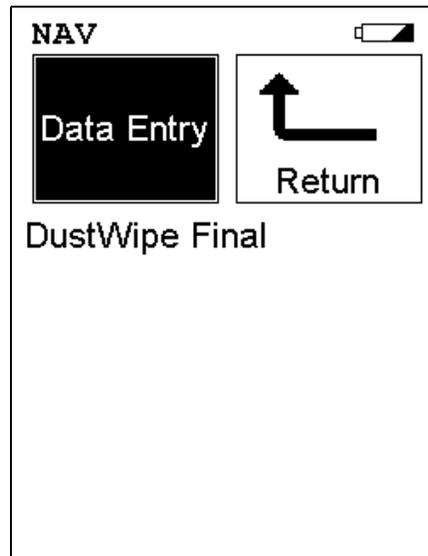


Figure 5-6. Dust Wipe Mode Testing Menu

From the **Dust Wipe Testing Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **Dust Wipe Testing Menu** to go to the “[The Data Entry Screen](#)” on [page 5-24](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



The Dust Wipe Mode prompts you to take four readings on a properly folded and bagged dust wipe, which are then averaged to give you a final test result. Dust wipes are usually analyzed for Pb, though many other contaminants may also be detected.

The wipe recommended by NITON is the Lead Wipe. If the use of other brands is desired, consult with NITON prior to any testing.

Note Some brands of wipes are not compatible with the NITON method. ♦

Lead Wipes are available from Thermo or from:

Lynx Products

Thorofare, New Jersey

(800) 767-6933

The following instructions are appropriate for screening purposes. The instrument displays levels of contamination in μg per wipe. The wipe reflects the levels of contaminants of the area wiped. Current regulations require lead contamination below $40 \mu\text{g}/\text{ft}^2$ on floors, $250 \mu\text{g}/\text{ft}^2$ on window sills, and $400 \mu\text{g}/\text{ft}^2$ in window wells.

Note Check with all local, state and federal regulatory bodies, as the regulations may change from location to location, and from time to time. ♦

Taking a Dust Wipe Sample

NITON assumes that you will follow the HUD guidelines for taking a dust wipe which are summarized here:

- 1. Measure a known area of the surface, preferably one square foot**
- 2. Wear clean surgical gloves. Wipe the measured square with parallel strokes**
- 3. Fold the wipe in half. Wipe in strokes 90° to the original direction.**
- 4. Fold the wipe in half again.**

Note Thus far, you have followed one of the HUD procedures for taking a wipe test. The following procedure is specific for testing with your instrument, though it will not affect your results should you decide on submitting the sample to an accredited laboratory. ♦

- 5. Fold the wipe in half three more times. You will now have a pad measuring about 1 x 1.5 inches (2.5 x 3.7 cm). It is important to fold the wipe neatly, so that the final wipe is very nearly a neat rectangle measuring about 1 x 1.5 inches.**
- 6. Place the folded wipe in one of the plastic baggies provided**
- 7. Position the wipe, in the baggie, in the metal dust wipe holder**

8. **The dust wipe is now ready to test. NITON recommends that the plastic bags NOT be re-used, to eliminate the chance of cross-contamination of subsequent wipes.**

Taking Measurements of Your Dust Wipe Sample

Follow the procedure below:

1. **Position the metal dust wipe holder on the number one position of the test stand.**
2. **Position the instrument in the nose cone adaptor and initiate the first measurement.**
3. **Place the wipe in the number two position of the test stand. Take the second measurement.**
4. **Rotate the dust wipe holder 180 degrees (without turning the holder over).**
5. **With the wipe in the number one position, take the third measurement.**
6. **Change the wipe to the number two position. Take the fourth measurement.**

This procedure assures that your analyzer measures the entire area of the folded dust wipe.

Reading The Measurement and Final Results Screens

The Measurement screen is continually updated during each test. When each test is terminated, the screen will update one final time and store the results for future review or downloading. After the fourth step of the test sequence is complete, the Final Results screen will appear.

When the four measurements are complete, the instrument automatically averages the results to yield the average loading in $\mu\text{g}/\text{wipe}$. These results are displayed on the Final Result screen. (Note that Figures 5-7 & 5-8 show multiple elements measured on a dust wipe sample. NITON 300 Series Analyzers will only display results for Pb.)

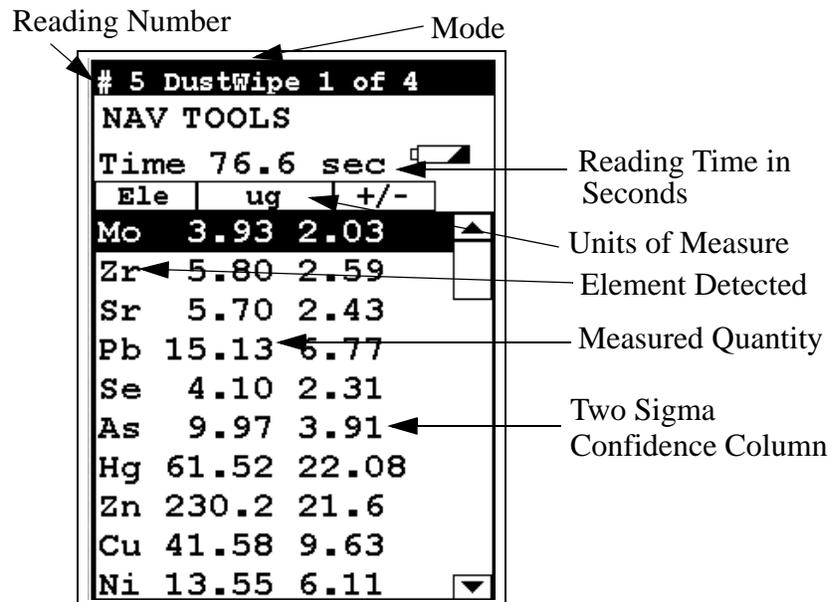


Figure 5-7. Reading the Final Results Screen

# 5 DustWipe 1 of 4			
NAV TOOLS			
Time		76.6 sec	
Ele	ug	+/-	
Mo	3.93	2.03	▲
Zr	5.80	2.59	
Sr	5.70	2.43	
Pb	15.13	6.77	
Se	4.10	2.31	
As	9.97	3.91	
Hg	61.52	22.08	
Zn	230.2	21.6	
Cu	41.58	9.63	
Ni	13.55	6.11	▼

# 6 DustWipe 2 of 4			
NAV TOOLS			
Time		61.7 sec	
Ele	ug	+/-	
Zr	7.33	3.35	▲
Sr	7.56	3.22	
Pb	11.82	6.90	
As	4.98	3.19	
Hg	83.55	29.69	
Zn	229.7	24.9	
Cu	42.19	11.19	
Ni	13.76	7.11	
Co	12.42	7.56	
Fe	49.47	16.90	▼

# 7 DustWipe 3 of 4			
NAV TOOLS			
Time		63.6 sec	
Ele	ug	+/-	
Mo	4.52	2.44	▲
Zr	6.94	3.17	
Sr	7.46	3.11	
Pb	9.47	5.99	
As	8.17	3.96	
Hg	50.40	22.37	
Zn	249.2	25.2	
Cu	33.25	9.64	
Ni	12.08	6.46	
Fe	70.67	19.60	▼

# 9 DustWipe Final			
NAV TOOLS			
Time		268.6 sec	
Ele	ug	+/-	
Mo	3.55	2.07	▲
Zr	7.19	3.12	
Sr	6.58	2.83	
Pb	13.73	6.91	
Se	3.44	2.27	
As	8.85	3.93	
Hg	64.16	24.42	
Zn	235.6	23.7	
Cu	35.46	9.60	
Ni	13.65	6.65	▼

Figure 5-8. All Four Dustwipe Reading Screens

37mm Testing Mode Menu

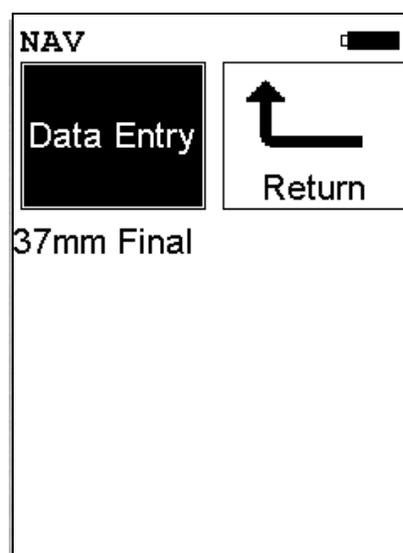


Figure 5-9. 37mm Testing Mode

From the **37mm Testing Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **37mm Testing Menu** to go to the “[The Data Entry Screen](#)” on [page 5-24](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



Preparing a filter

37 mm filters are often used for monitoring personal exposure. Dust vacuum measures (DVM) use the same size filters and are tested in much the same way. To prepare the filter for testing, remove it from the air-sampling cassette and load it in the correct sized filter sleeve. The filter sleeve consists of a thin piece of cardboard sandwiched between two layers of plastic film. The circular cutout in the cardboard should be slightly larger in diameter than the filter.

Note To avoid contaminating the test results, wear clean surgical gloves when handling the filter. If using tweezers or forceps to handle the filter, make certain they are clean, and never reuse a filter sleeve. ♦

1. **On a clean surface, take a filtersleeve and peel back the top layer of film.**

2. **Remove the bottom plug from the air sampling cassette. Separate the sections of the cassette so you can reach the filter.**
3. **Poke both the filter and filter pad through the outflow plug hole of the cassette, to release them from their seat in the cassette.**
4. **Touching only the edges of the filter and the pad, gently separate one from the other.**
5. **Lift the filter from the cassette and place it on the sleeve in the cutout. Be careful not to have the filter touch the paper mounting of the sleeve, as the light adhesive that holds the plastic in place may rip the filter.**
6. **Fold back the clear plastic of the filter sleeve, covering the filter. A little wrinkling of the plastic is acceptable.**

Note It is advisable to practice mounting several blank filter cassettes prior to mounting your first test sample. ♦

Positioning the 37 mm Filter and Performing a Test.

Note Make certain to place the filter stand on a flat stable surface. Be careful to work on a surface which will not contaminate the test fixtures or samples. ♦

1. **Remove the drawer from the test platform. Verify that the adaptor for holding 37 mm filters is in place. Insert the filter sleeve with the filter to be tested in position A of the adaptor, and slide the drawer back into the test stand.**

Note Testing order is essential: The first reading must be taken from position A. ♦

2. **Select the Thin Sample Mode Select menu, and then choose 37mm CE Filters icon**
3. **Position the instrument in the nose cone adaptor and initiate the first reading.**

You must take three readings, each from a different area of the filter to accurately determine the concentration of elements on the filter. When the desired test time has elapsed, remove the instrument to end the first test. The instrument will beep at 60 nominal (or source) seconds, unless pre set otherwise by the user, which is typically an adequate test time for the precision of the measurement to detect the presence of many contaminants at their action levels.

Note If concentrations of the elements of concern are significantly above the action level, the tests lengths may be shortened at the users discretion. ♦

4. Remove the drawer and change the filter to position B.

5. Repeat the above sequence to take the second test.

6. When the second test is complete, remove the drawer and position the test sleeve in position C and take a third measurement.

The instrument will automatically calculate the contaminant loading, in μg , after the three readings have been completed.

Reading The Measurement Screen in 37mm Testing Mode

The Measurement screen is continually updated during each test. When each test is terminated, the screen will update one final time, display the phrase Final Results, and store the results for future review or downloading. 37mm Testing Mode reports in units of μg of loading, and using the volumetric flow rate and airsampling time, the results can be converted to $\mu\text{g}/\text{m}^3$ concentrations.

# 10 37mm 1 of 3				# 11 37mm 2 of 3				# 13 37mm Final			
NAV TOOLS				NAV TOOLS				NAV TOOLS			
Time 61.8 sec				Time 71.2 sec				Time 201.7 sec			
Ele	ug	+/-		Ele	ug	+/-		Ele	ug	+/-	
Mo	4.30	2.38	▲	Mo	1.30	0.83	▲	Mo	2.65	1.60	▲
Zr	6.54	3.09		Zr	4.77	1.67		Zr	5.55	2.42	
Pb	10.49	6.33		Sr	1.72	0.95		Sr	2.74	1.62	
As	6.78	3.62		Pb	8.20	3.54		Rb	2.26	1.48	
Hg	45.74	21.38		Se	2.13	1.18		Pb	11.68	5.67	
Zn	236.8	24.6		As	3.69	1.69		As	6.77	3.09	
Cu	45.20	11.28		Hg	38.41	12.41		Hg	44.30	17.90	
Ni	17.09	7.71		Zn	117.1	11.0		Zn	196.2	19.2	
Fe	41.17	15.01		Cu	16.37	4.30		Cu	33.25	8.31	
			▼	Ni	8.37	3.42	▼	Ni	14.49	6.09	▼

Figure 5-10. All Three 37mm Reading Screens

25mm Testing Mode Menu

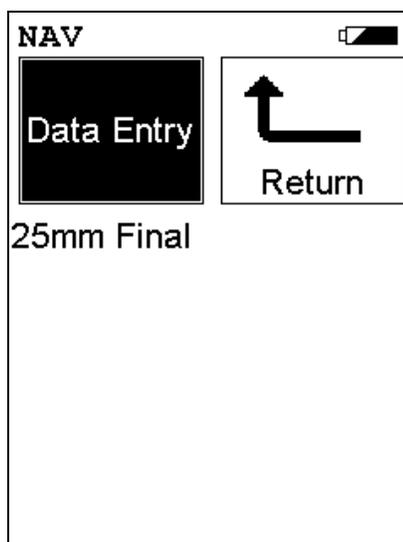


Figure 5-11. 25mm Testing Mode Menu

From the **25mm Testing Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **25mm Testing Menu** to go to the “[The Data Entry Screen](#)” on [page 5-24](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



Preparing a filter

25 mm filters are often used for monitoring personal exposure. Dust vacuum measures (DVM) use the same size filters and are tested in much the same way. To prepare the filter for testing, remove it from the air-sampling cassette and load it in a the correct sized filter sleeve. The filter sleeve consists of a thin piece of cardboard sandwiched between two layers of plastic film. The circular cutout in the cardboard should be slightly larger in diameter than the filter.

Note To avoid contaminating the test results, wear clean surgical gloves when handling the filter. If using tweezers or forceps to handle the filter, make certain they are clean, and never reuse a filter sleeve. ♦

1. **On a clean surface, take a filtersleeve and peel back the top layer of film.**

2. **Remove the bottom plug from the air sampling cassette. Separate the sections of the cassette so you can reach the filter.**
3. **Poke both the filter and filter pad, through the outflow plug hole of the cassette, to release them from their seat in the cassette.**
4. **Touching only the edges of the filter and the pad, gently separate one from the other.**
5. **Lift the filter from the cassette and place it on the sleeve in the cutout. Be careful not to have the filter touch the paper mounting of the sleeve, as the light adhesive that holds the plastic in place may rip the filter.**
6. **Fold back the clear plastic of the filter sleeve, covering the filter. A little wrinkling of the plastic is acceptable.**

Note It is advisable to practice mounting several blank filter cassettes prior to mounting your first test sample. ♦

Positioning the 25 mm Filter and Performing a Test.

Note Make certain to place the filter stand on a flat stable surface. Be careful to work on a surface which will not contaminate the test fixtures or samples. ♦

1. **Remove the drawer from the test platform. Verify that the adaptor for holding 25 mm filters is in place. Insert the filter sleeve with the filter to be tested in position one of the adaptor, and slide the drawer back into the test stand.**

Note Testing order is essential: The first reading must be taken from the middle of the filter. ♦

2. **Select the Thin Sample Mode Select menu, and then choose 25mm CE Filters icon**
3. **Position the instrument in the nose cone adaptor and initiate the first reading.**

The instrument will automatically calculate the contaminant loading, in mg, after the reading has been completed.

Reading The Measurement Screen in 25mm Testing Mode

The Measurement screen is continually updated during each test. When each test is terminated, the screen will update one final time, display the phrase Final Results, and store the results for future review or downloading. 25mm Testing Mode reports in units of μg of loading in just minutes, and using the volumetric flow rate and airsampling time, the results can be converted to $\mu\text{g}/\text{m}^3$ concentrations.

# 14 25mm Final		
NAV TOOLS		
Time 63.8 sec		<input type="checkbox"/>
Ele	ug	+/-
Zr	1.27	0.73
Sr	1.53	0.76
Pb	3.39	1.92
Se	1.29	0.78
As	1.66	0.96
Hg	11.56	5.75
Zn	54.12	6.29
Cu	8.20	2.57
Ni	3.90	1.97
Fe	15.17	4.87

Figure 5-12. 25mm Final Results Screen

Standard Testing Mode Menu

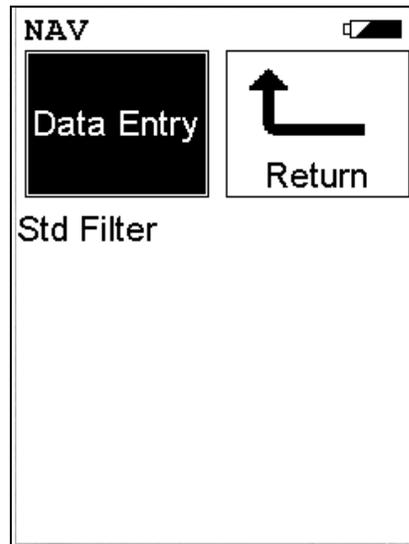


Figure 5-13. Standard Testing Mode Menu

From the **Standard Testing Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **Standard Testing Menu** to go to the “[The Data Entry Screen](#)” on [page 5-24](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



You should use Standard Thin Sample Mode to test thin samples that have uniform contamination or deposition. These include many filters for liquids and gases, various types of coatings, and the leaves of plants. Operators who want to make a single measurement and obtain a result in units of $\mu\text{g}/\text{cm}^2$ should use Standard Thin Sample Mode.



CAUTION Standard Thin Sample Mode should not be used for quantitative lead-paint testing. Use only the three Paint Testing modes to test lead-based paint. ♦

In Standard Thin Sample Mode, each measurement is a separate test. For this reason, there is no Final Result screen in this mode. The results of each test are given in $\mu\text{g}/\text{cm}^2$ for up to 14 elements.

