

Regulated BlueNotes™ 420 Software

Operator Manual

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1 Introduction

1.1 Contacting Sherwood Scientific Ltd.

- 1.1.1** If Regulated BlueNotes 420 software was supplied by a third party, i.e. a Distributor in the UK or Overseas, the first contact should be that Distributor for all issues of supply and operation. Please note here the details of the Company where you purchased this software:

Company

Tel Number

Contact Name

Email

- 1.1.2** If the software was obtained from Sherwood Scientific Ltd., contact for all issues of supply and operation should be sent to:

info@sherwood-scientific.com

Tel. +44 (0)1223 243444

Fax. +44 (0)1223 243300

1.2 Regulated BlueNotes 420 Capability

Regulated BlueNotes 420 software extends the use of either a Model 420 or Model 425 Flame Photometer by enabling multipoint calibrations and therefore the possibility to perform sample analyses outside the confines of the linear response regions of the standalone instrument.

BlueNotes allows the use of K as well as Li as an internal standard reference element. See Model 420 and 425 Operating Manual for an explanation of the Ref. facility and appendix A of this manual for an example.

The Spot Check facility updates a previous multipoint calibration thus adjusting for any drift and allowing previously generated multipoint calibrations to be re-used.

Working with the Model 860 Autosampler, 40 samples can be analysed automatically and the software allows addition of post standard and post sample rinses.

1.3 Using this Manual

This Operator Manual will inform how to operate Regulated BlueNotes 420 software in conjunction with either a Model 420 or Model 425 Flame Photometer and, where appropriate, the Model 805 Dilutor and/or the Model 860 Autosampler.

Access to the software and its various functions is organised as follows;

The software (application) operates in one of four modes.

- Launch Mode (**First use only**, after installation)
- **Administrator Mode**
- **Supervisor Mode**
- **Operator Mode**

Actions required in Launch Mode:

- Enter an Administrator Name
- Note the generated Administrator Password
- THIS WILL BE THE ONLY TIME THE ADMINISTRATOR PASSWORD CAN BE SEEN

Actions allowed in Administrator Mode:

- Create a new Administrator username
- Create a new Supervisor username
- Create a new Operator username
(entering names instigates system generation of unique passwords)
- Block/unblock existing usernames
- Regenerate own password
- Regenerate user passwords
- Specify System: 420/425, autosampler, COM Ports and display options
- View data items (Audit Trails, System Configurations, Calibration Procedures, Analysis Methods, Results and Reports).
- Archive all data items
- Restore archived data items

Actions allowed in Supervisor Mode:

- Regenerate own password
- View all data items (excluding Audit Trails)
- Create (New/Clone) System Configurations
- Create (New/Clone) Calibration Procedures
- Create (New/Clone) Analysis Methods
- Print Configuration, Calibration and Method definitions
- Perform all Operator actions

Actions allowed in Operator Mode:

- Regenerate own password
- View all data items (excluding Audit Trails)
- Create (Clone only) Analysis Methods
- Operate Calibration Procedure
- Operate Analysis Method
- Save and print Analysis Results

Dependent on the system configuration, the user may be required to refer to the following additional operator manuals:

- Model 420 and 425 Flame Photometer
- Model 805 Dilutor
- Model 860 Autosampler

1.4 Warranty

The Sherwood Scientific Ltd. warranty statement is included in **Appendix D**.

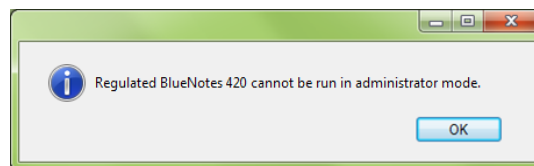
2 Installation

2.1 Windows Operating System Requirements

Regulated BlueNotes 420 software is supplied on a CD-ROM. The user requires the 16-character alphanumeric activation key, in order to access the software package which runs in Windows Vista SP2 or later Windows versions.

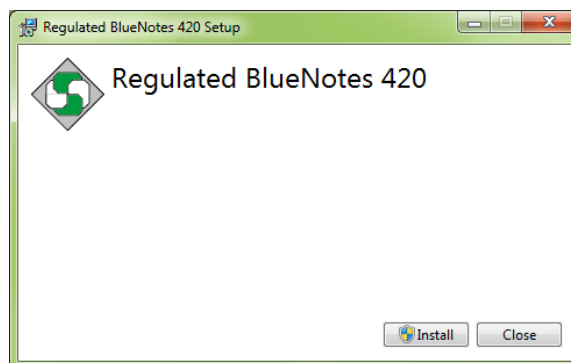
Regulated BlueNotes 420 requires a dedicated Windows user account in order to operate. The software installs on a machine wide scope but Administrator Settings are stored on a per Windows user basis. The software can be run using multiple Windows user accounts but any changes made to the Administrator Settings, with the exception of creating new BlueNotes usernames, will not have a global effect and will only be permanently applied to the currently logged in Windows user.

The Windows user account used to operate the software **cannot** have elevated user privileges. If the software detects that the currently logged in Windows user has elevated privileges it will not launch. The following error will be displayed:

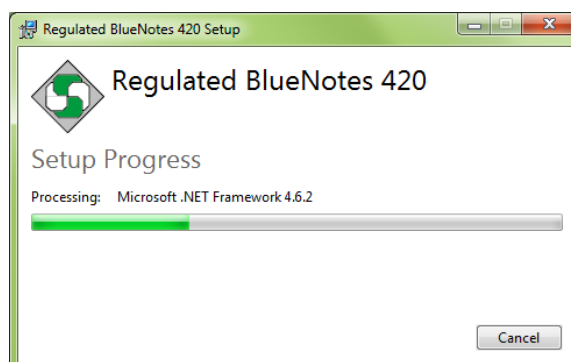


2.2 Software Installation

The Regulated BlueNotes 420 software is supplied on a CD-ROM with a unique 16-character alphanumeric registration code. Insert the CD-ROM into the disk drive of a PC. The software should auto-run and the following window appear.

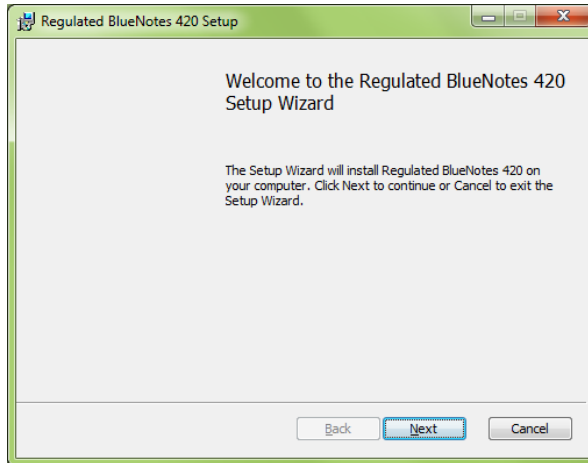


Click on **Install** to continue.

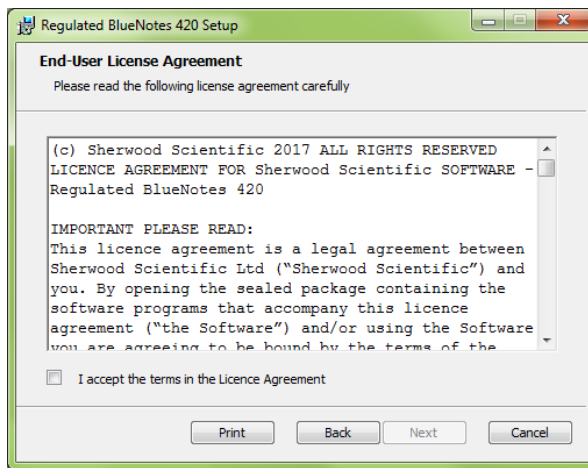


If Microsoft .NET version 4.6.2 or higher is not installed then the installer will update Microsoft .NET Framework.

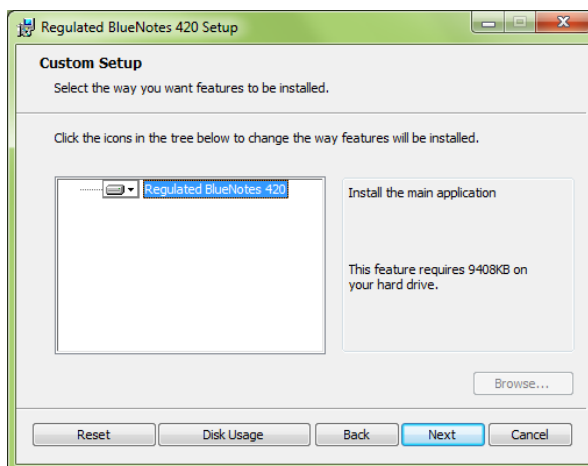
Once this process is complete the following window will be displayed.



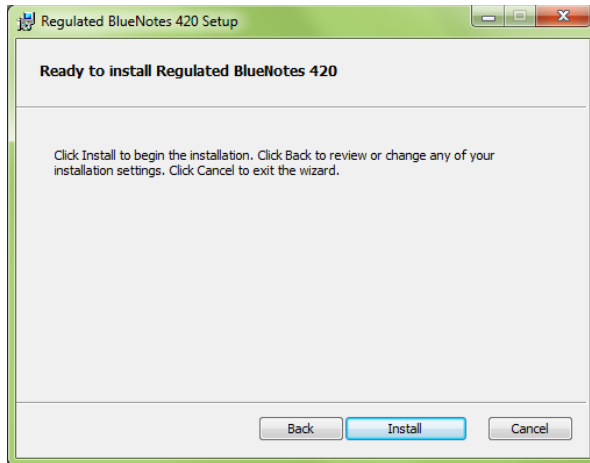
Click on **Next** to load the software.



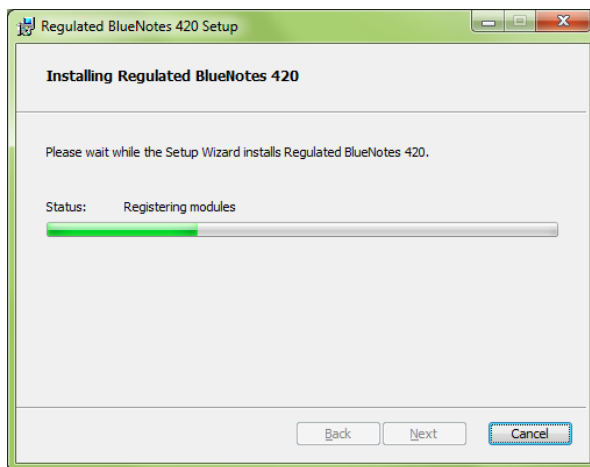
Read the Licence Agreement, select "I accept the terms in the Licence Agreement" and click **Next**.



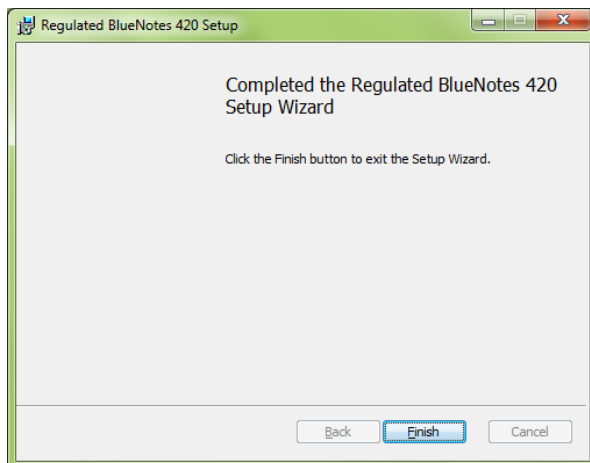
Select which program features are to be installed and click **Next**.



Click **Install** to begin the installation.



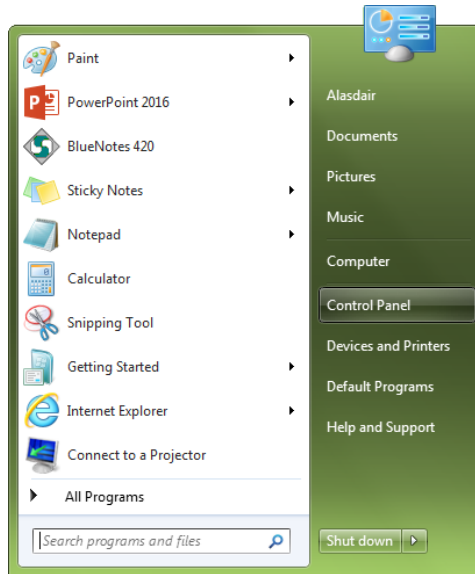
Wait for installation to finish.



Click **Finish** to complete the installation process. The Desktop will now show the Regulated BlueNotes 420 shortcut:



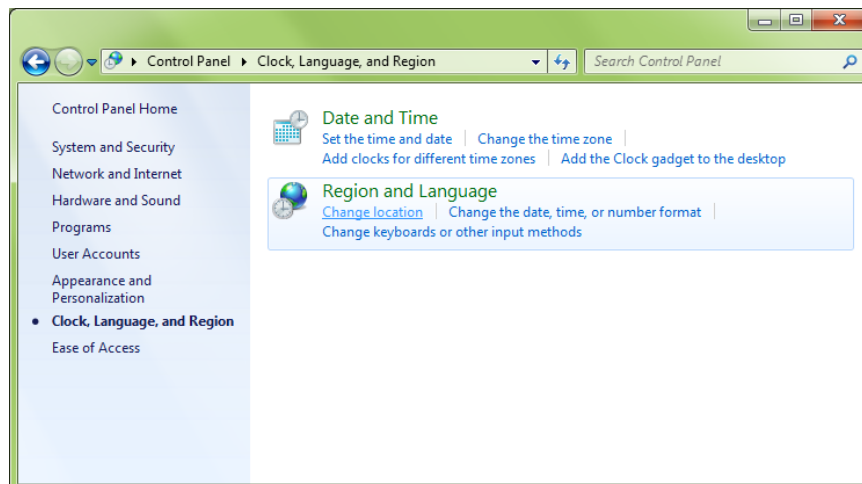
Before proceeding check in the **Control Panel** and set the **Region and Language** format to **English (United Kingdom)** and **Location** to **United Kingdom** as below:



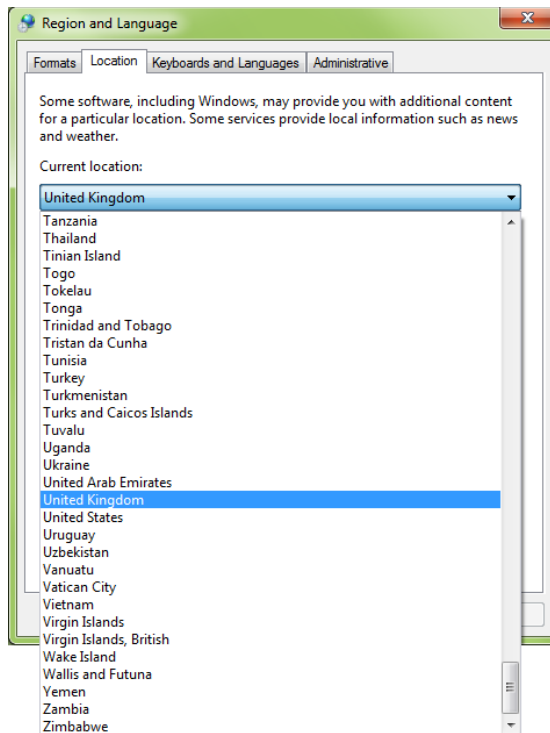
From the **Start Menu** click **Control Panel**.