Note Testing coatings and paints with Standard Thin Sample Mode may yield lower-than-actual results. The penetration depth of the measurement is highly dependent on the composition of the sample. ♦

Note Standard Thin Sample Mode does not correct for shielding caused by the presence of overlaying coatings. Thus, for coatings testing, the results should be viewed as the minimum amount of contaminants present. If an element is not detected, it may be that the element is present but entirely shielded by overlaying coatings. ♦

Reading The Measurement Screen in Standard Thin Sample Mode

The Measurement screen is continually updated during each test. When each test is terminated, the screen will update one final time, display the phrase Final Results, and store the results for future review or downloading. Standard Thin Sample Mode reports in units of $\mu\text{g}/\text{cm}^2$

# 15 Std Filter		
NAV TOOLS		
Time 61.7 sec		
Ele	$\mu\text{g}/\text{cm}^2$	+/-
Ag	39.39	16.25
Zr	0.51	0.26
Sr	0.31	0.19
Pb	1.01	0.58
Se	0.36	0.23
As	0.97	0.41
Hg	4.77	2.05
Zn	8.07	1.35
Cu	2.92	0.85
Ni	1.28	0.63

Figure 5-14. The Final Reading Screen for Standard Thin Sample Mode

For more information on this feature, please contact NITON's Customer Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460 or your local Authorized NITON Analyzers Service Center.

Analyzing Thin Samples



CAUTION After being powered on, the NITON 300 Series Analyzer will perform an internal re-calibration before an analysis is initiated. It is recommended that you let your instrument warm up for ten minutes after start up, before testing is begun. ♦

There are five different methods of operation for taking a sample measurement, and your analyzer will be configured to use one of those methods, depending on the regulatory requirements of your locality. These methods are:

- **Trigger-Only method.** With the Trigger-Only method, you only need to place the measurement window close to the sample to be analyzed and pull the trigger for sample analysis to be initiated.
- **Trigger-and-Proximity-Sensor method.** With the Trigger-and-Proximity-Sensor method, you must place the measurement window against the sample to be analyzed to engage the proximity sensor on the front of the instrument, then pull the trigger for sample analysis to be initiated.
- **Momentary-Trigger-Touch-and-Proximity-Sensor method.** With the Momentary-Trigger-Touch-and-Proximity-Sensor method, you must place the measurement window against the surface to be analyzed to engage the proximity sensor on the front of the instrument, then pull the trigger.
- **The trigger may be released and the reading will continue until you release the proximity button, or other criteria (such as Max Time) are reached.** This is the primary mode of operation for the XLp 300A/700A Series Lead-in-Paint Analyzer in the USA.
- **Trigger-and-Interlock method.** With the Trigger-and-Interlock method, you need to place the measurement window close to the sample to be analyzed, press and keep pressing the interlock button at the rear of the instrument with your free hand, then pull the trigger for sample analysis to be initiated.
- **Trigger-Interlock-and-Proximity-Sensor method.** With the Trigger-Interlock-and-Proximity-Sensor method, you must place the measurement window against the sample to be analyzed to engage the proximity sensor on the front of the instrument, press and keep pressing the interlock button at the rear of the instrument with your free hand, then pull the trigger for sample analysis to be initiated.

With any of these methods, analysis will stop if any one of the preconditions are violated. For example, with the Trigger-Interlock-and-Proximity-Sensor method, if the trigger or the Proximity Sensor or the Interlock is released, the reading will stop immediately, and the shutters will close.

After your NITON XLp analyzer is calibrated, initiate a sample reading using the appropriate method. If you attempt to initiate a sample reading using a different method, the analyzer will inform you that one or more of the preconditions need to be met in order for sample analysis to begin.



WARNING! The three LED warning lights are designed to blink only during a measurement, where one or more of the shutters are open and the trigger depressed. If the LED lights blink at any other time, disconnect the battery pack immediately, place the instrument in its shielded holster, place the holster in the shielded carrying case, and call NITON LLC's Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460, or your local Authorized NITON Analyzers Service Center. ♦



WARNING! The preconditions for operation must be continued for the duration of the reading. If the preconditions are violated, all the shutters will close, and the measurement will end. The three LED lights will stop blinking, the shutters will close, and the measurement will end. The flashing of the LED lights is not synchronized to minimize power consumption. ♦

Your NITON Analyzer will display the Results Screen throughout the duration of each reading. The Results Screen is updated regularly throughout the reading. When the reading is complete, a final screen update will appear, and your NITON analyzer will display the final results of the measurement which has just been completed.

The Data Entry Screen

The Data Entry Screen is accessed whenever you select the Data Entry icon from any screen. This screen allows you to input data in several different fields, or categories, concerning your sample, in several different ways:

- By selecting the Virtual Keyboard button and typing the parameter in using the **Virtual Keyboard**.
- By scanning in the parameter name using the integrated bar code scanner.
- By creating a new, or editing your analyzer's existing, '.ndf' file through the NDT program. You can then select from the various custom options you have created using the Drop-down List button.

These fields are saved along with the subsequent reading, and allow you to associate important information about the sample directly with the reading, so that you have a full description of the sample tied into the reading itself.

Once you have input data into a field, that information carries over into the next reading, so that you only have to input the information that has changed since the last reading. For example, if you are analyzing several samples of a particular lot, you only need to input the lot information once during that series of readings, changing only the sample name.

The screenshot shows a screen titled "Data" with a sub-header "NAV Tools". Below this, there are five numbered input fields, each with a label, a text entry box, a virtual keyboard icon, and a drop-down arrow. The fields are:

Field Number	Field Label
1	SAMPLE
2	LOCATION
3	INSPECTOR
4	CONDITION
5	TYPE

Figure 5-15. Data Entry Screen 1

This is the first section of the Data Entry Screen. There are five parameters in this section.

- Selecting **Sample** allows you to input the sample name parameter
- Selecting **Location** allows you to input the particular location information, if known
- Selecting **Inspector** allows you to specify the inspector.
- Selecting **Condition** allows you to input information on the sample's condition
- Selecting **Type** allows you to specify the sample's type

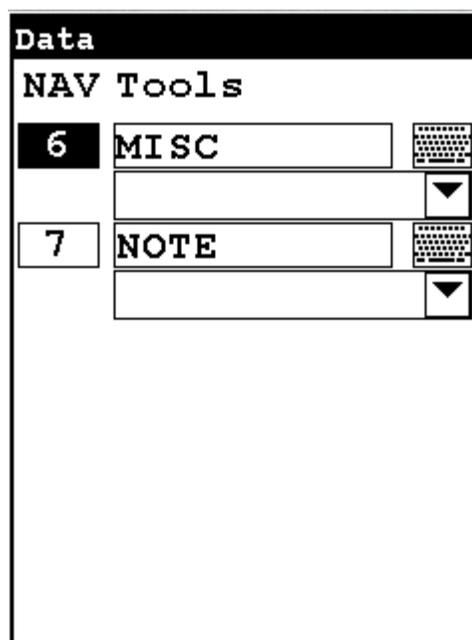


Figure 5-16. Data Entry Screen 2

This is the second section of the Data Entry Screen. There are two parameters in this section.

- Selecting **Misc** allows you to input miscellaneous parameters
- Selecting **Note** allows you to input notes on the sample

Navigating the Data Entry Screen

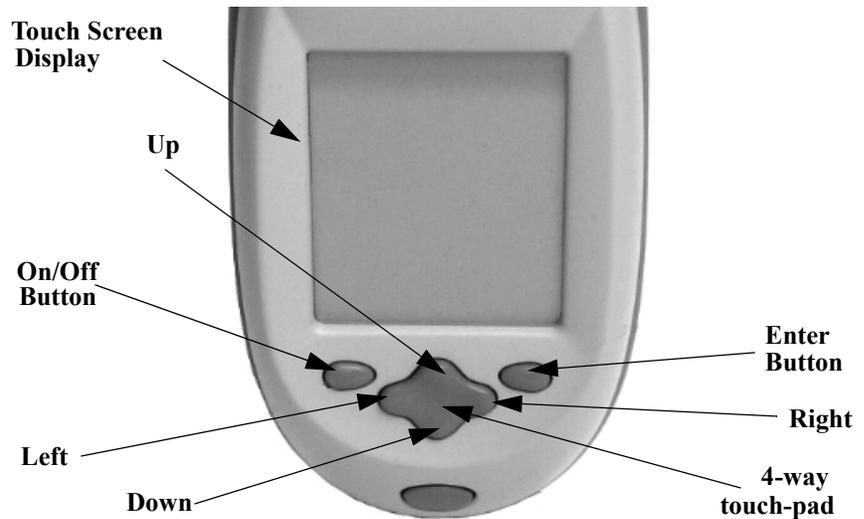


Figure 5-17. The Control Panel

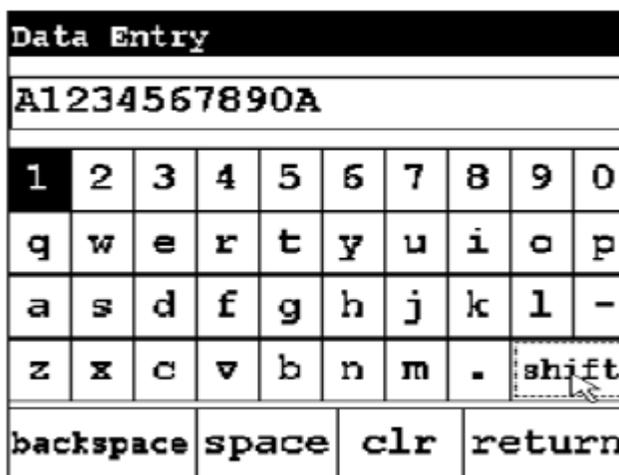
The following description of screen navigation using the control panel assumes that the analyzer is held so that the display is held upright as in [Figure 5-17](#).

- To move from column to column, use the Right and Left portion of the 4-way touch pad.
- To move from row to row, use the Up and Down portions of the 4-way touch pad.
- To select the highlighted option, press the Enter button on the control panel.

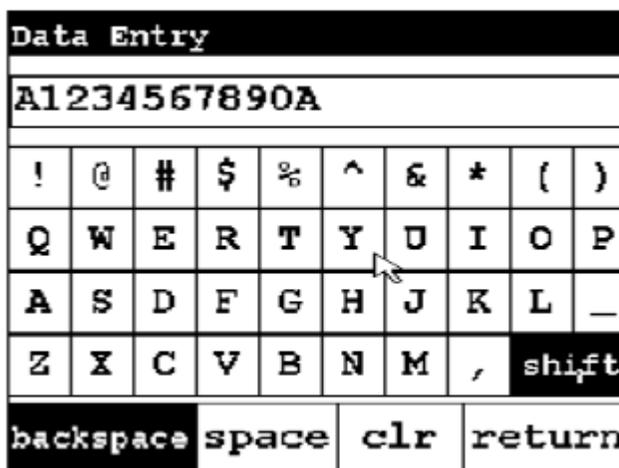
The *Data Entry* Screen is divided into sections of 5 setting parameters. By using the Down portion of the 4-way touch pad when you are on the last row of a section, the display will change to the next section. By using the Up portion of the 4-way touch pad when you are on the first row of a section, the display will change to the previous section.

By selecting the *On/Off* button, you can exit the *Data Entry* Screen.

The Virtual Keyboard



Lower Case Virtual Keyboard



Upper Case Virtual Keyboard

Figure 5-18. The Virtual Keyboard

The Virtual Keyboard is a full alphanumeric keyboard which appears on the LCD Touch Screen Display. You can use the Virtual Keyboard either with the four-way touch pad and control panel buttons, or using the touch screen display directly.

At the top of the screen is the data field you are entering data for, in this case, “Sample”, Directly underneath is the data you are entering, in this case “17-4 PH SS”, On this line also is the underscore cursor. This graphically shows where the next character will be placed. Up to 25 characters can be stored in the data fields.

Thin Sample Test Modes
Navigating the Data Entry Screen

Next is the Virtual Keyboard itself, with numbers 0-9, letters A-Z, and special characters *, <, >, and -.

Last is the control button line. This contains the screen buttons for Return and Clear.

When using the four-way touch pad and control buttons, pressing the On/Off button allows you access to the Return and Clear screen buttons. The Return screen button will enter the data and return you to the Data Entry Screen, while the Clear screen button will clear the data you have

All screen areas can be directly accessed using the LCD Touch Screen.

NITON Test Platforms

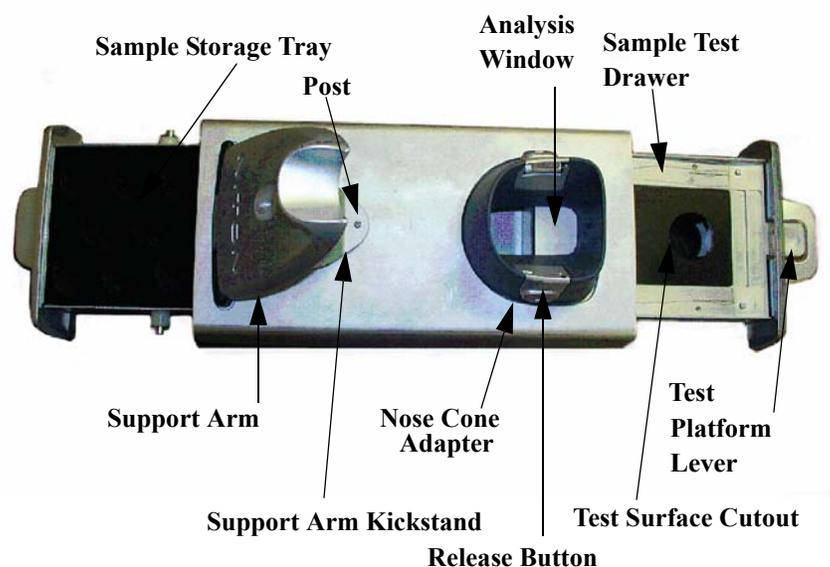


Figure 5-19. NITON Bulk Mode Test Stand

The NITON Bulk Test Stand is designed to facilitate bulk and thin sample testing using NITON Analyzers. The NITON Portable Test Stand is designed for bulk and moderate sized samples, and is portable.

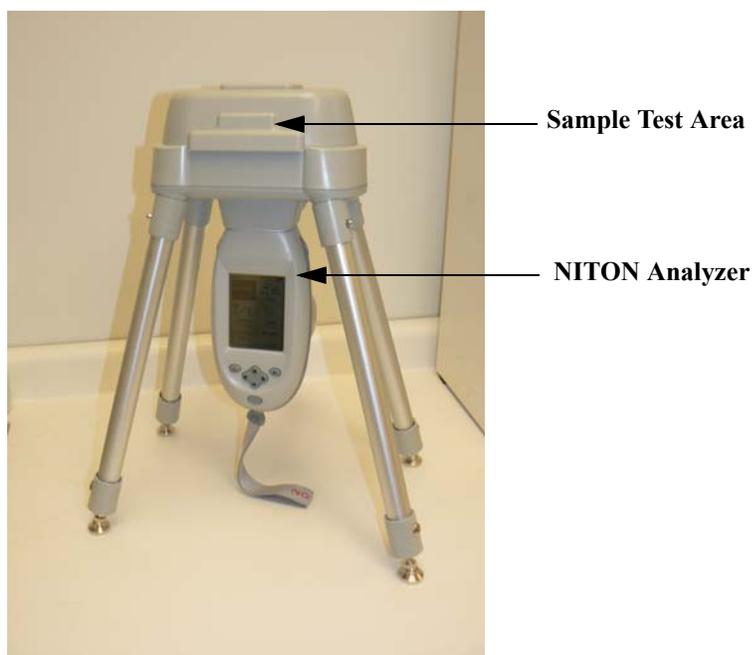


Figure 5-20. NITON Portable Test Stand

Chapter 6 Bulk Sample Test Modes

Using Bulk Sample Test Modes

Bulk Sample Test Modes allow you to test soils and other ground samples for composition and contamination. Your NITON XLp Analyzer may be used for soil and bulk analysis, either *in-situ* or *ex-situ*.

The Tools Menu

The Tools Menu, like the NAV Menu, uses context sensitive menus. The following is the most common menu set.

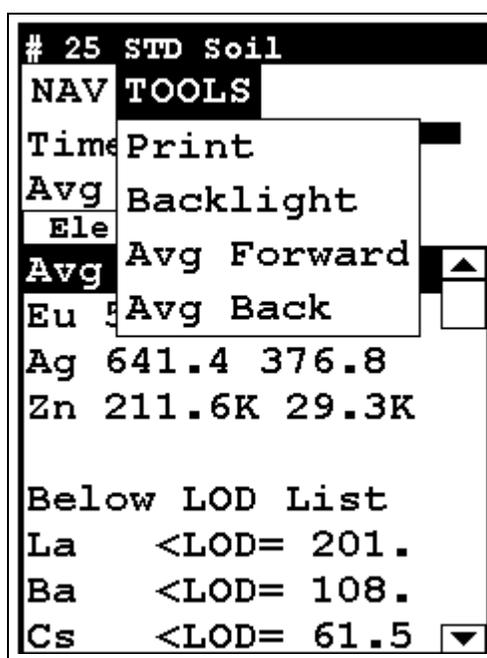


Figure 6-1. The Tools Menu

Print Enables you to print the sample analysis to the attached printer.

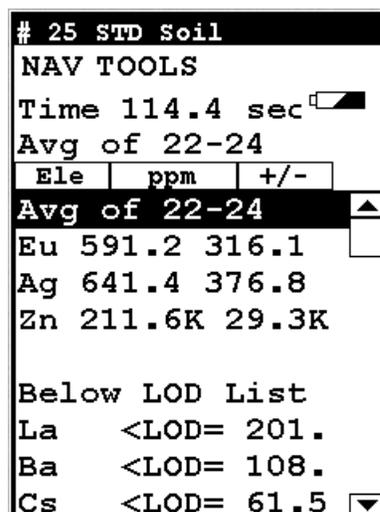
Backlight Enables you to turn backlighting on and off.

Avg Forward

Enables you to average different readings together from this analysis forward. Select **Avg Forward** to initiate future sample averaging. **Avg Forward** will set up an automatic personal averaging protocol to be followed until your analyzer is shut down or Averaging is turned off. To begin, select the number of readings you want to average from the virtual numeric keypad. Your analyzer will calculate an average reading after that number of tests, and continue this pattern until stopped. For example, if you select 3 on the virtual keypad, the analyzer will automatically calculate, average, and store a reading for every three tests you take.

Avg Back

Enables you to average different readings together from this analysis backward. Select **Avg Back** to initiate backwards sample averaging. **Avg Back** will take a number of readings you select and average their analytical results. The range is counted from the last reading backward by the number of readings selected. If your last reading was #15, selecting 3 would average readings #13, 14, and 15. The average is calculated, displayed, and stored into memory as the next sequential reading number.



The screenshot shows a terminal-style interface for an analyzer. At the top, it displays '# 25 STD Soil' and 'NAV TOOLS'. Below this, it shows 'Time 114.4 sec' with a progress bar, and 'Avg of 22-24'. A table with three columns is shown: 'Ele', 'ppm', and '+/-'. The table contains three rows of data: 'Eu 591.2 316.1', 'Ag 641.4 376.8', and 'Zn 211.6K 29.3K'. Below the table, it says 'Below LOD List' and lists 'La <LOD= 201.', 'Ba <LOD= 108.', and 'Cs <LOD= 61.5'. There are small square icons next to the 'Avg of 22-24' line and the 'Cs' entry.

Ele	ppm	+/-
Eu	591.2	316.1
Ag	641.4	376.8
Zn	211.6K	29.3K

Figure 6-2. Averaging Screen

Note You cannot average readings taken with different modes - or with different sources if they have different element lists - with either Avg Back or Avg Forward. Alloy and Mining modes use the same element lists with the different sources, so averaging works when switching between sources in either of these modes. Thin Film and Bulk modes both use different element lists for different sources, and readings with different sources cannot be averaged when using either of these modes. ♦

Note The Tools Menu is only available when viewing readings, and the menu is only accessible through the touch screen interface or NDTi. ♦

The range number is selected using a virtual keypad on your analyzer similar to the keypad used for login. Select the digits in the range number from the keypad, then select the “E” key to enter the number. “C” will clear all, and “<” will clear the last digit entered. The average will automatically be displayed.

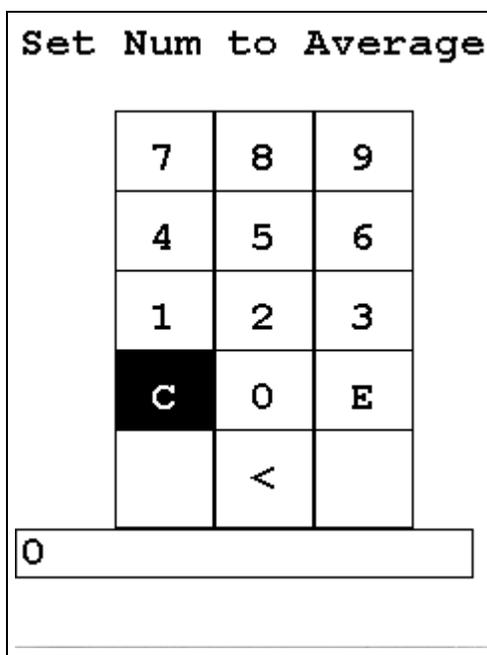


Figure 6-3. Set Range Virtual Keypad

Stop Avg Fwd

Avg Forward is a toggle. The option on the Tools Menu changes to its opposite when selected. To stop averaging, select Stop Avg Fwd from the Tools Menu.

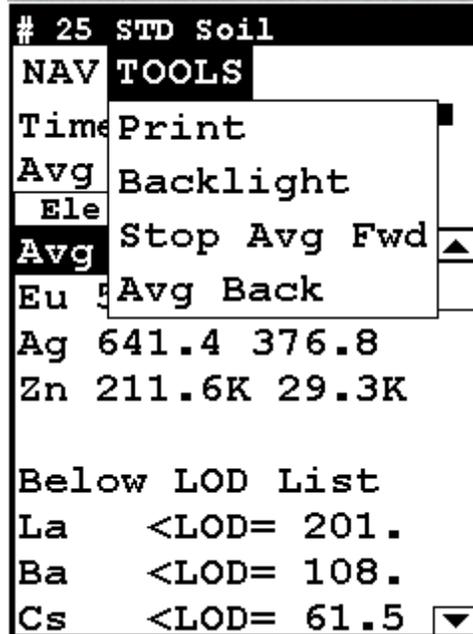


Figure 6-4. Stop Average Tool

Averaging Example

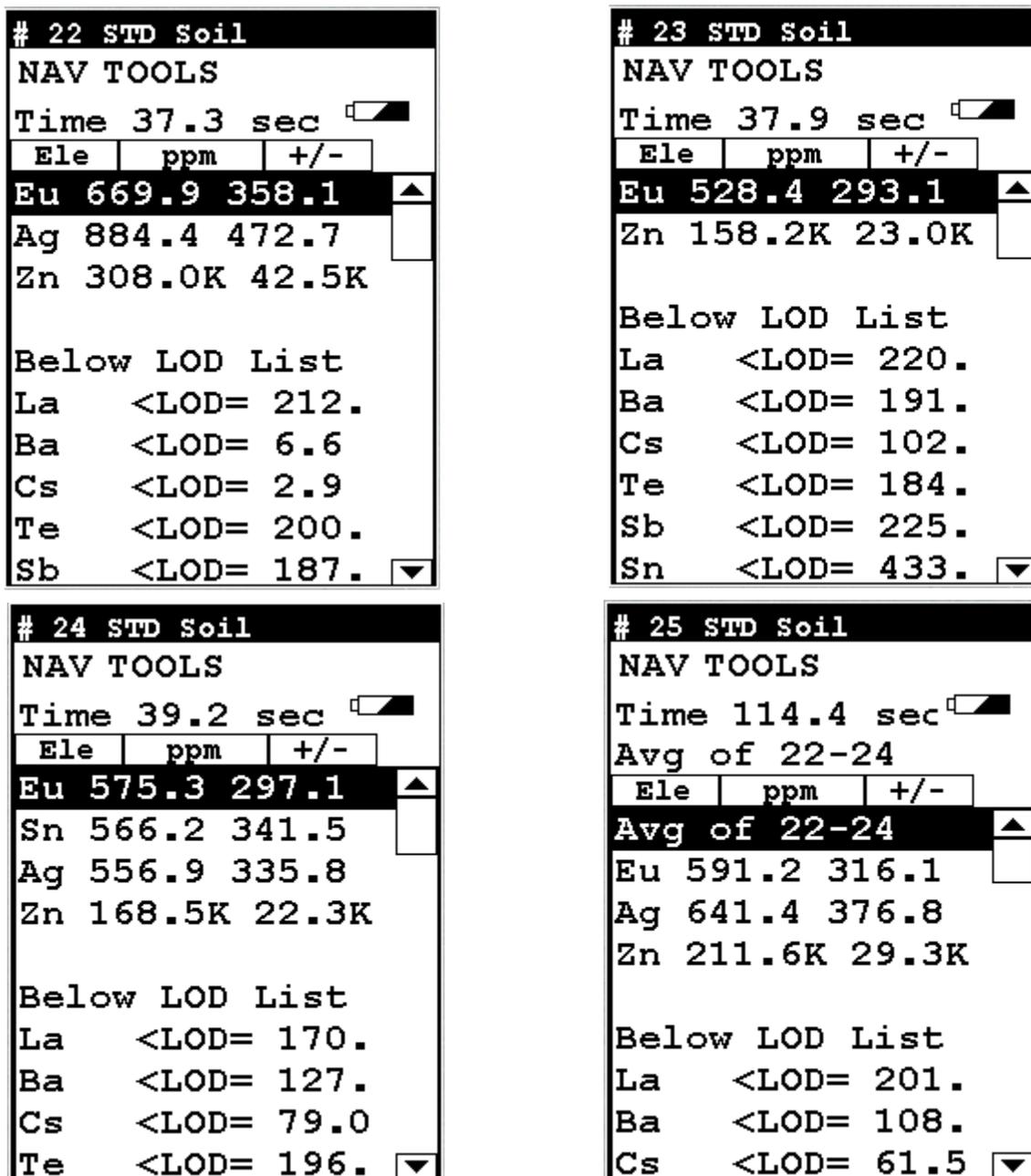


Figure 6-5. Example of Averaging

The Bulk Sample Mode Menu

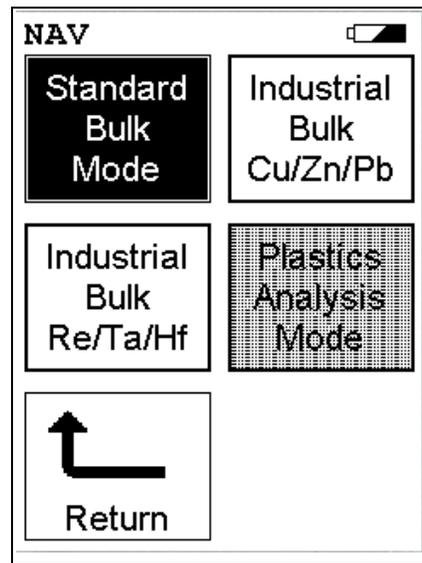
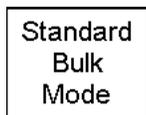


Figure 6-6. Bulk Sample Mode Menu

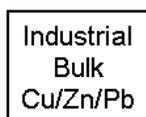
All NITON XLp Bulk Mode functions are accessible from the **Bulk Mode Menu** and subsidiary menus. Each of the instrument functions represented by an icon on the **Bulk Mode Menu** screen may be selected by choosing the appropriate icon. When one of these **Bulk Mode Menu** icons is selected, the function specific sub-menu appropriate to that icon will be displayed.

To use the **Standard Bulk Mode**, simply select the **Standard Bulk Mode** icon from the **Bulk Mode Menu** to place your instrument into **Standard Bulk Mode**. Use the **Standard Bulk Mode** if:



- The percentage of the elements of interest are <1.0%
- The material is of a light matrix, for example aluminum silicate
- Elements with atomic number greater than iron do not exceed several percent

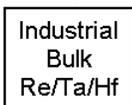
To use the **Industrial Bulk Cu/Zn/Pb Testing Mode**, simply select the **Industrial Bulk Cu/Zn/Pb** icon from the **Bulk Mode Menu** to place your instrument into **Industrial Bulk Cu/Zn/Pb Testing Mode**. In **Industrial Bulk Cu/Zn/Pb Testing Mode**, all other programmed elements are active in addition to Cu/Zn/Pb (e.g. Ti, Cr, Mn, Fe, Co, Ni, Zr, Nb, Mo, W, etc.). **Industrial Bulk Cu/Zn/Pb Testing Mode** is recommended if you know, *without a doubt*, that your sample contains Cu, Zn, and/or Pb and not Ta, Hf, or Re. When your NITON XLp analyzer is



operating in **Industrial Bulk Cu/Zn/Pb Testing Mode**, the NITON XLP analyzer will not measure concentrations of Hf, Ta, or Re in a sample. Once **Industrial Bulk Cu/Zn/Pb Testing Mode** is selected, you may begin testing samples.

Use Industrial Bulk Cu/Zn/Pb Testing Mode if:

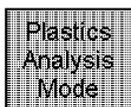
- There is more Cu/Pb/Zn than Ta/Hf/Re in the sample
- The percentage of the elements of interest are >1.0%
- The matrix material is **not** a light matrix
- Elements with atomic number greater than iron ($Z = 26$) exceed several percent



To use the **Industrial Bulk Re/Ta/Hf Testing Mode**, simply select the **Industrial Bulk Re/Ta/Hf** icon from the **Bulk Mode Menu** to place your instrument into **Industrial Bulk Re/Ta/Hf Testing Mode**. In **Industrial Bulk Re/Ta/Hf Testing Mode**, all other programmed elements are active in addition to Ta, Hf, or Re (e.g. Ti, Cr, Mn, Fe, Co, Ni, Zr, Nb, Mo, W, etc.). **Industrial Bulk Re/Ta/Hf Testing Mode** is recommended if you know, *without a doubt*, that your sample contains Ta, Hf, and/or Re and not Cu, Zn, and/or Pb. When your NITON XLP analyzer is operating in **Industrial Bulk Re/Ta/Hf Testing Mode**, the NITON XLP analyzer will not measure concentrations of Cu, Zn, or Pb in a sample. Once **Industrial Bulk Re/Ta/Hf Testing Mode** is selected, you may begin testing samples.

Use **Industrial Bulk Re/Ta/Hf Testing Mode** if:

- There is more Ta/Hf/Re than Cu/Pb/Zn in the sample
- The percentage of the elements of interest are >1.0%
- The matrix material is **not** a light matrix
- Elements with atomic number greater than iron ($Z = 26$) exceed several percent



Select the **Plastics Analysis** icon from the **Bulk Mode Menu** to place your instrument into **Plastics Analysis Mode**. Use **Plastics Analysis Mode** to find elements of interest in a plastic matrix. **Plastics Analysis Mode** is not available on this analyzer. For further information on **Plastics Analysis Mode**, contact Thermo or your local NITON representative.

Standard Bulk Mode

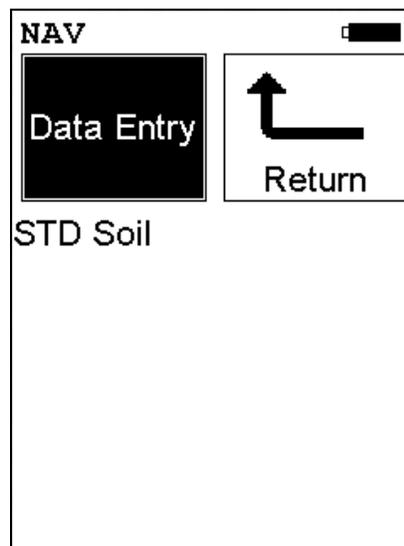
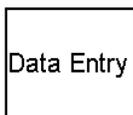


Figure 6-7. Standard Bulk Mode Menu

The **Standard Bulk Mode** is available from the **Bulk Mode Menu**. The **Standard Bulk Mode** allows you to perform tests on soil and other bulk samples without adjusting for a particular matrix. The **Standard Bulk Mode** is ideal for finding contaminants in soil. The **Standard Bulk Mode** uses Compton Normalization to automatically adjust for the effects of the matrix. From the **Standard Bulk Mode Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **Standard Bulk Mode Menu** to go to the “[The Data Entry Screen](#)” on [page 6-29](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



This mode of operation is optimum for any sample whose elements of interest are present at less than 1%. **Standard Bulk Mode** utilizes the Compton Scatter (Inelastic Collisions) of a particular sample. Compton scatter occurs when primary X-rays do not cause fluorescence but instead collide with the atoms of the sample. The Compton Scatter that occurs is directly proportional to the density (average atomic number (Z)) of the sample. A light matrix material, such as an oil or sand, will have a much greater scatter than that of a heavy matrix, such as ore. The analyzer measures this scatter peak and automatically adjusts the concentration based

on the matrix of the material and allows for the analysis of a bulk sample without the use of site specific calibration standards. This mode is used chiefly for the analysis of contaminants in soils.

Industrial Bulk Cu/Zn/Pb Testing Mode

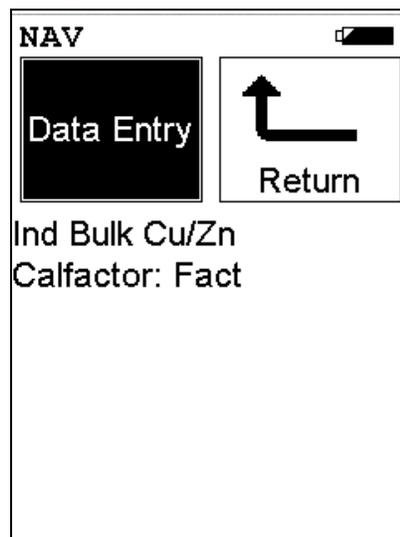


Figure 6-8. Industrial Bulk Cu/Zn/Pb Testing Mode Menu

The **Industrial Bulk Cu/Zn/Pb Testing Mode** is available from the **Bulk Mode Menu**. The **Industrial Bulk Cu/Zn/Pb Testing Mode** allows you to perform tests on soil and other bulk samples without adjusting for a particular matrix. **Industrial Bulk Cu/Zn/Pb Testing Mode** is ideal for finding concentrations of analytes in rock or soil. This mode of operation is optimum for any sample whose elements of interest are present at 1% or greater. **Industrial Bulk Cu/Zn/Pb Testing Mode** utilizes Fundamental Parameters to analyze the sample. From the **Industrial Bulk Cu/Zn/Pb Testing Mode Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **Industrial Bulk Cu/Zn/Pb Testing Mode Menu** to go to the “[The Data Entry Screen](#)” on [page 6-29](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



Industrial Bulk Re/Ta/Hf Testing Mode

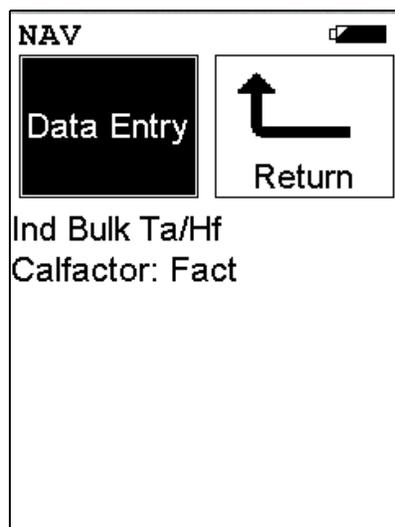


Figure 6-9. Industrial Bulk Re/Ta/Hf Testing Mode Menu

The **Industrial Bulk Re/Ta/Hf Testing Mode** is available from the **Bulk Mode Menu**. The **Industrial Bulk Re/Ta/Hf Testing Mode** allows you to perform tests on soil and other bulk samples without adjusting for a particular matrix. **Industrial Bulk Re/Ta/Hf Testing Mode** is ideal for finding concentrations of analytes in rock or soil. This mode of operation is optimum for any sample whose elements of interest are present at 1% or greater. **Industrial Bulk Re/Ta/Hf Testing Mode** utilizes Fundamental Parameters to analyze the sample. From the **Industrial Bulk Re/Ta/Hf Testing Mode Menu**, you can immediately initiate a sample test using the proper preconditions for operation, enter data about your sample using the **Data Entry** icon, or return to the **Main Menu**.