Click **Clock, Language, and Region** settings.

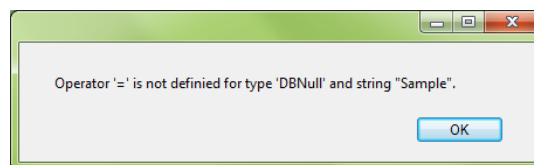


Click **Change location**.



Select **United Kingdom** from the dropdown, click **Apply** and then click **OK**.

Failure to do this may result in display problems, for example text may not appear next to the Post Standard Rinse option box in the Configuration file page and the error message below may appear in the Analysis file page.



2.3 Principles of Operation

Once the Regulated BlueNotes 420 software has been installed on a PC it requires the following information to operate:

The COM Port address(es) for the Model 420/425 Flame Photometer serial port and the Model 860 Autosampler (if applicable). (Administrator input only).

A System Configuration file, to indicate sample introduction mode (Manual or Model 860 Autosampler), Model 805 Dilutor use (and dilution ratio) or not, signal selection method, measurement units and analytes. (More than one configuration file may be stored). (Supervisor input only).

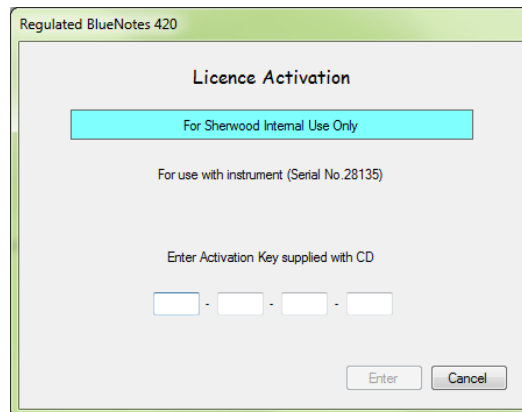
A Calibration Procedure (linked to a configuration file) including Calibrator details; required to create a calibration graph. (Supervisor input only).

An Analysis Method (linked to a calibration procedure) including sample details and Spot Check standard options. (Supervisor input only).

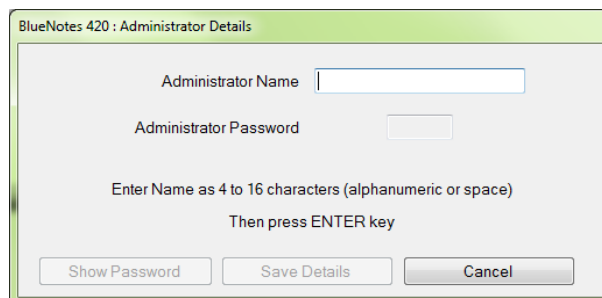
2.4 Getting Started

On the first execution, following installation, the application is in Launch Mode. The user must first enter the 16-character activation key provided with the Regulated BlueNotes 420 installation disc, once correctly entered the only action allowed is to specify the Administrator's name. The software will then generate a 4-character alphanumeric password. Closing the application without entering a name will result in the same action on the next execution.

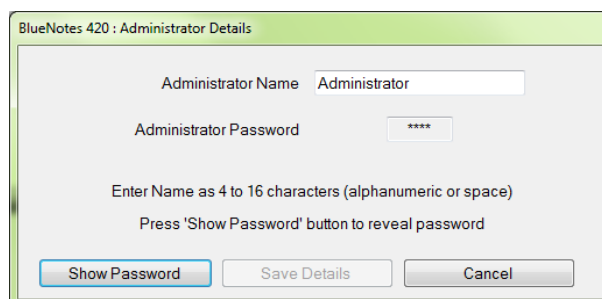
NOTE: Passwords generated by Regulated BlueNotes 420 software are not case sensitive.



Enter the 16-character activation key and click **Enter**.



Enter a name for the **Administrator** as instructed followed by the **Enter** key.



The software will generate a 4-character alphanumeric password. Click **Show Password** to view the password and note this down for future reference.

MAKE A RECORD OF THE PASSWORD FOR FUTURE REFERENCE.

NOTE: THIS IS THE ONLY TIME THE ADMINISTRATOR'S PASSWORD WILL BE SHOWN.

It is extremely important that this password is documented at this stage as it will not be possible to do so again once **Save Details** has been clicked.

Once the Administrator has viewed and recorded the password click **Save Details** to continue.

Entry of an Administrator's name places the application in **Administrator Mode** enabling the user to access the **Administrator Settings**. It is recommended that the Administrator sets up at least one **Supervisor** and one **Operator** login at this time, for detailed instructions see section **2.5 Administrator Settings**.

NOTE: Subsequent launches of the application will only allow login on the specified Administrator, Supervisor or Operator accounts.

- All names (Administrator, Supervisor and Operator) must consist of 4 to 16 case sensitive characters (alphanumeric and space) and be unique.
- All passwords are unique, 4 alphanumeric characters in length (consisting of 1 to 9, A to Z) and are generated automatically. Passwords are not case sensitive.
- Login will be cancelled after three unsuccessful attempts at entering the correct password.
- Names cannot be modified or deleted.
- Administrator, Supervisor and Operator names can be blocked; meaning that they cannot logon but the names are retained on the system thereby preventing them from being redefined.

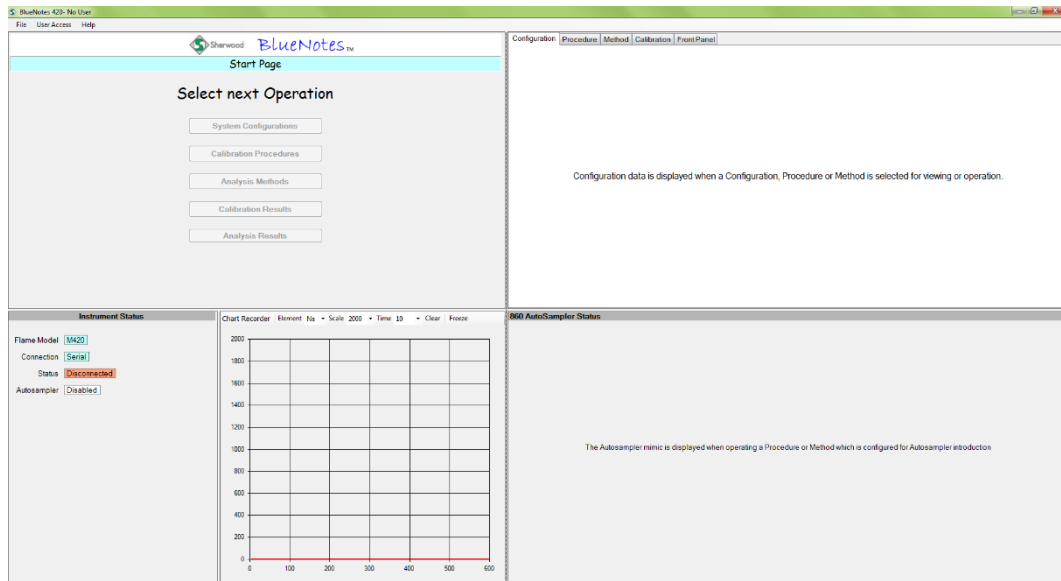
There may be multiple users of each type.

The application title bar will indicate the current mode (i.e. Administrator, Supervisor or Operator) together with their username.

In order to maintain the integrity of the audit trail the currently logged in user is prompted to re-enter the appropriate password before any audited action can be initiated.

Analysis Methods will be handled in the same way as Configurations and Calibrations in that they can be "Cloned" and then, once saved with a unique name, will be non-editable. Before saving, sample identifiers may be edited to reflect the new batch of samples for analysis.

The Start Page will be shown as below.



NOTE: Hibernate or sleep timeout on the PC **must** be set such that the computer will **not** enter either state while BlueNotes is operating. Failure to prevent sleep or hibernate during analysis of either the calibration or samples will result in **loss of data**.

2.5 Connecting Peripheral Devices

2.5.1 Model 420 Series Flame Photometer

Connect the host PC to the flame photometer serial socket using the Serial Connection Cable provided. The 9 pin D-plug connects to a serial port on the PC. If the PC does not have a spare serial port, use a Serial/USB Adapter.

NOTE: BlueNotes only establishes a connection to the instrumentation while a Calibration Procedure or Analysis Method is 'operated', at all other times the instrumentation status bar on the bottom left of the PC screen will indicate Disconnected.

2.5.2 Model 860 Autosampler

The Model 860 Autosampler has a 9-way male D socket on the rear panel of the base compartment. That socket needs to be connected to the host PC using the Null Modem Cable (001 09 003) provided with the Model 860 Autosampler. Your PC may require a USB/Serial Adapter Cable to be purchased (001 09 005).

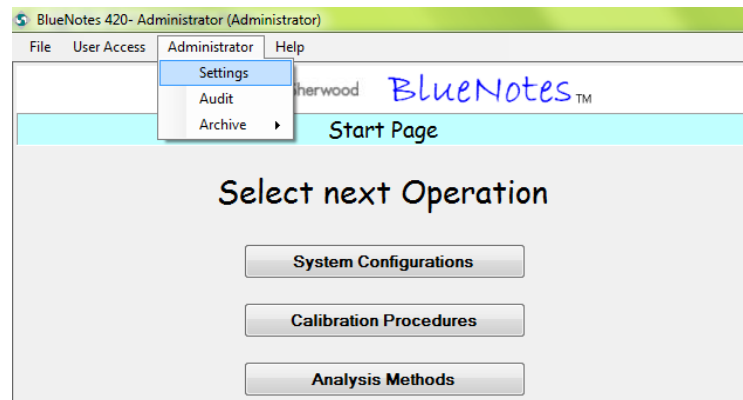
NOTE: BlueNotes only establishes a connection to the instrumentation while a Calibration Procedure or Analysis Method is 'operated', at all other times the instrumentation status bar on the bottom left of the PC screen will indicate Disconnected.

2.5.3 Model 805 Dilutor

There is **no connection** between the Model 805 Dilutor and the software host PC.

2.6 Administrator Settings

The Administrator Settings are only accessible when the user is logged into the Administrator account. From here RS-232 connections to the Model 420 Series Flame Photometer and the Model 860 Autosampler (optional) can be set up.

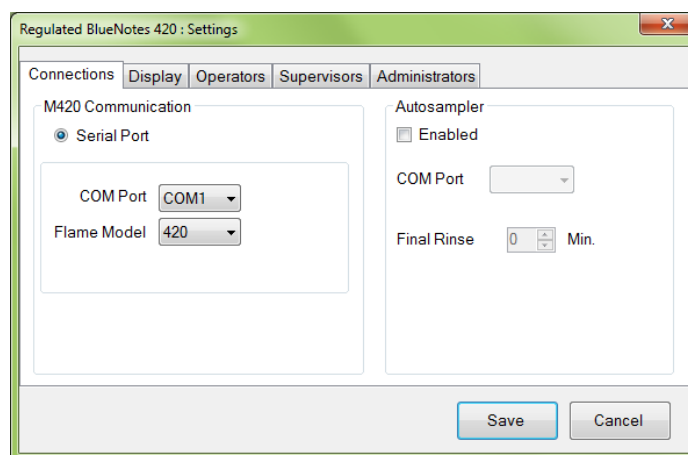


Access administrator settings by clicking **Administrator** and then **Settings**.

2.6.1 Connections

Within the **Connections** panel, select the **Flame Model** to be used and also indicate which COM port the Model 420 Series Flame Photometer is connected through. If a Model 860 Autosampler is to be used, enable it and select the appropriate COM port. Users should be aware that in order for Regulated BlueNotes 420 to function correctly, the correct instrument must be selected from the **Flame Model** dropdown menu. The flame model can be read from the front panel of the instrument.

NOTE: BlueNotes only establishes a connection to the instrumentation when a **Calibration Procedure** or **Analysis Method** is 'operated', at all other times the instrumentation status bar on the bottom left of the PC screen indicates **Disconnected**.

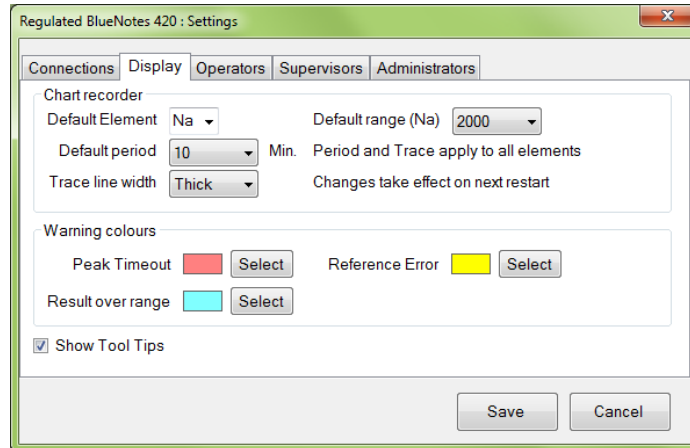


NOTE: If you are unsure which COM ports the flame photometer (and/or autosampler) is connected to; with the cable(s) connected to the PC and the flame photometer (and autosampler) switched on, click on **START**, then **Settings, Control Panel**, then **Device Manager** and then open up **Ports**; the potential COM port connections should be visible. There may be some 'trial and error' involved in selecting the correct COM port for each device.

Final Rinse time selected here refers to the time which the autosampler (if used) will aspirate blank solution upon completion of an **Analysis Method**.

2.6.2 Display

Regulated BlueNotes 420 has an “on-screen” real-time “chart recorder” style signal display allowing observation of raw photodetector output of all elements selected in the current system configuration. Use the **Display** panel to set the default parameters for the real-time chart recorder displayed during operation of an Analysis Method. There is also a choice of coloured flags for the on-screen results table to highlight samples that gave results either above 125% of the Max Concentration (defined in the Calibration Procedure) or an unstable reading - to indicate samples that might warrant re-analysis.

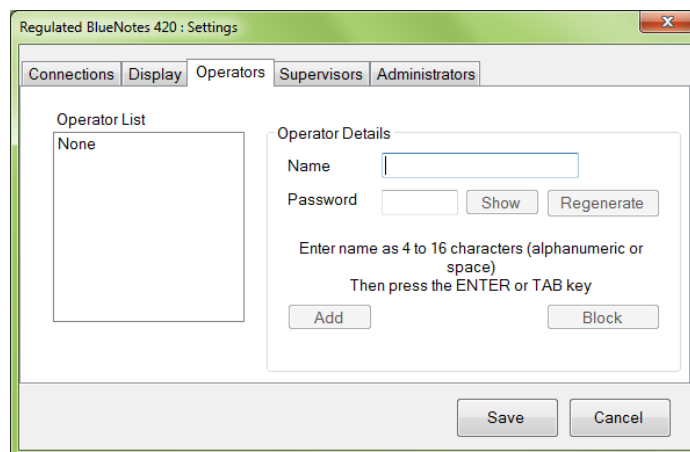


Tool tips that are shown throughout BlueNotes may be disabled by the **Administrator** here by unchecking the **Show Tool Tips** check box.