Select the **Data Entry** icon from the **Industrial Bulk Re/ta/Hf Testing Mode Menu** to go to the “[The Data Entry Screen](#)” on [page 6-29](#), to input data about the sample which you are testing. The data you enter will be associated with the next sample you test.



Analyzing Bulk Samples



CAUTION After being powered on, the NITON 300 Series Analyzer will perform an internal re-calibration before an analysis is initiated. It is recommended that you let your instrument warm up for ten minutes after start up, before testing is begun. ♦

There are five different methods of operation for taking a sample measurement, and your analyzer will be configured to use one of those methods for soil samples, depending on the regulatory requirements of your locality. These methods are:

- **Trigger-Only method.** With the Trigger-Only method, you only need to place the measurement window close to the sample to be analyzed and pull the trigger for sample analysis to be initiated.
- **Trigger-and-Proximity-Sensor method.** With the Trigger-and-Proximity-Sensor method, you must place the measurement window against the sample to be analyzed to engage the proximity sensor on the front of the instrument, then pull the trigger for sample analysis to be initiated.
- **Momentary-Trigger-Touch-and-Proximity-Sensor method.** With the Momentary-Trigger-Touch-and-Proximity-Sensor method, you must place the measurement window against the surface to be analyzed to engage the proximity sensor on the front of the instrument, then pull the trigger.
- **The trigger may be released and the reading will continue until you release the proximity button, or other criteria (such as Max Time) are reached.** This is the primary mode of operation for the XLP 300A/700A Series Lead-in-Paint Analyzer in the USA.
- **Trigger-and-Interlock method.** With the Trigger-and-Interlock method, you need to place the measurement window close to the sample to be analyzed, press and keep pressing the interlock button at the rear of the instrument with your free hand, then pull the trigger for sample analysis to be initiated.
- **Trigger-Interlock-and-Proximity-Sensor method.** With the Trigger-Interlock-and-Proximity-Sensor method, you must place the measurement window against the sample to be analyzed to engage the proximity sensor on the front of the instrument, press and keep pressing the interlock button at the rear of the instrument with your free hand, then pull the trigger for sample analysis to be initiated.

- With any of these methods, analysis will stop if any one of the preconditions are violated. For example, with the Trigger-Interlock-and-Proximity-Sensor method, if the trigger or the Proximity Sensor or the Interlock is released, the reading will stop immediately, and the shutters will close.

After your NITON XLp analyzer is calibrated, initiate a sample reading using the appropriate method. If you attempt to initiate a sample reading using a different method, the analyzer will inform you that one or more of the preconditions need to be met in order for sample analysis to begin.

Note The three LED lights will blink during calibration or whenever there is a shutter open. ♦



WARNING! The preconditions for operation must be continued for the duration of the reading. If the preconditions are violated, all the shutters will close, and the measurement will end. The three LED lights will stop blinking, the shutters will close, and the measurement will end. The flashing of the LED lights is not synchronized to minimize power consumption. ♦



WARNING! The three LED warning lights are designed to blink only during a measurement, where one or more of the shutters are open and the trigger depressed. If the LED lights blink at any other time, disconnect the battery pack immediately, place the instrument in its shielded holster, place the holster in the shielded carrying case, and call Thermo Scientific's Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460, or your local Authorized NITON Analyzers Service Center. ♦

Your NITON Analyzer will display the Results Screen throughout the duration of each reading. The Results Screen is updated regularly throughout the reading. When the reading is complete, a final screen update will appear, and your NITON analyzer will display the final results of the measurement which has just been completed.

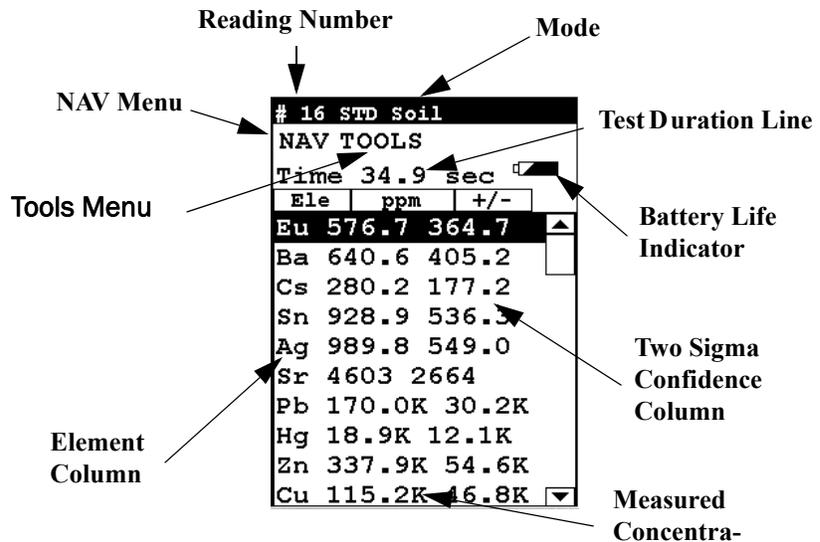


Figure 6-10. The Results Screen

The Results Screen displays the following information:

- The Reading Number line shows a number automatically assigned by your NITON analyzer in order to uniquely identify each reading. The reading number automatically increments up by one with each successive reading.
- The Nominal Seconds Test Duration line shows the number of nominal (source) seconds elapsing since the initiation of the reading. Nominal seconds are true, clock seconds slowed down to compensate for the electronic dead-time that occurs when the NITON XLp is taking a measurement.
- The Mode line displays the test mode in use during the measurement.
- The **Element** (left) column shows the elements that have been detected in the sample.
- The **Concentration Level** (central) column shows the concentration levels of the corresponding elements in percentages.
- The **Confidence** (right) column displays the 2 sigma (95%) confidence interval for the corresponding elements.

To Prepare or Not to Prepare - In Situ vs. Ex Situ

Bulk media are generally tested either on-site (*in situ*) for screening purposes, or removed and prepared (*ex situ*) to enhance the accuracy of the measurement. The degree of preparation may vary depending on the accuracy desired, the characteristics of the sample, and the characteristics of the site.

Understanding the advantages of *in situ* testing and of various degrees of preparation is crucial to obtaining useful data. *In situ* measurements should be used to profile an area, locate sources of contamination, determine the boundaries of contaminated areas, or gather data that will subsequently be used to design a sampling plan.

In situ measurements are usually only approximations, though they may correlate very well with lab analysis if the site tested is highly homogeneous. If the site is non-homogeneous, as is often the case, then *in situ* measurement results may differ greatly from laboratory obtained results. Both sets of results may be correct. The difference arises from the fact that actual samples tested were different.

Analysis of Unprepared Samples – In Situ



Figure 6-11. In-Situ Soil Testing

Screening Techniques

Use direct measurement when you need to determine whether an element is present (rather than in accurately measuring how much is present). Use preliminary direct measurements to survey a site quickly even if you intend to take samples

Testing In Situ



WARNING! When taking samples from a site where toxic chemicals may be present, always use gloves and respiration equipment for your own protection. ♦

- 1. Select a measurement site, and clear away any surface debris and vegetation.**

Note Valid results will depend on a sufficient and appropriate selection of sites to sample. Lead-in-soil from paint, for instance, will usually be concentrated within a few feet of the painted structure. ♦

- 2. Choose an area to test where the measurement window of the analyzer will be flush with the test media. Position the nose against the surface to be analyzed and initiate a reading by squeezing the shutter release, and firmly pressing the instrument flat against the surface.**
- 3. After the test, inspect the nose of the instrument for contamination, which may affect future analysis. If the nose appears to be soiled, clean it with a soft cloth or tissue.**



WARNING! Always treat radiation with respect. Do not hold your instrument near the Kapton window during testing. Never point your instrument at yourself or anyone else when the shutter is open. ♦

Note Never use in situ testing with field portable XRF when comparing field results with laboratory results to justify XRF usage. Always collect samples and prepare them before testing. Refer to the instructions on sample collection and preparation in *Ex Situ* Testing. ♦

On-site vs. Lab Analysis

When comparing field screening to laboratory analysis, it is preferable to compare results obtained from the same samples. Start by collecting a sample large enough to be divided into two parts, with one portion stored for future reference and the other submitted to a laboratory for independent analysis. For best results, follow the complete protocol for sample preparation, including drying and grinding of the sample. Grinding is essential for homogenizing the sample, ensuring that the portion sent to the lab is the sample as that analyzed on-site.

If you must test for *in situ* performance evaluation, take several XRF readings bracketing a spot. Then take a sample for laboratory testing from that spot. For further discussion of field screening, please refer to EPA Method 6200, “Field Screening Using A Field-Portable XRF,” which can be obtained from NITON Corporation’s Customer Service Department. EPA accepts field screening results using portable XRF provided that Method 6200 protocol is followed.

In Situ Depth Profiling

XRF analysis for soil is a surface technique. To perform a depth profile, remove a vertical slice of soil and test several samples taken from different depths. This procedure will yield information, rapidly, about the depth of contamination.



Figure 6-12. In-Situ Depth Profiling

Analysis of Prepared Samples – Ex Situ



Figure 6-13. Ex-Situ Analysis of Prepared Samples

Analysis of bagged bulk samples

Sometimes it is convenient to measure samples in plastic bags. Without further preparation of the sample, you can screen the site by testing each bag. Because you are testing through a bag, test results will tend to be lower than test results obtained from direct analysis. This effect will vary depending on the element analyzed and the thickness of the plastic through which the sample is tested. Bagged samples can be retested and/or be further prepared and then retested, allowing samples of particular interest to be more accurately analyzed.

Sample Collection

Examine the site for differences in soil characteristics before sampling. Valid results depend on a sufficient and appropriate selection of sites to sample. Incorrect sample collection may give rise to misleading or meaningless results, regardless of the analysis method. Delineate sections with different characteristics and treat them as different areas. It may be desirable to subdivide larger areas even if they have the same characteristics to ensure a thorough examination.

Note When testing for lead-in-soil in a residential setting, it is standard practice to sample the top 4 to 6 inches of soil. ♦

Lead is usually concentrated near a building with lead paint (within 4–6 feet), and appropriate sample areas should be defined. Samples from the following areas should also be collected and combined separately:

- near painted structures
- near roads and driveways
- near to where various types of waste have been stored, or
- near pressure-treated wood

The soil probe or sampling tube is a very convenient sampling tool. It quickly takes accurate and consistent samples, and may be inserted to a marked depth to remove the same amount of soil at each insertion. In addition, there also are core-sampling devices that can remove an intact cylinder of sample material. If no sample tool is available, a shovel, spade, narrow (1-1/2 inch) garden trowel, or other sampling tool is adequate to take a soil slice of the required depth.



WARNING! When taking samples from a site where toxic chemicals may be present, always use gloves and respiration equipment for your own protection. ♦

Individual samples may require reduction in size if they were taken with a spade, trowel, or other large sampling tools. Reduce the samples by taking a vertical slice (so it is representative of the entire sample) about one inch wide.

Prepare a composite sample from each predetermined area. A composite sample of an area consists of many smaller samples from different sections of that area. These samples should consist of vertical columns of material approximately 1 inch in diameter. The length of each column should be about 6 inches. The elements you wish to measure and the local history will determine the depth at which you need to sample. For example, lead from paint is usually concentrated within the top 1–4 inches.

Do not combine samples from different areas. A composite sample taken from two distinctly different areas is not representative of either area.

Place the samples in a clean pail. Then mix the sample thoroughly by stirring and by rotating the pail at an angle of 45 degrees. Don't shake the sample—you do not want to stratify the sample.

A sample should contain at least 50–100 grams of soil. Once the sample has been thoroughly mixed, place it in a clean bag that can be closed securely (with a twist tie for example). Zip Lock style bags are very convenient, though extra care must be taken to ensure the bags do not unseal, which could ruin the samples.

Make certain to label each bag thoroughly. Common information included on each bag includes the person and/or the company who collected the sample, the location and area where the sample was taken, and the date the sample was collected.

Testing Samples in Bags

Flatten the bag of soil to form a continuous uniform layer of at least 1 cm. (0.4 inch) thickness. Place the measurement window of the NITON XLp Lead Paint Analyzer on the bag. Then follow *In Situ* testing instructions from page 5.

- 1. Choose a convenient work surface. This surface should be free of material containing elements that may be detected by the analyzer. When uncertain of the work surface, test the surface with the analyzer.**
- 2. Flatten the bag of soil to form a continuous uniform layer of at least 1 cm. (0.4 inch) thickness. Place the nose of the NITON analyzer on the bag. Be careful of bags with manufacturers printing or labeling surfaces. This printing often contains detectable elements, most notable Ti, and should be avoided when possible.**
- 3. Position the instrument against the surface of the bagged sample, and initiate a reading by squeezing the shutter release, and firmly pressing the instrument flat against the sample. The trigger and the proximity sensor must both be engaged before the shutter will open and the measurement initiated.**



WARNING! Do not hold bagged samples while testing. ♦

Prepared sample analysis is the most accurate method for determining the concentration of elements in a bulk medium using the instrument. Sample preparation will minimize the effects of moisture, large particle size, variations in particle size and sample non-homogeneity.

Note: More sample preparation (drying, milling and sifting) will yield greater accuracy. The drier, finer, and more homogeneous the particles, the better the measurements.

Preparing Bulk Soil Samples

Thermo NITON recommends a specific sample protocol. Following this protocol for preparing and testing samples is vital for achieving a level of accuracy comparable with laboratory results.

The equipment you need to prepare samples is included in your kit. Among these are a mortar and pestle, several different sized metal sieves, cups to hold the samples, and the soil test platform.



CAUTION All test equipment must be kept clean to prevent contamination of samples. ♦

Cleaning Your Equipment:

The mortar, pestle, and grinding mill may be cleaned with dry paper towels. You can also clean the mortar, pestle, and the mill's container with water, but be sure each is absolutely dry before using them on another sample. The mortar and pestle may be cleaned by grinding clean, dry sand in the mortar. Use the short bristle brushes (included in your Soil Testing Kit) to clean the sieves. If you have an electric soil grinder in your kit, when the soil grinder blades wear out, unbolt the worn blades and replace them. Call the Thermo Sales Department at 1-800-875-1578 for replacement blades.

Note Using the soil grinder may artificially increase the amount of Fe in soil samples. ♦

Sample Preparation

Prior to analysis, the material should be dry and well homogenized. Ideally, the entire sample should be dried to constant weight, sifted to remove gravel and debris, and ground or milled to a fine powder.

Dry the sample if it is moist and cohesive. The sample can be dried in any of several ways. Choose one of the following:

- Oven dry the sample for approximately 2 hours at 150° C, until the sample reaches a constant weight. Note: Oven drying is inappropriate when volatile compounds may be present in the sample. For example, lead present as tetraethyl lead would be driven off by the heat of drying. Some forms of mercury and arsenic are volatile. Air drying will preserve more of these volatile substances.
- Air dry the sample overnight at room temperature in a shallow pan.
- Stir gently and warm the sample in a pan over a hot plate or burner.

Coning and Quartering

You may need to divide your sample at various times during preparation. Coning and quartering is a method for dividing the sample into homogenous quarters.

- Pour the dry material slowly and carefully onto a flat sheet or pan, forming a symmetrical cone. Divide the cone into equal piles using a flat thin-bladed tool, such as a knife or ruler. Divide these in half again.
- Now you have four samples, each one-quarter the size of the original and each more homogenous than the original.
- Grind the sample to break up dirt clods and/or paint chips.



WARNING! Grinding and sifting dried samples produces dust. Even clean soil contains silica, which may be hazardous when airborne. Prepare all samples in a ventilated area; wear a mask, gloves, and an apron; and spread a drop cloth. ♦

Sift using the #10 (2mm) mesh and separate out the larger pieces (stones, organic matter, metallic objects, etc. Examine the larger particles by eye (look for paint chips), but do not include in the sample. Grind the sample again so its particles will be finer and more homogenous. Use mortar and pestle, or an electrically powered grinding mill. Sift at least 10 grams of the sample through #60 (250 μm) and #120 (125 μm) mesh. Re-grind the un-passed material until the entire fraction is able to pass. Mix the resulting sample.

Placing the Sample in an XRF Sample Cup

The container used to hold the sample will affect the accuracy of the measurement. Use a container with as thin-walled a window as is convenient and use the same kind of container and window for each sample. Consistency and careful attention to detail are keys to accurate measurement.



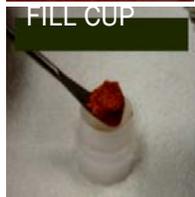
Note The sample container should be a sample cup of a type that can be filled from the rear; that is, the side opposite the window (e.g. Thermo NITON Part Number 187-466). Thermo recommends using a 1/4 mil Mylar film (e.g. Thermo NITON Part Number 187-492). A supply of cups and films are included.



Place a circle of Mylar film on top of an XRF sample cup. This film goes on the end of the cup with the indented ring. Thermo recommends preparing the cup ahead of time, if possible.



Secure the film with the collar. The flange inside the collar faces down and snaps into the indented ring of the cup. Inspect the installed film window for continuity and smooth, taut appearance.



Set the cup on a flat surface film-window-side down. Fill it with at least five grams of the prepared sample, making sure that no voids or uneven layers.

TAMP SAMPLE



Lightly tamp the sample into the cup. The end of the pestle makes a convenient tamper.

PLACE FILTER



Place a filter-paper disk on the sample after tamping it.

STUFF CUP



Fill the rest of the cup with polyester fiber stuffing to prevent sample movement. Use aquarium filter or pillow filling as stuffing. A small supply of stuffing comes with your bulk sample kit.

CAP CUP



Cap the cup.