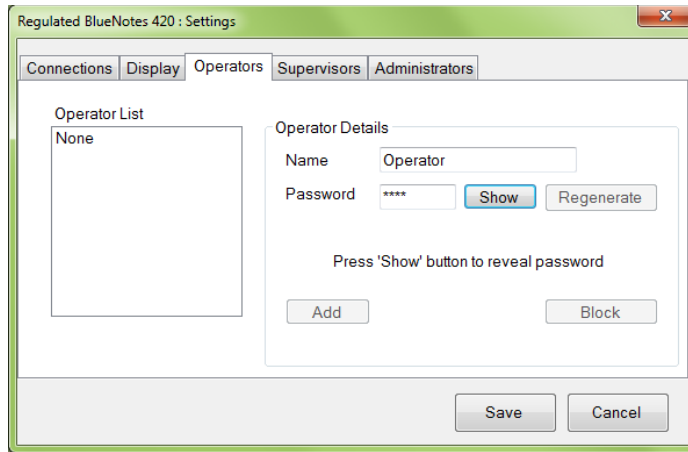
NOTE: Changes made to the chart recorder settings will only take effect once Regulated BlueNotes 420 software has been restarted.

2.6.3 Operators

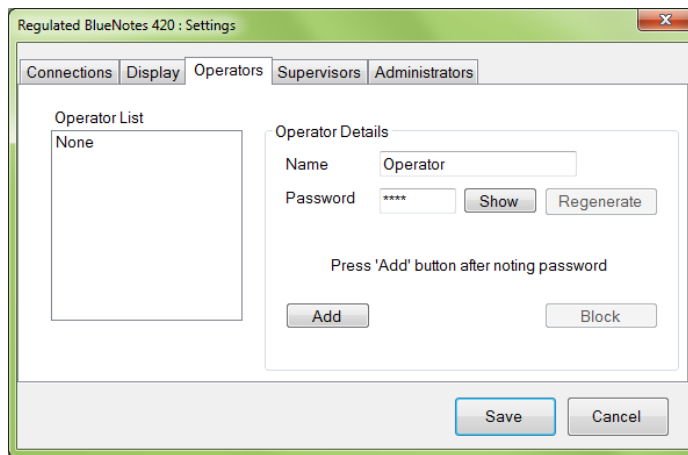
Operator usernames may be added or blocked by an **Administrator**.



Enter a name for the **Operator** as instructed followed by the **Enter** key.

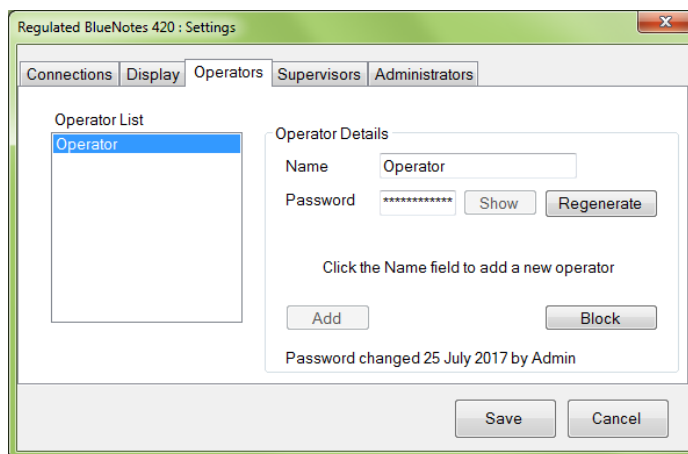


Click **Show** to view the generated password, record this for future reference.



Ensure that the **Name** is correct and that the password has been recorded then click **Add**.

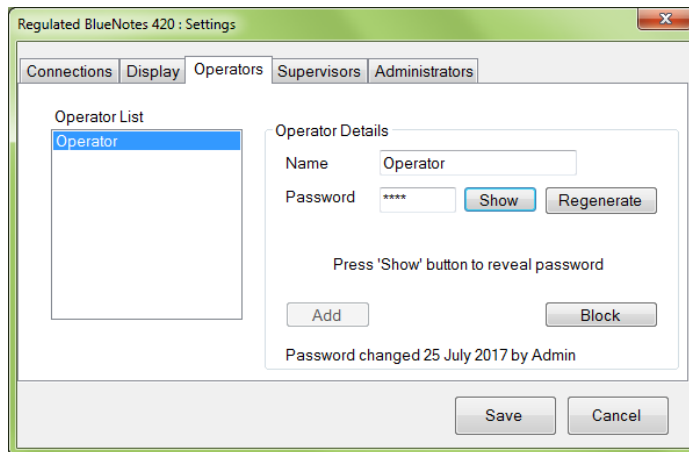
NOTE: Once a username has been added it cannot be edited or deleted, take care to ensure that all details are correct before clicking **Add**.



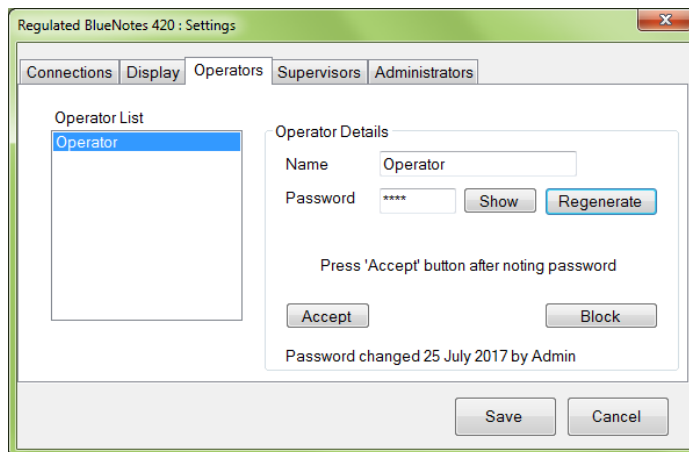
The new **Operator** username will now appear under the **Operator List**.

If an **Operator** should no longer be granted access to the system, highlight their username in the **Operator List** and click **Block**. To unblock a blocked **Operator**, highlight their username in the **Operator List** and click **Unblock**.

Once an **Operator** has been added the **Administrator** has the ability to regenerate the user's password. Highlight the **Operator** from the **Operator List** and then click **Regenerate**.



Click **Show** to view the generated password, record this for future reference.



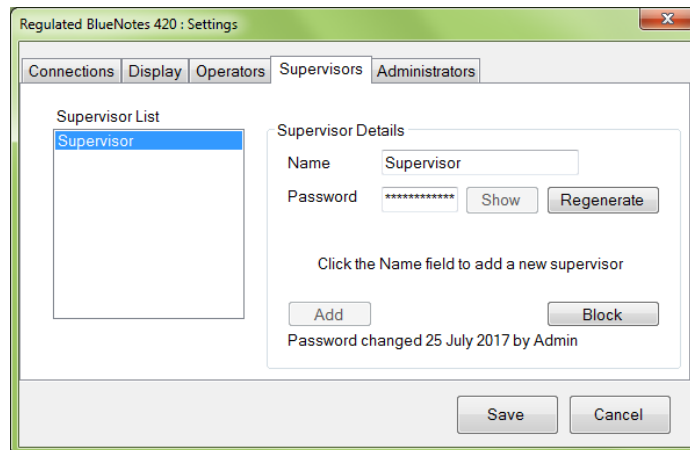
Ensure that the password has been recorded then click **Accept**.

NOTE: The date that the password was last changed and the user that initiated the change is recorded at the bottom of the window.

Once all required settings have been modified click **Save** to close the **Administrator Settings** window.

2.6.4 Supervisors

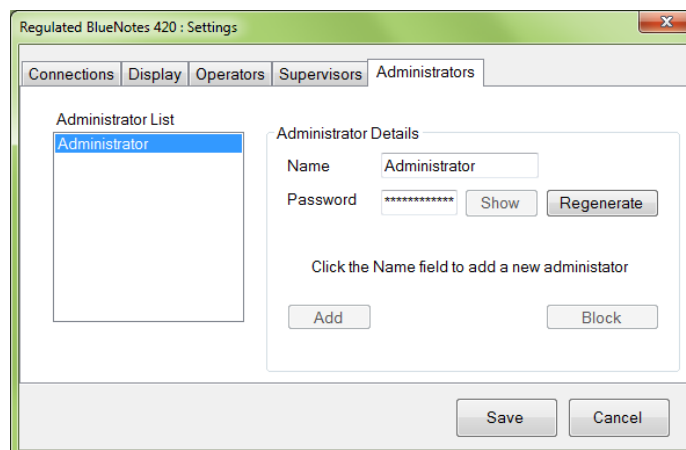
Supervisor usernames may be added or blocked by an **Administrator**.



The **Supervisors** settings panel functions in the same way as the **Operators** settings panel detailed in section **2.6.3 Operators**.

2.6.5 Administrators

Administrator usernames may be added or blocked by an **Administrator**.



The **Administrators** settings panel functions in the same way as the **Operators** settings panel detailed in section **2.6.3 Operators**.

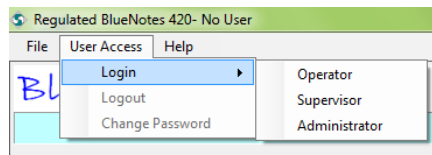
2.7 User Access

Regulated BlueNotes 420 software operates in one of three operational modes. **Administrator Mode**, **Supervisor Mode** and **Operator Mode**. The latter two modes can be accessed with the relevant passwords once an **Administrator** has added at least one **Supervisor** and/or **Operator** account.

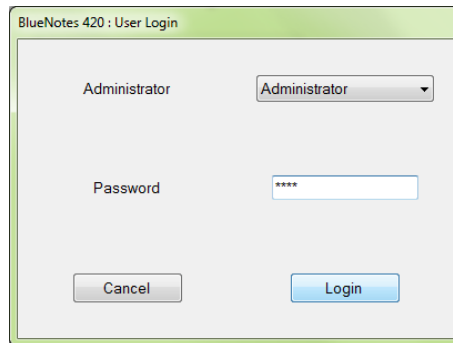
NOTE: Once logged in the user must re-enter their password to confirm any action that they take. This is intended to maintain the integrity of the audit trail and prevent another user from operating the software if it has been left unattended while a user is already logged on.

2.7.1 Logging In

To gain access to one of the three operational modes of Regulated BlueNotes 420 a username must have already been created by an **Administrator**.



Click **User Access** and then select the required login mode.



Select the required username from the dropdown menu, enter the password and click **Login**.

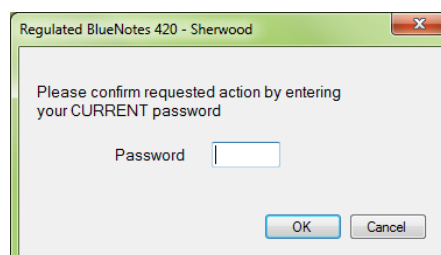
NOTE: If a user enters their password incorrectly three consecutive times their account will become blocked. An **Administrator** will be required to unblock that user. In the event that all **Administrator** accounts become blocked in this way then contact Sherwood Scientific Ltd. for assistance.

2.7.2 Change Password

Once logged in the user has the ability to change their password through the **Change Password** entry in the **User Access** menu.



Clicking **Generate New Password** will initiate software generation of a new unique password. Click **Show** to view the password. Ensure the new password has been committed to memory or noted down. Click **Accept Password** to complete the process.



The user will be prompted to re-enter their current password to confirm the changes before the new password comes into effect.

2.7.3 Administrator Access

The highest level of access is available to the **Administrators** only. **Administrators** are able to access the **Administrator Settings** although the **Administrator** is restricted from routine operation of the instrument through Regulated BlueNotes 420.

The **Administrator** is able to perform the following actions:

- View **System Configurations**
- View **Calibration Procedures**
- View **Analysis Methods**
- View **Calibration Results**
- View **Analysis Results**
- Access **Administrator Settings**
- Configure instrument and autosampler COM ports
- Edit **Display Settings**
- Create and block/unblock **Administrator, Supervisor and Operator** usernames
- Regenerate own password
- Regenerate **Administrator, Supervisor and Operator** passwords
- Generate **Audit Reports**
- Archive all analysis data and configuration data items

2.7.4 Supervisor Access

In Regulated BlueNotes 420 software the facility to set-up **System Configuration, Calibration Procedures and Analysis Methods** is limited to designated **Supervisors**. This password protected facility may be activated through the **User Access** menu once at least one **Supervisor** username has been created by an **Administrator**.

Supervisors are able to perform the following actions:

- View, create and clone **System Configurations**
- View, create, clone and operate **Calibration Procedures**
- View, create, clone and operate **Analysis Methods**
- View **Calibration and Analysis Results**
- Regenerate own password

2.7.5 Operator Access

The lowest level of access is available to designated Operators.

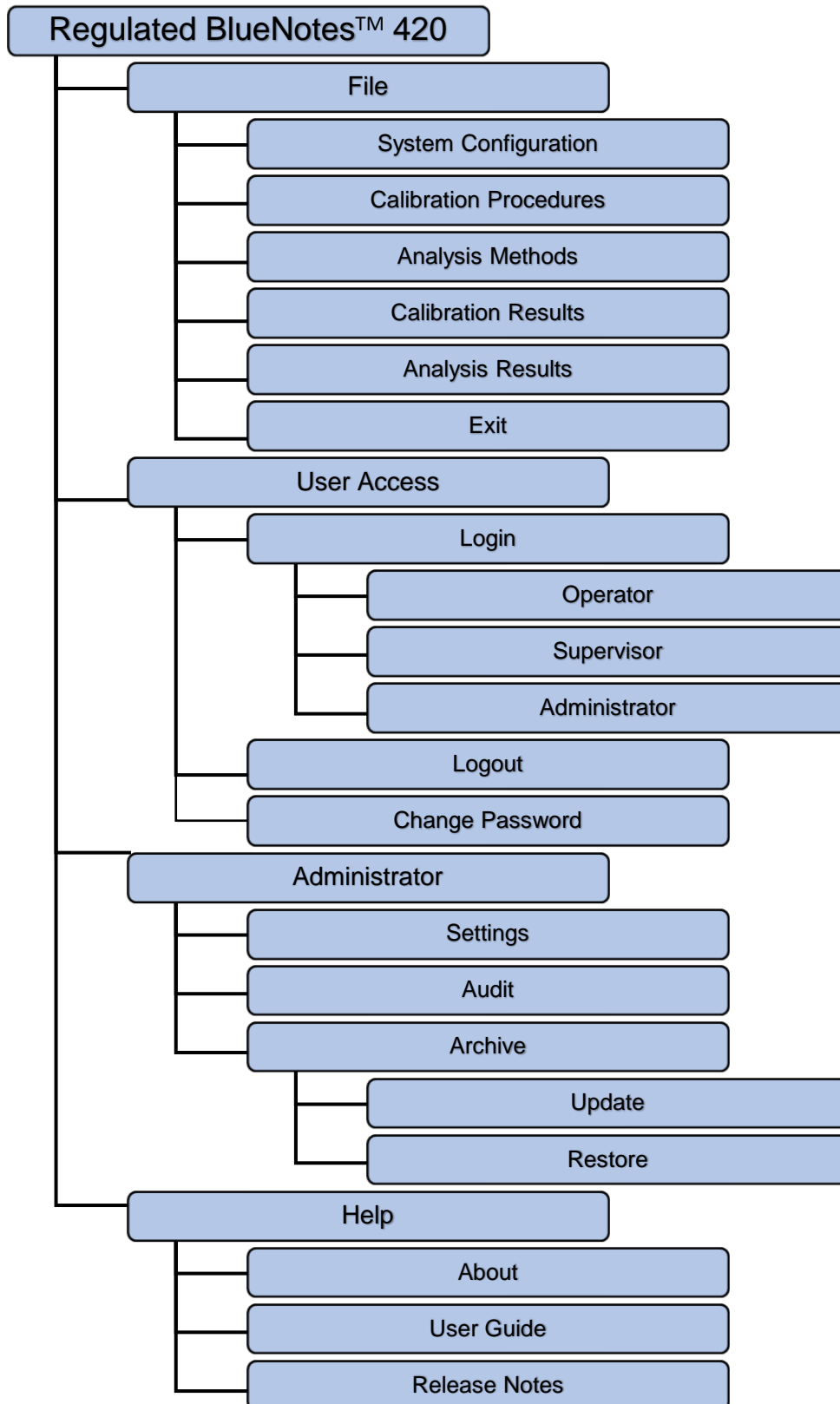
Operators are able to perform the following actions:

- View **System Configurations**
- View and operate **Calibration Procedures**
- View, operate and clone existing **Analysis Methods**
- View **Calibration and Analysis Results**
- Regenerate own password

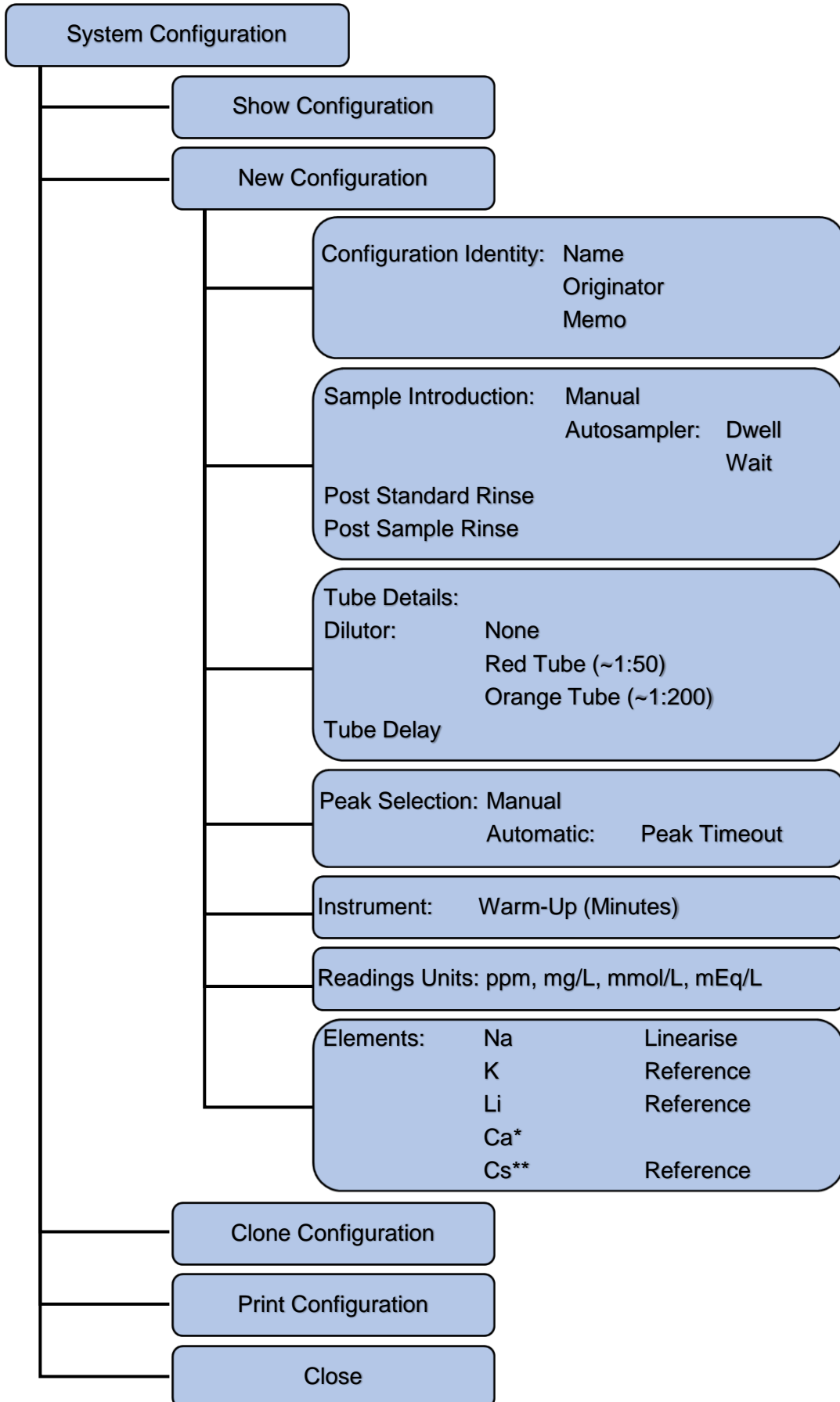
3 Software Structure

3.1 Top Level Menu Structure

TOP LEVEL

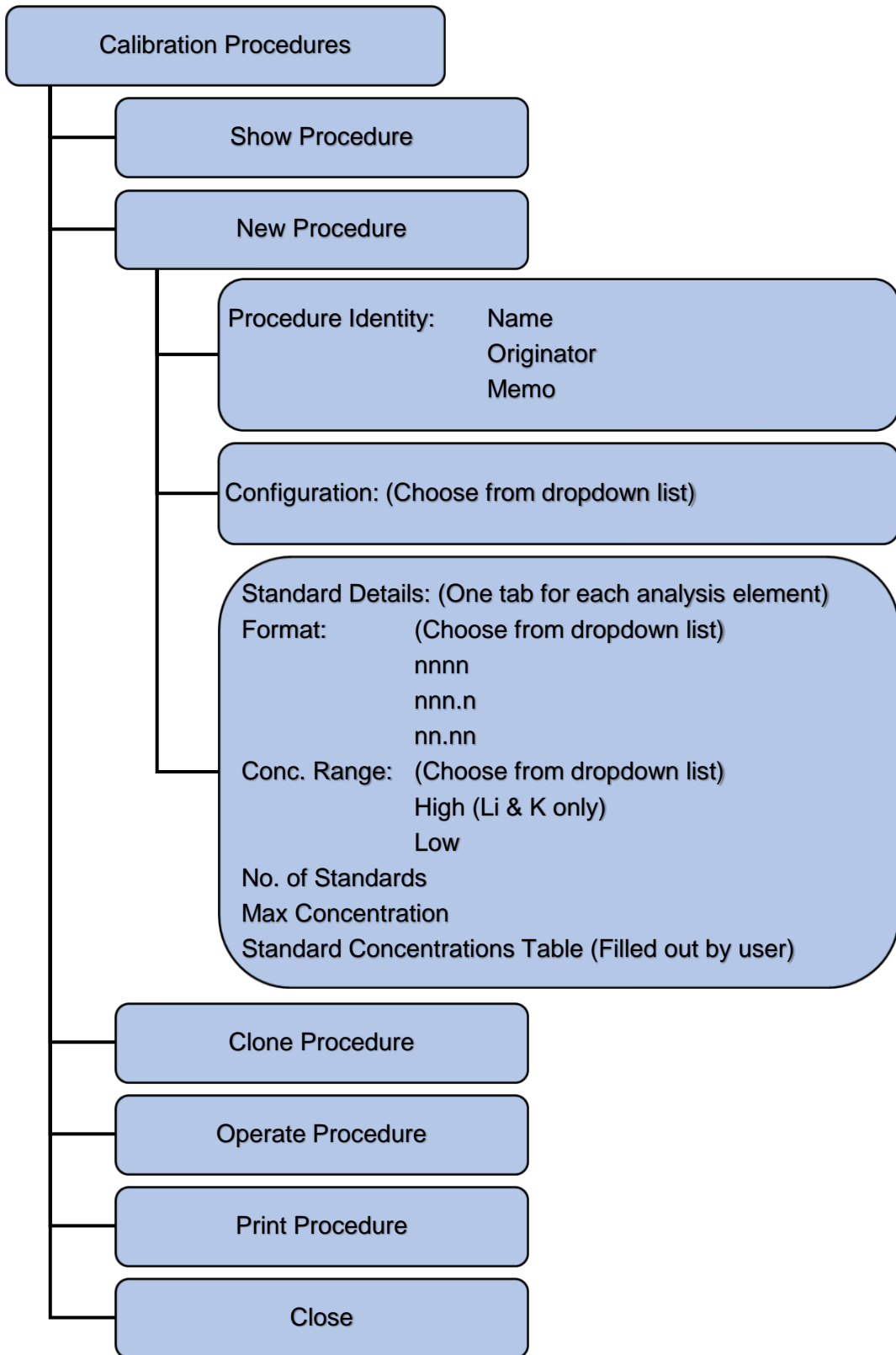


3.2 System Configuration Menu

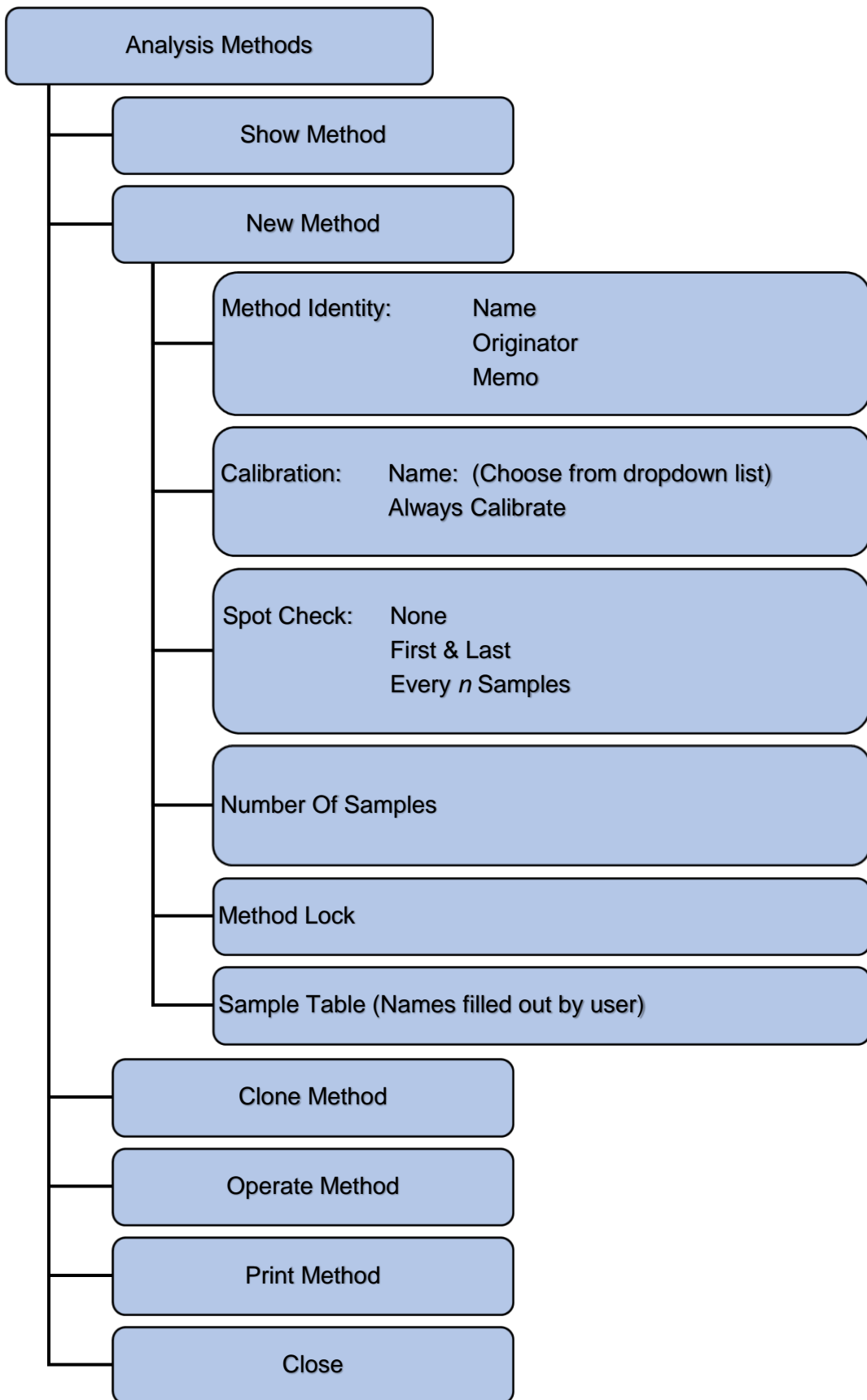


* Model 425 only ** Model 420Cs only

3.3 Calibration Procedure Menu



3.4 Analysis Method Menu



4 System and Software Setup

BlueNotes requires three files to be set up that define how samples are analysed:

- **System Configuration:** Holds information about how the instrumentation is being used, the elements of interest, if the response is to be linearised or used as an internal reference.
- **Calibration Procedure:** Stores information about the standard(s) (and their units of measurement) used to calibrate and refers to the Configuration
- **Analysis Method:** Contains information about the samples and refers to the Calibration file.

The software allows storage of multiple System Configurations, Calibration Procedures and Analysis Methods for recall as required.

File Organisation

Once created in Regulated BlueNotes 420, System Configurations and Calibration Procedures may not be edited or deleted, the user must take great care to ensure that all details are correct before saving.

4.1 System Configuration

From the BlueNotes **Start Page**, select **System Configuration** and then choose from one of the following:

- Show Configuration
- New Configuration
- Clone Configuration
- Delete Configuration
- Close

Only Supervisors have access to **New Configuration** or **Clone Configuration**. To log in as a Supervisor follow instructions in section **2.6 User Access**.

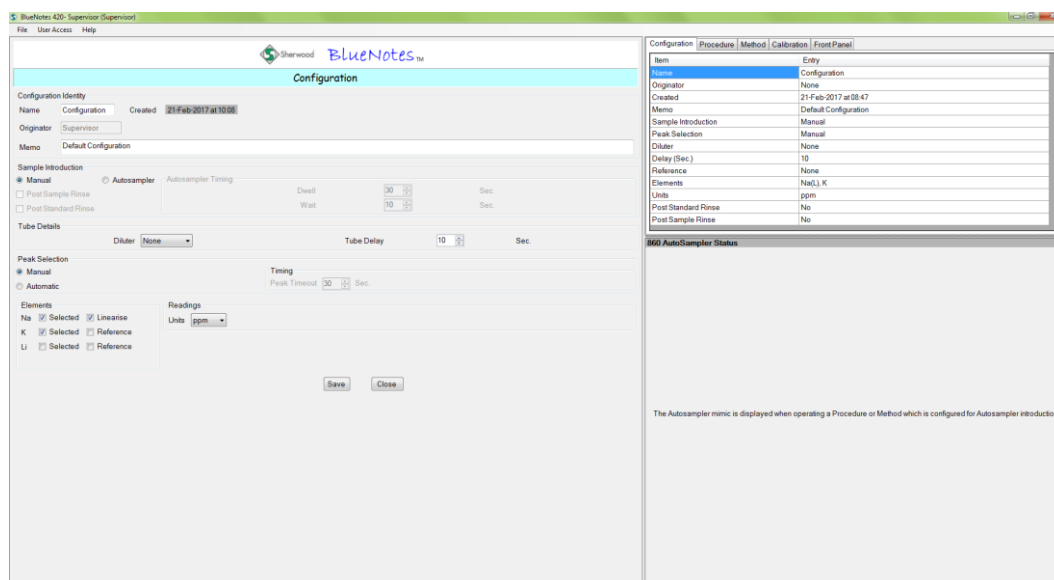
4.1.1 Show Configuration

Show Configuration allows the user to view an existing configuration; it is not possible to edit a Configuration once it has been created.

4.1.2 New Configuration

Only Supervisors have access to **New Configuration**. To log in as a Supervisor follow instructions in section **2.6 User Access**.

To create a **New Configuration**, click to reveal the following:



Configuration Identity:

Enter a new **Name**, indicate the **Originator** of the **New Configuration** and record any required comments in the **Memo** text box.

NOTE: Date and time created/modified are shown but cannot be altered.

Sample Introduction:

If using a flame photometer with a Model 860 Autosampler, select the **Autosampler** option, otherwise select **Manual**.

Selecting **Autosampler** activates the **Dwell** and **Wait** times, set times as required. (For examples see **Appendix B**)

Dwell sets the time the autosampler probe will be immersed in each sample.

Wait sets the time period between the probe exiting one sample and entering the next sample (the gap between samples).

When setting up a method using an autosampler some experimentation will normally be required to establish appropriate Dwell and Wait times depending on the use of the Model 805 Dilutor and sample characteristics. See **Appendix B** for example timings.

Selecting **Autosampler** enables the **Post Standard Rinse** and **Post Sample Rinse** features to become available. Selecting **Post Standard Rinse** instructs the Model 860 Autosampler to rinse the probe and tube briefly in the blank solution every time it leaves the standard in position 'S'; the highest or Spot Check Standard. Selecting **Post Sample Rinse** instructs the autosampler to perform the same action after every sample. No data is collected from this rinse solution, but the rinses are shown in the sample table.

NOTE: When sample rinse is enabled the autosampler executes an additional **Wait** after each rinse, this effectively doubles the wait time between sample. The user should consider reducing the wait time to account for this.

Tube Delay:

Indicate here if a Model 805 Dilutor is in use. If it is, the option selected from the dropdown indicates the dilution ratio used: The **Red Tube** is for a nominal 1:50 dilution and the **Orange Tube** is for a nominal 1:200 dilution (relates to the tubes used on the dilutor).

The **Delay** relates to the time the Regulated BlueNotes 420 software 'waits' before it begins to monitor for a stable signal. The **Delay** is particularly important if **Automatic Peak Selection** is required enabling BlueNotes to determine when to take the blank, standards and samples readings from the flame photometer (see below). (**Automatic Peak Selection** must be selected for autosampler use).

Tube Delay Time without the Model 805 Dilutor

The Tube Delay time should be set to the time it takes for the reading to begin to increase after the sample tube is placed in the sample, either Manually (by hand when **Measure/Print** is pressed) or by the autosampler starting its **Dwell Time**.

Tube Delay Time with Model 860 Autosampler and Model 805 Dilutor

In this case the Tube Delay time should be set to the time it takes for the reading to begin to increase AFTER the end of the autosampler **Dwell Time**.

When setting up a new procedure it is usual to perform a certain amount of experimentation to determine the best Delay time: see **Appendix B** for example timings.

Peak Selection:

Determines *how* a reading is taken.

Selecting **Manual** means the user decides when a stable signal has been achieved and then presses the **Measure/Print** button on the flame photometer to accept the reading. (This option cannot be selected if using an autosampler).

Selecting **Automatic** means the software determines when the signal in the flame has stabilised after sample introduction. If using a Model 860 Autosampler only **Automatic Peak Selection** is available. If introducing samples manually, the operator presses the **Measure/Print** button at the time of introduction.

Peak Timeout is used to give a time limit to the search for a stable reading when in Automatic Peak Selection mode. Samples that give rise to unstable reading are highlighted in the analysis report.

Peak Timeout is not available when Manual Peak Selection is chosen. Peak Timeout is set automatically when using the autosampler to the same length of time as the Dwell Time (as the Dwell Time represents the time that the signal will reflect the sample). If the autosampler is **not** in use then the Peak Timeout time is set by the User and defines the time to stop the search for a stable signal. Refer to Appendix B for guidance in setting appropriate timings.

Elements:

Click the Elements for analysis. Standards must contain all elements of interest in one solution i.e. combined standards.

Sodium

If it is the intention to analyse Sodium at concentrations **going into the flame** of less than 40 ppm, 40 mg/L, 1.8 mmol/L or 1.8 mEq/L **AND** to undertake only a single point calibration then select **Linearise** next to Na. If working above this range or if intending to use a multipoint calibration do not select **Linearise**.

Potassium

BlueNotes enables K to be selected as the **Reference** element or an analyte. If using K as Reference it is recommended that it is included at a concentration entering the flame between 20 and 30 ppm, 20 and 30 mg/L, 0.5 and 0.8 mmol/L, 0.5 and 0.8 mEq/L.

NOTE: See **Appendix A** for examples of blanks, standards and samples prepared with an internal standard Reference. Sherwood Scientific Ltd. does **not** recommend

the use of Potassium as an internal reference for biological samples; e.g. measurement of Lithium in Serum samples.

Lithium

BlueNotes allows Li to be selected as the **Reference** element or an analyte. If Li is being used as a Reference it ought to be included at a concentration entering the flame at approximately 100 ppm, 100 mg/L, 14.5 mmol/L, 14.5 mEq/L. (3 Molar Li solution delivered 1:200 via the dilutor gives approximately 104 ppm).

NOTE: See **Appendix A** for examples of blanks, standards and samples prepared with an internal standard Reference.

Calcium

Calcium is available for analysis with the Model 425 only. We strongly recommend the operator consults the literature for guidance about overcoming interferences for Calcium analysis with low temperature flame emission.

Caesium

Caesium is available as a **Reference** only and only when BlueNotes is being operated in conjunction with the Model 420Cs Flame Photometer. When used as a reference Cs ought to be included at a concentration entering the flame at approximately 50 ppm, 50 mg/L, 0.4 mmol/L, 0.4 mEq/L.

Readings:

Select, from a dropdown list, the **Units** of concentration to be used to report sample concentration after calibration conversion of recorded sample readings.

Save:

Click on **Save** and the Configuration will be saved under the name given in the **Configuration Identity**. The **Configuration** can then be recalled from a list of saved configurations and used in a **Calibration Procedure**.

4.1.3 Clone Configuration

Clone is used to reproduce the highlighted Configuration to enable a copy to be made with ease. Changes can be made to the cloned configuration and then the new copy saved with a new name.

Only Supervisors have access to **Clone Configuration**. To log in as a Supervisor follow instructions in section **2.6 User Access**.

4.1.4 Close

Click **Close** to return to the BlueNotes Start Page.

4.2 Calibration Procedure

From the Regulated BlueNotes 420 **Start Page**, select **Calibration Procedures**. There is a choice:

- Show Procedure
- New Procedure
- Clone Procedure
- Operate Procedure
- Delete Procedure
- Close

Only Supervisors have access to **New Procedure** or **Clone Procedure**. To log in as a Supervisor follow instructions in section **2.6 User Access**.

Select an option and click.

4.2.1 Show Procedure

Show Procedure allows the user to view an existing Procedure. It is not possible to edit a Calibration Procedure once it is created.

4.2.2 New Procedure

Only Supervisors have access to **New Procedure**. To log in as a Supervisor follow instructions in section **2.6 User Access**.

To create a **Calibration Procedure**, select New Procedure to reveal the following:

The screenshot shows the 'Calibration Procedure' configuration window in the BlueNotes 420 Supervisor software. The window is divided into several sections:

- Procedure Identity:** Includes fields for Name (Procedure), Originator (Supervisor), and Memo (Default Calibration Procedure). A 'Created' timestamp of 22-Feb-2017 at 08:40 is displayed.
- Configuration:** A dropdown menu set to 'Configuration'.
- Standard Details:** Includes checkboxes for Na and K, a Format dropdown (nnnn), a Conc. Range dropdown (Low), a Max. Conc. field (100 ppm), and a No. of Standards field (1) with an 'Apply' button.
- Standards Table:** A table with columns 'Seq.#' and 'Concentration'. It contains one entry: Seq.# 1, Concentration 100.
- Right Sidebar:** Contains a table with columns 'Item' and 'Entry'. The 'Name' entry is 'Procedure'. Below this is the '860 AutoSampler Status' section, which contains the text: 'The Autosampler mimic is displayed when operating a Procedure. Autosampler introduction'.

Procedure Identity:

Enter a **Name**, indicate the **Originator** of the new procedure and record any required comments in the **Memo** text box.

NOTE: Date and time created/modified are shown but cannot be altered.

Configuration:

Choose the required Configuration from the drop-down options list.

Standard Details:

Only the elements selected in the Configuration file chosen are displayed. For Potassium and Lithium choose the appropriate **Conc. Range**:

K: select **Low** if the highest standard concentration into the flame is less than or equal to 2ppm, 2mg/L, 0.05mmol/L or 0.05mEq/L. For concentrations above this select **High**.

Li: select **Low** if the highest standard concentration into the flame is less than or equal to 0.7 ppm, 0.7 mg/L, 0.1 mmol/L or 0.1 mEq/L. For concentrations above this select **High**.

NOTE: Refer to the Model 420 and 425 Operator Manual Dilutions section.

Format Select the required results number format from the dropdown options; the number format setting is independent for each element.

No of Standards Enter the number of standards intended for use.

If working within the linear response range of the analytes, a single point calibration is sufficient to meet the instrument's linearity specification.

Linear Response Range for each Element:

Element	Concentration entering the flame
Na (with Linearise selected in the Configuration)	Up to 40 ppm, 40 mg/L, 1.8 mmol/L or 1.8 mEq/L
K	Up to 20 ppm, 20 mg/L, 0.5 mmol/L or 0.5 mEq/L
Li	Up to 20 ppm, 20 mg/L, 2.9 mmol/L or 2.9 mEq/L
Ca	Up to 100 ppm, 100 mg/L, 2.5 mmol/L or 1.3 mEq/L

NOTE: For multi-point calibrations, **no fewer than five standards and a maximum of seven standards** can be used.

Enter each standard's concentration in the table from the most concentrated and descending in order. If the standards are not entered in descending order an error message will prompt the user to change the order.

NOTE: BlueNotes does not infer anything about the **absolute** concentration of a standard from the user inputted standard 'Concentration'. For example, if samples are diluted 200 times to bring them into range for analysis, then the standards inputted concentration can be the original concentration (i.e. 200 times higher) to give results for samples with the dilution factor *already* accounted for.

It is important that the **relative** concentration of the standards is added accurately into the table; BlueNotes uses this information to generate the calibration equation and from that sample concentrations are calculated.

It is best that standards are spread across the concentration range for example 0, 2, 4, 6, 8, 10 rather than 0, 1, 2, 3, 4, 10 as the latter may give rise to failure of the calibration and a message – "Calibration abandoned due to unable to calibrate".

If a Configuration is selected which includes a Model 860 Autosampler, the vial numbers appear in the table. (Note: these will be in descending order from 40, with the first standard in position S on the carousel).

The **Max Conc.** field is populated with the highest standard concentration; samples giving rise to results in excess of this standard will be highlighted as over range.

Save:

Click the Save button to save the Calibration Procedure under the name in Procedure Identity. The Procedure can then be recalled and used in an Analysis Method.

4.2.3 Clone Procedure

Clone is used to reproduce the highlighted Calibration Procedure to enable a copy to be made with ease. Changes can be made to the cloned procedure and the new copy saved with a new name.

Only Supervisors have access to **Clone Procedure**. To log in as a Supervisor follow instructions in section **2.6 User Access**.

4.2.4 Operate Procedure

A Calibration Procedure can be operated to calibrate the instrument in advance of sample analysis, alternatively both the Calibration Procedure and Analysis Method can be set up. Operating the Analysis Method will invoke the operation of the Calibration Procedure. See section **5 Operation**.

4.2.5 Close

Click **Close** to return to the BlueNotes Start Page.

4.3 Analysis Method

From the BlueNotes Start Page, select **Analysis Methods**. There is a choice:

- Show Method
- New Method
- Operate Method
- Delete Method
- Close

Only Supervisors have full access to **New Method** or **Clone Method**. Operators have limited access to **Clone Method**. To log in as a Supervisor follow instructions in section **2.6 User Access**.

4.3.1 Show Method

Show Method allows the user to review an existing Method. It is not possible to edit an Analysis Method once it has been created.

4.3.2 New Method

Only Supervisors have access to **New Method**. To log in as a Supervisor follow instructions in section **2.6 User Access**.

To create an analysis method, select **New Method** to reveal the following:

Item	Entry
Name	Method1
Originator	Not known
Created	22-Feb-2017 at ...
Memo	Default analysi...
Procedure	Procedure
Always Calibrate	Yes
Spot Check	None
No. of Samples	5
Sample	Sample 1
Sample	Sample 2
Sample	Sample 3
Sample	Sample 4

Method Identity:

Enter a **Name**; indicate the **Originator** of the Analysis Method and any required comments in the comments **Memo** text box.

NOTE: Date and time created/modified are shown but cannot be altered.

Calibration:

Select the **Calibration Procedure** for use in association with the Analysis Method from the drop-down menu.

Always Calibrate:

If this box is checked then every time the Analysis Method is Operated the software will direct the user to run the selected Calibration Procedure immediately prior to running the Analysis Method.

If the Method does not specify **Always Calibrate** then the first time the method is Operated, BlueNotes will inform that no calibration data is available and a Calibration must be performed. The next time the method is run, BlueNotes will provide the calibration file and date performed and allow the user to specify whether to accept this previous calibration or not. Care should be exercised when accepting a previous calibration, it is important that **no** instrumentation settings or environmental conditions have changed, see section **8 Getting the Best from BlueNotes** showing other variables which may invalidate a calibration.

If the method does not include **Always Calibrate**, then **Spot Check** is selected automatically. It is possible to have both **Always Calibrate** and **Spot Check**, but the method must specify at least one of these options.

Spot Check and Sample Auto-correction:

The Regulated BlueNotes 420 software allows standard **Spot Checks** to be performed during the analysis of a series of samples, either **None, First and Last** or **Every *n* samples**. Choose the frequency of Spot Check use.

Spot Checks are particularly useful in systems where many samples may be presented to the Model 420 or 425 Flame Photometer e.g. autosampler systems where 40 samples may be presented to the flame photometer unattended. Each time a Spot Check is called for, the standard is presented to the flame photometer and the response recorded.

Spot Checks are also useful in that they allow a previously generated calibration to be reused and adjusted in conjunction with the Auto-correct feature below.

If the **Sample Auto-correction** facility is also selected then samples will be compared to the most recently adjusted calibration.