PLACE LABEL



Place a label on the cup. Using a pen with indelible ink, write identifying information on the cup. Keep a record of the sample designation, the site and location, the date of the sample, and any other relevant comments.

CUP READY



Cup is ready for testing.

Preparing Liquids, Sludge or Dust

Liquids Fill an XRF sample cup with the liquid to be tested (do not pad the sample with cotton). The cup must be full so it is best if some liquid is allowed to overflow when the cap is put on.

Sludge Sludge can be placed directly into an XRF cup for screening. This is considered in-situ testing because no attempt has been made to prepare the sample. For more accuracy, the sludge can be dried, sieved, and ground.

Dust Vacuum dust with a household vacuum cleaner and use large dust samples taken from the vacuum cleaner bag. Remove fibers, hairs, and debris. At least three grams of dust are needed to assure accurate analysis. Samples as small as one or two grams may be measured with less accuracy. Even smaller samples (0.3 to 1.0 grams) can be analyzed by applying a weight correction factor and by using a funnel to place the sample in the center of the sample cup.

Prepare in an XRF sample cup and test the same way you would with a soil sample. For risk analysis, it is advisable to use a 60-mesh sieve to isolate and test only fine particles.

Standard Soil Mode

Thermo provides a set of three soil standards containing either NIST high, NIST medium, and NIST low, or containing NIST high, TILL-4, and NCS DC 73308. Use these standards to check the calibration of the instrument when testing in **Standard Soil Mode**. For the compositions of these standards, see Chapter 2 - page 66.

Note Although the standards do not contain every element that the Lead Paint Analyzer is capable of testing, and although the standards do contain elements that the analyzer is not capable of testing, it can be assumed that the XLP Environmental Analyzer will measure all elements correctly if it correctly measures those elements contained in the standards supplied. ♦

Test the standards regularly. Thermo recommends testing immediately after the instrument finishes self-calibration. Test the standard samples appropriate to the type of tests you are conducting, and once every 1–2 hours thereafter.

Note For defensible Quality Control, keep a record of the time and precision of every calibration, using the bar code system when possible. ♦



WARNING! Tampering with the 5,500 ppm (lead high) lead-in-soil standard may cause exposure to lead dust. Keep all standards out of the reach of children. ♦



CAUTION Never tamper with Test Standards. They should not be used unless they are completely intact. ♦

During each test, the instrument looks at the full range of x-ray spectrum and continuously corrects for cross-element interference.

Testing Prepared Samples

Set the test platform on a flat, solid surface. Slide out the drawer and place the sample cup in the holder and slide the drawer shut. Insert the instrument into the nose cone adaptor so that the LCD screen is facing the side that the test platform drawer is on, and follow in-situ bulk sample instructions

FP Soil Testing Modes

These modes of the operating software are intended primarily for the detection of metal concentrations greater than 1% in light or heavy matrices. The full fundamentals parameter (FP) algorithm accurately measures elemental concentrations from minor levels to 100%, and automatically corrects for inter-element effects. However, elements lighter than calcium cannot be detected by XRF and light element combinations, such as oxides, carbonates, and silicates are common matrix components. To fine-tune results, you may enter calibration factors for individual elements to adjust for effects of light element interference. These calibration factors are linear corrections, which adjust the FP calculation. Calibrations only need to be entered once per matrix. However, as matrices can vary considerably from one sampling area to another, it is recommended that new calibrations be done for each change in matrix.

Using both the ^{109}Cd and ^{241}Am sources, concentrations for the following analytes can be determined:

Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, W, Pb, Bi, Zr, Ta, Nb, Mo, Sn, and Ag.

All concentrations are displayed in units of wt.%.

Note For defensible Quality Control, keep a record of the time and precision of every calibration, using the bar code system wherever possible. ♦



WARNING! Tampering with the 5,500 ppm (lead high) lead-in-soil standard may cause exposure to lead dust. Keep all standards out of the reach of children. ♦



CAUTION Never tamper with Test Standards. They should not be used unless they are completely intact. ♦

During each test, the instrument looks at the full range of x-ray spectrum and continuously corrects for cross-element interference.

Testing Prepared Samples

Set the NITON test platform on a flat, solid surface. Slide out the drawer and place the sample cup mylar side facing up in the holder and slide the drawer shut. Insert the instrument into the nose cone adaptor so that the LCD screen is facing in the same side as the test platform drawer and follow ex-situ bulk sample instructions

The Data Entry Screen

The **Data Entry Screen** is accessed whenever you select the **Data Entry** icon from any screen. This screen allows you to input data in several different fields, or categories, concerning your sample, in several different ways:

- By selecting the Virtual Keyboard button and typing the parameter in using the **Virtual Keyboard**.
- By scanning in the parameter name using the integrated bar code scanner.
- By creating a new, or editing your analyzer's existing, '.ndf' file through the NDT program. You can then select from the various custom options you have created using the Drop-down List button.

These fields are saved along with the subsequent reading, and allow you to associate important information about the sample directly with the reading, so that you have a full description of the sample tied into the reading itself.

Once you have input data into a field, that information carries over into the next reading, so that you only have to input the information that has changed since the last reading. For example, if you are analyzing several samples of a particular lot, you only need to input the lot information once during that series of readings, changing only the sample name.

Standard Soil Mode Data Entry Screens

Data	
NAV Tools	
1	SAMPLE NIST 2710 HIGH
2	LOCATION STANDARD
3	INSPECTOR FRED W
4	COR 1 NA
5	COR 2 NA

Figure 6-14. Data Entry Screens Standard Soil Mode - First Page

This is the first section of the **Standard Soil Data Entry Screen**. There are five parameters in this section.

- Selecting **Sample** allows you to input the sample name parameter
- Selecting **Location** allows you to input the particular location information, if known
- Selecting **Inspector** allows you to specify the inspector.
- Selecting **COR 1** allows you to specify the first coordinate.
- Selecting **COR 2** allows you to specify the second coordinate.

The screenshot shows a data entry screen titled "Data" with a sub-header "NAV Tools". It contains two main sections:

- 6**
-
- 7**
-

Figure 6-15. Data Entry Screens Standard Soil More - Second Screen

This is the second section of the Standard Soil Data Entry Screen. There are two parameters in this section.

Selecting **Misc** allows you to input miscellaneous parameters

Selecting **Note** allows you to input notes on the sample

Data Entry Screens for all other Bulk Modes

Data	
NAV Tools	
1	SAMPLE
	NIST 2710 HIGH
2	LOCATION
	STANDARD
3	INSPECTOR
	FRED W
4	COR 1
	NA
5	COR 2
	NA

Figure 6-16

Figure 6-16. Data Entry Screen - Other Bulk Mode

This is the only section of the **Data Entry Screen**. There are five parameters in this section.

- Selecting **Sample** allows you to input the sample name parameter
- Selecting **Location** allows you to input the particular location information, if known
- Selecting **Inspector** allows you to specify the inspector.
- Selecting **Misc** allows you to input miscellaneous parameters
- Selecting **Note** allows you to input notes on the sample

Navigating the Data Entry Screen

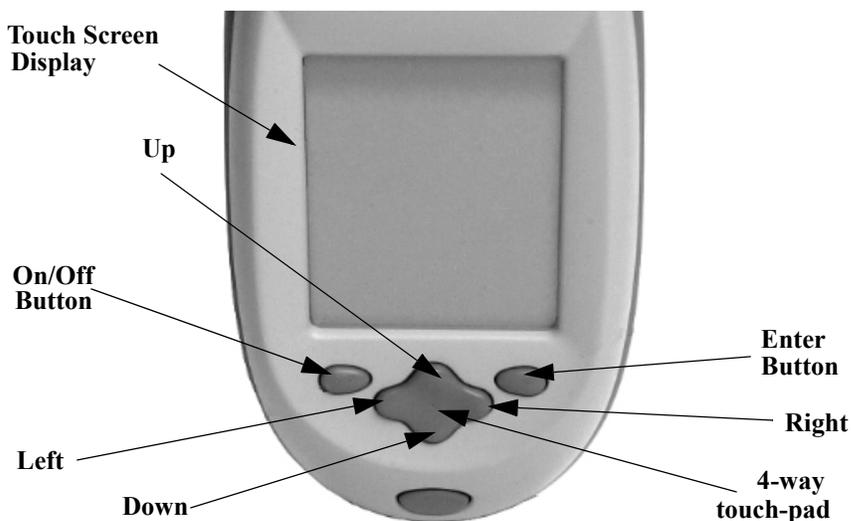


Figure 6-17. The Control Panel

The following description of screen navigation using the control panel assumes that the analyzer is held so that the display is held upright as in [Figure 6-17](#).

- To move from column to column, use the Right and Left portion of the 4-way touch pad.
- To move from row to row, use the Up and Down portions of the 4-way touch pad.
- To select the highlighted option, press the Enter button on the control panel.

The *Data Entry* Screen is divided into sections of 5 setting parameters. By using the Down portion of the 4-way touch pad when you are on the last row of a section, the display will change to the next section. By using the Up portion of the 4-way touch pad when you are on the first row of a section, the display will change to the previous section.

By selecting the *On/Off* button, you can exit the *Data Entry* Screen.

The Virtual Keyboard

Data Entry									
A1234567890A									
1	2	3	4	5	6	7	8	9	0
q	w	e	r	t	y	u	i	o	p
a	s	d	f	g	h	j	k	l	-
z	x	c	v	b	n	m	.	shift	
backspace			space			clr		return	

Lower Case Virtual Keyboard

Data Entry									
A1234567890A									
!	@	#	\$	%	^	&	*	()
Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	_
Z	X	C	V	B	N	M	,	shift	
backspace			space			clr		return	

Upper Case Virtual Keyboard

Figure 6-18. The Virtual Keyboard

The Virtual Keyboard is a full alphanumeric keyboard which appears on the LCD Touch Screen Display. You can use the Virtual Keyboard either with the four-way touch pad and control panel buttons, or using the touch screen display directly.

At the top of the screen is the data field you are entering data for, in this case, “Sample”, Directly underneath is the data you are entering, in this case “17-4 PH SS”, On this line also is the underscore cursor. This graphically shows where the next character will be placed. Up to 25 characters can be stored in the data fields.

Next is the Virtual Keyboard itself, with numbers 0-9, letters A-Z, and special characters *, <, >, and -.

Last is the control button line. This contains the screen buttons for Return and Clear.

When using the four-way touch pad and control buttons, pressing the On/Off button allows you access to the Return and Clear screen buttons. The Return screen button will enter the data and return you to the Data Entry Screen, while the Clear screen button will clear the data you have

All screen areas can be directly accessed using the LCD Touch Screen.

NITON Test Platforms

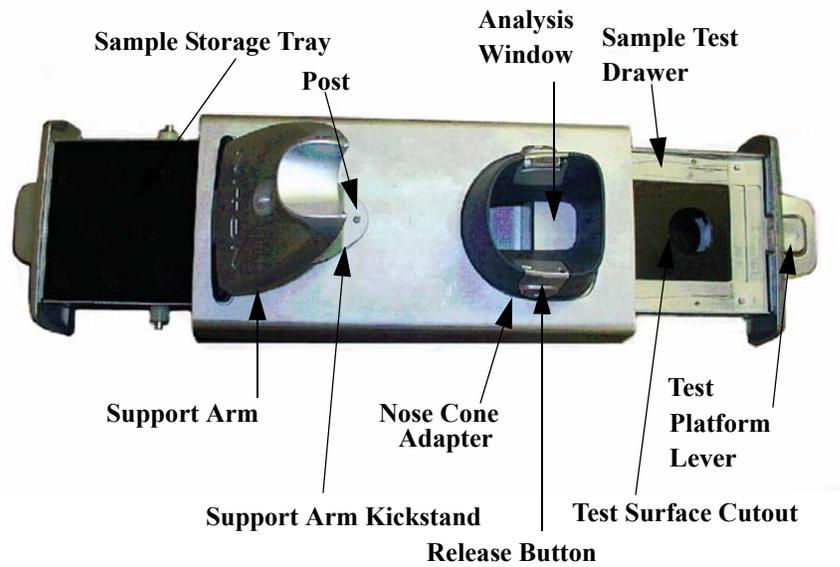


Figure 6-19. NITON Bulk Mode Test Stand

The NITON Bulk Test Stand is designed to facilitate bulk and thin sample testing using NITON Analyzers. The NITON Portable Test Stand is designed for bulk and moderate sized samples, and is portable.

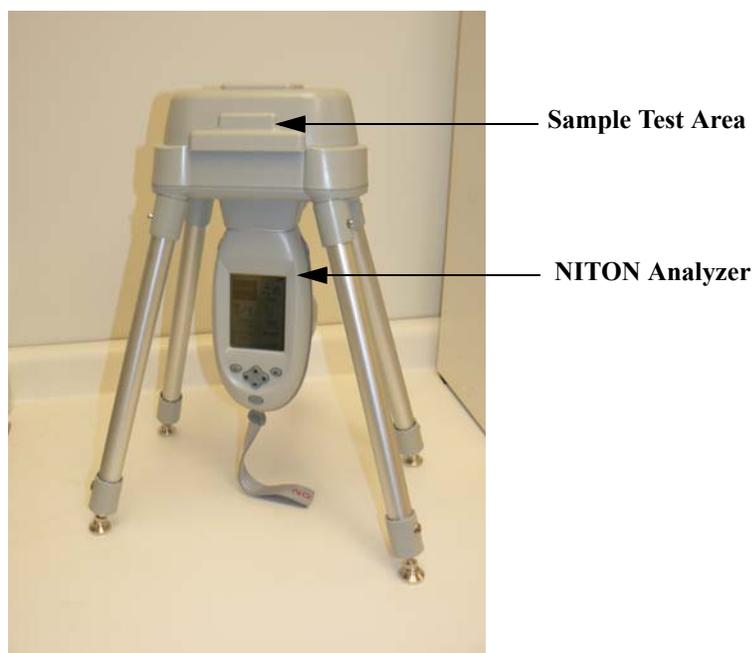


Figure 6-20. NITON Portable Test Stand

NITON RCRA Verification Response Sample

This sample contains 7 of the 8 RCRA metals as follows:

As, Ba, Cd, Cr, Pb, Se, and Ag

NITON may recommend the analysis of this sample if you question the data that the instrument is displaying for the above elements.

Chapter 7 Precious Metals Mode

Using Precious Metals Mode

Precious Metals Mode is not enabled on your Niton XLp analyzer. For more information on this feature please contact Thermo Scientific's Customer Service Department in the United States, Toll free, at (800) 875-1578, or outside the United States at + 1-978-670-7460 or your authorized Niton Analyzer Service Center.

Precious Metals Mode
Using Precious Metals Mode

Chapter 8 Bluetooth

Setting up Bluetooth

Bluetooth Wireless Networking enables you to connect to your computer and other Bluetooth-enabled devices such as printers and GPD S devices without the need of cabling, ports, or hubs.

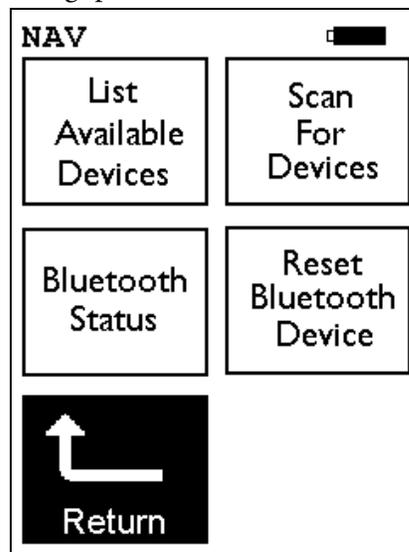


Figure 8-1. The Wireless Setup Menu

To access the Bluetooth Wireless Networking, select the Wireless Setup icon from the Instrument Setup Menu.

Select the **List Available Devices** icon to show a list of Bluetooth devices previously discovered. The Bluetooth devices listed are only those which were present at the last time you ran a discovery scan for Bluetooth devices, as the list is not automatically updated. Selecting the **List Available Devices** icon brings up the **Available Devices** screen. From the list, you can connect your analyzer to those devices.



Select the **Scan For Devices** icon bring up the **Bluetooth Search Screen**, enabling you to initiate a discovery scan of Bluetooth devices in the operational area. This scan will find all appropriate Bluetooth devices in the operational area, enabling you to connect to those devices.



Bluetooth
Status

Select the **Bluetooth Status** icon to view the current status of your Bluetooth connections on the **Bluetooth Status** screen. The Bluetooth Status screen will display your analyzer's serial number, connection status, the transfer rate, and your analyzer's address

Reset
Bluetooth
Device

Select the **Reset Bluetooth Device** icon to initiate an immediate reset of the Bluetooth Wireless Networking. Selecting the **Reset Bluetooth Device** icon will clear out old settings and data, as well as enabling you to switch between Bluetooth and standard serial cable. While resetting, your analyzer will show the following screen:

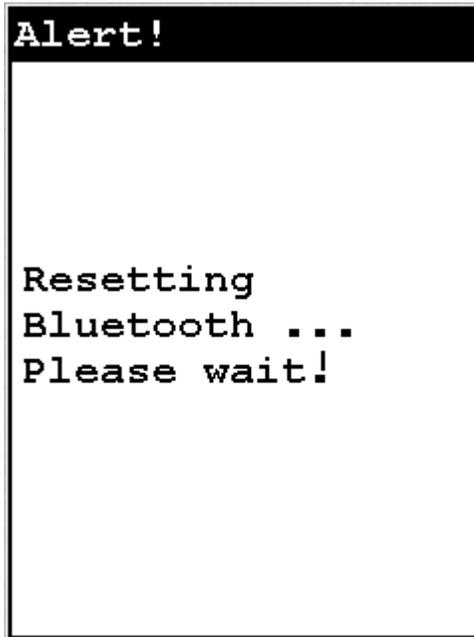


Figure 8-2. Bluetooth Reset Alert

Available Devices Screen

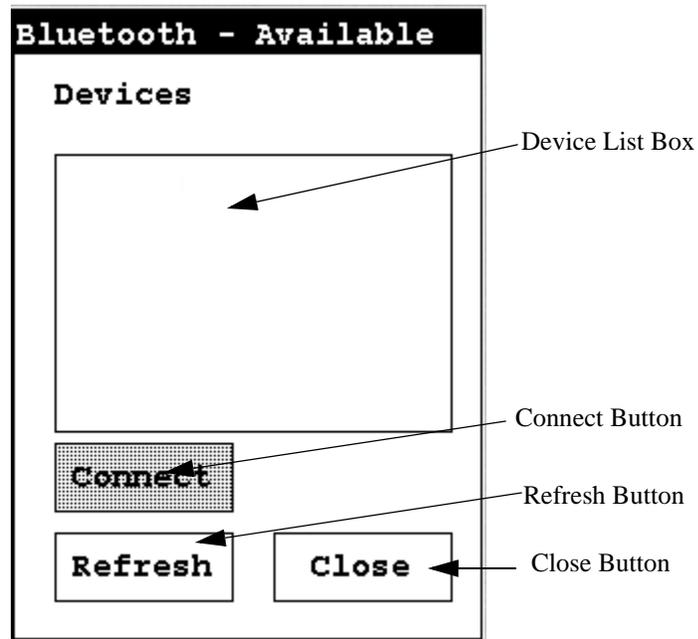


Figure 8-3. Available Devices Screen

Under “Devices,” in the Device List Box, the Available Devices Screen lists all known applicable Bluetooth devices in the area found during the last refresh or scan.

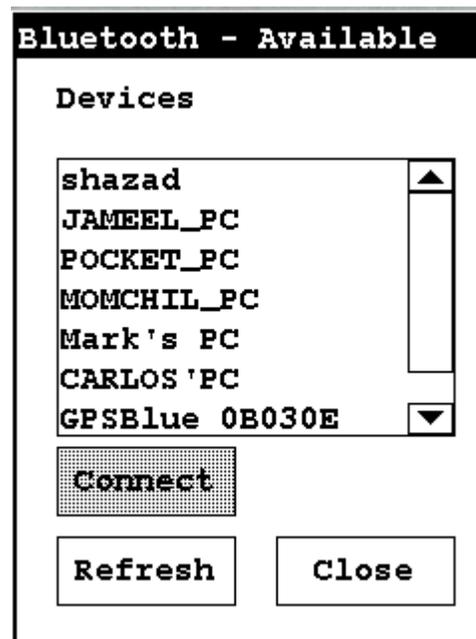


Figure 8-4. Example Device List

- Selecting the Refresh Button initiates a scan of the area for new Bluetooth devices. Devices no longer present are removed.

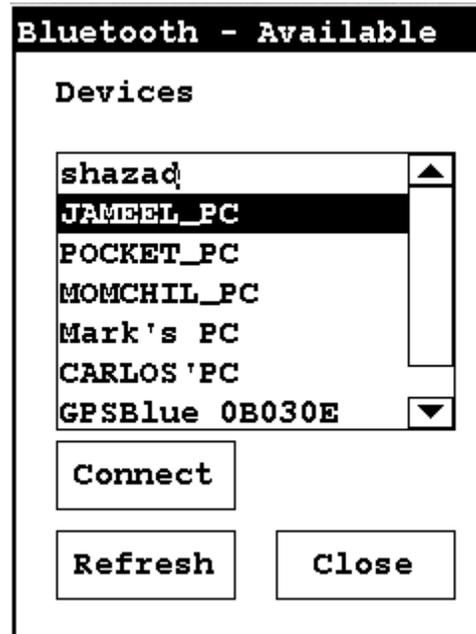


Figure 8-5. Available Device Refresh

- Selecting a listed Bluetooth Device enables the Connect Button.
- Selecting the Connect Button will connect your analyzer to the selected device. See the Connected Screen.

Bluetooth Search Screen

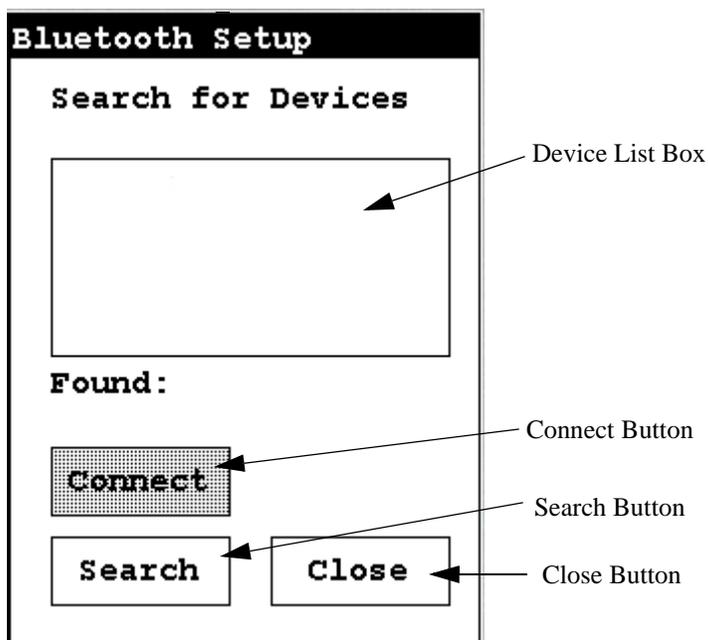


Figure 8-6. Bluetooth Search Screen

The **Bluetooth Search Screen** does not retain information about previously detected Bluetooth Devices. Each time the **Bluetooth Search Screen** is opened, the Device List Box is empty.

- Selecting the Search Button initiates a scan for Bluetooth Devices in the area.

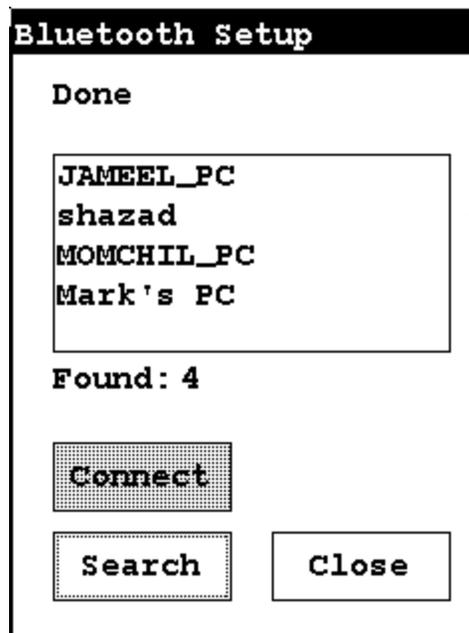


Figure 8-7. Example Search List

Depending on where and when the Search Scan is conducted, certain devices may or may not be detected. You can select a device and connect to that device in exactly the same manner as in the **Available Devices Screen**, once the search is finished.

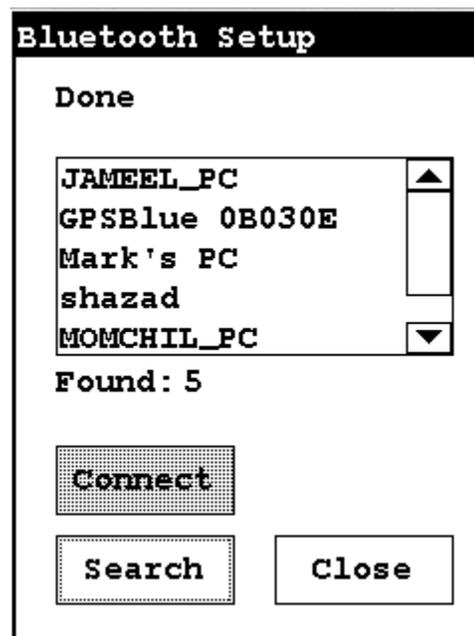


Figure 8-8. Search List with New Device Found

The Connected Screen

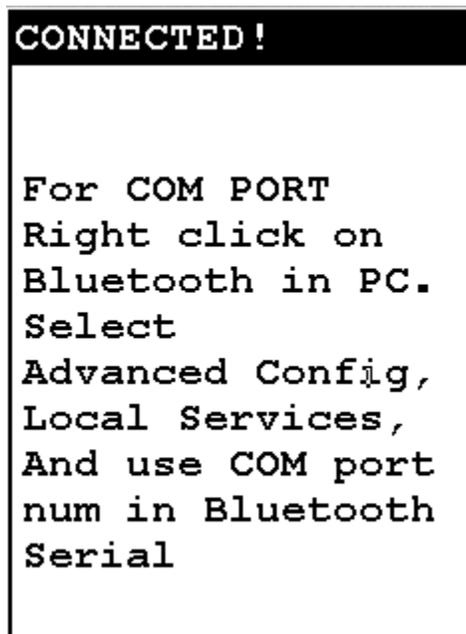


Figure 8-9. The Connected Screen

When you have connected your analyzer to a Bluetooth Device, you get the Connection Screen. The Connection Screen serves as a reminder of what needs to be done to use the connection. With simple devices like GPS devices, a notification that you are connected is given, and everything just works, but working with a PC is a bit more complex.

In order to use a Bluetooth Serial Connection with a PC, you need to know which COM port Bluetooth is connected through. To determine this, right click on the Bluetooth logo in your system tray on your PC. From the popup menu which appears, select Advanced Config., then select Local Services.



Figure 8-10. Advanced Configuration selection on PC

Service Name	Startup	Secure Connection	COM Port
Audio Gateway	Auto...	Not Required	
Headset	Auto...	Not Required	
PIM Synchronization	Manu...	Required	
Fax	Manu...	Required	
File Transfer	Auto...	Required	
PIM Item Transfer	Manu...	Not Required	
Dial-up Networking	Manu...	Required	
Network Access	Auto...	Required	
Bluetooth Serial Port	Auto...	Not Required	COM3

Figure 8-11. Bluetooth Service Listing on PC

In the Bluetooth Serial Port row, the COM port used by Bluetooth is identified. Use this port for any interactions between your analyzer and your computer, such as NDT or NDTi.

Make sure that the Secure Connection setting for the Bluetooth Serial Port is set to “Not Required.”

Service Name	Startup	Secure Connection	COM Port
Audio Gateway	Auto...	Not Required	
Headset	Auto...	Not Required	
PIM Synchronization	Manu...	Required	
Fax	Manu...	Required	
File Transfer	Auto...	Required	
PIM Item Transfer	Manu...	Not Required	
Dial-up Networking	Manu...	Required	
Network Access	Auto...	Required	
Bluetooth Serial Port	Auto...	Not Required	COM3

Figure 8-12. Selecting Bluetooth Serial Port on PC

To edit the setting, double click the row.

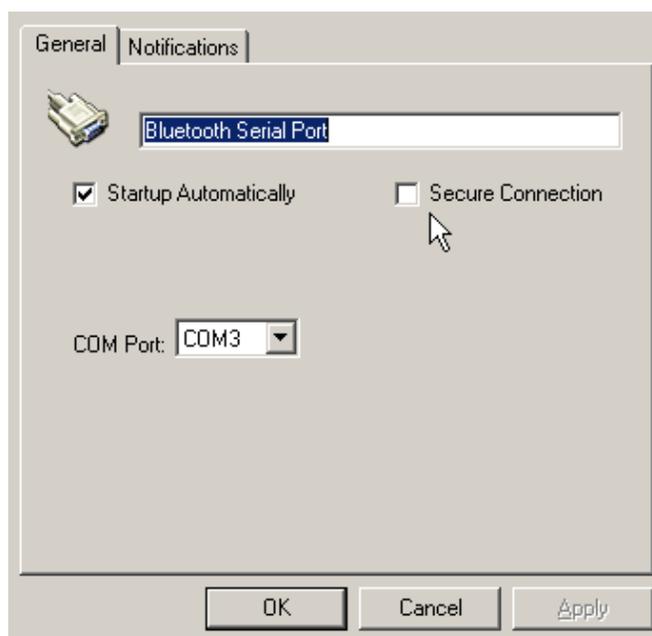


Figure 8-13. Changing the Bluetooth Secure Connection Checkbox on PC

Unselect the Secure Connections checkbox if it is already selected, then select the “OK” button.

Bluetooth Status Screen

The Bluetooth Status Screen enables you to see at a glance if and how your analyzer is connected to your computer.

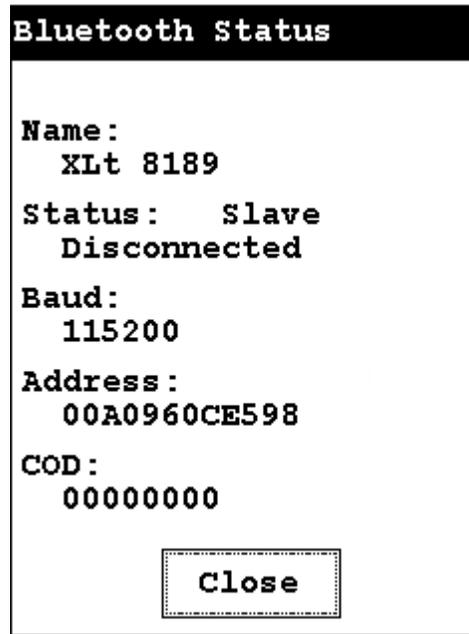


Figure 8-14. Example Bluetooth Status Screen

The Bluetooth Status Screen shows your analyzer's identification label, its connection state, the speed of the communication port setting, your analyzer's network address, and the COD.

In [Figure 8-14](#), the analyzer "XLt 8789" is not connected to any computer, was last in Slave state - i.e. the last connection was initiated by the computer and not by the analyzer, has a com port set to communicate at 115200 baud, has the unique network (MAC) address of 00A0960CE598, and has a COD (Class Of Device) of 00000000.

The Close screen button will return you to the Wireless Setup Menu.

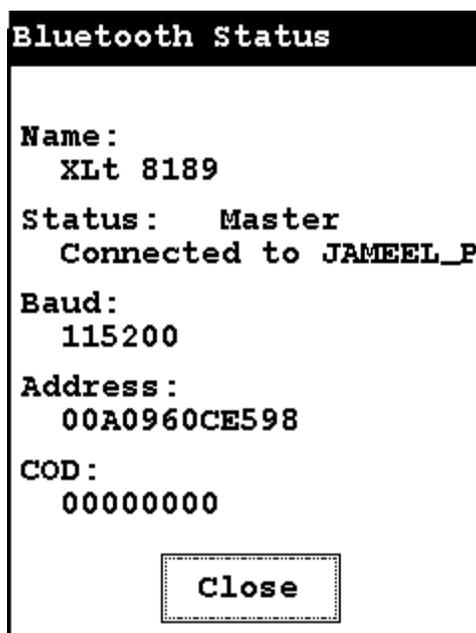


Figure 8-15. Second Example Bluetooth Status Screen

In another example, in [Figure 8-15](#), the analyzer “XLt 8789” is connected to the computer JAMEEL_P, is currently in Master state - i.e. connection was initiated by the analyzer and not by the computer, has a com port set to communicate at 115200 baud, has the unique network (MAC) address of 00A0960CE598, and has a COD (Class Of Device) of 00000000.

GPS Data Tracking

Bluetooth equipped Niton XRF Analyzers are now capable of communicating with GPS modules and saving GPS coordinates with every reading. Follow the Bluetooth connection instructions found in the Users Manual to scan for and connect to a Bluetooth enabled GPS device.

Once connected, the GPS unit sends out a number of signals that can be read. The analyzer will display the relevant information from the GPS after connection, as shown in [Figure 8-16](#)

As shown in [Figure 8-17](#), these coordinates can be viewed in the Data screen in entry positions eight, nine, and ten. (Scroll down to reach these fields.) When the results are downloaded using the NDT software the GPS coordinates are also stored and downloaded in data entry fields eight, nine and ten.

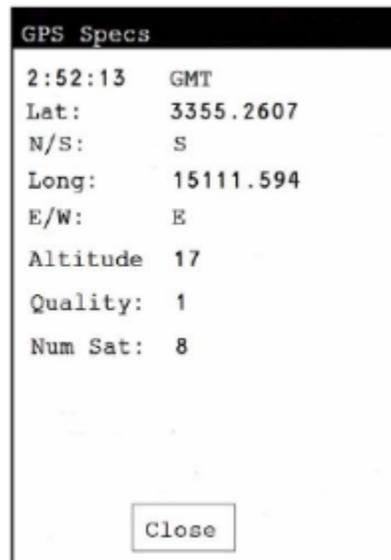


Figure 8-16. Example of GPS Data

Example of GPS Data

- 2:52:13 GMT - Greenwich Mean Time obtained from the GPS satellites.
- Lat: 3355.2607 -Latitude coordinate of current location. This should be read as:
 - All digits to the right of the decimal point are seconds.
 - First two digits to the left of the decimal point are minutes.

- The next two or three digits to the left of the decimal point are degrees.
- Thus 3355.2607 is read 33 degrees 55 minutes 26.07 seconds.
- N/S: S - Compass direction of Latitude.
- Long: 15111.594 - Longitude coordinate of current location.
 - All digits to the right of the decimal point are seconds.
 - First two digits to the left of the decimal point are minutes.
 - The next two or three digits to the left of the decimal point are degrees.
 - Thus 15111.594 is read 151 degrees 11 minutes 59.4 seconds.
- W/E: E - Compass direction of Longitude.
- Altitude: 17 - Height above sea level in meters.
- Quality: 1 - Quality of signal strength.
- Num Sat: 8 - Number of satellites signals being received by GPS. This number varies depending on your position, the current position of the satellites, and the signal strength.

Data	
NAV Tools	
6	MISC
7	NOTE
8	LATITUDE
	3355.252930
9	LONGITUDE
	15111.599609
10	ALTITUDE
	31

Figure 8-17. GPS Data Integrated Into Reading Data

GPS Options

The communication system standard required for compatibility is NMEA0182 ver. 3.0, using GPGGA, GPGSA, GPRMC, and GPGSV formats. This type of GPS is most commonly used for motor and marine directional mapping systems.

Tested Units include:

Copilot BTGPS3

<http://www.alk.com/copilot/pocketpc.asp>

RoyalTek Star111

<http://www.royaltek.com/index.php/content/view/98/80/>

IOGEAR Bluetooth GPS

<http://www.iogear.com/main.php?loc=product&Item=GBGPS201W6>

Note These GPS systems have an accuracy of about 10 meters.