The Detailed BlueNotes Report will display:

- The instrument reading.
- The concentration according to the initial calibration.
- The Auto-corrected result based on the adjustment made by the most recent Spot Check result.

Hence any change in response due to drift in flame conditions with time may be kept to a minimum.

If using a Model 860 Autosampler, the Spot Check is placed in the 'S' standard position on the carousel.

NOTE: Ensure that there is sufficient solution in the S vial for the frequency of spot checks selected. It is essential to do this prior to starting an analysis method, do not top up the calibration solution during the analysis.

Concentration:

Enter the **Concentration** of the Spot Check standard for each element in turn.

The Spot Check standard does not have to be one of the standards used in the generation of the calibration but it may be no higher in concentration than the top standard. **If using the Model 860 Autosampler and the Spot Check Standard is not the highest standard then remember after calibration is complete and before sample analysis begins, the vial in position 'S' must be replaced with the Spot Check Standard solution.**

Sample Auto-correction:

Click the **Sample Auto-correction** box if you require BlueNotes to calculate the sample result relative to the most recent Spot Check Standard.

If Auto-Correction is not selected the analysis of the Spot Check will be reported for the user to interpret any drift.

No. of Samples:

Set the number of samples to be analysed using the scroll box next to No. of Samples. The number of rows in the sample table will expand and if the Configuration specified includes an autosampler, the vial numbers will appear. At this point the user may enter sample names and/or numbers in the Identifier column (max. 16 characters).

NOTE: If using a multipoint calibration and Model 860 Autosampler the number of vials available for samples will be reduced as some vial positions will be taken up by standards.

NOTE: If using Model 860 Autosampler and the last vial position used is number 24, then add an additional empty vial in position 25, there is no need to include it in the sample table. Vial 25 will not be sampled; it is used by the 860 Autosampler to accommodate vial 24's unique orientation.

Method Locked:

Supervisors click on the Method Locked box to grey out user entered variables.

Save:

Click the Save button to save the Analysis Method under the Name in Method Identity. The Method can then be recalled to Operate (run) an Analysis Method and analyse samples.

4.2.3 Clone Method

Clone is used to reproduce the highlighted Calibration Procedure to enable a copy to be made with ease. Changes can be made to the cloned procedure and the new copy saved with a new name.

Only Supervisors have full access to **Clone Method**. Operators have limited access and are able to change only the **Name, Memo, No. of Samples** and amend sample IDs in the sample table. To log in as a Supervisor or Operator follow instructions in section **2.6 User Access**.

4.3.4 Operate Method

See section **5 Operation** for details.

4.3.5 Close

Clicking **Close** will return the user to the Start Page.

5 Operation

NOTE: Hibernate or sleep timeout on the PC **must** be set such that the computer will **not** enter either state while BlueNotes is operating. Failure to prevent sleep or hibernate during analysis of either the calibration or samples will result in the **loss of data.**

A Calibration Procedure can be operated on its own or an Analysis Method can be operated which may instigate a Calibration if the Analysis Method includes Always Calibrate, or if no Calibration results have yet been generated.

5.1 Operate Calibration Procedure

Turn on the flame photometer following the instructions in the Model 420 and 425 Operator Manual such that the flame is lit and '000' is displayed in both channels. Ensure the instrumentation is connected to the host PC according to section **2.4 Connecting Peripheral Devices**.

To operate a procedure (run a calibration) click on **Operate Procedure** within the Calibration Procedure page of the software. BlueNotes will connect to the flame photometer and the Model 860 Autosampler (if used); successful connection is shown at the bottom left of the screen and the flame photometer will show 'PC' in the top channel display. Follow the on-screen instructions which guide the user through each step of the procedure.

- If using a Configuration that specified **Manual Peak Selection** the user must press the **Measure/Print** button on the instrument when the blank and each standard has achieved a stable reading.
- If **Automatic Peak Selection** was specified in the Configuration the software will count down the delay once the operator has pressed the **Measure/Print** button then establish when a stable signal is obtained and enter the reading for the standard in the calibration table.
- If operating with a Model 860 Autosampler (which must use **Automatic Peak Selection**) the user does not need to press any buttons on either instrument at all.

If using a Model 805 Dilutor to add the Reference element remember to ensure that it has reached the flame (by looking through the inspection port the flame will appear red if Lithium is present or referring to the element's tab in the BlueNotes chart recorder pane) before the blank reading is taken.

Display:

During the calibration process the display on the right of the screen shows:

During blanking: the raw detector reading to just one decimal place.

Measuring standards: the raw reading with the blank reading removed. The display will briefly flash with the standard concentration (as it was added to the calibration table). The number of decimal places shown will depend on the format selected in the Calibration Procedure.

Reference element: (if selected as a Reference) is shown to one decimal place.

Regulated BlueNotes 420 retains all decimal places for calculations irrespective of the number of decimal places selected for results in the Calibration Procedure.

Chart:

The Chart Display shows the raw uncalibrated output from the detector.

Continue to follow the instructions as they appear in the on-screen blue box until the procedure is complete.

Calibration Complete:

When the calibration is complete a dialog box will appear. The calibration graph and correlation coefficient is displayed on the right of the screen. Click the tabs to display the calibration graphs for each element selected in turn.

If the fit to the line was not good enough, the calibration will fail. It is worth re-running the calibration procedure to see if results are improved, alternatively fresh solutions should be prepared. See Model 420 and 425 Flame Photometer Operator Manual –Troubleshooting.

5.2 Operate Analysis Method

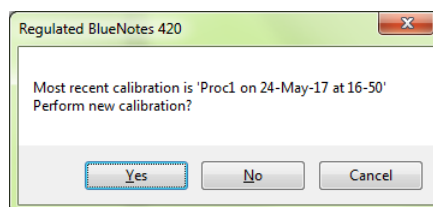
Turn on the flame photometer following the instructions in the Model 420 and 425 Operator Manual such that the flame is lit and '000' is displayed in both channels. Ensure the instrumentation is connected to the host PC according to section 2.4 **Connecting Peripheral Devices**.

To operate an Analysis Method (run an analysis) click on **Operate Method** within the Analysis Method page of the software. BlueNotes will connect to the flame photometer and the Model 860 Autosampler (if used); successful connection is shown at the bottom left of the screen and the flame photometer will show 'PC' in the top channel display.

Follow the on-screen instructions, which guide the user through each step of the procedure.

If **Always calibrate** was selected in the Analysis Method setup page, the method will start with the Calibration Procedure.

If the Analysis Method is specified to not **Always Calibrate** then a previous calibration file can be used, BlueNotes will prompt with a message like that shown below:



- If using a Configuration that specified **Manual Peak Selection** the user must press Print when the blank and each standard has achieved a stable reading.
- If **Automatic Peak Selection** was specified in the **Configuration**, the software will count down the **Delay** once the operator has pressed the **Measure/Print** button on the instrument then establish when a stable signal is obtained and enter the reading for the standard in the calibration table.
- If operating with a Model 860 Autosampler (which must use **Automatic Peak Selection**) the user does not need to press any buttons on either instrument at all.

If using a Model 805 Dilutor to add the Reference element remember to ensure that it has reached the flame before the blank reading is taken.

Display:

During the analysis process the display on the right of the screen shows:

- **During blanking:** the raw detector reading to one decimal place.
- **Measuring Spot Check Standard:** the calibrated result (with the effect of any Reference element already taken into account).
- **Measuring Samples:** The results with the effect of any Reference element selected and influenced by the most recent Spot Check Standard.
- **Reference element:** (if selected as a Reference) raw figure is shown to one decimal place.

NOTE: If using a Model 860 Autosampler and **no** dilutor and using the Ref facility **E99** may be displayed **between** samples while the level of the Reference element is lowered.

NOTE: Depending upon the concentration of the sample the display may occasionally show **INV** either between or during sample analysis. INV means that the sample's reading is outside the limits of the calibration.

The number of decimal places shown for standards and samples will depend on the **Format** selected in the Calibration Procedure. Regulated BlueNotes 420 retains all decimal places for calculations irrespective of the number of decimal places selected for results in the Calibration Procedure.

Results Table:

During the analysis process the Results Table towards the left of the screen is populated with sample results as they are generated. When Spot Check Standards and Auto-correct is selected in the Analysis Method the results grid will show the results of the samples according to the calibration in the first column, then in the next column (indicated by a *) the result for the sample with adjustment for the most recent Spot Check. Results for Spot Check Standards are compared just to the calibration. All figures in the Results table have the moderation from any Reference element already applied.

Chart:

The Chart Display shows the raw output from the detector.

Continue to follow the instructions as they appear in the on-screen blue box until the analysis is complete.

5.3 Reports and Error Messages

Reports:

When all the samples are complete, a Summary report is generated automatically.

If Spot Checks were selected and Automatic Correction requested; original and corrected results will be reported in the detailed report:

- **Result** gives the sample result compared to the calibration (with any Reference factor applied).
- **Corrected** shows the sample result (with any Reference factor applied) and with the Spot Check adjustment made.

Error messages in Reports:

Any sample results 25% higher than the Max Concentration specified in the Calibration Procedure will be labelled as **Over Range**.

If the Reference Element varies by more than 25% (either way) compared to the Calibration a **Reference Error** will be flagged against the sample.

If Spot Check was selected and the result varies by 5% either above or below the original reading in the calibration then a **Spot Check Error** will be flagged against the sample.

INV means that the sample's reading is outside the limits of the calibration.

T/O indicates that a stable signal was not detected for that element before the end of the Peak Timeout time.

SAT indicates that the detector signal was saturated.

NOTE: Depending upon interference between elements, the accuracy required and the importance attached to the results, if a saturated signal is reported consideration should be given to the validity of the result for other elements. If in doubt, dilute the sample appropriately and reanalyse.

NOTE: Errors reported are ranked by priority due to limited space in the report; not all errors for a sample may be shown in the report.

6 File Archives

The file archive can be backed up to a user specified location and then restored in the event of data loss. All system configuration, calibration procedure, analysis methods, calibration and analysis results files are backed up during this process. When the archive is restored the user will be alerted to any files which fail a validation check. The validation check is performed on each file before the archive is restored, in the event that a file fails validation the restore process will not be carried out. See section **7 Administrator Actions**.

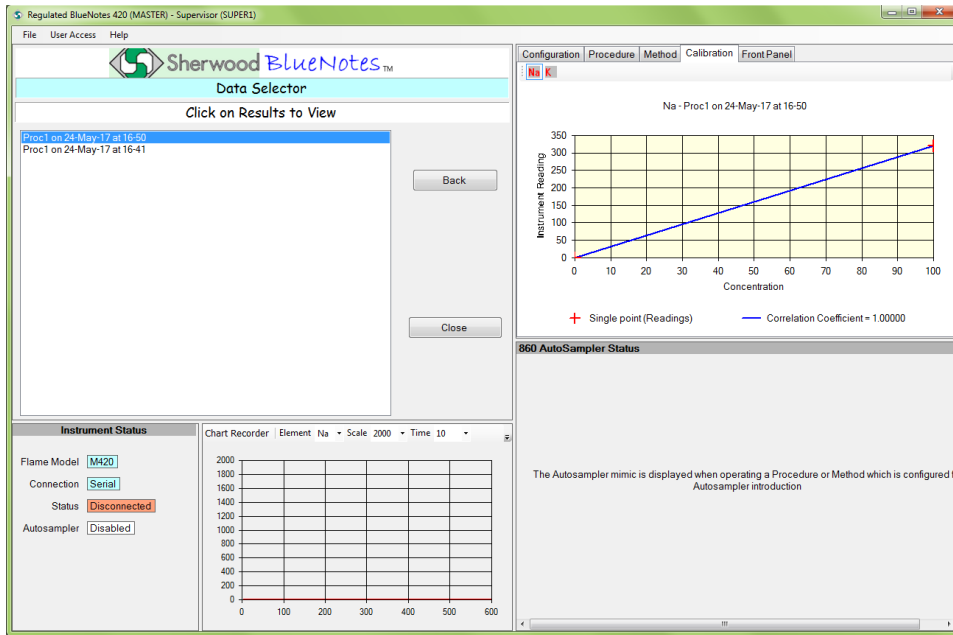
NOTE: For more detailed information regarding the data archive see **Appendix C**.

6.1 Calibration Results

From the BlueNotes Start Page, click **Calibration Results** to reveal the Calibration Results page with all the stored calibration files listed – an example is shown below.

Configuration	Procedure	Method	Calibration	Front Panel
Name	Entry			
Name	Proc1			
Originator	SUPER1			
Created	24/05/2017 16:37:49			
Memo	Default Calibration Procedure			
Configuration	Config1			
No. of Standards	1			
Elements	Na K			
Max Conc.	100.00 100.00			
Standard 1	100.00 100.00			

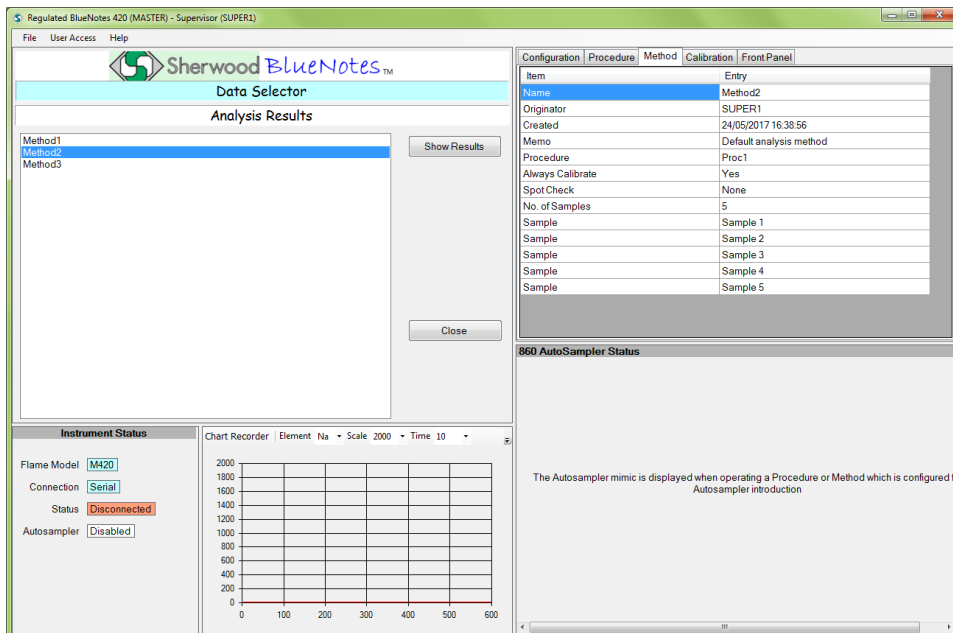
Click either **Show Results** or **Close** (to return to Start Page): click a calibration file to select. All the calibration result files associated with the chosen procedure will appear in date and time order.



Click on the required file to view the calibration graph or select one of the other options shown: **Back** or **Close**.