Chapter 9 Routine Maintenance Guidelines

Battery Pack and Battery Charger

Each Niton 300Analyzer is shipped with two lithium ion battery packs. When fully charged, the battery pack provides approximately 6-8-12 hours of use, depending on duty cycle.

There are two types of battery chargers distributed with Niton XRF Analyzers. The Trickle Charger shows a solid red light while charging, then a green light once charging is complete.

The other battery charger has 2 lights in the top of the battery charger. When connected to a wall outlet, the lights will display the following information:

Table 9-1. Battery Charger Status Display

Left Hand Light	Right Hand Light	Battery Status
ON	OFF	CHARGING
ON	ON	80% CHARGED
OFF	ON	COMPLETE
BLINK	BLINK	ERROR
OFF	OFF	NO BATTERY

Replacement battery packs (Niton part number 600-540) may be ordered from Thermo Scientific in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460, or from your local Authorized Niton Analyzers Service Center.

Note Before beginning a test, be certain that the battery has sufficient charge. ♦



CAUTION Do not leave the battery pack connected to the charger for excessive periods of time. Overnight recharging is recommended. ♦



CAUTION Store the analyzer and the spare battery packs in a cool place, away from direct sunlight. ♦

Replacing The Battery Pack

1. Rest your Niton analyzer on a clean surface. Avoid damp or dusty environments.
2. Point the front of the analyzer away from you, and press in the battery housing latch.
3. Slide out the battery pack out toward you.
4. Fully insert the new battery pack, making sure that it seats properly.
5. Press in until the latch resets.

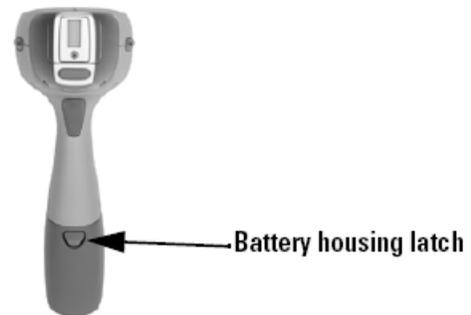


Figure 9-1. Location of the Battery Housing Latch

Recharging The Battery Pack

Fully recharging a Niton XLp battery pack takes approximately 2 hours.

1. Remove the battery pack from the analyzer.
2. Lifting the gasket flap, plug one end of the Battery Charger (AC adapter or 12V adapter) into the battery charger port.
3. Plug the other end of the AC adapter into a wall socket.



Figure 9-2. Location of the Battery Charger Port



CAUTION Do not force the charger into the RS-232 port! ♦



CAUTION Do not store battery packs or charger in direct sunlight. ♦

The AC adapter/Battery Charger comes with a convenient indicator light to inform you when the battery is fully charged.



CAUTION Do not let the battery pack recharge for excessive periods of time. ♦

Maintenance, Cleaning and Repairs

To ensure the reliability, durability, and performance of your Niton Analyzer, keep it clean—especially the transparent Kapton window covering the analysis window. Clean the Kapton window gently with a cotton swab. Clean the body of the analyzer with a soft cloth. Never use detergents, or solvents on your analyzer, or immerse your analyzer in water. If the Kapton window becomes frayed, ripped, or contaminated with metal particulates, replace it with a new window. Kapton windows (Niton P/N 187-095) may be ordered from Thermo Scientific's Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460 or from your local Authorized Niton Analyzers Service Center.

From time to time, your touch screen will need cleaning. Thermo Scientific recommends that you use a lens cleaning solution with a soft cloth. Do not use water to clean your Niton Analyzer.



Note All Service, except exterior cleaning and Kapton window replacement, must be performed by Thermo Scientific or an Authorized Niton Analyzers Service Center. Do not attempt to make repairs yourself. Opening the case of your analyzer will void the analyzer Warranty in its entirety. ♦



CAUTION Always obtain a Return Authorization (RA) number from Thermo Scientific's Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460 before returning your analyzer to the Niton Service Department or local Authorized Niton Analyzers Service Center. ♦

Replacing the Kapton Window

1. Remove the three Phillips head screws.



Figure 9-3. View of Face Plate and Kapton Window

2. Remove the face plate and place it face down.



Figure 9-4. Face Plate Removed showing Kapton Window on Reverse

3. Remove the old Kapton window.
4. Clean the back surface of the face plate and install the new Window.

5. Turn the face plate over and replace it on the analyzer's front end, fitting the plate carefully over the Proximity Button.



Figure 9-5. Fitting Face Plate over Proximity Button

6. Reinstall the three screws, being careful not to over-tighten them.



Figure 9-6. Replacing the Screws.

Storing and Transporting Your Niton XLp Analyzer

All Niton Analyzers are transported in waterproof, drop-resistant, fully padded carrying cases with padlocks. In most countries, Niton XRF analyzers may be transported by car or plane or shipped as an *ordinary* package. For most courier services, no special labels are required on the outside of the Niton analyzer case or on additional packaging.



Figure 9-7. The Niton Carrying Case

All padlocks are shipped with a default combination of “0-0-0”. If you change this combination, please inform Thermo Scientific of the new combination if you return the unit for service.

To change the combination:

- 1. Dial the default combination to open the lock, and pull out the shackle.**
- 2. Rotate the shackle 180 degrees and push it down as far as it can go.**
- 3. While holding the shackle down, rotate it 90 degrees back in either direction and release shackle.**

4. **Change the dial settings to the desired combination, record the combination, and without disturbing the dials, rotate the shackle back 90 degrees to the position it had in step 2.**

5. **Pull shackle out and rotate it 180 degrees and secure it. Your lock now has its own secret combination.**



CAUTION Always transport the unit in its padded carrying case, and store the Niton Analyzer in its case whenever it is not being used. ♦



CAUTION In most cases, no notification is required if transporting within state boundaries. This may not be the case when entering federal properties. ♦



CAUTION Within the United States, always keep a copy of the US DOT compliance statement in your Niton analyzer case at all times. A copy is included with your analyzer. ♦



CAUTION Always follow all pertinent local and national regulations and guidelines, wherever your XLp 300 series analyzer is transported or used. ♦



CAUTION Always obtain a Return Authorization (RA) number from Thermo Scientific's Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460 before returning your analyzer to the Service Department or to your local Authorized Niton Analyzers Service Center. ♦



CAUTION If you return your Niton analyzer without the carrying case, you will void your Niton 300 Series Analyzer's warranty in its entirety. You will be billed for a replacement case plus any repairs resulting from improper shipping. ♦



CAUTION Always remove the battery pack when transporting or storing your analyzer. ♦

Note THE Niton SPECTRUM ANALYZER CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.424 FOR EXCEPTED RADIOACTIVE MATERIAL. EXCEPTED-PACKAGE INSTRUMENTS AND ARTICLES, N.O.S. UN-2911. ♦

Appendices

Appendix A: X-ray Emission Energies Arranged Alphabetically by Element, by Atomic Number

Table A-1. X-ray Emission Energies Arranged Alphabetically by Element, by Atomic Number

Element	Symbol	Atomic Number	Atomic Weight	Ka	Kb	La	Lb	Lg
potassium	K	19	39.10	3.3	3.7			
calcium	Ca	20	40.80	3.7	4.0			
scandium	Sc	21	44.96	4.1	4.5			
titanium	Ti	22	47.90	4.5	4.9			
vanadium	V	23	50.94	4.9	5.4			
chromium	Cr	24	52.00	5.4	5.9			
manganese	Mn	25	54.94	5.9	6.5			
iron	Fe	26	55.85	6.4	7.1			
cobalt	Co	27	58.93	6.9	7.6			
nickel	Ni	28	58.70	7.5	8.3			
copper	Cu	29	63.55	8.0	8.9			
zinc	Zn	30	65.38	8.6	9.6			
gallium	Ga	31	69.72	9.2	10.3			
germanium	Ge	32	72.59	9.9	11.0			
arsenic	As	33	74.92	10.5	11.7			
selenium	Se	34	78.96	11.2	12.5			
bromine	Br	35	79.90	11.9	13.3			
krypton	Kr	36	83.80	12.6	14.1			
rubidium	Rb	37	85.47	13.4	15.0			
strontium	Sr	38	87.62	14.1	15.8			
yttrium	Y	39	88.91	14.9	16.8			
zirconium	Zr	40	91.22	15.7	17.7			
niobium	Nb	41	92.91	16.6	18.6			
molybdenum	Mo	42	95.94	17.4	19.6			
technetium	Tc	43	98.00	18.3	20.6	2.4	2.5	2.8

Table A-1. X-ray Emission Energies Arranged Alphabetically by Element, by Atomic Number

Element	Symbol	Atomic Number	Atomic Weight	Ka	Kb	La	Lb	Lg
ruthenium	Ru	44	101.07	19.2	21.7	2.6	2.6	3.0
rhodium	Rh	45	102.91	20.2	22.8	2.7	2.8	3.1
palladium	Pd	46	106.42	21.1	23.9	2.8	3.0	3.3
silver	Ag	47	107.87	22.1	25.0	3.0	3.2	3.5
cadmium	Cd	48	112.41	23.1	26.1	3.1	3.3	3.7
indium	In	49	114.82	24.1	27.4	3.3	3.5	3.9
Tin	Sn	50	118.71	25.2	28.6	3.4	3.7	4.1
antimony	Sb	51	121.76	26.3	29.9	3.6	3.8	4.3
tellurium	Te	52	127.60	27.4	31.1	3.8	4.0	4.6
iodine	I	53	126.90	28.5	32.4	3.9	4.2	4.8
xenon	Se	54	131.30	29.7	33.8	4.1	4.4	5.0
cesium	Cs	55	132.91	30.9	35.1	4.3	4.6	5.3
barium	Ba	56	137.33	32.1	36.6	4.5	4.8	5.5
lanthanum	La	57	138.91	33.3	38.0	4.7	5.0	5.8
cerium	Ce	58	140.12	34.6	39.5	4.8	5.3	6.0
praseodymium	Pr	59	140.91	35.9	41.0	5.0	5.5	6.3
neodymium	Nd	60	144.24	37.2	42.5	5.2	5.7	6.6
promethium	Pm	61	145.00	38.5	44.0	5.4	6.0	6.9
samarium	Sm	62	150.35	39.9	45.6	5.6	6.2	7.2
europium	Eu	63	151.96	41.3	47.3	5.8	6.5	7.5
gadolinium	Gd	64	157.25	42.8	48.9	6.1	6.7	7.8
terbium	Tb	65	158.92	44.2	50.7	6.3	7.0	8.1
dysproium	Dy	66	162.50	45.7	52.4	6.5	7.3	8.4
holmium	Ho	67	164.93	47.3	54.2	6.7	7.5	8.7
erbium	Er	68	167.26	48.8	56.0	6.9	7.8	9.1
thulium	Tm	69	168.93	50.4	57.8	7.2	8.1	9.4
ytterbium	Yb	70	173.04	52.0	59.7	7.4	8.4	9.8
lutetium	Lu	71	174.97	53.7	61.6	7.7	8.7	10.1
hafnium	Hf	72	178.49	55.4	63.6	7.9	9.0	10.5
tantalum	Ta	73	180.95	57.1	65.6	8.1	9.3	10.9
tungsten	W	74	183.85	58.9	67.6	8.4	9.7	11.3
rhenium	Re	75	186.20	60.7	69.7	8.7	10.0	11.7
osmium	Os	76	190.20	62.5	71.8	8.9	10.4	12.1

Table A-1. X-ray Emission Energies Arranged Alphabetically by Element, by Atomic Number

Element	Symbol	Atomic Number	Atomic Weight	Ka	Kb	La	Lb	Lg
iridium	Ir	77	192.20	64.3	73.9	9.2	10.7	12.5
platinum	Pt	78	195.09	66.2	76.1	9.4	11.0	12.9
gold	Au	79	196.97	68.2	78.4	9.7	11.4	13.4
mercury	Hg	80	200.59	70.2	80.7	10.0	11.8	13.8
thallium	Tl	81	204.37	72.2	83.0	10.3	12.2	14.3
lead	Pb	82	207.19	74.2	85.4	10.5	12.6	14.8
bismuth	Bi	83	208.98			10.8	13.0	15.2
polonium	Po	84	(209.0)			11.1	13.4	15.7
astatine	At	85	(210.0)			11.4	13.9	16.2
radon	Ra	86	(222.0)			11.7	14.3	16.8
francium	Fr	87	(223.0)			12.0	14.8	17.3
radium	Ra	88	(226.0)			12.3	15.2	17.8
actinium	Ac	89	(226.0)			12.7	15.7	18.4
thorium	Th	90	232.04			13.0	16.2	19.0
protactinium	Pa	91	(231.0)			13.3	16.7	19.6
uranium	U	92	238.03			13.6	17.2	20.2
neptunium	Np	93	237.00			13.9	17.7	20.8
plutonium	Pu	94	242.00			14.3	18.3	21.4

Appendix B: X-ray Emission Energies Arranged Alphabetically by Element, by name

Table A-2. X-ray Emission Energies Arranged Alphabetically by Element, by name

Element	Symbol	Atomic Number	Atomic Weight	Ka	Kb	La	Lb	Lg
actinium	Ac	89	(226.0)			12.7	15.7	18.4
antimony	Sb	51	121.76	26.3	29.9	3.6	3.8	4.3
arsenic	As	33	74.92	10.5	11.7			
astatine	At	85	(210.0)			11.4	13.9	16.2
barium	Ba	56	137.33	32.1	36.6	4.5	4.8	5.5
bismuth	Bi	83	208.98			10.8	13.0	15.2
bromine	Br	35	79.90	11.9	13.3			
cadmium	Cd	48	112.41	23.1	26.1	3.1	3.3	3.7
calcium	Ca	20	40.80	3.7	4.0			
cerium	Ce	58	140.12	34.6	39.5	4.8	5.3	6.0
cesium	Cs	55	132.91	30.9	35.1	4.3	4.6	5.3
chromium	Cr	24	52.00	5.4	5.9			
cobalt	Co	27	58.93	6.9	7.6			
copper	Cu	29	63.55	8.0	8.9			
dysprosium	Dy	66	162.50	45.7	52.4	6.5	7.3	8.4
erbium	Er	68	167.26	48.8	56.0	6.9	7.8	9.1
europium	Eu	63	151.96	41.3	47.3	5.8	6.5	7.5
francium	Fr	87	(223.0)			12.0	14.8	17.3
gadolinium	Gd	64	157.25	42.8	48.9	6.1	6.7	7.8
gallium	Ga	31	69.72	9.2	10.3			
germanium	Ge	32	72.59	9.9	11.0			
gold	Au	79	196.97	68.2	78.4	9.7	11.4	13.4
hafnium	Hf	72	178.49	55.4	63.6	7.9	9.0	10.5
holmium	Ho	67	164.93	47.3	54.2	6.7	7.5	8.7
indium	In	49	114.82	24.1	27.4	3.3	3.5	3.9
iodine	I	53	126.90	28.5	32.4	3.9	4.2	4.8
iridium	Ir	77	192.20	64.3	73.9	9.2	10.7	12.5
iron	Fe	26	55.85	6.4	7.1			
krypton	Kr	36	83.80	12.6	14.1			
lanthanum	La	57	138.91	33.3	38.0	4.7	5.0	5.8
lead	Pb	82	207.19	74.2	85.4	10.5	12.6	14.8

Table A-2. X-ray Emission Energies Arranged Alphabetically by Element, by name

Element	Symbol	Atomic Number	Atomic Weight	Ka	Kb	La	Lb	Lg
lutecium	Lu	71	174.97	53.7	61.6	7.7	8.7	10.1
manganese	Mn	25	54.94	5.9	6.5			
mercury	Hg	80	200.59	70.2	80.7	10.0	11.8	13.8
molybdenum	Mo	42	95.94	17.4	19.6			
neodymium	Nd	60	144.24	37.2	42.5	5.2	5.7	6.6
neptunium	Np	93	237.05			13.9	17.7	20.8
nickel	Ni	28	58.70	7.5	8.3			
niobium	Nb	41	92.91	16.6	18.6			
osmium	Os	76	190.20	62.5	71.8	8.9	10.4	12.1
palladium	Pd	46	106.42	21.1	23.9	2.8	3.0	3.3
platinum	Pt	78	195.09	66.2	76.1	9.4	11.0	12.9
plutonium	Pu	94	244.00			14.3	18.3	21.4
polonium	Po	84	(209.0)			11.1	13.4	15.7
potassium	K	19	39.10	3.3	3.7			
praseodymium	Pr	59	140.91	35.9	41.0	5.0	5.5	6.3
promethium	Pm	61	(145.0)	38.5	44.0	5.4	6.0	6.9
protactinium	Pa	91	231.0			13.3	16.7	19.6
radium	Ra	88	(226.0)			12.3	15.2	17.8
radon	Rn	86	(222.0)			11.7	14.3	16.8
rhenium	Re	75	186.20	60.7	69.7	8.7	10.0	11.7
rhodium	Rh	45	102.91	20.2	22.8	2.7	2.8	3.1
rubidium	Rb	37	85.47	13.4	15.0			
samarium	Sm	62	150.35	39.9	45.6	5.6	6.2	7.2
scandium	Sc	21	44.96	4.1	4.5			
selenium	Se	34	78.96	11.2	12.5			
silver	Ag	47	107.87	22.1	25.0	3.0	3.2	3.5
strontium	Sr	38	87.62	14.1	15.8			
tantalum	Ta	7	180.95	57.1	65.6	8.1	9.3	10.9
tellurium	Te	52	127.60	27.4	31.1	3.8	4.0	4.6
terbium	Tb	65	158.92	44.2	50.7	6.3	7.0	8.1
thallium	Tl	81	204.37	72.2	83.0	10.3	12.2	14.3
thorium	Th	90	232.04			13.0	16.2	19.0
thulium	Tm	69	168.93	50.4	57.8	7.2	8.1	9.4

Table A-2. X-ray Emission Energies Arranged Alphabetically by Element, by name

Element	Symbol	Atomic Number	Atomic Weight	Ka	Kb	La	Lb	Lg
tin	Sn	50	118.71	25.2	28.6	3.4	3.7	4.1
titanium	Ti	22	47.90	4.5	4.9			
tungsten	W	74	183.85	58.9	67.6	8.4	9.7	11.3
uranium	U	92	238.03			13.6	17.2	20.2
vanadium	V	23	50.94	4.9	5.4			
xenon	Se	54	131.30	29.7	33.8	4.1	4.4	5.0
ytterbium	Yb	70	173.04	52.0	59.7	7.4	8.4	9.8
yttrium	Y	39	88.91	14.9	16.8			
zinc	Zn	30	65.38	8.6	9.6			
zirconium	Zr	40	91.22	15.7	17.7			

Appendix C: SpectraView

SpectraView enables you to qualitatively analyze the fluorescent x-rays of most of the elements in the periodic table in a given sample. For a complete list of elements and their fluorescent x-rays see Appendix A. In SpectraView Mode, the spectrum is displayed in a linear scale, autoscaled logarithmically so that the highest peak on the screen reaches the top of the scale.