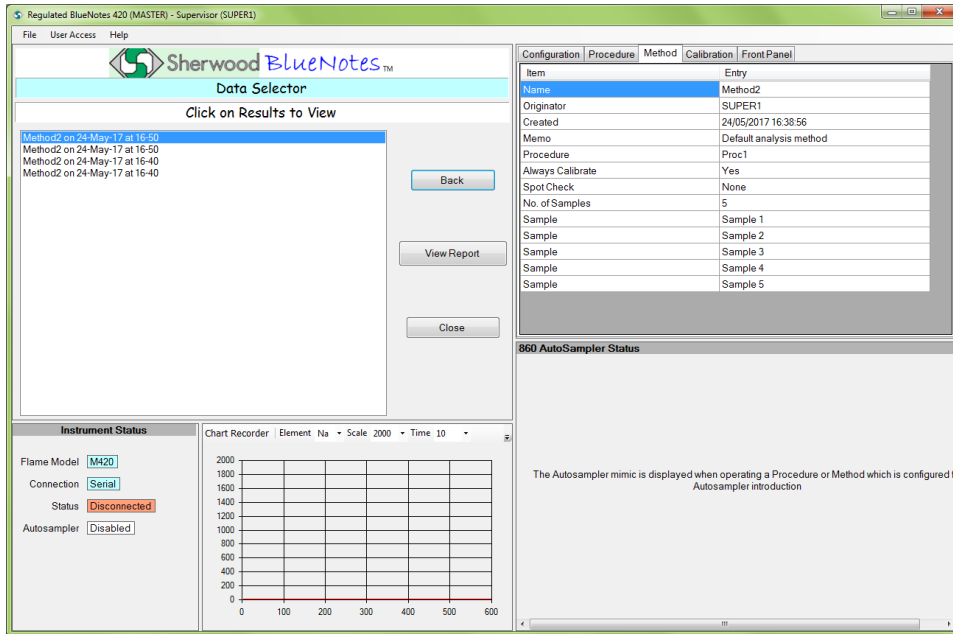
6.2 Analysis Results

From the BlueNotes Start Page, select Analysis Results and click to reveal the Analysis Results page with all the stored analysis files listed – an example is shown below.

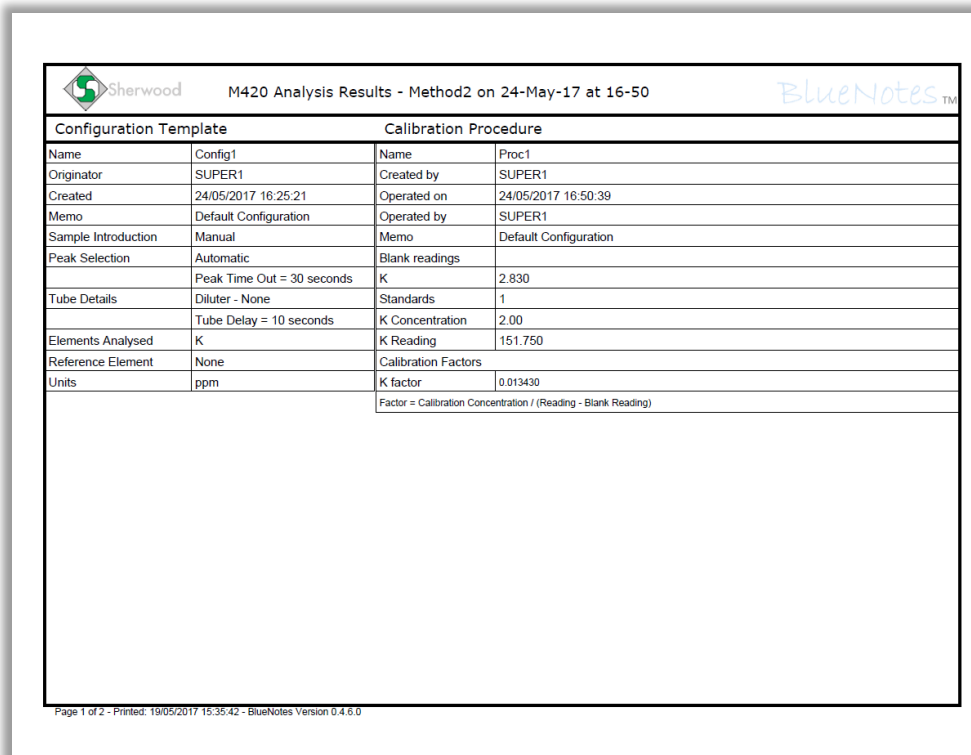


Click on the required file to highlight it and then **Show Results**, or **Close** (to return to Start Page).

Choosing **Show Results** displays the screen below;



Highlight the required file and click **View Report** to display the pdf file generated upon completion of the analysis.



Page 1 of an example report pdf, displays details of system configuration, calibration procedure and analysis method operated. Calibration details (raw detector reading, calibration concentration and calibration factors) are also displayed.

Sherwood		M420 Analysis Results - Method2 on 24-May-17 at 16-50			BlueNotes™
Method	Method2 on 24-May-17 at 16-50				
Calibration	Proc1 on 24-May-17 at 16-50				
Reference	None				
Performed on	24/05/2017 16:50:15				
Performed by	SUPER1				
Result Code	Completed OK				
Calculation Method	Result = Blanked Reading * Factor				
Time	Reading Type	K (ppm)			Memo
		Blanked Reading	Result	Corrected	
14:58:10	Blank	0.0	0.0		
14:59:10	Calibration	148.92	2.00		
14:59:40	Spot check	150.29	2.02	2.00	
15:00:16	Cal Standard	149.84	2.01	1.99	Over Range (K)
15:01:23	Cal Standard	150.02	2.01	2.00	Over Range (K)
15:22:53	Unknown 1	127.15	1.71	1.69	
15:24:16	Unknown 1	125.67	1.69	1.67	
15:24:47	Unknown 2	82.98	1.11	1.10	
15:25:10	Unknown 2	82.64	1.11	1.10	
15:25:57	Unknown 3	52.25	0.70	0.70	
15:26:41	Unknown 3	52.16	0.70	0.69	
15:27:10	Unknown 4	59.05	0.79	0.79	
15:27:41	Unknown 4	59.44	0.80	0.79	
15:28:51	Spot check	147.75	1.98	2.00	
15:29:22	Cal Standard	148.11	1.99	2.00	
15:29:44	Cal Standard	0.39	0.01	0.01	
15:30:27	Unknown 1	126.44	1.70	1.71	

Page 2 of 2 - Printed: 19/05/2017 15:35:42 - BlueNotes Version 0.4.6.0

Page 2 of the report displays the analysis results, **Blanked Reading** displays the blanked detector output, **Result** displays the concentration of each sample after the reading has been corrected by the calibration factor and, in the cases where an internal standard reference is being used, the reference factor.

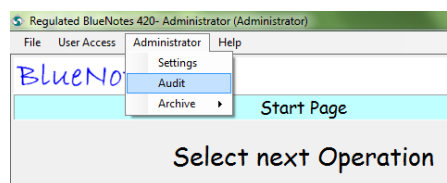
7 Administrator Actions

7.1 Audit

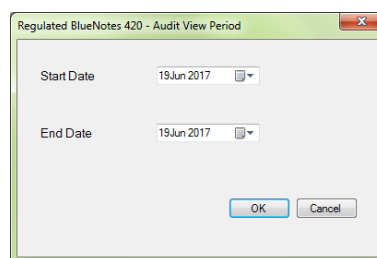
All user actions are recorded to the audit trail. The audit trail can be accessed and a report generated by the Administrator.

The full list of auditable actions are as follows:

- Software launched
- Software closed
- User logon (number of failed attempts)
- User logout
- User created
- User blocked
- User unblocked
- System configuration saved
- Calibration procedure saved
- Analysis method saved
- Calibration procedure operated
- Calibration procedure results saved
- Calibration procedure finished
- Calibration procedure operation cancelled
- Analysis method operated
- Analysis method results saved
- Analysis method finished
- Analysis method operation cancelled
- Update Archive
- Restore Archive
- System configuration restored
- Calibration procedure restored
- Analysis method restored
- Calibration results restored
- Analysis results restored
- Run Audit



Administrators are able to run the audit by selecting **Audit** from the Administrator menu.



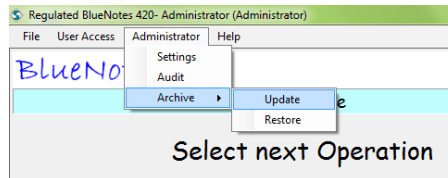
The user will then be prompted to select a start date and an end date. Once the desired dates have been input, click **OK** to generate an audit report pdf for the time period spanning the selected dates.

7.2 Archive

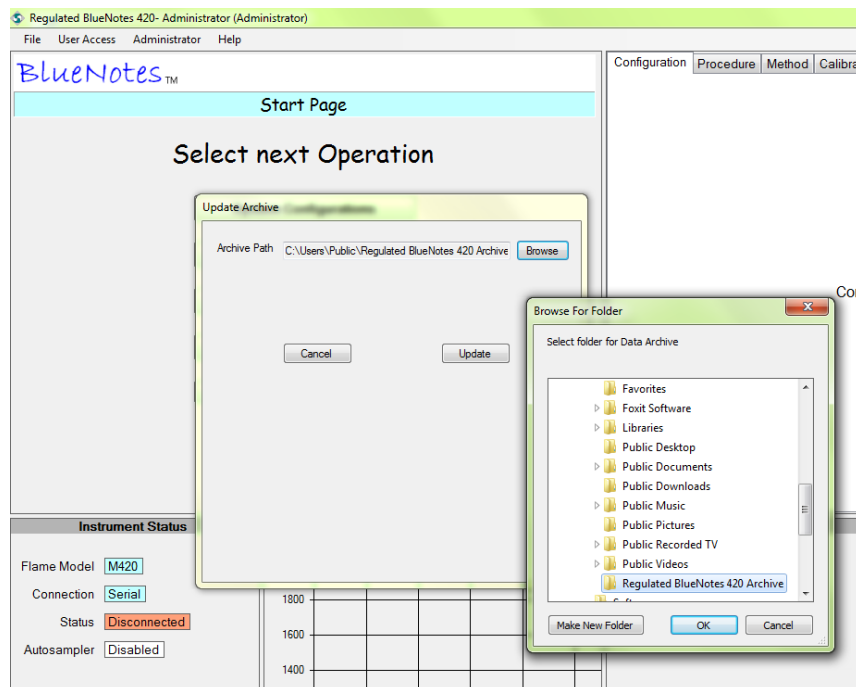
Administrators have access to the **Archive** function through the **Administrator** menu. The archive function allows the administrator to back up analysis data and configuration files to a user specified location.

NOTE: For more information regarding the data archive see **Appendix C**.

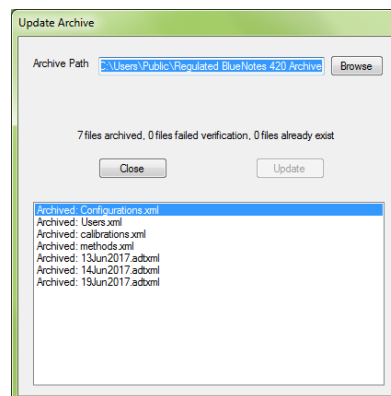
7.2.1 Update



To update the archive, select **Archive > Update** from the **Administrator** menu.

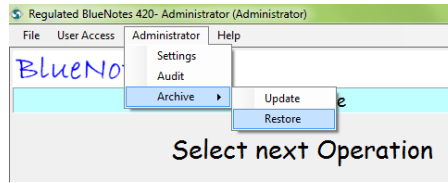


The Administrator must specify a location for the archive to be stored to by clicking **Browse**. Once a location has been selected click **Update** to carry out the archive procedure.

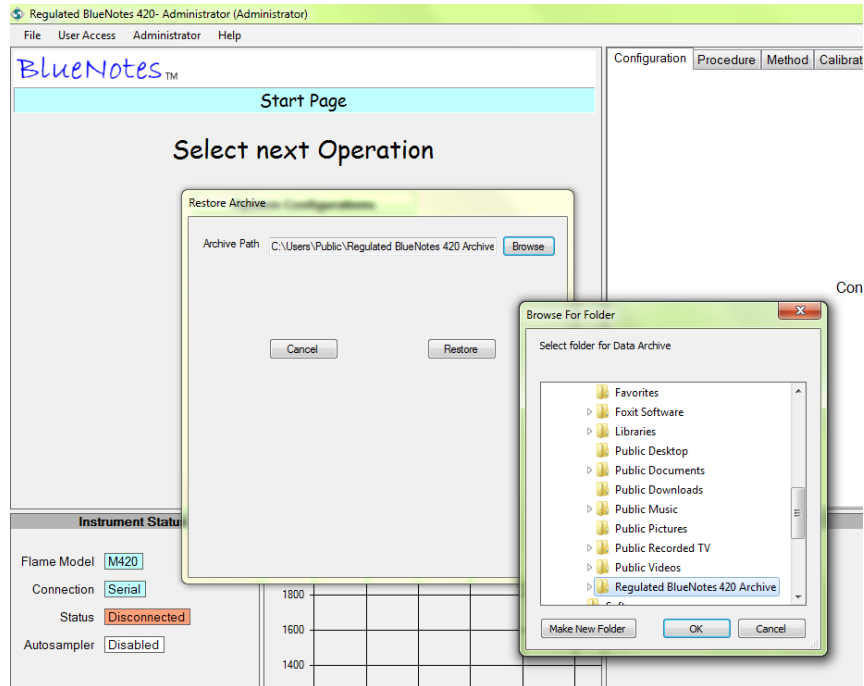


Once the archive procedure is complete the dialog box will display details of specific files that were copied to the archive location.

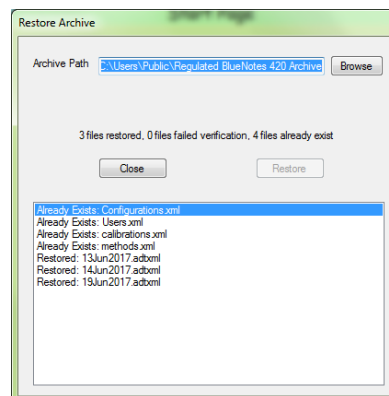
7.2.2 Restore



To update the archive, select **Archive > Update** from the **Administrator** menu.



The Administrator must specify a location from which the archive is to be restored by clicking **Browse**. Once a location has been selected click **Restore** to carry out the restore procedure.



Once the archive restore procedure is complete the dialogue box will display details of specific files that were restored. Any files which were not restored are also detailed with a reason given for those specific files not being restored.

8 Getting the Best from Regulated BlueNotes 420

Maintenance:

Keep instrumentation in good condition by following the Routine Maintenance procedures outlined in the instrumentation Operating Manuals.

Ensure all solutions, including those aspirated during warm-up are free of particles.

Warm-up:

Ensure all instrumentation has sufficient time to warm-up according to their respective Operating Manuals before starting.

With Model 860 Autosampler (and no Model 805 Dilutor):

If using the Model 860 Autosampler without the Model 805 Dilutor, use the long uptake tube disconnected from the autosampler probe to aspirate water during warm-up. Ideally place a beaker of water at the same height as the sample carousel as the uptake rate of the atomiser is influenced by both the length of the tube and its tip's position relative to the atomiser.

After warm-up, check and record the uptake rate of the atomiser (Model 420 and 425 Operating Manual) before starting.

With a Model 805 Dilutor (with or without Model 860 Autosampler):

If using the Model 805 Dilutor ensure that during the warm-up the Model 420 or 425 Flame Photometer is aspirating fluid from the weir cup supplied by the running dilutor.

Ensure that any Reference element that is dosed by the Model 805 Dilutor has reached the flame before the Calibration Procedure or Analysis Method begins.

Time spent setting up the correct timings can improve precision; refer to Appendix B for examples.

After warm-up, check and record the uptake rate of the atomiser (Model 420 and 425 Operating Manual) before starting.

Manual Sample Introduction:

If using manual sample introduction aim to position the tip of the sample uptake tube in the same 'place' each time; for example, use small sample cups placed in the sample tray and ensure the tip of the tube is not 'stuck' flat to the bottom of the cup, but resting at an angle so that the sample flow up the tube is unrestricted.

Pass the atomiser cleaning wire through the sample uptake tube and replace the sample tube if small particles have accumulated inside it.

After warm-up, check and record the uptake rate of the atomiser (Model 420 and 425 Flame Photometer Operating Manual) before starting.

Calibration:

Ensure standards are accurately prepared and encompass the whole sample concentration range expected.

Match the composition of the standards as closely as possible to the samples for analysis.

Single Point Calibrations:

Single point calibrations are suitable when working within the linear response range of the instrument, see table below.

Element	Concentration entering the flame
Na (with Linearise selected in the Configuration)	Up to 40 ppm, 40 mg/L, 1.8 mmol/L or 1.8 mEq/L
K	Up to 20 ppm, 20 mg/L, 0.5 mmol/L or 0.5 mEq/L
Li	Up to 20 ppm, 20 mg/L, 2.9 mmol/L or 2.9 mEq/L
Ca	Up to 100 ppm, 100 mg/L, 2.5 mmol/L or 1.3 mEq/L

If working outside these concentrations multipoint calibrations must be undertaken.

Multipoint Calibrations:

Whilst working in the linear concentration range of the instrument with a single point calibration gives results meeting the stand-alone instruments specification, a multipoint calibration may allow, depending up on the character of the samples, the stand-alone specification to be exceeded.

Cautions when re-using multipoint calibrations:

The validity of a calibration is dependent on many things, not least the accuracy of the results required.

For best results, at least until confidence is gained to do otherwise, Sherwood recommends that providing no changes to the system are made (see below), multipoint calibration should be performed on a fully warmed up system at least on a daily basis.

If with experience, and depending upon accuracy sought, confidence is gained such that calibrations can be re-used for longer periods, then time can be saved by accepting an existing multipoint calibration.

Although the use of Spot Check Standards and the Auto-correct Facility can 'refresh' a calibration there are instances where **re-calibration** ought to be performed. Below are some instances which may invalidate a calibration (the list is not meant to be exhaustive):

- Change in atomiser uptake rate:
As the readings are highly dependent on the amount of solution entering the flame, changes to the uptake rate may invalidate a calibration.
It is advisable to record the uptake rate of the atomiser (see Model 420 and 425 Operator Manual) before a calibration method is operated. When a calibration is to be re-used the uptake rate can be checked again. If the uptake rate has changed significantly then re-using the calibration will not be valid.
 - Movement of instrumentation, if either the flame photometer, compressor, autosampler or dilutor are repositioned with respect to each other, or in their entirety.
 - Replacement of air compressor or Model 805 Dilutor.
 - Replacement of uptake tube, or any dilutor tube.
- Servicing of instrumentation:
Small adjustments made during cleaning and servicing may affect the calibration. Always recalibrate after:
 - Replacement of Model 420 or 425 Flame Photometer element filter.
 - Change made to programmed Filter Factor.
- Change of sample matrix, the standards matrix must closely match that of the samples – containing, as far as is practical, everything that the samples contain with the exception of the element(s) of interest.

If in doubt recalibrate.

9 Appendix A: Use of Reference Facility

Refer to the Model 420 & 425 Operator Manual for further information.

Theory:

Blank and standard solutions are prepared so that they contain a known and consistent amount of a Reference element in addition to the analyte of interest. Samples have exactly the same amount of the Reference element added to them.

- The standards are measured for the analyte and the Reference element.
- A calibration graph is constructed using the response of the detectors to the analyte elements and their concentrations. The response to the Reference element during calibration is also recorded.
- Samples are analysed; for each sample the response to the analytes is moderated by the response to the Reference element.
- The analyte in each sample is determined by comparison to the calibration.

NOTE: It is important that the element chosen to be the Reference is not present in the sample. It is important that exactly the same level of Reference element is present in the blank, standards and samples.

See the table below for an illustration using 20 ppm K as Reference element.

Example: Analysis of Na using K Reference

Sample solutions containing between 120 and 160 mmol/L Na are to be determined.

The standards below were prepared from a 200 mmol/L Na Standard using 20 ppm K solution.

20ppm K was prepared by diluting 20.0ml of 1000ppm K Standard to 1litre with good quality deionised water.

Standard concentration for calibration table /mmol/L	Actual standard concentration into the flame /mmol/L	Volume of 200mmol/L Na standard / μ L	Volume of good quality deionised water / μ L	Volume of K 20ppm solution /mL	Total volume /mL
200*	1.00	500	0	99.5	100.0
180*	0.90	450	50	99.5	100.0
160*	0.80	400	100	99.5	100.0
140*	0.7	350	150	99.5	100.0
120*	0.6	300	200	99.5	100.0
100*	0.5	250	250	99.5	100.0
0 (Blank)	0	0	500	99.5	100.0

* Use these figures when entering the standard concentration into the Calibration Procedure so that the results calculated by BlueNotes automatically take into the account the 200 times dilution.

Samples were diluted 500 μ l to 100.0ml using an aliquot of the exact same batch of 20 ppm K solution used to prepare the standards and blank solution.

Using the System Configuration:

Using the Calibration Procedure:

Seq #	Concentration
1	200.0
2	180.0
3	160.0
4	140.0
5	120.0
6	100.0

Enter the concentration values from the highlighted table on page 45.

The Analysis Method:

BlueNotes 420 (Supervisor) - MASTER

File Supervisor Help

Sherwood BlueNotes™

Analysis Method

Method Identity

Name: KRefdemo Created: 11/05/2010 - 15:08

Originator: Supervisor Modified: 11/05/2010 - 15:08

Memo: K as Ref for demo

Calibration

Name: KRefdemo Multi point Always Calibrate

Spot Check

None Sample Auto correction

First and Last

Every 10 Samples Spot Check Conc. 140.0

No. of Samples: 12 Method Locked

Diluter: None
Peak Selection: Automatic
Units: mmol/l

Type	Identifier
Blank	
Spot Check	
Sample	Sample 1
Sample	Sample 2
Sample	Sample 3

Save Cancel

The 0 Standard (Blank) solution was used as the blank during Calibration and as the Blank to begin the Analysis Method.

Sample results are 'moderated' by the Reference element leading to greater precision of results.

Preparation of solutions with internal standard Reference elements added can be automated with the Model 805 Dilutor. The Model 805 adds either K or Li at suitable concentration while diluting samples and standards accurately and consistently by either (approximately) 50 or 200 times (depending upon tube sizes fitted).

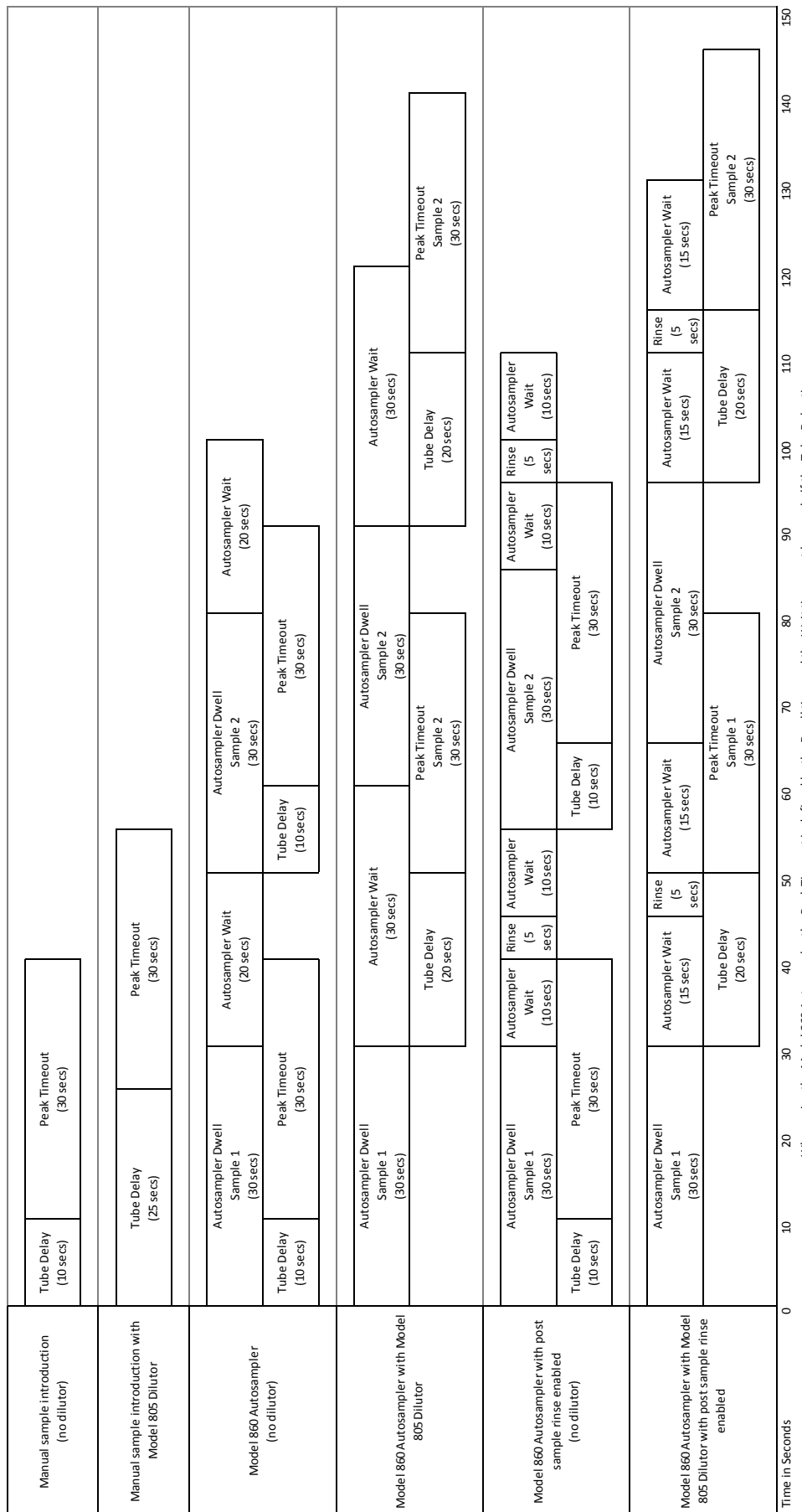
10 Appendix B: Timings for Delay, Dwell, Wait and Peak Timeout

Some preliminary experimentation will normally be required to set the optimal timings.

It can be useful to observe the chart and display on the PC screen to time how long standards and samples take before appearing in the flame and giving rise to stable signals.

Example timings for simple aqueous samples are shown in the diagram on the following page.

NOTE: Signals from concentrated samples may take longer to stabilise in the flame so when setting timings it may be best to experiment with the strongest standard.



11 Appendix C: Data Integrity

All data generated and utilised by Regulated BlueNotes 420 is stored in the following directory:

“C:\ProgramData\Sherwood Scientific Ltd\Regulated BlueNotes M420”

Data stored here includes:

- analysis results
- calibration results
- analysis methods
- calibration procedures
- system configurations
- user names
- passwords
- audit trails
- activated licence key
- temporary files (PDF reports and CSV exports)

All files are stored in XML format with the exception of temporary files. All XML files are check summed and digitally signed to ensure they are tamper evident. Any XML file that fails the check sum are rejected by the software.

To ensure data integrity it is important that the system administrator responsible for controlling Windows user rights ensures the following:

- that the ability for users to access “C:\ProgramData\Sherwood Scientific Ltd\Regulated BlueNotes M420” is restricted.
- that the contents of “C:\ProgramData\Sherwood Scientific Ltd\Regulated BlueNotes M420” is backed up to an external location, either automatically through existing Windows functionality or manually using the Archive Backup and Restore functionality detailed in section 7.2 of this manual.

NOTE: All data in the “C:\ProgramData\Sherwood Scientific Ltd\Regulated BlueNotes M420” directory persists after uninstalling the software. To perform a clean install, it is necessary to delete the contents of this folder beforehand but it is the users' responsibility to do this in compliance with their existing SOPs concerning data integrity.

12 Appendix D: Warranty

Sherwood Scientific Limited

Product Warranty Statement

Warranty Term: 12 Months

Sherwood Scientific Ltd (Sherwood) warrants, subject to the conditions itemised within this document, through either Sherwood personnel or personnel of its authorised distributors, to repair or replace free of all charges, including labour, any part of this product which fails within the warranty time specified above, appertaining to this particular product. Such failure must have occurred because of a defect in material or workmanship and not have occurred as a result of operation of the product other than in accordance with procedures described in the instructions furnished with this product. Conditions and specific exceptions that apply to the above statement are as follows:

1. End-user warranty time commences on the date of the delivery of product to end-user premises.
2. *Free of all charges* statement applies only in areas recognised by Sherwood as being serviced either directly by its own personnel, or indirectly through personnel of an authorised distributor. Products purchased outside these areas requiring service during the warranty period will incur charges relative to the travel/transit costs involved. However, products purchased in such areas will be serviced during the warranty period free of all charges providing they are returned, carriage paid, to either Sherwood or by pre-arrangement to an authorised Sherwood distributor.
3. All maintenance (other than operator maintenance as described in the instructions), repairs or modifications have been made by Sherwood or Sherwood authorised personnel.
4. This product has where applicable been operated using Sherwood specified supplies and reagents.
5. Sherwood reserves the right to make any changes in the design or construction of future products of this type at any time, without incurring any obligation to make any changes whatsoever to this particular product.
6. Reagents, supplies, consumables, accessories and user maintenance items are not included in this warranty.
7. Repairs or replacement of any part failing due to abnormal conditions including the following, are excluded from this warranty:
 - a. Flood, lightning, earthquake, tornado, hurricane, or any other natural or man-made disaster.
 - b. Fire, bombing, armed conflict, malicious mischief or sprinkler damage.
 - c. Physical abuse, misuse, sabotage or electrical surge.
 - d. Damage incurred in moving the product to another location.
8. User agrees to permit Sherwood personnel or personnel of its authorised distributor to make changes in the product which do not affect results obtained, but do improve product reliability.

Product Warranty Statement (continued)

Representations and warranties purporting to be on behalf of Sherwood made by any person, including distributors and representatives of Sherwood, which are inconsistent or in conflict with the terms of this warranty (including but not limited to the limitations of the liability of Sherwood as set forth above), shall not be binding upon Sherwood unless reduced to writing and approved by an officer of Sherwood Scientific Ltd.

Except for the obligations specifically set forth in this warranty statement, in no event shall Sherwood be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort or any other legal theory and whether advised of the possibility of such damages.

Neither Sherwood nor any of its third-party suppliers makes any other warranty of any kind, whether expressed or implied, with respect to Sherwood Products.

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