How to Use SpectraView

You can access the SpectraView screen after taking a measurement in any mode, or while viewing a previous measurement, by selecting Spectra from the NAV Menu. Once you are in SpectraView, you can use the up and down positions of the 4-way touch pad to scroll through the spectrum, or you can tap on the spectrum display with the stylus to place the cursor at the point you tapped. The vertical cursor line indicates the current position along the spectrum.

Viewing the Information in SpectraView Mode

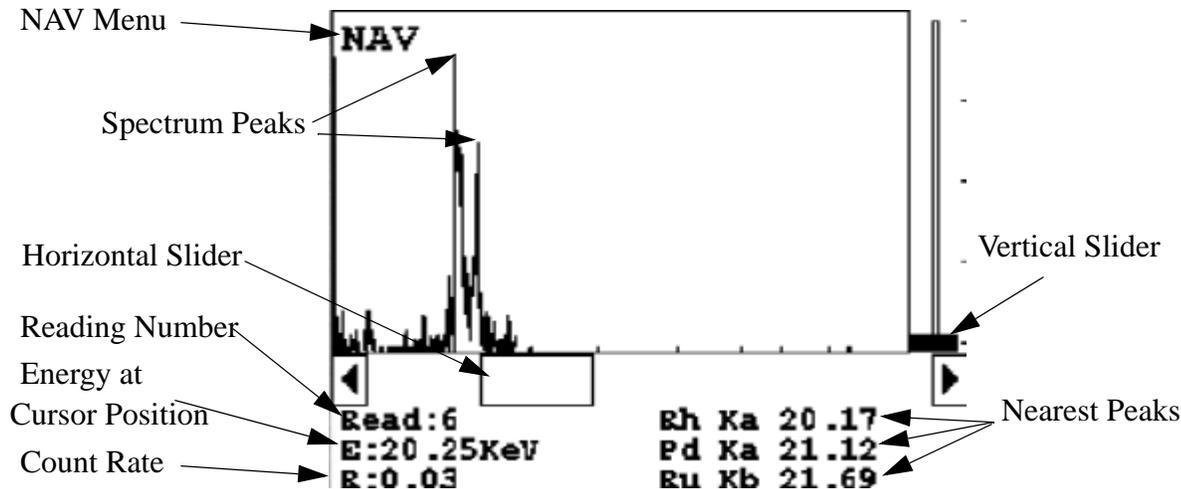


Figure A-1. The SpectraView Screen

By default, the following information is shown along with the spectrum:

The **Reading** number (Bottom Left) in the form "Read:x", where x is the Reading number.

The **position of the cursor** on the energy scale (Bottom Left, under the Reading number), in the form "E: x.xx KeV", where KeV is thousands of electron volts.

The **count rate** (Bottom Left, under the energy position), in the form "R:x.xx".

Ka, Kb, La, Lb, and/or **Lg** peaks of the three elements closest to where your cursor is positioned on the energy scale (Bottom Right). This information is written with the element symbol first, followed by either Ka (K shell alpha peak), Kb (K shell beta peak), La (L shell alpha peak), Lb (L shell beta peak), or Lg (L shell gamma peak). An example would be "Al Ka 1.5." To determine if a given element is present, look at the count rate at that cursor position.

SpectraView cannot be used to determine exact element percentages in a sample.

Multiple Spectra

SpectraView can display the reading spectra from multiple sources if your analyzer has more than one X-ray source or filter. Use the NAV Menu to select which spectrum to view.

The "Spectra1" choice will display the spectrum produced by excitation from the first source.

The "Spectra2" choice will display the spectrum produced by excitation from the second source.

The "Spectra3" choice will display the spectrum produced by excitation from the third source.

SpectraView Navigation

Use the left button on the 4-way touch pad to expand the spectrum, centered on the position of the cursor.

Use the right button on the 4-way touch pad to contract the spectrum, centered on the position of the cursor.

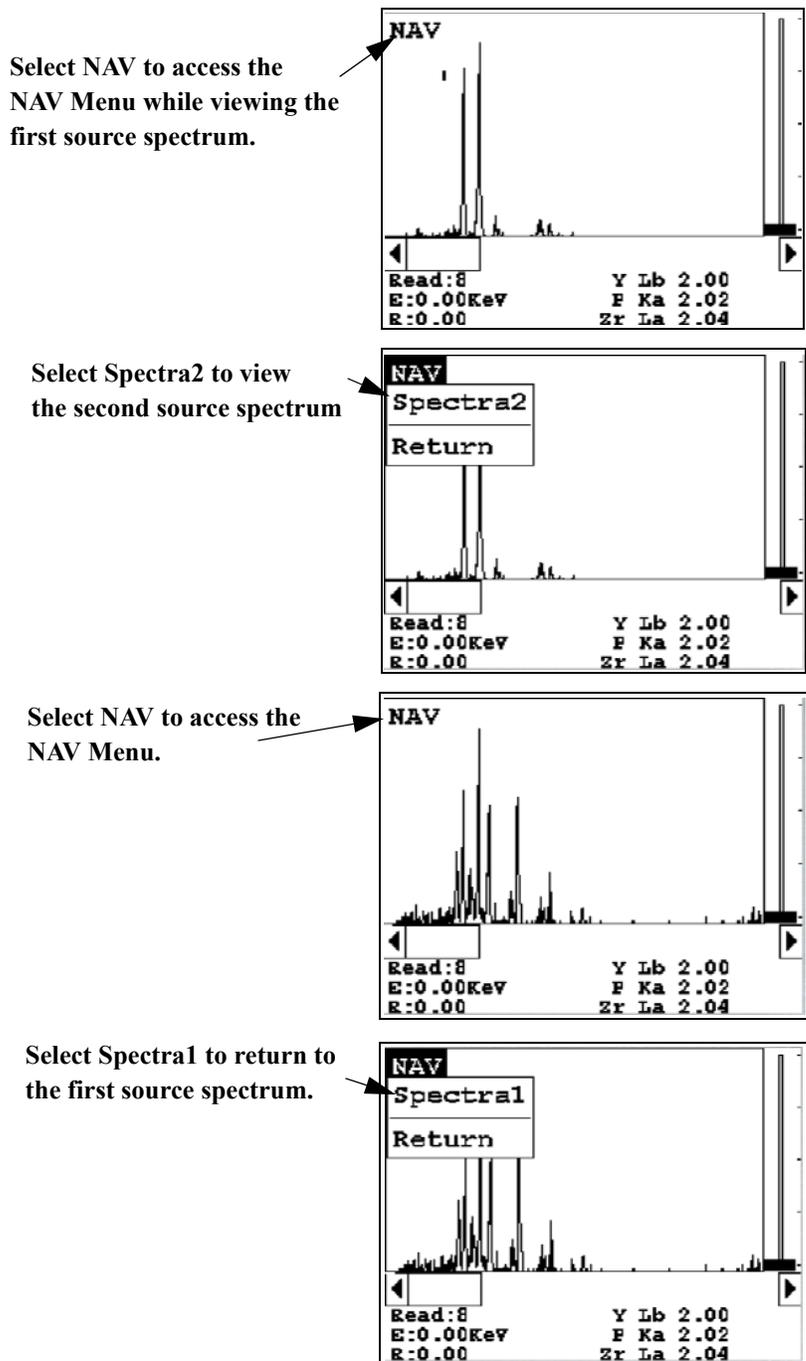


Figure A-2. Viewing Multiple Spectra

Appendix D: Summary of Warnings



Warning! Do not attempt to use this instrument without first reading and understanding the entire User's Guide! ♦



WARNING! Always be aware of the location of your instrument's radioactive sources and the direction of their beam of X-rays. The location of the sources is at the front end of the instrument. ♦



WARNING! Always treat radiation with respect. Do not hold your instrument near the Kapton window during testing. Never point your instrument at yourself or anyone else when the shutter is open. ♦



WARNING! In the unlikely event that the shutter becomes stuck in the open position, remove the battery (see Battery Pack and Battery Charger - Routine Maintenance Guidelines - Note: All shutters should close immediately and remain locked in the closed position when the battery pack is not attached to the instrument), replace the instrument in its shielded holster, place the holster in the shielded carrying case, and call Thermo Scientific's Service Department at (800) 875-1578 or +1-978-670-7460. ♦



WARNING! If your LCD Touch Screen displays the message "SHUTTER DOES NOT OPERATE", remove the battery (see Battery Pack and Battery Charger - Routine Maintenance Guidelines - Note: All shutters should close immediately and remain locked in the closed position when the battery pack is not attached to the instrument), replace the instrument in its shielded holster, place the holster in the shielded carrying case, and call Thermo Scientific's Service Department at (800) 875-1578 or +1-978-670-7460. ♦



WARNING! The preconditions for operation must be continued for the duration of the reading. If the preconditions are violated, all the shutters will close, and the measurement will end. The three LED lights will stop blinking, the shutters will close, and the measurement will end. The flashing of the LED lights is not synchronized to minimize power consumption. ♦



WARNING! The three LED warning lights are designed to blink only during a measurement, where one or more of the shutters are open and the trigger depressed. If the LED lights blink at any other time, disconnect the battery pack immediately, place the instrument in its shielded holster, place the holster in the shielded carrying case, and call Thermo Scientific's Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460, or your local Authorized NITON Analyzers Service Center. ♦



WARNING! When taking samples from a site where toxic chemicals may be present, always use gloves and respiration equipment for your own protection. ♦



WARNING! Do not hold bagged samples while testing. ♦



WARNING! Tampering with the 5,500 ppm (lead high) lead-in-soil standard may cause exposure to lead dust. Keep all standards out of the reach of children. ♦



WARNING! It is important that the date and time information displayed on the **Date and Time Screen** is correct. If either the date or time is incorrect, the information stored with your readings will be incorrect. In addition, an incorrect date prevents the instrument from properly compensating for normal source decay - causing erroneous analysis results for instruments equipped with 109Cd. This information must be correct before proceeding with testing. ♦



WARNING! Do not attempt to take measurements while downloading readings! This will generate an error requiring a system reset, and may corrupt your stored readings, requiring all stored readings to be erased. ♦



WARNING! Grinding and sifting dried samples produces dust. Even clean soil contains silica, which may be hazardous when airborne. Prepare all samples in a ventilated area; wear a mask, gloves, and an apron; and spread a drop cloth. ♦



WARNING! All Service, except exterior cleaning and Kapton window replacement, must be performed by Thermo Scientific. Do not attempt to make repairs yourself. Opening the case of your NITON will void the instrument Warranty in its entirety. ♦

Appendix E: Summary of Cautions



CAUTION NITON Analyzers are not intrinsically safe instruments in regard to sparking. All pertinent Hot Work procedures should be followed in areas of concern. ♦



CAUTION Enabling the backlight will reduce your battery pack operating time, requiring more frequent recharges. ♦



CAUTION After being powered on, the NITON 300 Series Analyzer will perform an internal re-calibration before an analysis is initiated. It is recommended that you let your instrument warm up for ten minutes after start up, before testing is begun. ♦



CAUTION Standard Thin Sample Mode should not be used for quantitative lead-paint testing. Use only the three Paint Testing modes to test lead-based paint, which are available only on certain models. ♦



CAUTION All test equipment must be kept clean to prevent contamination of samples. ♦



CAUTION Never tamper with Test Standards. They should not be used unless they are completely intact. ♦



CAUTION Your XLp analyzer must have the correct time and date set in order to test samples correctly using the ^{109}Cd radioisotope source. Please make sure that the time and date are set correctly before testing. ♦



CAUTION Never turn off the instrument while data is being erased! ♦



CAUTION Do not leave the battery pack connected to the charger for excessive periods of time. Overnight recharging is recommended. ♦



CAUTION Store the instrument and the spare battery packs in a cool place, away from direct sunlight. ♦



CAUTION Always obtain a Return Authorization (RA) number from Thermo Scientific's Service Department in the United States, toll free, at (800) 875-1578, or outside the United States, at +1-978-670-7460 before returning your instrument to the NITON Service Department or local Authorized NITON Analyzer Service Center. ♦



CAUTION Do not force the charger into the RS-232 port! ♦



CAUTION Do not store battery packs or charger in direct sunlight. ♦



CAUTION Do not let the battery pack recharge for excessive periods of time. ♦



CAUTION Always transport the unit in its padded carrying case, and store the NITON Analyzer in its case whenever it is not being used. ♦



CAUTION In most cases, no notification is required if transporting within state boundaries. This may not be the case when entering federal properties. ♦



CAUTION Within the United States, always keep a copy of the US DOT compliance statement in your NITON instrument case at all times. A copy is included with your instrument. ♦



CAUTION Always follow all pertinent local and national regulations and guidelines, wherever your XLp 300 series analyzer is transported or used. ♦



CAUTION If you return your NITON instrument without the carrying case, you will void your NITON 300 Series Analyzer's warranty in its entirety. You will be billed for a replacement case plus any repairs resulting from improper shipping. ♦



CAUTION Always remove the battery pack when transporting or storing your instrument. ♦



CAUTION Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure. ♦

Appendix E:



CAUTION Avoid any vibration, loud noise, strong electronic fields, or other possible interference when your analyzer is calibrating its detector. ♦

Appendix F: Laser Device Notice

Thermo Scientific products using lasers comply with US 21CFR1040.10, Subchapter J, and with IEC825/EN 60 825 or IEC825-1/EN 60 825-1, depending on date of manufacture. The laser classification is marked on one of the labels on the product.

Class 1 laser devices are not considered to be hazardous when used for their intended purpose. The following statement is required to comply with IUS and International regulations:



CAUTION Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure. ♦

Class 2 laser scanners use a low power, visible light diode. As with any very bright light source, such as the sun, the user should avoid staring directly into the light beam. Momentary exposure to a Class 2 laser is not known to be harmful.

Appendix G: Warranty

Thermo Fisher Scientific will warranty parts and labor for any manufacturer's defects for two years (24 months). No precision instrument is warranted if crushed, dropped on the floor or in a bucket of water. All service, including repairs and routine maintenance, and x-ray tube replacement or re-sourcing, must be performed by Thermo Fisher Scientific or by an Authorized NITON Analyzer Service Facility. Any attempt to open the sealed plastic housing of your NITON instrument will nullify the instrument warranty in its entirety.

Limited Warranty Provision for Use with Purchase and License Agreement for Thermo Fisher Scientific XRF Detection instruments:

Except as otherwise agreed in writing, Thermo Fisher Scientific warrants, under normal conditions of operation, each product sold (except for components not of its manufacture) against defects of material and workmanship, provided that such product has been properly utilized. This warranty applies to the original purchaser only and shall commence to run from the date of shipment and shall continue for a period of twenty-four (24) months. In any event, Thermo Fisher's liability for any such defects of material and workmanship shall not exceed the cost of replacement of defective parts upon timely notification of such defect in writing delivered to Thermo Fisher's home office. Thermo Fisher shall not be liable for damage or destruction caused during delivery or caused other than by employees of Thermo Fisher Scientific.

Material, accessories, parts, or items of equipment furnished by suppliers to Thermo Fisher and used in the manufacture of Thermo Fisher products are guaranteed by Thermo Fisher Scientific only to the extent of the original manufacturer's express warranty to Thermo Fisher for a period not to exceed the warranty period described in paragraph (a) above and provided that the purchaser shall have notified Thermo Fisher so as to enable Thermo Fisher to avail itself of its rights under such original manufacturer's express warranty.

Specific warranties of some common accessories:

- Battery Charger 12 months
- Batteries 12 months
- Soil Grinder no warranty
- Single-stage helium tank regulator 12 months
- Two-stage helium tank regulator 12 months

Thermo Fisher Scientific shall, at its option, repair such defects or replace the parts or products found defective. All defective parts are to be returned, freight prepaid, immediately to Thermo Fisher for inspection and credit. Thermo Fisher will make no allowance for repairs or alterations made by the purchaser unless made with the advance written consent of Thermo Fisher.

Thermo Fisher Scientific assumes no liability for costs of disassembly of defective parts and equipment. Shipment by purchaser of all repairs and replacements under this warranty are F.O.B. Thermo Fisher Scientific's factory or authorized service representative and method of shipment will be determined by Thermo Fisher. The purchaser will pay shipping costs and insurance in both directions of products, parts, or components shipped for warranty service hereunder. The purchaser will be responsible for risk of loss in both direction. Replaced parts or components will become the property of Thermo Fisher Scientific. Replacement parts or components may contain recycled, refurbished, or remanufactured parts equivalent to new parts and shall be warranted for the remainder of the original warranty period for the products.

Thermo Fisher Scientific shall not be liable for delays, deprivation of use, or any other damages, direct or indirect, which may result to the purchaser because of defects in the product or because of the purchaser's inability to operate it or use it to his satisfaction. Thermo Fisher Scientific will not be liable to anyone for special or consequential damages of any kind. Thermo Fisher neither assumes nor authorizes any person to assume for it, any other obligation or liability with respect to Thermo Fisher products.

- a. Except for the foregoing express warranty, there are no warranties, representations, or guarantees, express or implied, except as are expressly set forth herein. The foregoing warranty is the only warranty made by Thermo Fisher Scientific. Any implied warranty of merchantability or fitness for a particular purpose on this product is limited in duration to the one year (12 month) duration of this written warranty. Some countries, and some states within the United States, do not allow limitations on how long an implied warranty lasts or the exclusion of limitation of incidental or consequential damages so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state and country to country.

Appendix G: