Manual

NOWTrak™

Operation and Installation Manual

Manual
TM001E B0603

NOWTrak™
Critical Materials Management System

ATMI PACKAGING
- Critical Materials Packaging Solutions -

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1 Introduction

1.1 Purpose

The purpose of the user guide is to provide a better understanding of the workings of the NOWTrak system for purposes of maintaining a NOWTrak installation.

1.2 Overview

The NOWTrak product's primary mission is to manage information about consumable chemicals. NOWTrak consists of hardware and software to support this capability.

The NOWTrak controller is an industrial computer running the MS Windows 2000 operating system. The controller is populated with NOWTrak circuit boards that are inserted into PCI card slots in the controller. IntelliProbes, which are dispense connectors for NOWPak containers, are connected to the controller with cables. The probes mate to IntelliCaps, which are the closures located on NOWPaks and contain chemical information.

The software provided includes the NOWTrak application, responsible for monitoring the chemicals, the Network Database Manager, responsible for keeping the local database current with global databases, the NOWTrakEditor, used for editing the global databases; and the NOWTrakFabView application, used to remotely observe and interact with all of the NOWTrak controllers.

1.3 NOWTrak System Basics

RFID stands for **R**adio **F**requency **Id**entification. The RFID system consists of a tag, an antenna, and a reader. The tag is an integrated circuit with data, communications capability and some intelligence. The antenna is connected to the reader. When the reader wants to read the tag, it energizes the antenna. The antenna then energizes the tag. When the tag is energized, it has enough intelligence to communicate with the reader through the antenna to receive new data and to provide the reader with the data contained on the tag.

The tag contains approximately 1 kilobyte of information. Some of the data contained on the tag is for encryption, which reduces the effective useable storage. Each tag also contains a serial number that is guaranteed to be unique. Chemical data is saved on the tag, which is embedded within the cap of the chemical NOWPak. The antenna becomes an integral part of the probe that is inserted into the NOWPak. When the probe is fully inserted, the antenna can energize the tag to begin communications with the read. There are four readers per reader board. The reader boards are PCI boards. This means that each board has four antennas and one I/O cable attached.

1.4 Definitions

Antenna – A remote antenna is used to read the chemical information from the RFID tag embedded in the IntelliCap. The antenna is embedded in the IntelliProbe and is connected to a NOWTrak RFID reader board via a coaxial cable.
NOWPak – The NOWPak is the combination of the bottle, bag and IntelliCap used in the NOWTrak system.
Cabinet – The cabinet is a chemical cabinet that contains drawers that hold NOWPaks and IntelliProbes.
Card –The card is a PCI board which performs the RFID reads. Also referred to as the RFID Reader Board.
Client – A client is a user of services. In the case of network databases or programs, the user would run a client program to get data from a server to display in a client window.
Drawers – Drawers reside in a chemical cabinet and may contain one or more NOWPaks.
IntelliCap – The IntelliCap is the white bottle cap with an RFID tag embedded in it.
IntelliProbe – The IntelliProbe is the RFID antenna attached to the NOWTrak controller. It is used when reading the IntelliCap RFID tags.
Misconnect – An event that occurs when an invalid chemistry is detected by the probe.
NOWTrak Controller – The industrial computer that contains the NOWTrak electronics and software.
PCI – A standardized format communications bus in computers. The format contains hardware and software standards which define communication form, fit, and function.
Pre-connect verification (PCV) – Pre-connect verification is the term used to describe the process by which the operator verifies the validity of the chemical to a specific location before the probe is inserted into the NOWPak.

Probe – The probe is located at the chemical dispensing location. It contains an embedded antenna and a tube that is used to extract the chemicals from the NOWPak.
Probe Template – A probe template defines the acceptable chemical attributes that an RFID tag being read by a probe antenna must satisfy in order for the respective tool to be enabled. A probe template contains chemical definitions, which are used for comparisons with the RFID tag data.
RFID – Radio Frequency Identification. The acronym RFID is an abbreviation for the technology of using radio frequency to read data from an integrated circuit.
RFID Reader Board – The reader board is responsible for reading RFID tags at multiple physical locations. Also referred to as a card.
RFID Tag – An RFID tag (or chip) is a memory device that is embedded in the cap of the NOWPak. The antenna energizes it. Once the RFID tag is energized, the antenna reads data from the RFID tag.
Server - A server is a manager of information and provides an interface through which a clients may retrieve information. In the case of NOWTrak, one of the servers provides probe information to its clients who will then present the data to the user.
Process – A process is a software term describing the software logic that executes on a computer.
Tool – A machine used in the manufacturing of semiconductors that makes use of probes.
XML – An acronym for E**X**tensible **M**arkup **L**anguage. It is an industry standard method of representing data. It is used for everything from word processing files TV schedules and bank records. The data is hierarchically structured and human readable.

2 NOWTrak Hardware

2.1 Controller System

2.1.1 Chassis

The chassis is a rack mountable industrial computer.

2.1.2 Hard drive

The system contains two PROMISE Technology Inc. hot swappable RAID drives. This provides immediate backup between drives. If a new drive is inserted, it can be synchronized with the primary disk when it is inserted. The purpose of this system is to maintain system integrity and reliability.

2.1.3 CD drive

The CD drive is a CD-R, which is a read only CD drive.

2.1.4 Floppy drive

The floppy drive is a 3.5 inch standard floppy drive.

2.1.5 NOWTrak RFID reader boards

The reader board contains hardware to support reading RFID tags embedded in IntelliCaps and provides this information to the NOWTrak controller. The reader board is a PCI bus board. Each reader board supports four antenna cables and one I/O cable. The cables are connected to the reader board via connectors on the end plate of the board.

2.1.6 Cables

2.1.6.1 Digital I/O cables

There is one I/O cable per RFID reader board. The purpose of these cables is to provide I/O capability for each probe. The cables come in several lengths.

2.1.6.2 Antenna cable

The antenna cable is a coaxial cable connecting the antenna to the reader board. The cables come in various lengths.

2.1.7 NOWTrak Controller RAID

NOWTrak provides the option of having a hardware platform with dual redundant hard drives. This system allows for immediate recovery in the event of a single hard drive failure. It works by having a primary and secondary disk drive in the system. The secondary drive is continuously being kept up to date when data is written to the primary drive. It allows you to insert and remove a drive without stopping the system. When a drive is inserted, the system will update this drive to be identical to the primary drive. All of this can be done while the NOWTrak controller is running. Another alternative is to have a third drive that can be stored in a remote location. On a periodic basis, this third drive could be inserted into the system and updated to the current state of the NOWTrak controller.

2.1.8 Hardware failure protection

NOWTrak provides several safeguards in the unlikely event of a hardware failure. The reader board and the NOWTrak controller are in constant communication with each other. If a reader board fails to respond to the NOWTrak controller within ten seconds, the NOWTrak controller sends a firmware reset to the reader board so that it can attempt to restart.

2.2 IntelliProbe

The IntelliProbe features an RFID reader antenna that communicates with the IntelliCap. The RFID antenna in the IntelliProbe reads tag information and ensures an exact match with the IntelliCap before chemistry goes on the tool.

2.3 IntelliCap

The IntelliCap has a RFID tag embedded into the cap that allows information about the chemical in the NOWPak to be written onto the RFID tag.

2.4 IntelliCheck

The IntelliCheck feature of NOWTrak provides an additional validation step, ensuring the correct chemical is inserted on the correct probe. When a NOWPak is presented to the IntelliCheck probe, NOWTrak searches for probes within a defined context and the green LEDs of the matching probes will blink at one quarter second intervals for one minute.

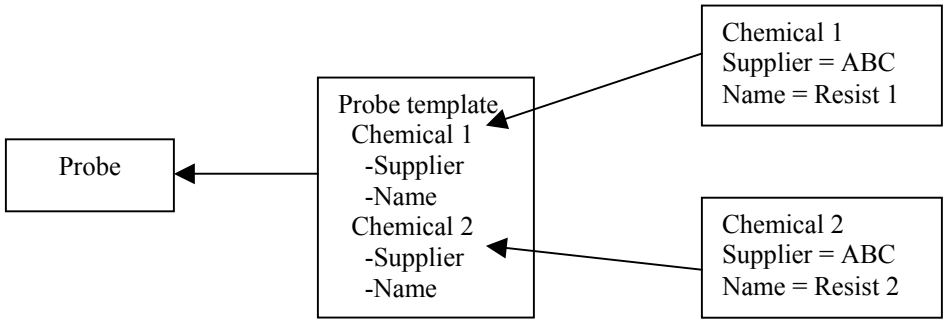
2.5 Example hardware configuration

This section describes hardware configurations for several representative NOWTrak systems.

2.5.1 NOWTrak Hardware Setup Table

3 NOWTrak Software

The NOWTrak application's databases assist in chemical validation by defining how to monitor the NOWPaks/probes connected to the NOWTrak computer. When a POU is defined, the computer hardware location is associated with the IntelliProbe location on the tool. This association information is kept in the ProbeAssociation.xml database on the local NOWTrak computer. In the process of this definition, the probe is also associated with validation rules for the chemicals used at the probe. These rules are kept in two databases, the Chemicals.xml database and the ProbeTemplates.xml database. The chemicals database contains the definition of the chemicals deployed in the NOWTrak system. A probe template defines the chemicals and a select set of chemical attributes to be used for validation. This feature handles the possibility of having more than one chemical valid for a given probe. The following diagram shows the chemical validation database relationship:



In this example, the probe makes use of a probe template with two valid chemicals. This means that it is acceptable to use either ABC resist 1 or ABC resist 2 at this probe. The probe templates and chemicals are defined in global databases. The NOWTrakEditor is used to edit these databases. To read more about the probe template database, see the section labeled Probe Template. To read more about the chemical database, see the section labeled Chemicals Database. To read more about the process of probe monitoring, see the section labeled Monitoring functions.

3.1 Overview

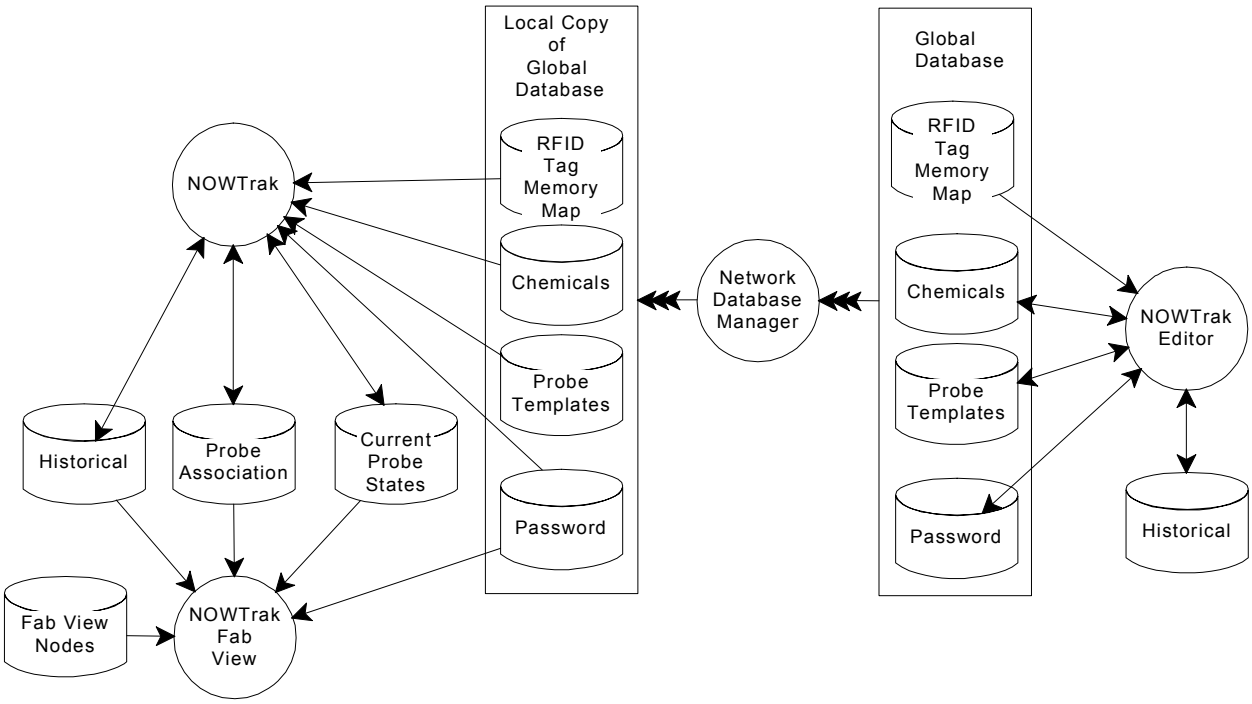
There are global databases that are common to all NOWTrak computers and there are local databases at each NOWTrak computer. The global databases provide commonality throughout the NOWTrak environment. The global databases define the format of the data contained in the RFID tag embedded in the IntelliCap, the chemicals that are used throughout the NOWTrak system, and the rules for chemical validation. The local databases define the mapping of the NOWTrak reader boards to the probes at the tool, the current state of the defined probes, and the historical information at the NOWTrak computer. The global databases are:

- RFIDTagMemoryMap.xml – Defines the format of the data on the RFID tag.
- Chemicals.xml – Defines the chemicals used.
- ProbeTemplates.xml – Defines the rules for validation.
- Pass.dat – Contains the user account information.

The local databases are:

- ProbeAssociation.xml – Defines the mapping of the RFID reader board to the probe.
- CurrentProbeStates.xml – Contains the current chemical state of the probe.
- HistoricalDatabases.xml – Contains all pertinent historical information.
- FabViewNodes.xml – Contains the network address of all of the NOWTrak computers

Four software applications perform all functions of the NOWTrak system. These applications are NOWTrak, Network Database Manager (NDM), NOWTrakEditor, and NOWTrakFabView. NOWTrak is the probe monitoring and control program. The NDM keeps local databases up to date. The NOWTrakEditor is the editor for the global databases. NOWTrakFabView allows for global viewing and alert interaction with all of the NOWTrak computers. The following diagram shows the applications and the databases they use. The circles represent the programs. The cylinders represent the databases. The triple arrows indicate that the Network Database Manager simply copies files from the global database to the local copy. The NOWTrakFabView reads the data on the local NOWTrak computer. The direction of the arrows indicates whether the program reads or also changes the database.



3.1.1 Database Updates

NOWTrak has the ability to dynamically react to changes made to its databases. NOWTrak monitors its database files and when the last modified date changes, it rereads the specific database and forces all probes to re-evaluate their status.

3.2 Tag Memory Map

The RFID tag memory map database is stored in file RFIDTagMemoryMap.xml. It defines how the chemical data is stored in the RFID tag embedded in the IntelliCap. This is the first database that is used after the chemical data is read. This database defines the actual character/byte offsets for each chemical attribute saved on the RFID tag. It also defines data that is pertinent to the hardware requirements of the RFID tag. The first section defines the hardware requirements. The second section defines the mapping of the chemical data. Since the data on the RFID is a fixed format, NOWTrak has no tools for editing this database. This database is delivered to the customer and is not expected to change without serious consideration. The following table and RFIDTagMemoryMap.xml represent the exact definition of the mapping of the tag data.

TITLE	FORMAT or UNITS	FIELD LENGTH (bytes)
RFID Tag Serial Number	Alpha	4
RFID Tag Serial Number expansion	Alpha	4
Version	Text	8
NOWPak Installation Day	Text	2
NOWPak Installation Month	Text	2
NOWPak Installation Year	Text	4
Chemical Supplier	Text	20
Product name	Text	20
Product Description	Text	40
Lot Number	Text	16
Batch Number	Text	16
Product Number	Text	16

TITLE	FORMAT or UNITS	FIELD LENGTH (bytes)
Fill Day	Text	2
Fill Month	Text	2
Fill Year	Text	4
Bottle Number	Text	8
Shelf life Expiration Day	Text	2
Shelf life Expiration Month	Text	2
Shelf life Expiration Year	Text	4
Viscosity	Text	10
Viscosity Units	Text	10
Photospeed	Text	10
Photospeed Units	Text	10
NOWPak Liner Material	Text	10
NOWPak Model Number	Text	16
Configurable Fields ATMI	Text	300
Configurable Fields Others	Text	218
Total Bytes		760

3.2.1 Tag Memory Map Details

RFDATA – This encapsulates the definition of the RFID tag embedded in the IntelliCap. The tag has two attributes associated with it. The **VERSION** attribute allows for future definition of multiple tag memory maps. The **TOTAL_BYTES** attribute defines the total amount of RFID tag memory.
BLOCKS – This encapsulates the hardware definition of the RFID tag. The RFID tag requires that there be multiples of 48 bytes of useable data followed by 16 bytes of encryption data. The only way that this data would change is if the vendor of the RFID tags changes this format.
BLOCK – As stated in the BLOCKS definition, we have two types of blocks. Attribute **TYPE** has options of "**VALID DATA**" and "**ENCRYPTION DATA**". Attribute **SIZE** defines the number of bytes in the block. The blocks follow each other contiguously.
ATTRIBUTES – This encapsulates the useable area of the tag and maps the tag memory as if it was contiguous and the encryption blocks did not exist. The basis for the chemical definition is saved within this layer on the RFID tag. Each of the elements that follow identifies the specific names of the chemical fields, giving the chemical its definition.
Attributes within each field are as follows:
ATTRIBUTE – This determines if data is read or read/write. The only fields that are read only are the tag serial number and it expansion area. The rest of the fields are read/write.
TYPE – This attribute defines how the data will be converted when read from the RFID tag. Choices are "**STRING**" and "**BINARY**".
HELP – This defines a help text that is shown as a tool tip when using the NOWTrakEditor program.
BYTE_OFFSET – This defines the starting location of the data within the RFID tag. This offset assumes that all of the chemical data is in one big block and the encryption blocks are removed from the definition.
SIZE – This defines the space reserved for the text. If the size is "10", then you have 10 characters to define the value.

3.3 Software Functions and Features

3.3.1 Chemical validation

Chemical validation begins with the connection of a new NOWPak to an IntelliProbe. When this occurs, the chemical data is read from the IntelliCap. The information is sent to the NOWTrak computer. The NOWTrak controller sees that a new NOWPak was detected and compares the chemical data against the rules defined for this

probe. If the chemical matches the rules, the probe's tool is enabled. If the chemical does not match the rules, a misconnect alert is shown on the user interface.

Chemicals are validated in several ways. If the chemical is expired, it is identified as invalid. If a chemical does not match all of the predetermined criteria, it is considered invalid. If a NOWPak passes these tests when placed on the IntelliProbe the chemical is valid and the tool dispense for the probe is enabled.

3.3.2 Chemical expiration

NOWTrak makes use of two criteria when determining chemical expiration. The expiration date stored in the RFID tag is combined with an expiration date extension to determine the final expiration date for a chemical. NOWTrak monitors chemical expiration every minute. NOWTrak also warns of a pending expiration within 96 hours, 24 hours and every hour from 11 hours down. Since expirations are date based, they will occur within the first minute of the expiration date (hour: 00:01).

3.3.3 Chemical mismatch

A chemical mismatch means that the wrong chemical was placed on the probe. This is determined by comparing the chemical information stored in the RFID tag against predefined data assigned to the given probe.

3.3.4 Add / Modify a Chemical

The NOWTrakEditor application, which is available on the controller hosting the global database, provides the ability to change a chemical in the global chemical database. Once the chemical has been changed and the database has been updated, all NOWTrak controllers will automatically update and reflect the new chemical database. Extend a chemical expiration

The NOWTrakEditor application, which is available on the computer hosting the global database, provides the ability to extend a chemical expiration. Once the chemical expiration has been changed and the database has been updated, all NOWTrak controllers will be automatically updated and the chemical expiration will be extended on all NOWTrak controllers.

3.3.5 Add / Modify a Probe Template

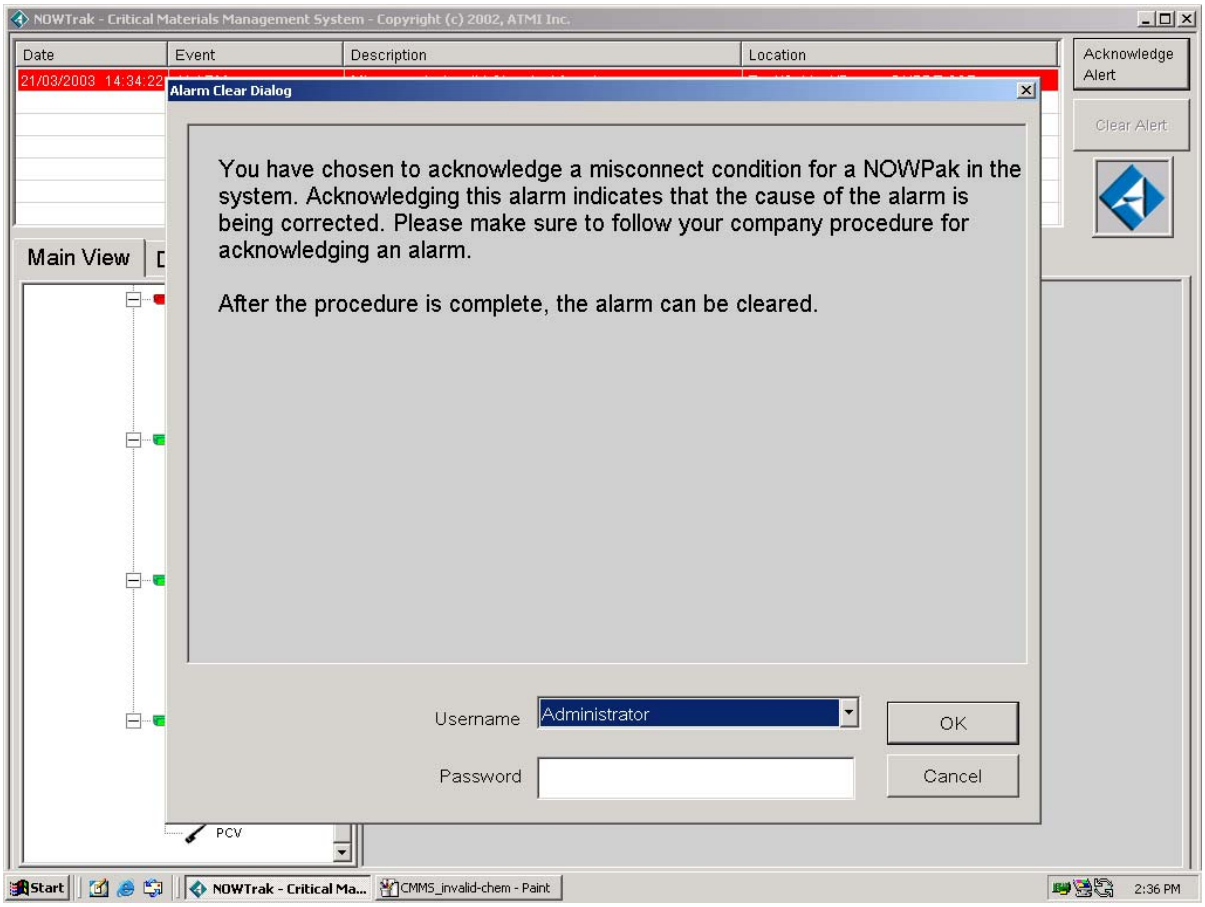
The NOWTrakEditor application, which is available on the computer hosting the global database, provides the ability to change a probe template in the global probe template database. Once the probe template has been changed and the database has been updated, all NOWTrak controllers will automatically update and reflect the new probe template database.

3.3.6 Allow Multiple Chemicals on the Same Probe

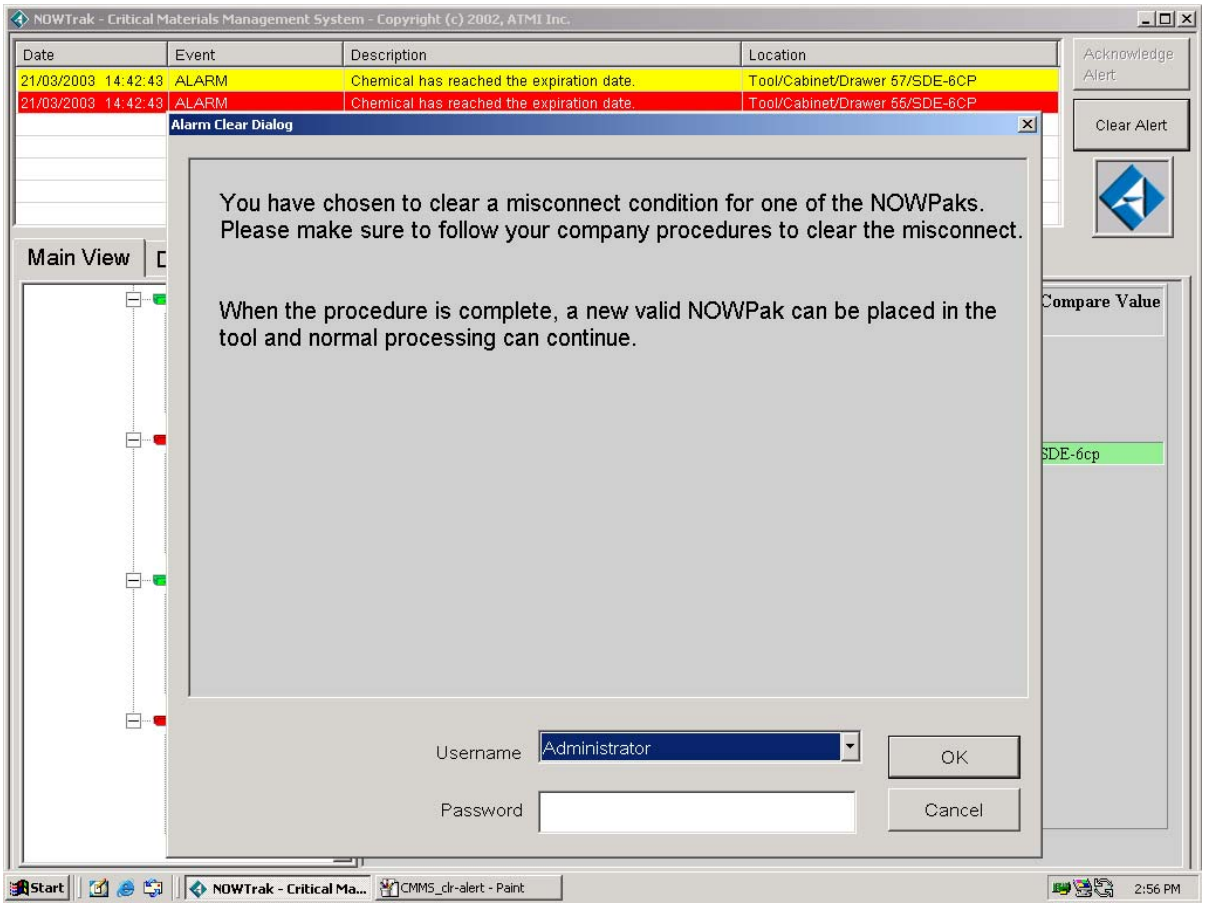
NOWTrak supports the ability to assign more than one chemical to a probe. To do this, you must define a probe template with two chemicals selected. This is done using the NOWTrakEditor application.

3.3.7 Recover From a Misconnect

The primary responsibility of NOWTrak is to prevent misconnects from becoming operational. Once a misconnect occurs, an alert is presented in the NOWTrak alert list. The alert must be acknowledged so any observers using the NOWTrakFabView application will know when it was acknowledged and by whom. The user acknowledging the alert must be at password level 1. When the acknowledge button is pressed, an acknowledge dialog appears, which provides instructions on how to recover from the misconnect. These instructions are contained in an html file located at "c:/NOWTrak/Database/html/ MisconnectAcknowledge.htm". It is the intent that this html file be modified to reflect the desired actions. The default acknowledge is as follows:



Once the misconnect condition has been acknowledged, the offending NOWPak has been removed and any other corrective action has been taken, a clear alert dialog appears, which provides instructions about the clear alert condition. These instructions are contained in an html file located at "c:/NOWTrak/Database/html/ MisconnectClear.htm". This file should be modified to reflect the desired information. The default misconnect clear dialog is as follows:



3.3.8 Chemical Expiration Warning

When a chemical is near its expiration date, it warns of its pending expiration. Chemical expiration warnings can be cleared when they occur with no side effects. This is done by selecting the warning in the alert list and pressing the "Clear Alert" button. Another way to handle a chemical near expiration is to add to the chemical extension. This is done by using the NOWTrakEditor and adding to the expiration extension.

3.3.9 A NOWPak is removed

- When a NOWPak is removed, the antenna and reader board detect this condition.
- The reader board then informs the NOWTrak controller that a NOWPak/RFID tag is no longer present.
- The NOWTrak controller disables the tool.
- The CurrentProbeStates.xml database is updated.
- The HistoricalDatabases.xml database is updated.

3.3.10 Clear an Alert

An alert is shown in the list at the top of the NOWTrak user interface. To clear the alert:

- Select the alert in the alert list by placing the cursor over the alert and pressing the left mouse button.
- Once the alert has been selected, the "Clear Alert" button will become enabled. If the "Acknowledge Alert" button is enabled instead see "Acknowledge an alert" below.
- Press the "Alert Clear" button.
- An alert clear dialog will appear. A level 3 user must perform this action.
- Pressing the "OK" button will clear the alert. If the selected user is not a level 3 user, a message box will appear stating: "ERROR - Must be level 3 to perform this function." The alert clear dialog will not close until a level 3 user has pressed "OK" or the "Cancel" button has been pressed to close the alert clear dialog. If "Cancel" is chosen, the alert clear action is terminated.

3.3.11 Acknowledge an Alert

An alert is shown in the list at the top of the NOWTrak user interface. To acknowledge the alert:

- Select the alert in the alert list by placing the cursor over the alert and pressing the left mouse button.
- Once the alert has been selected, the "Acknowledge Alert" button will become enabled. If the "Clear Alert" button is enabled instead see "Clear an alert" above.
- Press the "Acknowledge Alert" button.
- An acknowledge dialog will appear. This dialog requires a level 1 user to select a username and password. Pressing the "OK" button will clear the alert. If the selected user is not a level 1 user, a message box will appear stating: "ERROR - Must be level 1 to perform this function." The alert clear dialog will not close until a level 1 user has pressed the "OK" button or the "Cancel" button has been pressed to close the acknowledge alert dialog. If "Cancel" is chosen, the alert clear action is terminated. Add a user account
-

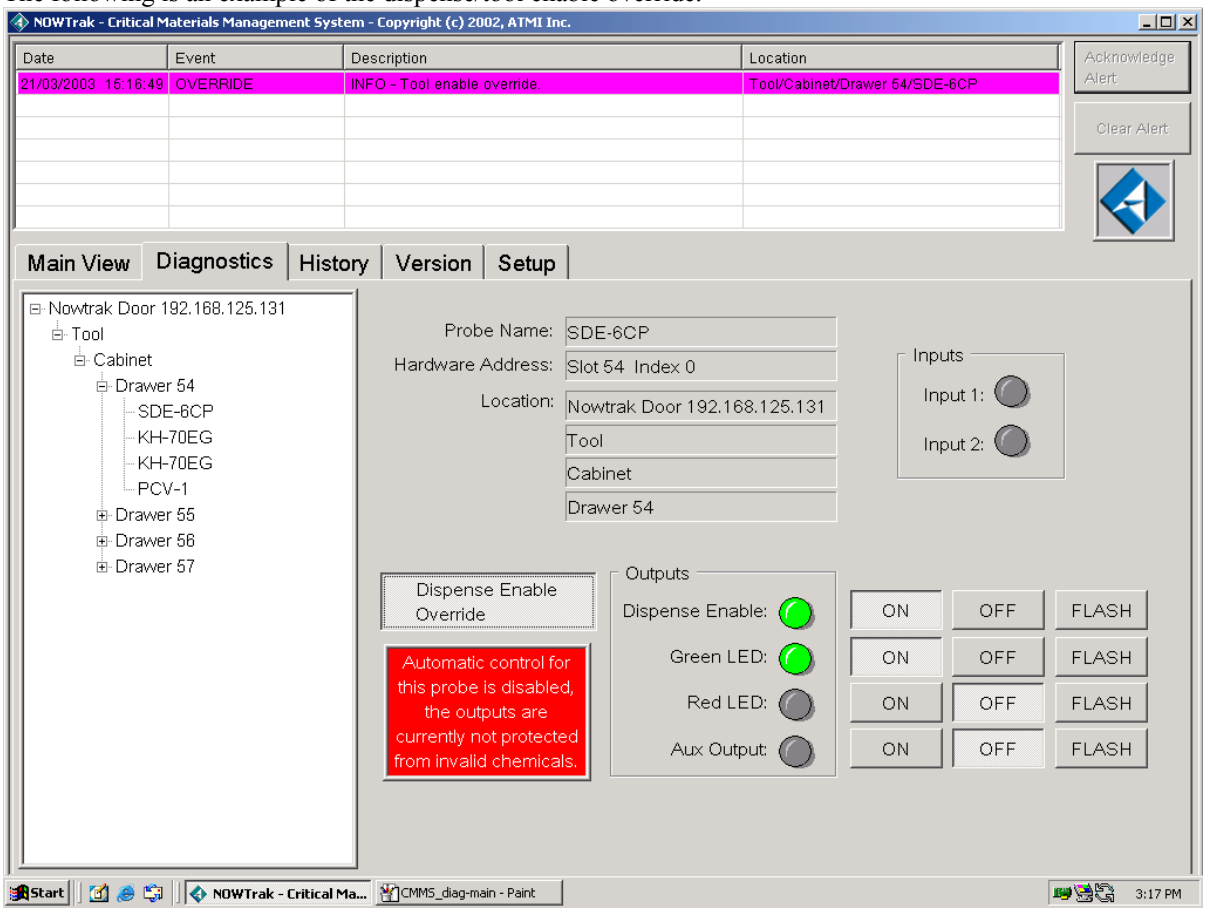
All users are global to the NOWTrak network. This means that the user needs to be added via the NOWTrakEditor, which is responsible for editing the global databases. The Password tab of the NOWTrakEditor application provides the capability to add a user. Only level 3 users can add other users. To start the process, login as a level 3 user on the Password tab. Then press the "Add Account" button. This will present three fields for editing. The "Username" field must be edited first. Once a character is edited in the username field, the password field becomes available to be edited. Once the password field editing begins, the drop list for levels becomes available. The level drop list allows the account to have a level of 0 through 3, with 3 being the highest level of control. The user name can be a minimum of 1 character and a maximum of 90 characters, which should certainly be enough! The password also has no rules. It has a minimum of no characters to a maximum of 90 characters. Finally, when the account is fully defined, press the "Save Account" button to save the user account. If you attempt to change tabs or quit the program, it will also give you the opportunity to save the new user account.

3.3.12 Dispense/Tool Enable Override

CAUTION: ENABLING A DISPENSE/TOOL OVERRIDE WILL DISABLE ALL MISCONNECT PROTECTION OF THE NOWTRAK SYSTEM!

Forcing a probe dispense enable is a simple process with user level and password protection. the NOWTrak controller provides this capability. This action requires a user at password level 3 to enable the override.
To start this activity, select the Diagnostics tab. Then open the tree view to the desired probe. Once the probe is selected, press the "Dispense Enable Override" button. This action will cause a user account dialog to appear. Once a level 3 user has been selected, the password has been entered, and the dialog dismissed, the override action will be taken. The next action is to press the dispense enable "On" or "Off" button to get the desired action. When this action has been done, the status of the probe on the main view dialog will show that NOWTrak control of the dispense enable has been disabled. A lock icon indicates that the probe's tool enable/disable is locked from automatic control. You can reverse this action by pressing the same "Dispense Enable Override" button. A user at any password level can do this action.

The following is an example of the dispense/tool enable override.



3.3.13 Password Protection

NOWTrak provides password protection for activities that either change the database or allow the tool to be controlled. There are four levels of protection (0-3), with 3 being the highest level. When a user account is created, the user is assigned a level. NOWTrak only makes use of level 1 and level 3. You must be a level 3 user when editing any database, clearing alerts, or performing a probe dispense enable override. You must be at least a level 1 user to acknowledge alerts. There are no other actions that are password protected.

NOWTrak Password Level Functions Table.

Item	Top Level Function	Sub-Level Function	Security Level Required
1.	Setup and configure NOWTrak software		
2.		Install, update, and unistall	Facility Administrator
3.		Configure tools, cabinets, drawers, probes	3
4.	View NOWTrak information		
5.		View status, alarms, etc.	ALL
6.	Change NOWPak container		
7.		Perform changeout procedure with operator interface	1
8.	Configure probe		
9.		Add new probe to system	3
10.		Reconfigure existing probe	3
11.	Change expiration date		
12.		Change end-user chemical	3

Item	Top Level Function	Sub-Level Function	Security Level Required
		expiration date	
13.	Alarm / Warning Management		
14.		Acknowledge alarm or warning condition	1
15.		Clear alarm or warning condition	3
16.	Emergency Shutdown		
17.		Disable NOWTrak control for a single POU	3
18.	Diagnostics		
19.		Perform I/O and connection diagnostics	3

3.4 Databases Details

All of the databases except the password database are stored in XML format. The databases are the basis for the behavior and view of the NOWTrak system. The databases have a hierarchical relationship to each other. Starting with the lowest they are: RFIDTagMemoryMap.xml, Chemicals.xml, ProbeTemplates.xml, and ProbeAssociation.xml. Each database makes use of elements of its predecessor. The probe templates within ProbeAssociation.xml are derived from ProbeTemplates.xml. The chemicals and chemical fields within ProbeTemplates.xml are derived from Chemicals.xml and RFIDTagMemoryMap.xml. The fields within Chemicals.xml are derived from RFIDTagMemoryMap.xml.
The NOWTrakFabView application contains another database that is specifically for its use. This database is FabViewNodes.xml.

3.4.1 Global Network Databases

The global network databases provide a central location for information common to all NOWTrak computers. Each NOWTrak computer has a local copy of these databases, which are automatically updated when the global databases change.

3.4.1.1 Chemicals Database

The Chemicals database is stored in file Chemicals.xml. It is used in the process of validating a new NOWPak. It contains all of the information about the inventory of chemicals that are used on the NOWTrak system. It contains only that information contained in the NOWTrak RFID tag. This database is used as a resource for building other databases. It provides consistency in describing the various chemicals used in a fab. The NOWTrakEditor is used to edit this database. The chemical attributes listed within the editor are defined by the RFIDTagMemoryMap.xml database.

3.4.1.1.1 Chemicals Database Details

`CHEMICAL` – This element encapsulates the definition of a given chemical. The element has one attribute with which it is associated. The ID attribute is a constant generated by the software. This ID number is used in the probe templates database to tie a specific chemical to a specific template. It is not advisable to change a chemical ID as it will affect all templates in which it is referenced.
TAG_DATA – This element encapsulates the definition of the chemical. Each element within the TAG_DATA comes from the RFIDTagMemoryMap.xml. The NOWTrakEditor is used to add the data associated with the element. This data is representative of the data saved on the RFID tag embedded in the IntelliCap.
`SHELF_LIFE_DAYS_EXTENSION` – This element (and its associated value) provides the ability to extend (or reduce) the expiration date read from the RFID tag in the IntelliCap.

3.4.1.2 Probe Template Database

The probe template database is stored in file ProbeTemplates.xml. It is used to associate many probes to the same set of chemical attributes. It simplifies the task of assigning chemical match attributes to a probe. Instead of

repeatedly associating all of the chemical details to a probe, the details are defined once. This also expedites the act of changing a group of probes to use different chemical match attributes. Simply changing the probe template database changes all of the probes that use it. Transition periods can also be handled. A chemical can be phased out without causing a misconnect with the probes currently using the chemical. The NOWTrakEditor is used to edit this database. The following database shows several templates, the chemicals assigned to them, in what condition the chemical is valid and the specific chemical attributes used for the template comparison.

3.4.1.2.1 Probe Template Database Details

PROBE_TEMPLATE – This element encapsulates the definition of a given template. The element has two attributes associated with it. The **ID** attribute is a constant generated by the software. This **ID** number is used in the probe association database. It ties a specific template to a specific probe. It is not advisable to change a template **ID** as it will affect all probes that were referencing it. The **NAME** attribute provides a more meaningful name than the **ID** number alone. The name can change at will without affecting the processing of a probe. The **HIDDEN** attribute is intended to notify the operator that the template should not be used and should be changed. When the value of this attribute is TRUE, it is hidden. This notification occurs when a probe is being edited using the Setup dialog.
CHEMICAL – This element encapsulates the attributes of a defined chemical that will be used in the chemical validation of the probe. The element has two attributes with which it is associated. The **ID** attribute refers to the specific chemical in the chemical database.

The fields encapsulated by the **CHEMICAL**, (`CHEMICAL_SUPPLIER` and `PRODUCT_NUMBER`), represent the fields of the chemical to be used in the comparison. Since the database only refers to the field name and not the field value, the underlying definition of the chemical can change and the template can remain the same.
A given probe template can have multiple **CHEMICAL** definitions. NOWTrak searches the list of chemicals within the template until it finds a match or it runs out of chemicals, in which case, the match will fail. So, if the probe on the tool can make use of more than one chemical, the system provides this capability.

3.4.1.3 Password database

The Password database is stored in file pass.dat. It contains all of the user account information. This database is encrypted.

3.4.2 Local Databases

Local databases are those databases that are created on a NOWTrak controller and are not visible to other NOWTrak controllers. The NOWTrakFabView application does use these databases, also. These databases are the probe association database, history database and current probe states database.

3.4.2.1 Probe Association Database

The probe association database is stored in file ProbeAssociation.xml. It is used to associate the hardware to a user's view of the system. It translates a board slot and card index to a Controller, Tool, Cabinet, Drawer, and Probe hierarchy. The database also provides the ability to define each of the branches of the tree (Controller, Tool, Cabinet, Drawer, Probe) with names rather than numbers for readability purposes.

3.4.2.1.1 Details

NODE – This element encapsulates all of the tools connected to this computer. There are two attributes associated with the controller. **NAME** defines the name used to describe this computer. This name is displayed in the tree view of the NOWTrak controller. **HTML_FILE** defines the name of the html file located in the NOWTrak/Database/html directory that will be displayed by the NOWTrak controller when the controller in the tree view is selected
TOOL – This element encapsulates the definition of a tool. It has the same two attributes. **NAME** defines the name of the tool, again, displayed in the tree view of the NOWTrak controller. **HTML_FILE** defines the name of the html file located in the NOWTrak/Database/html directory that will be displayed by the NOWTrak controller when the tool in the tree view is selected.
BOTTLE_CHANGE_REQUIRES_OPERATOR_ACTION – This element has two values associated with it. When the value is TRUE, the tool enable will be delayed until the operator clears the new NOWPak alert in the alert list. When the value is FALSE, the tool will be enabled as soon as the new RFID tag is validated. Since **BOTTLE_CHANGE_REQUIRES_OPERATOR_ACTION** is within the tool hierarchy, the defined behavior is scoped to this tool.

BOTTLE_CHANGE_REQUIRES_PCV_TEST – This element has two values associated with it. When the value is TRUE, the user must first test the bottle at the PCV for the probe. If this is not done, an alert will appear and the the tool enable will be delayed until the operator clears the alert from the alert list. When the value is FALSE, the tool will be enabled as soon as the new RFID tag is validated.
BOTTLE_CHANGE_REQUIRES_PCV_TEST is scoped to the NOWTrak computer node.
CABINET – This element encapsulates the definition of a cabinet within the tool. It also has the **NAME** and **HTML_FILE** attributes.
DRAWER – This element encapsulates the definition of a drawer within a cabinet.
CABINET – This element encapsulates the definition of a cabinet within the tool. It again has the same two attributes and these attributes have the same purpose, respectively.
PROBE_ANTENNA – This element encapsulates the definition of a specific probe within a drawer. It has four attributes associated with it. **ID** is a numeric id that is used by NOWTrak to access this probe. **NAME** is the name assigned to provide a more friendly definition to the probe. **SLOT** is the PCI slot within the NOWTrak computer that contains the RFID reader board. **INDEX** is the index within the RFID reader board. There are four readers per RFID reader board. The index value has a range of 0 through 3.
PROBE_TEMPLATE – This element contains the ID of the probe template used by the probe for validation of the RFID tags/chemicals.

3.4.2.2 History Database

The history database is stored in file HistoricalDatabases.xml. The history database tracks all interaction within the NOWTrak controller's domain. The following activities or events are logged to this database:

- Program startup
- Program shutdown
- RFID tag read error
- Acknowledge an alert
- Clear an alert
- Tool enable override enabled/disabled
- A new RFID tag detected
- A PCV RFID tag detected
- An RFID tag is removed

Each logged event is also shown by the NOWTrak controller via the History tab on the user interface.

3.4.2.3 Current Probe States Database

The current probe state database is stored in file CurrentProbeStates.xml. It contains the current condition of all of the probes and any events that have not been cleared or acknowledged. Any data that is shown on the NOWTrak user interface that relates to the probes is kept in this database. When an alert is cleared or acknowledged, the associated data moves from this database to the historical database because it is now historical information. This database is also read by the NOWTrakFabView application for the same purpose.

3.4.3 NOWTrak FabView Nodes Database

The Fab View Nodes database is stored in file FabViewNodes.xml. It is used by the NOWTrakFabView application to define the location of the NOWTrak controllers that it will be able to see.

3.4.3.1 Database details

NODES – This element encapsulates the controllers that the NOWTrakFabView application can view.
NODE – This element has two attributes associated with it. NAME is the name of the NOWTrak controller that is shown in the NOWTrakFabView application user interface. ADDRESS is the IP address of this controller.

4 Installation

4.1 Software

4.1.1 Setup Location of NOWTrak Editor

In a system with only one NOWTrak controller system, the NOWTrakEditor can be located on the NOWTrak controller. The global databases must not be located in the same directory as the NOWTrak controller's copy of these files.

4.1.2 Setup Network Connections

In order for the NOWTrak applications to share files, the network must be setup at a minimum to provide each NOWTrak controller with READONLY privileges for the global database directory. This can be done in various ways and is highly dependent on the network administration. Your network administrator will need to perform this function.
The NOWTrakFabView application also requires network access. It needs read only access to all NOWTrak controllers on the network. This can be done in various ways and is highly dependent on the network administration. Your network administrator will need to perform this function.

4.1.3 Setup Databases

Prior to running the NOWTrak controller, you must first use the NOWTrakEditor to setup the chemicals, probe templates and password databases. Once these databases have been setup, you must use the NOWTrak controller SETUP tab to define all of the probes in the system.

4.2 Hardware

4.2.1 Location of NOWTrak controller

The NOWTrak controller should be easily accessible, but does not necessarily need to be visible. It is probable that the NOWTrak controller is located under a false floor. It will need to be connected to a standard computer rated power outlet. It should be in close proximity to the tool that it is monitoring and controlling. If a monitor, keyboard and mouse are to be connected to it, cable lengths of these items will need to be considered.

4.2.2 Connecting I/O cables

Each NOWTrak RFID reader board has an I/O cable connected that connects the LEDs and tool enable lines to the controller. These cables come in varying lengths and will be routed to locations on or near the tool.

4.2.3 Connecting Antennas

Each NOWTrak RFID reader board supports up to four RFID antennas. The antennas allow the NOWTrak RFID reader board to read the RFID tags embedded in the chemical IntelliCaps. These cables come in varying lengths and will be routed to locations on or near the tool.

4.2.4 Verifying I/O Cables

At some point during installation of the hardware, verification of proper I/O connection is required.
. This can be done using the NOWTrak controller's Diagnostics tab. This dialog allows you to view the inputs and control the outputs. It is imperative that all I/O be checked prior to running the NOWTrak system. It would also be appropriate to perform this activity on a regular maintenance schedule to ensure the reliability of the system.

4.2.5 Verifying Antennas

Antenna cables also need to be verified during hardware installation to ensure they can read an RFID tag presented at the antenna. Running the NOWTrak controller and presenting a known invalid RFID tag at the probe connection can accomplish this. This will cause the NOWTrak controller to display a misconnect and immediately show the data found on the probe in the Main View tab's html window.

4.3 System verification and checkout

4.3.1 Verify NOWTrak Operation

Much of the validation of the NOWTrak operation will be performed when the antennas are verified. The next step is to verify that the NOWTrak controller's databases are set up properly. This step ensures chemicals are handled properly at the given probes. At each probe present a chemical as follows:

- New valid chemical
- New invalid chemical
- Expired chemical
- Chemical near expiration

4.3.2 Verify NOWTrakFabView Operation

The purpose of this verification is to ensure that the fab view application can see the current probe states databases and that it can acknowledge and clear alerts for each of its defined NOWTrak controllers. This can be accomplished by simply running the application and verifying that what it sees is actually being shown at the NOWTrak controller. This will also provide the opportunity to acknowledge and clear alerts and observe the NOWTrak controller reflect these changes.
When the NOWTrakFabView application clears or acknowledges alerts, they should be reflected on the NOWTrak controller.

4.3.3 Verify NDM Operation

The purpose of this verification is to ensure that each NOWTrak controller is being updated whenever a global database changes. To do this, the NOWTrakEditor needs to be used to modify and update the chemical, probe template and password databases. Checking the time stamps on the database files copied to the NOWTrak controller can verify that the databases have been updated. These files are located in the "SystemDirectory" and are Chemicals.xml, ProbeTemplates.xml, and Pass.dat.

4.4 Add a NOWTrak Controller to a NOWTrak Network

The NOWTrak controller needs two things from the network. It needs access to the global databases and it needs to be visible to the NOWTrakFabView application.

4.4.1 Global Database Sharing

To provide access to the global database, you must share the global database folder on the global database controller with the NOWTrak controller. Map a network drive to the global database so the access to the global database will be reestablished through a reboot sequence on the NOWTrak controller. This is done using standard network file sharing tools provided with Microsoft Windows operating systems.

4.4.2 Connecting the NOWTrakFabView Application to a NOWTrak Controller

As stated in the section describing the NOWTrakFabView application, the NOWTrak controllers are defined in the FabViewNodes.xml database on the NOWTrakFabView computer. This database must be modified using a text editor such as Notepad. There may be some network administrator work required to ensure that the NOWTrakFabView application can connect to the NOWTrak controller. The network administrator may have to be involved in setting up the network to support this connection.

4.5 Add New IntelliProbe

The NOWTrak application provides the SETUP tab for defining a new IntelliProbe antenna. The following is a brief description of the steps required:

- There must be an open RFID reader.
- Connect an antenna to an open RFID reader board.
- Ensure that the I/O cable is also connected to the RFID reader board.
- Make note of this RFID reader board's slot and the antenna's index on the board
- As already stated, go to the SETUP tab on the NOWTrak controller.

- Map the specific RFID reader to a tool/cabinet/drawer/probe address.
- If this is not a PCV probe, assign a probe template to the probe for chemical validation.
- If this is a PCV probe, you must select the scope of its use, either tool, cabinet, or drawer.

Once these steps have been taken and you have saved your changes, the probe will be operational.

4.5.1 Remove an IntelliProbe

The NOWTrak application provides the SETUP tab. This section describes all of the steps necessary to remove a probe antenna.

4.6 Add a New RFID Reader Board

The steps include installing hardware, attaching and routing wiring, updating the database, validation of the hardware and validation of the databases. The remainder of this section defines the details of accomplishing this activity. Many of the steps are already described elsewhere in this document. In this case, there will be links to these items.

4.6.1 Install Reader Hardware

To safely add a new RFID board to a NOWTrak computer:

- Ensure that the computer is powered off.
- Remove the cover from the computer.
- Determine the PCI slot to use for the new board.
- Use an electro-static wrist strap and connect it to the computer.
- Using a Philips screwdriver, remove the protective rear cover plate for the slot.
- Remove the new RFID reader board from its electro-static bag.
- Insert the board in the slot and use the original screw to lock the board in place.
- Replace the cover on the computer.

4.6.2 Wiring

Once the new board is installed in the computer, the next step is to connect the wires to the board. There are a minimum of two and a maximum of five wires that will need to be connected.
There are four antenna wires, which are thin coaxial cables. These coaxial cables have a threaded brass connector at one end and an antenna embedded in a white plastic fitting. The threaded connectors attach to the back of the board. The other end is assembled into the probe assembly.
The remaining wire is a thick and rigid I/O cable used in controlling the LED's and tool enable. The connector end of the I/O cable connects to the back of the board. The other end connects to the antenna white plastic fitting for the LED's. One of the wires is connected to the tool enable.

4.6.3 Update the Database

Once all of the hardware is assembled, the next step is to update the probe association database. To do this, start the NOWTrak controller and go to the SETUP tab to define the new probes attached to this new board. The SETUP dialog requires that the probe be defined within the tool hierarchy. It also requires that a probe template and probe type be selected for the new probe.

4.6.4 Validation of the Hardware

Now that the probes are defined, validation of the probes can begin. This is done using the diagnostics tab of the NOWTrak controller.

4.6.5 Validation of the Databases

This item is also discussed in the installation section of this document. The validation will require RFID tags with valid chemical data.

4.7 Replace a NOWTrak RFID Reader Board

To replace a NOWTrak Reader Board:

- Ensure that the computer is powered off.
- Ensure that the cables attached to the board are labeled and removed from the board.
- Remove the cover from the computer.
- Use a electro-static wrist strap and connect it to the computer.
- Using a Philips screwdriver, remove the screw holding the board in the computer.
- Remove the board.
- Install the new board.
- Insert the board in the slot and use the original screw to lock the board in place.
- Replace the cover on the computer.
- Reconnect the cables to the computer.
- The system is now ready for use.

4.8 Determine if an Antenna is Inoperable

It should be rather easy to determine if an antenna is bad. The question that could be asked is, "Is it the antenna, RFID tag or reader board that is bad?" To make sure it is not just a bad RFID tag, place another RFID tag under the antenna. If that works, the RFID tag must have been the defective part. To isolate the antenna, connect it to a PCV. Then place a RFID tag under the antenna. If there is no response, then the antenna is bad. If there is a response, then the next step is to replace the antenna at the probe with a new antenna. If this does not fix the problem, the next step is to also replace the RFID reader board. If this does not fix the problem, more robust testing than that addressed in this document may be required..

4.9 Define the Scope of Use of a PCV Antenna

One of the expectations of a PCV antenna is that it needs to be convenient to be useful. To do this, a PCV antenna is limited to a logical grouping. The scope of the PCV is defined by using the NOWTrak controller's SETUP tab at the time that a probe is being added to the probe association database. The PCV scope is defined by making a selection from the "Specify the type of probe" drop list. There are three choices: "TYPE PCV – TOOL", "TYPE PCV – CABINET", and "TYPE PCV – DRAWER". Selecting one of these defines the scope of the PCV. More information is available elsewhere in this document.

5 Troubleshooting

The items in this list are described elsewhere in this document. If it is appropriate, links will be made to allow for navigating to prior relevant information. The text in this section will be brief as a result.

5.1 Abnormal NOWTrak software behavior

As with most things in life, bad things can happen. There are many reasons for this. In the software domain, the less its environment changes, the less likely the software will fail. When the software suddenly exhibits abnormal behavior it is usually the result of a change somewhere. When attempting to track the reason for an abnormal software behavior, back track and document what has changed recently. Have databases changed? Has new hardware been installed? Has the network environment been modified? Has there been a recent hardware failure? Has a new release of the software been recently installed? Have files been deleted? Have new applications been installed?

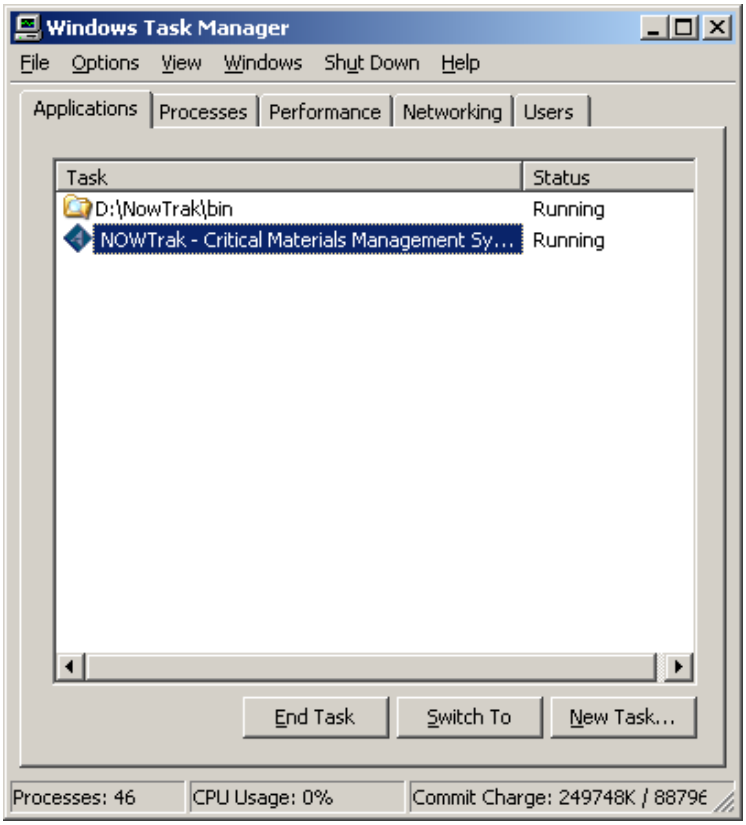
As much as we try, software is not foolproof. Unexpected events pop up all the time that need to be addressed. New features provide the opportunity to introduce flaws in the software. If an abnormal condition occurs, try to isolate why this condition suddenly occurred. Try to make the abnormal situation repeatable and predictable. With this information, the software developers will have more success in tracking down the cause of the problem.

5.2 Antenna is non-functional

This condition and its recovery are described in section Determine if an antenna is bad.

5.3 The NOWTrak application hangs

As with most software applications, there is always the likelihood that a NOWTrak application will hang. A hang is indicated by the user interface failing to respond to user interaction within a reasonable period of time. Since the user interface is hung, the application will need to be killed and restarted. To kill a NOWTrak application, the "Windows Task Manager" will have to be opened. Select the NOWTrak controller and press "End Task". Pressing the right mouse on the task bar and selecting "Task Manager" from the pop up menu will start the "Windows Task Manager". Another way to start it is to press "control-alt-delete" and press "Task Manager" from this dialog.
Once the NOWTrak controller has terminated, restart the application by double clicking on the NOWTrak controller icon on the desktop.
If the application hangs again, it is probably that there are other problems in the NOWTrak environment. It may require hardware analysis or possibly restoring prior databases. If the databases have just changed, it may be appropriate to back track and restore an earlier version of the database to see if the hang situation goes away.



5.4 A RFID reader board hangs

When an RFID reader board hangs, there are several steps that can be taken. As with the NOWTrak controllers, the reader board also has software to make it function. The board may have gotten into a situation from which it cannot recover. The first step is to reboot the system to see if the board can be reset this way. It may be necessary to remove or replace the cables attached to the board. If this does not fix the problem board replacement may be necessary.

5.5 A misconnect occurs

The primary purpose of the NOWTrak system is to prevent misconnects from becoming operational. The process of responding to a misconnect is described in section Recover from a misconnect in this document.

5.6 An I/O cable fails

This situation may initially be difficult to determine. Verification of the I/O cable is described in section Verifying I/O cables. If this verification indicates that there is a problem somewhere in the cable, the next step is to perform a full continuity check on the cable. Next the I/O devices being monitored and controlled need to be verified as functional. If nothing is found, the problem may be on the RFID reader board and board replacement may be appropriate.

5.7 A database is corrupt

A corrupt database can cause abnormal operation of the NOWTrak system. It may cause a NOWTrak application to hang or crash. If a database was just modified and NOWTrak applications begin to display abnormal operations, the database would have to be the primary suspect as the cause of the problem. If regular backups have been performed, the system can readily be restored to a previous period in time. The restore operation is described in section Restore Procedure.

5.8 The tool enable will not enable or disable

The NOWTrak application's Diagnostic tab provides validation of the tool enable output signal. If this indicates that the tool enable is not working, then hardware diagnostic techniques will have to be used to track the problem. See section An I/O cable fails for further instructions.

5.9 An LED does not illuminate when it should

The NOWTrak application's Diagnostic tab provides validation of the LED output signal. If this indicates an LED is not working, trace the problem using hardware diagnostic techniques. See section An I/O cable fails for further instructions.

5.10 Someone forgets their password

If a user forgets their password, run the NOWTrakEditor application; login as a level 3 user and update the user's password. See section Password Editor for more details.

5.11 All passwords have been forgotten

If all passwords have been forgotten, send the password file to ATMI and they will be able to determine the password for one of the level 3 user accounts and send this to the appropriate individual.

5.12 A NOWPak is placed at a PCV probe

- The IntelliCap has an RFID tag embedded in it.
- The RFID reader board is continuously attempting to read the RFID tag serial number.
- When the RFID tag is within range of the antenna embedded in the probe, the reader board reads a serial number.
- The reader board then attempts to read all of the RFID tag data.
- Once all of the data is read, the board informs the NOWTrak controller that a new RFID tag was detected.
- NOWTrak sends a request to the board to send it the data.
- NOWTrak then parses the data and removes the encryption keys from the data so that it can be more readily processed.
- NOWTrak formats the PCV RFID tag data and writes it to the CurrentProbeStates.xml and HistoricalDatabases.xml databases.
- NOWTrak already knows that the data is from a PCV probe.
- NOWTrak determines the scope of the PCV probe.
- Depending on the scope of "Tool", "Cabinet" or "Drawer", NOWTrak blinks the green LED at all of the probes that are within the same scope as the PCV probe and sets a one minute timer to turn off the blinking green LED when the timer expires.

6 NOWTrak Applications

6.1 NOWTrak Controller

6.1.1 Overview

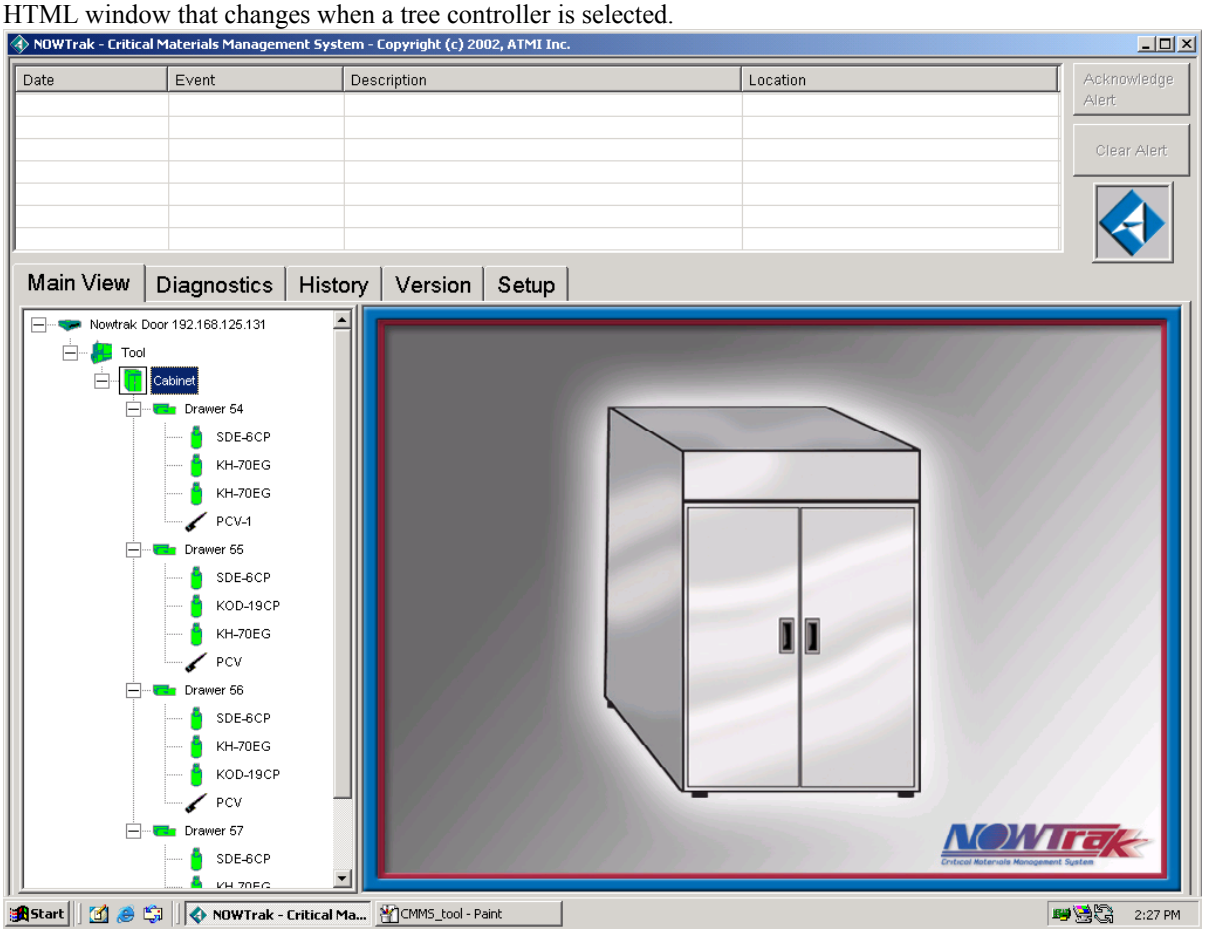
The NOWTrak application is responsible for monitoring the individual probes attached to a specific NOWTrak controller. Along with monitoring, NOWTrak provides current probe state information and alert for significant events. NOWTrak also provides an editor to allow reconfiguration of the probes by adding, deleting and modifying the probe definitions. NOWTrak provides alerts for significant events that can be acknowledged and cleared. Any action that changes the environment of the NOWTrak is password protected to prevent unauthorized interaction. NOWTrak allows viewing of the chemical data for a given probe. Viewing of data requires no password authority. It is only when changes are requested, that password protection is involved.

6.1.2 Graphical User Interface (GUI) components

Interaction with NOWTrak is via the graphical user interface. The interface is broken down into two areas. The first area is the alert list area. The second area is the tab page area. The alert list area contains information on system alerts requiring user attention. The tab page area allows the user to view the states of the NOWTrak system and to partially modify the monitoring environment.

6.1.2.1 Main View tab

The main view tab provides the details of all of the probes being monitored by this NOWTrak controller. The left side of the main view contains a tree structure of the NOWTrak controller. The right side of the main view is an HTML window that changes when a tree controller is selected.



6.1.2.1.1 Alert list

The alert list area is shown in the above figure. The list contains columns of data that briefly describe an individual event. All events in this list are associated with a specific probe. The alerts are color coded, using white, yellow, and red backgrounds to indicate level of severity of the alert. When an alert is selected in the list (by pressing the left mouse button while the cursor is over a given row in the list) the main view tab will show the probe associated with the alert. Through user interaction, the alerts in the list can be removed. If the alert is serious (red) and needs to be removed from the list, the alert must first be selected.. When the red alert is selected, the "Acknowledge Alert" button is enabled. Pressing this button causes password dialog to be displayed. A user name is then selected from the drop down list and a password is entered. Acknowledging red alerts requires a password level 1 user. Attempting to acknowledge the alert with an insufficient password level causes an error dialog to appear indicating the reason for the rejection.
When a yellow alert is selected, the "Clear Alert" button is enabled. Pressing this button again causes the password dialog to appear and requires following the same steps as a red alert acknowledge. Clearing alerts requires a password level 3 user.

6.1.2.1.1.1 Origination of data

The data shown in the alert list is extracted from NOWTrak/Database/Current/CurrentProbeStates.xml.

6.1.2.1.1.2 Column descriptions

The date column represents the time that the alert was detected. The type column is a very brief description of the alert. The description column is a more robust description of the alert. The location column shows the actual location of the probe in alert in terms of tool, cabinet, drawer, probe.

6.1.2.1.1.3 Sorting features

Clicking on the column header sorts the rows of data in ascending or descending order.

6.1.2.1.1.4 Alert types

ALARM – An alarm alert requires acknowledge and clear. The alert will first appear as text with a red background.
ACK REQUIRED – An ACK REQUIRED alert requires a clear and shows up as text with a yellow background.
WARNING – A warning alert is an expiration warning, which requires a clear and shows up as text with a yellow background.

6.1.2.1.1.5 Alert descriptions

"**Valid Chemical, but probe still in ALERT state**" – This alert only occurs when a probe first had an alert that was not removed before a new good NOWPak was detected at the probe.
"**Valid Chemical found**" – This alert occurs if the system was set up to require operator acknowledgement for every new NOWPak detected at a probe.
"**Misconnect - Invalid Chemical found**" – This alert occurs when a NOWPak has been detected as invalid for the given probe.
"**Misconnect - Already in alarm. Another invalid chemical found.**" – This alert occurs if the system detects more than one misconnect at a probe.
"**Misconnect - NOWPak used already. It has a valid installation date.**" – This alert occurs if a NOWPak is placed on a probe more than once.
"**Chemical has reached the expiration date.**" – This alert occurs if the expiration date of the chemical plus the expiration date extension is less than the current date.
"**Chemical to expire in 96 hours.**" – This alert occurs when a chemical is detected to be within 96 hours of its expiration date plus the expiration date extension.
"**Chemical to expire in less than 24 hours.**" - This alert occurs when a chemical is detected to be within 24 hours of its expiration date plus the expiration date extension.
"**Chemical to expire in less than xx hours.**" - This alert occurs every hour in the final 24 hours of the expiration date of the chemical plus the expiration date extension.
"**PCV was not performed before bottle change**" – This alert occurs when a NOWPak has been detected before it has been verified by its PCV probe.
"**INFO - Tool enable override.**" – This alert appears when the operator has overridden the tool enable control by the NOWTrak controller.
It is also possible for alerts to appear if there are hardware or software errors with regards to the RFID reader boards. These alerts should not happen:
ERROR - Tag write failed.
ERROR - Tag read failed.

ERROR - Tag communication failed.
ERROR - Tag authorization failed.
ERROR - Timeout.
ERROR - Antenna disconnect.
ERROR - Read memory lock timeout.
ERROR - Write memory lock timeout.
ERROR - Reader chip init failed.

6.1.2.1.1.6 Alert colors

As stated earlier, alerts are yellow or red. Yellow indicates that the alert only needs a "clear alert" action. Red indicates a serious condition has occurred and an acknowledge and clear action are required.

6.1.2.1.1.7 Alert acknowledge

The alert acknowledge action is performed when the alert is first observed. When the alert is acknowledged, this indicates to other observers, that someone is aware of the alert and corrective action is in process. This step is most useful if the NOWTrak controller is being monitored remotely via the NOWTrakFabView application. The NOWTrakFabView application will be able to see that the alert is being handled.

6.1.2.1.1.8 Alert clear

The clear alert action is only done when the alert condition is no longer present. It indicates that someone has taken corrective action and the system is happy again.

6.1.2.1.2 Tree view

Interaction with the tree view is in the exact same manner as with MS Windows Explorer when viewing files on a MS Windows system. To open or close a controller on the tree, simply place the cursor on the +/- and press the left mouse button or place the cursor on the icon or text and double click the left mouse.

6.1.2.1.2.1 Origination of data

The data shown in the tree is derived from NOWTrak/Database/Config/ProbeAssociation.xml.

6.1.2.1.2.2 Tree controller definitions

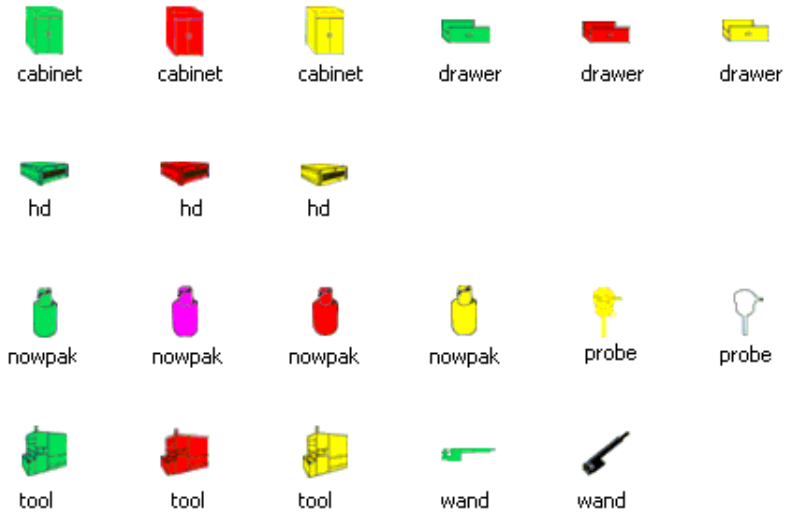
NOWTrak divides the elements of the system to be monitored into levels of detail. The first level is the controller (computer), then tool, followed by cabinet, drawer and finally probe. Each of the tree nodes can be named and each can support multiple child nodes under it. This means that you can have multiple tools per computer, or multiple cabinets per tool and so on.

6.1.2.1.2.3 Color cueing

Each controller in the tree is color coded to reflect the most serious alert under it. The colors that are shown for this purpose are green, yellow and red. If there is a red alert probe on the tool, then the tree, cabinet, and drawer icons will all be red. A green tree controller indicates that all is normal under that controller. In the case of a probe, there are several additional colors being used. A blue probe indicates that a given probe is a pre-connect verification (PCV) probe. A magenta lock icon indicates the tool enable has been overridden. A green NOWPak surrounded by a red rectangle indicates a probe red alert is active and a good NOWPak is now on the probe.

6.1.2.1.2.4 Icons

The icons in the tree represent the controllers on the tree. The probe icon is the only one that significantly changes appearance. The probe has three types of icons. The first represents a NOWPak on the probe. The second indicates the probe tool enable is overridden and not under the automatic control of NOWTrak. Green indicates good. Yellow indicates alert needs to be cleared. Red indicates alert needs to be acknowledged. Magenta/purple indicates that the tool enable is overridden. The gray outline for the probe indicates no bottle. The green wand indicates bottle at PCV. Black wand indicates no bottle at PCV probe.



6.1.2.1.3 HTML Current Probe State window

The HTML window shows information relevant to the tree controller selected. When a probe is selected, the NOWTrak controller creates an HTML page relevant to the specific probe. Several files in the NOWTrak database are used to format this HTML page. These files are located in NOWTrak/Database/html. Since these files are simply text files, they can be changed to present information useful to the specific end user.
For example, unique HTML pages can be created showing information relevant to each of the tool, cabinet, and drawers in the tree. . This feature also allows creation of an HTML page designed to show the physical location of all of the tool's probes. Another HTML page could show the mapping of the RFID readers to probes in a table form. The ProbeAssociation.xml database allows the user to associate a unique HTML page to all of the controllers in the tree except the probe nodes.
Also, since this is an HTML window, these newly created HTML pages could have links to the Internet and beyond, possiblly allowing users to open other HTML documents relevant to the activities on the NOWTrak controller.
The main file used to display the probe information is NOWTrak/Database/html/TransformCurrentState.xsl. This file makes use of several other files to present the probe information.

6.1.2.1.3.1 Origination of data

The primary file used is the NOWTrak/Database/Current/CurrentProbeStates.xml.

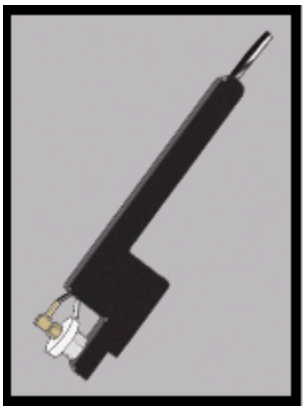
6.1.2.1.3.2 Icons

6.1.2.1.3.2.1 Misconnect Icon

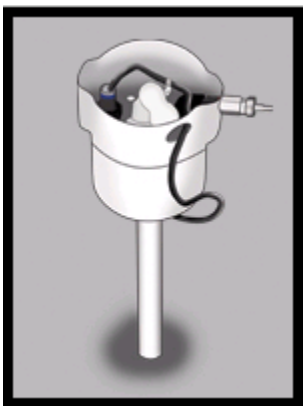
6.1.2.1.3.2.2 Expired Chemical Icon

6.1.2.1.3.2.3 Valid Chemical Icon

6.1.2.1.3.2.4 PCV Icon



6.1.2.1.3.2.5 No NOWPak Icon



6.1.2.1.3.2.6 Locked/Overridden Probe Icon

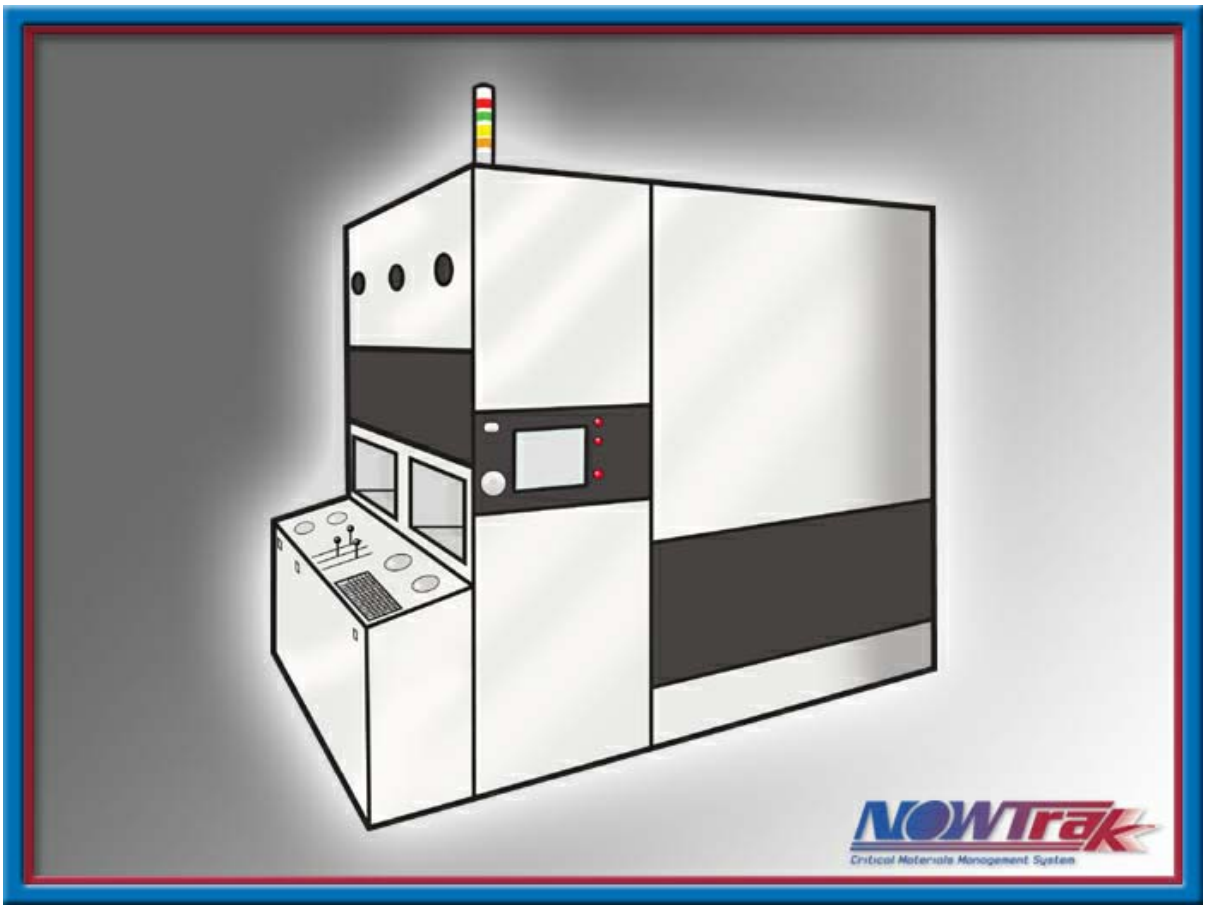
6.1.2.1.3.2.7 PCV with bottle Icon

6.1.2.1.3.3 Pictures

When a node/controller, tool, cabinet, or drawer is selected, the HTML pane shows one of these pictures.

6.1.2.1.3.3.1 Node / NOWTrak Controller picture:

6.1.2.1.3.3.2 Tool picture:



6.1.2.1.3.3.3 Cabinet picture:

6.1.2.1.3.3.4 Drawer picture:

6.1.2.1.3.4 Location description

The location description section of the HTML window lists the Tool, cabinet, drawer, and probe of the current NOWPak shown.

Location
Tool
Cabinet
Drawer 54
SDE-6CP

6.1.2.1.3.5 NOWPak comparison table

The NOWPak comparison table shows the chemical attributes of the NOWPak and indicates the attributes used for comparison.
If the comparison is a match, the row appears with a light green background color.
If the comparison is a mismatch, the row appears with a light red background color.

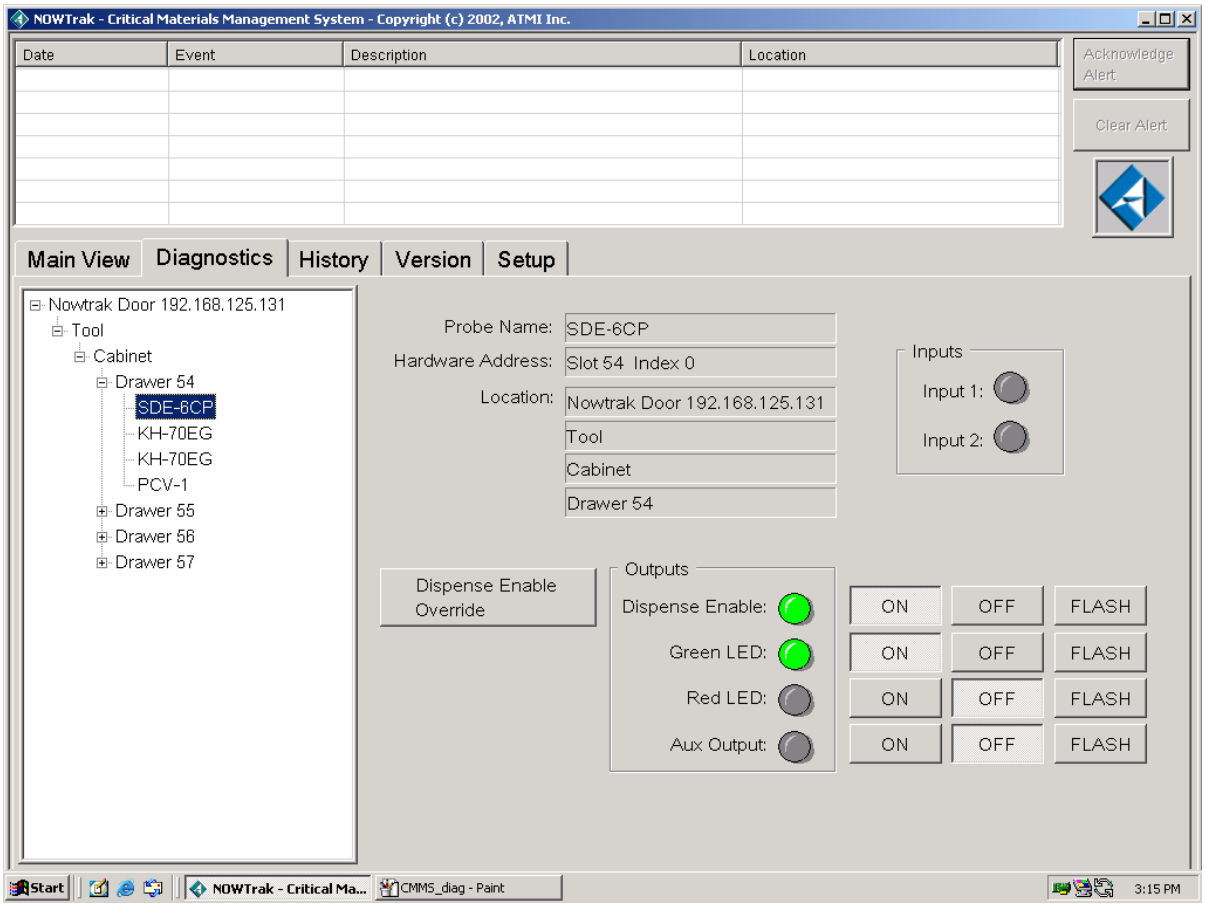
Value Description	Actual Value	Compare Value
RFID_TAG_SERIAL_NUMBER	02035c52	
VERSION	1.0	
NOWPAK_INSTALLATION_DATE	20 - Mar - 2003	
CHEMICAL_SUPPLIER	Chemagic	
PRODUCT_NAME	SDE-6cp	SDE-6cp
PRODUCT_DESCRIPTION	I-Line Resist	
LOT_NUMBER	2f1806	
BATCH_NUMBER	2	
PRODUCT_NUMBER	50854	
FILL_DATE	10 - Feb - 2002	
BOTTLE_NUMBER	000048	
SHELF_LIFE_EXPIRATION_DATE	20 - Mar - 2003	
VISCOSITY		
VISCOSITY_UNITS		
PHOTO_SPEED_UNITS		
NOWPAK_LINER_MATERIAL		
NOWPAK_MODEL_NUMBER		
SHELF_LIFE_EXPIRATION_EXTENSION	90	
SHELF_LIFE_EXPIRATION_DATE_COMPUTED	18 - Jun - 2003	

or

Value Description	Actual Value	Compare Value
RFID_TAG_SERIAL_NUMBER	b299b5eb	
VERSION	1.0	
NOWPAK_INSTALLATION_DATE	21 - Mar - 2003	
CHEMICAL_SUPPLIER	JSR	
PRODUCT_NAME	IX420H-19CP	SDE-6cp
PRODUCT_DESCRIPTION	I-Line Resist	
LOT_NUMBER	2F1808	
BATCH_NUMBER		
PRODUCT_NUMBER	50856	
FILL_DATE	1 - Mar - 2003	
BOTTLE_NUMBER		
SHELF_LIFE_EXPIRATION_DATE	11 - Mar - 2004	
VISCOSITY		
VISCOSITY_UNITS		
PHOTO_SPEED_UNITS		
NOWPAK_LINER_MATERIAL		
NOWPAK_MODEL_NUMBER		
SHELF_LIFE_EXPIRATION_EXTENSION	90	
SHELF_LIFE_EXPIRATION_DATE_COMPUTED	09 - Jun - 2004	

6.1.2.2 Diagnostics tab

The diagnostic tab allows you to control and monitor individual RFID readers and thus individual probes. When a probe is selected from the tree view, controls and status for the given reader are displayed. You also have the ability to override a given reader so that the reader is not controlled automatically by the NOWTrak controller. This diagnostic tool makes use of all of the I/O interaction of the NOWTrak RFID reader board.



6.1.2.2.1 Tree view

The tree view is identical in structure to the tree view on the main view tab. Selecting a probe node on the tree identifies the reader/probe with which the operator intends to interact.

6.1.2.2.1.1 Origination of data

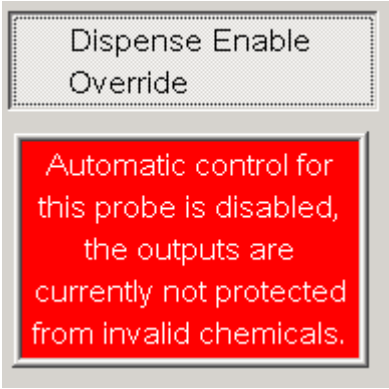
The nodes of the tree are derived from NOWTrak/Database/Config/ProbeAssociation.xml.

6.1.2.2.2 Icons

The icons used on the dialog tab are red, dark gray, and green. The red icon is used for the red LED at the probe. The green icon is used for the green LED at the probe and for the remaining inputs and outputs. The green icon indicates that the inputs or the outputs are ON. The dark gray icon is used to indicate that the inputs or outputs are OFF.

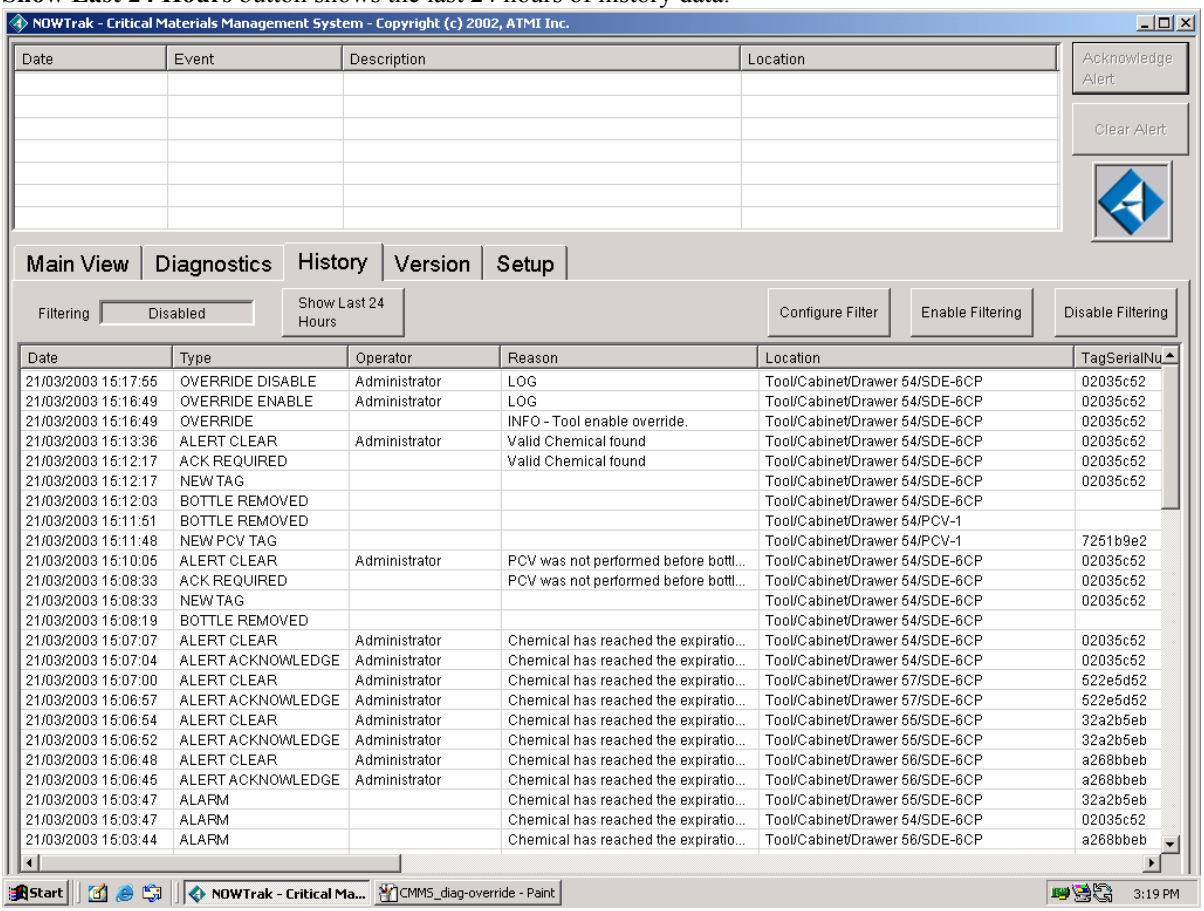
6.1.2.2.3 Probe Antenna "Dispense Enable Override"

This feature needs to be used with great caution. It overrides the intended function of the NOWTrak controller. NOWTrak stops all control of the probe when the probe is overridden. This feature is performed on a probe-by-probe basis. There is no global capability available, intentionally, due to the severity of this action. When a probe is overridden, the NOWTrak main view tab tree shows a lock representing the probe. The HTML window displays a lock on a NOWPak.



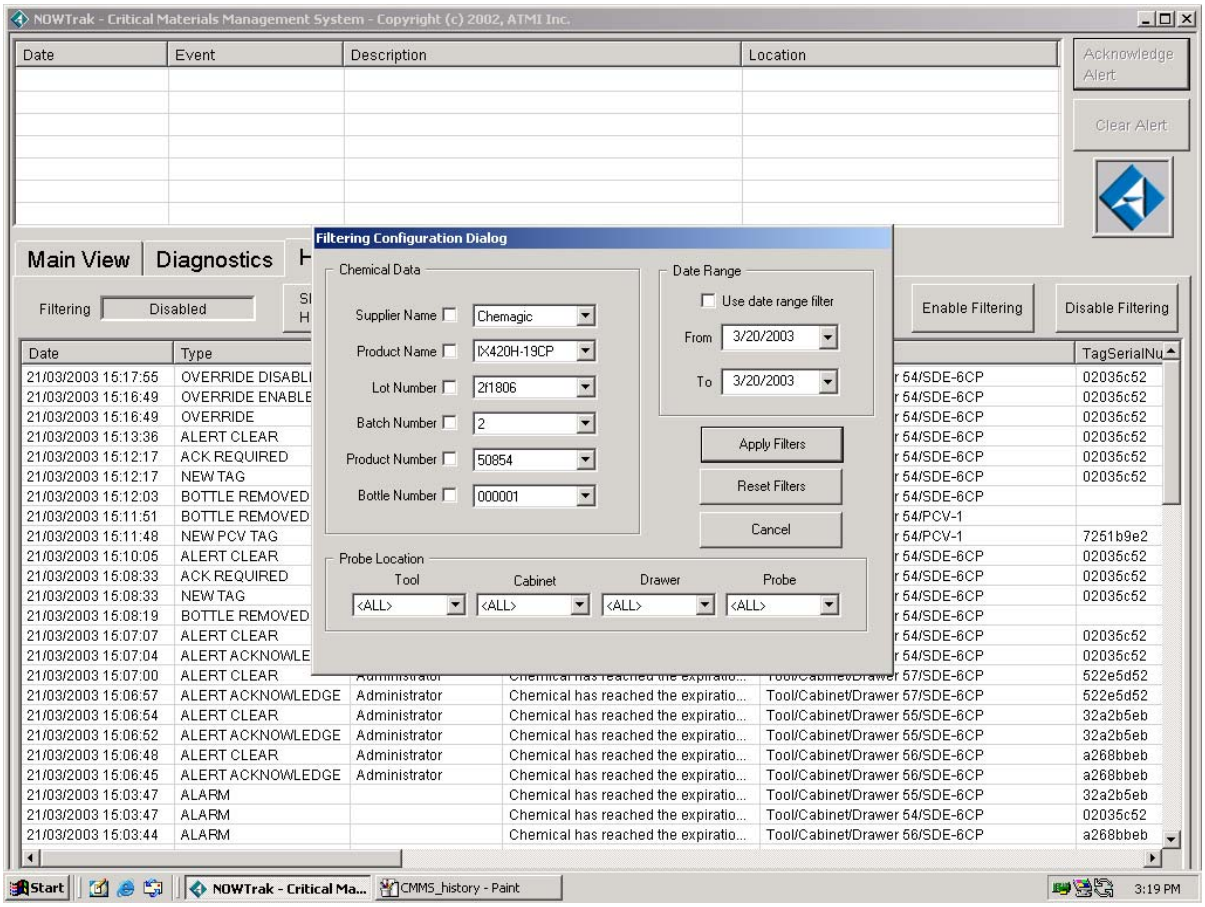
6.1.2.3 History tab

The history tab shows significant events that have occurred for the NOWTrak controller. The history data contains operator interactions and NOWPak RFID tag information. The history tab provides the user with the ability to view a subset of the historical data. The **Filter Configuration Dialog** provide this capability. It is possible to sort the individual columns of data in ascending or descending order by simply clicking on the column header. Pressing the **Show Last 24 Hours** button shows the last 24 hours of history data.



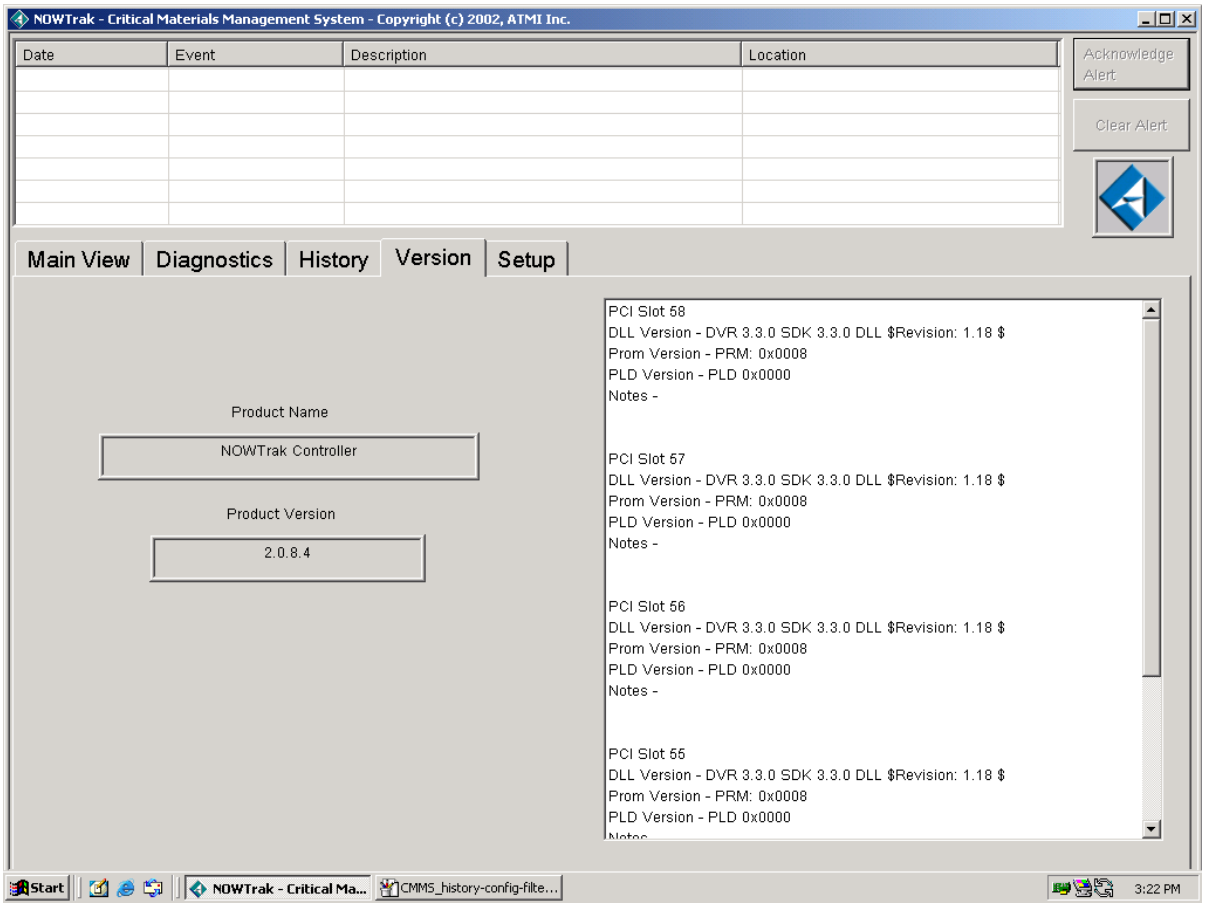
Date	Type	Operator	Reason	Location	TagSerialNu
21/03/2003 15:17:55	OVERRIDE DISABLE	Administrator	LOG	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:16:49	OVERRIDE ENABLE	Administrator	LOG	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:16:49	OVERRIDE		INFO - Tool enable override.	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:13:36	ALERT CLEAR	Administrator	Valid Chemical found	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:12:17	ACK REQUIRED		Valid Chemical found	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:12:17	NEW TAG			Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:12:03	BOTTLE REMOVED			Tool/Cabinet/Drawer 54/SDE-6CP	
21/03/2003 15:11:51	BOTTLE REMOVED			Tool/Cabinet/Drawer 54/PCV-1	
21/03/2003 15:11:48	NEW PCV TAG			Tool/Cabinet/Drawer 54/PCV-1	7251b9e2
21/03/2003 15:10:05	ALERT CLEAR	Administrator	PCV was not performed before bottl...	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:08:33	ACK REQUIRED		PCV was not performed before bottl...	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:08:33	NEW TAG			Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:08:19	BOTTLE REMOVED			Tool/Cabinet/Drawer 54/SDE-6CP	
21/03/2003 15:07:07	ALERT CLEAR	Administrator	Chemical has reached the expiratio...	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:07:04	ALERT ACKNOWLEDGE	Administrator	Chemical has reached the expiratio...	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:07:00	ALERT CLEAR	Administrator	Chemical has reached the expiratio...	Tool/Cabinet/Drawer 57/SDE-6CP	522e5d52
21/03/2003 15:06:57	ALERT ACKNOWLEDGE	Administrator	Chemical has reached the expiratio...	Tool/Cabinet/Drawer 57/SDE-6CP	522e5d52
21/03/2003 15:06:54	ALERT CLEAR	Administrator	Chemical has reached the expiratio...	Tool/Cabinet/Drawer 55/SDE-6CP	32a2b5eb
21/03/2003 15:06:52	ALERT ACKNOWLEDGE	Administrator	Chemical has reached the expiratio...	Tool/Cabinet/Drawer 55/SDE-6CP	32a2b5eb
21/03/2003 15:06:48	ALERT CLEAR	Administrator	Chemical has reached the expiratio...	Tool/Cabinet/Drawer 56/SDE-6CP	a268bbeb
21/03/2003 15:06:45	ALERT ACKNOWLEDGE	Administrator	Chemical has reached the expiratio...	Tool/Cabinet/Drawer 56/SDE-6CP	a268bbeb
21/03/2003 15:03:47	ALARM		Chemical has reached the expiratio...	Tool/Cabinet/Drawer 55/SDE-6CP	32a2b5eb
21/03/2003 15:03:47	ALARM		Chemical has reached the expiratio...	Tool/Cabinet/Drawer 54/SDE-6CP	02035c52
21/03/2003 15:03:44	ALARM		Chemical has reached the expiratio...	Tool/Cabinet/Drawer 56/SDE-6CP	a268bbeb

Historical data configuration dialog:



6.1.2.4 Version tab

The version tab is useful in determining the version of the software and firmware for the NOWTrak controller. Each reader board's firmware reports the version it is running. the NOWTrak controller also displays its own version information.



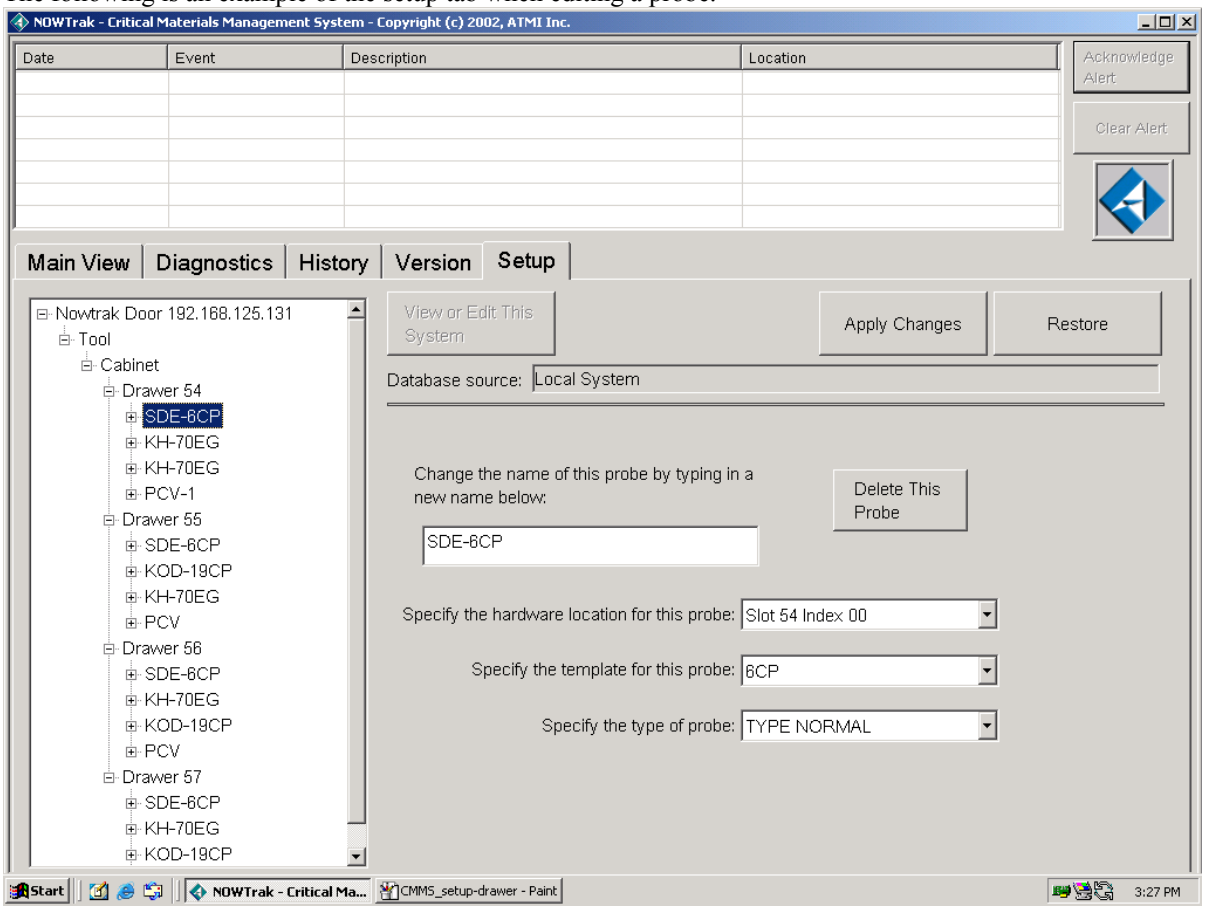
6.1.2.4.1 Origination of data

The data provided on this tab is derived from the individual reader boards and the NOWTrak controller.

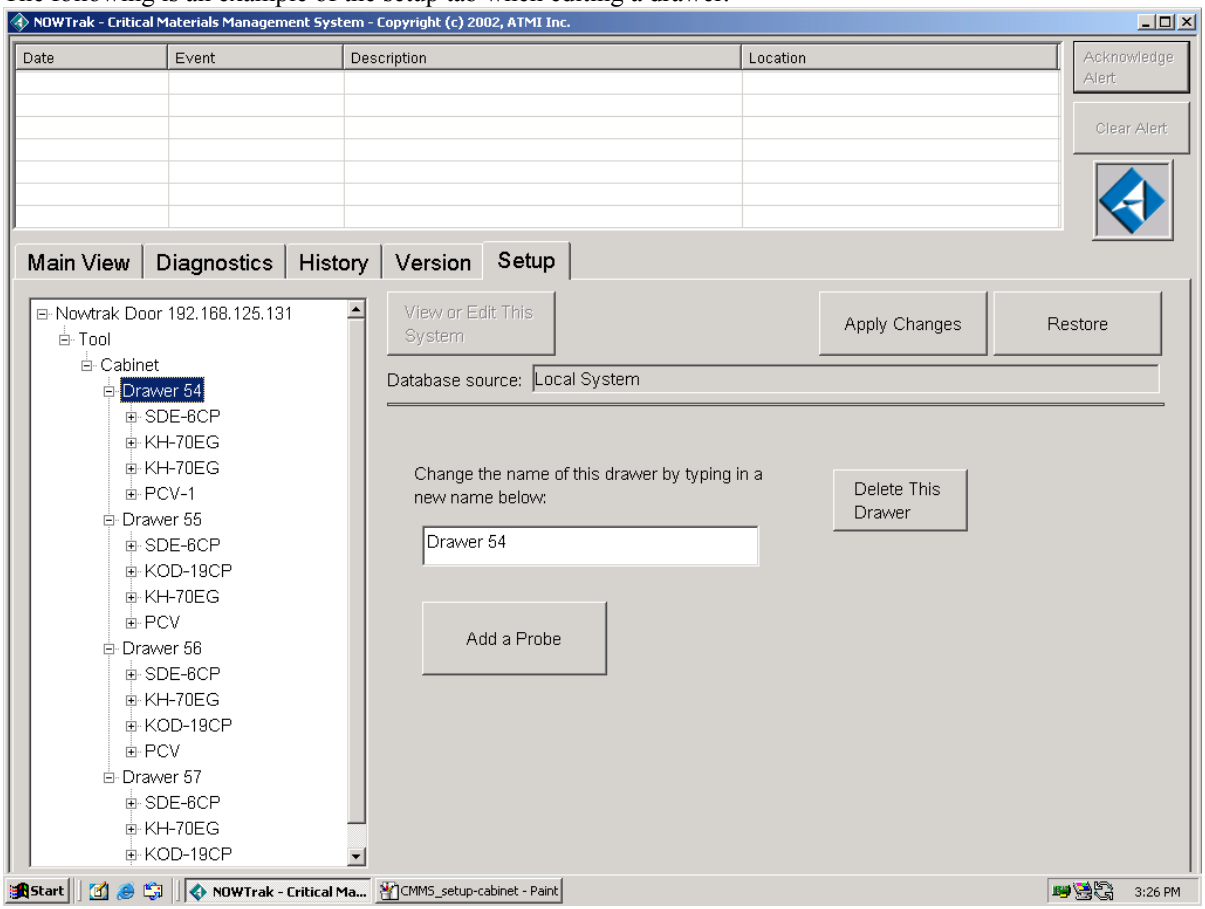
6.1.2.5 SETUP tab

The editor allows you to add / change / delete a probe from the system. Once a probe is defined here, it becomes operational in the NOWTrak system.

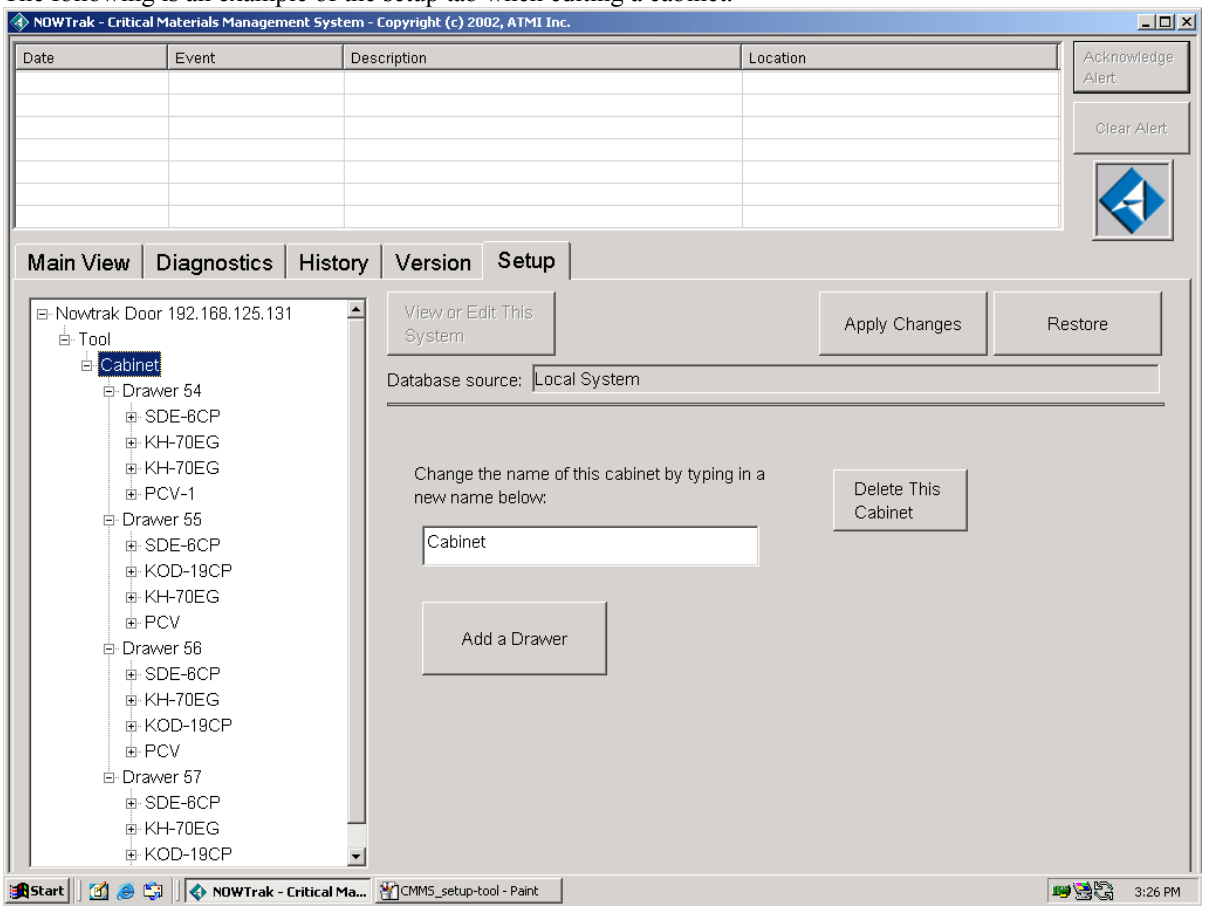
The following is an example of the setup tab when editing a probe.



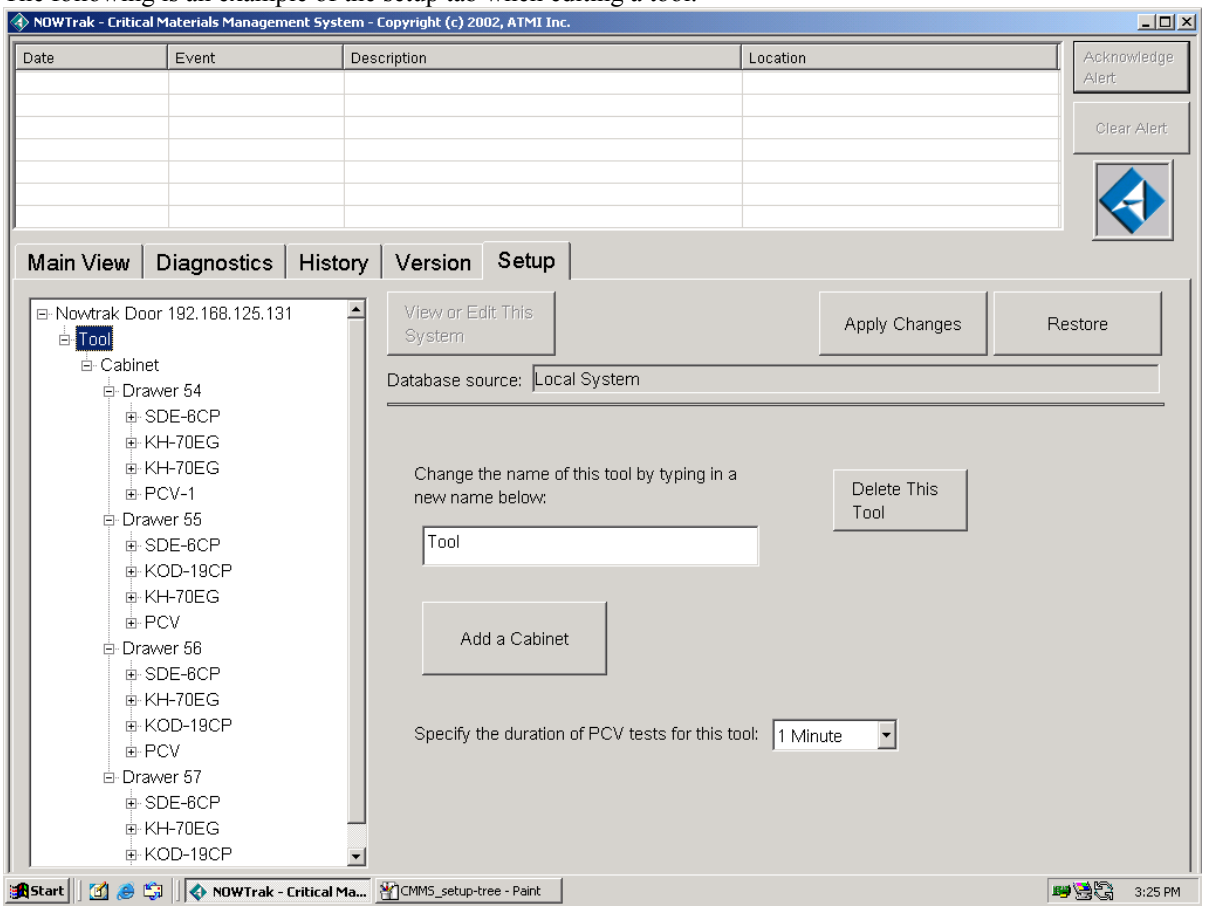
The following is an example of the setup tab when editing a drawer.



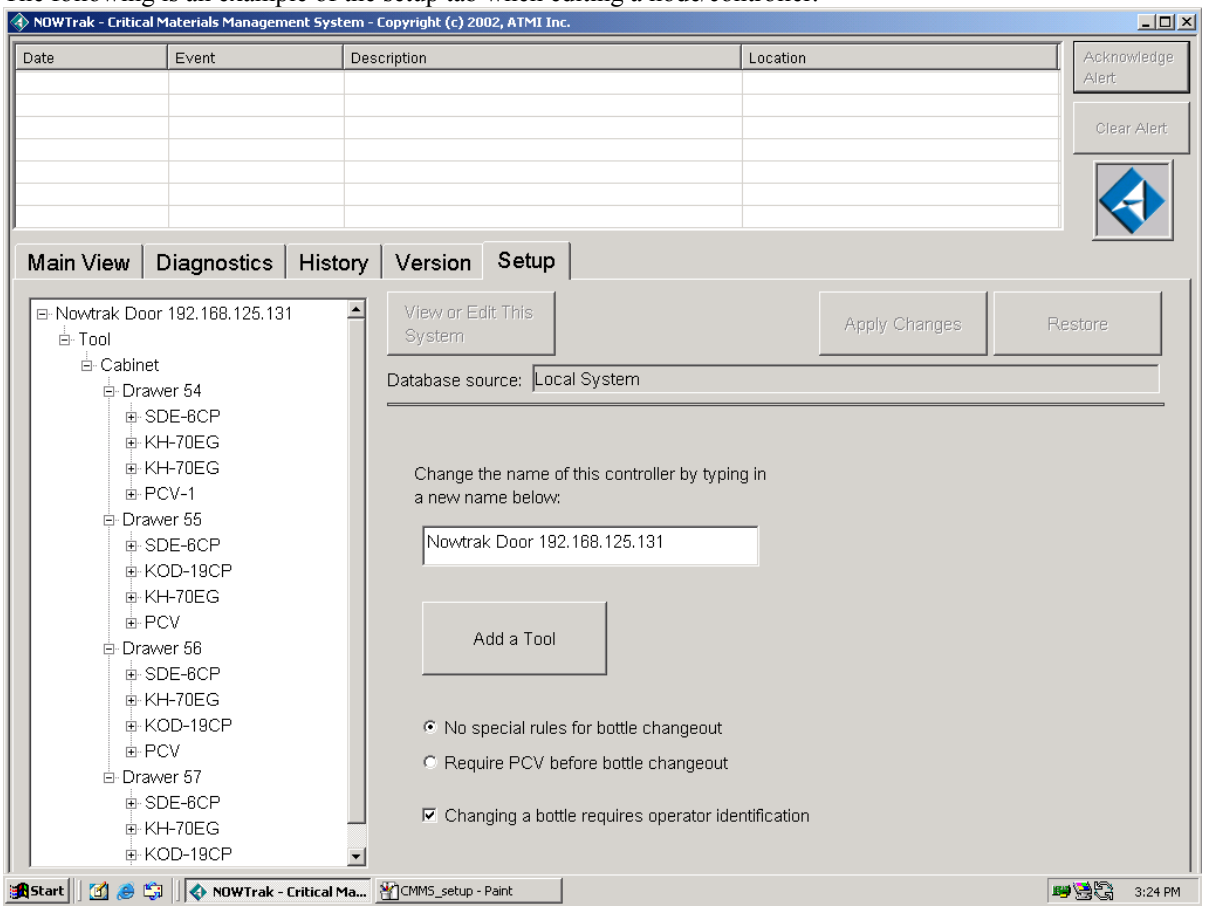
The following is an example of the setup tab when editing a cabinet.



The following is an example of the setup tab when editing a tool.



The following is an example of the setup tab when editing a node/controller.



6.1.2.5.1 Origination of data

The probe association data resides in NOWTrak/Database/Config/ProbeAssociation.xml

6.1.2.5.2 Tree view

The tree view is similar to the main view dialog tab and the diagnostics dialog tab. When a tree controller is selected, child nodes can be added and specific attributes of the selected node can be edited.

Adding a tool.
To add a tool, simply select the controller. An “Add Tool” button will appear. When selected, a new tool is added to the tree and its attributes can be edited.

6.1.2.5.3 Changing a node of the tree

Select a node on the tree. Its attributes will appear so that they can be edited.

6.1.2.5.4 Deleting a node of the tree

When a node is selected, a delete button will appear. When it is pressed, it and all of its child nodes will be deleted.

6.1.2.5.5 Cancel changes

At any time during editing, the original database can be restored. Simply press the restore button.

6.1.2.5.6 Apply changes

At any time during editing, you can choose to update the database with your changes. Simply press the “apply changes” button.

6.1.3 Monitoring functions

This section describes the behavior of the system when certain events occur.

6.1.3.1 System startup

When the system is started, NOWTrak checks for all reader boards in the system and creates a process to monitor each reader on each reader board. Each process is responsible for its own reader. It continues to run for the life of the application. If it is associated with a probe that is to be monitored, it begins the monitoring process. If it is not associated with a probe, it is suspended until a database change occurs or the application is terminated. Once all of the monitoring processes have been started, another process monitors the health of all these monitoring processes. If any monitoring process dies, a new monitor process begins.

6.1.3.2 "NOWPak added" processing

When a NOWPak is added, the antenna in the probe reads the RFID tag embedded in the cap of the NOWPak. This data is sent to the RFID reader board. The reader board then informs the NOWTrak controller that a new NOWPak/RFID tag was found. the NOWTrak controller then reads the chemical information from the reader board and passes the information to the process that is responsible for this specific reader (probe).
The information is then validated against the database for this probe. The validation is as follows:

- Validation is done using the associated probe template.
- Validate whether the NOWPak was already used. It does this by checking if the installation date has already been written. If it has an installation date, then it becomes a misconnect. **This feature is currently disabled.**
- Validate the chemical information against the probe template that is assigned to this probe. It looks through all of the chemicals listed in the template and when it finds a match, it stops looking and says that the chemical is a match. If does not find a match, it becomes a misconnect.
- Validate whether the chemical has reached its expiration date. If so, it becomes a misconnect.
- If the probe is already in an alarm condition and this is a good NOWPak, then an alert is added to the system stating this. The tool is not enabled until the alert is cleared.
- If the probe is already in an alarm condition and this is yet another misconnect, an alert is added to the system stating this.
- If the same NOWPak that caused the misconnect is found and the alert is still active, then the alert date and time are updated.
- If the probe association database has BOTTLE_CHANGE_REQUIRES_OPERATOR_ACTION set to TRUE, then an ACK REQUIRED (acknowledge required) alert is added to the system and the operator must clear this alert before the tool is enabled.
- If the probe association database has BOTTLE_CHANGE_REQUIRES_PCV_TEST set to TRUE, then an ACK REQUIRED (acknowledge required) alert is added to the system if the bottle was not first tested on the PCV probe. The operator must clear this alert before the tool is enabled.
- The CurrentProbeStates.xml database is updated for any of the conditions just described and all of the chemical's information is written to this database.
- The HistoricalDatabases.xml database is updated for any of the conditions just described and all of the chemical's information is written to this database.
- The probe LED's are set to indicate the current condition at the probe.

6.1.3.3 "NOWPak removed" processing

When a NOWPak is removed, the antenna and reader board detect this condition. The reader board then informs the NOWTrak controller that a NOWPak/RFID tag is no longer present. the NOWTrak controller disables the tool. The CurrentProbeStates.xml database is updated. The HistoricalDatabases.xml database is updated.

6.1.3.4 Misconnect reasons

A misconnect situation occurs for the following reasons:

- A NOWPak already has a valid installation date and it is being added at a probe. Not currently enabled.
- A NOWPak's chemical has expired.
- A NOWPak's chemical data fails the chemical match criteria as defined by the probe template and chemical databases.
- The misconnect alert for the current probe has been cleared and the same NOWPak is on the probe.

Once a misconnect has occurred, you have several options:

- If it is determined that the database is incorrect, you can modify the appropriate database. When it is updated with data that makes the NOWPak valid, you can acknowledge and clear the alert and the NOWPak can be made operational.
- If it is truly a misconnect, you can take the appropriate corrective action such as acknowledging the alert, removing the offending NOWPak from the probe, cleaning the probe and disposing of the contaminated chemical. Once the offending NOWPak has been removed, the misconnect alert can be cleared.

All of the NOWTrak controller activities are tracked in the HistoricalDatabases.xml database and the current state information is updated in the CurrentProbeStates.xml database.
When the misconnect occurs, the alert list at the top of the user interface reflects this condition with a new entry in the alert list. This entry is initially shown with text on a red background.
The LED's at the probe also reflect the misconnect condition. The red LED is turned on and the green LED is turned off.

Date	Event	Description	Location
21/03/2003 14:34:22	ALARM	Misconnect - Invalid Chemical found	Tool/Cabinet/Drawer 54/SDE-6CP

6.1.3.5 RFID reader board errors.

If any of these errors suddenly appear and repeatedly appear under varying conditions, the error is most likely related to a hardware problem. The first step to recovery is to replace the RFID reader board and any offending antenna. It may even be appropriate to replace the entire computer. If at all possible, start with the reader board and work up to a wholesale replacement of hardware.
The possible errors are:

- RS_TAG_WRITE_FAILED – NOWTrak only writes the installation date to the RFID tag when NOWTrak detects the RFID tag for the first time. The error would most likely be the result of a RFID tag not being in the field of the antenna for the duration of the write, a bad antenna or antenna wire, or a bad RFID tag.
- RS_TAG_READ_FAILED – If this error occurs, it is likely the result of the RFID tag not being in the field of the antenna for the duration of the read, a bad antenna, a bad antenna wire, or a bad RFID tag.
- RS_TAG_COMMUNICATION_FAILED – This error is most likely the result of a bad antenna, a bad antenna wire, or a bad RFID tag
- RS_TAG_AUTHORIZATION_FAILED – This error means the encryption key on the RFID tag does not match the NOWTrak encryption key. This error is highly unlikely. If it does occur, it is an unrecoverable error for the given RFID tag. If it occurs on all RFID tags, the board likely needs to be replaced.
- RS_ANTENNA_DISCONNECT – This error occurs when the antenna is disconnected from the reader board. Antenna replacement is the most likely solution.
- RS_READ_MEMORY_LOCK_TIMEOUT – This is most likely a software error. It is a safeguard to help prevent firmware lockups. It is highly unlikely this error will occur. This error should be reported to ATMI for further diagnosis.
- RS_FIRMWARE_RESET – This is most likely a software error. It is a safeguard to help prevent software lockups. It is highly unlikely this error will occur. This error should be reported to ATMI for further diagnosis.
- RS_WRITE_MEMORY_LOCK_TIMEOUT - This is most likely a software error. It is a safeguard to help prevent firmware lockups. It is highly unlikely this error will occur. This error should be reported to ATMI for further diagnosis.
- RS_READER_CHIP_INIT_FAILED – This is most likely a hardware error. It means one of the RFID reader chips is inoperable. Board replacement is the most likely solution.

6.1.3.6 Override Tool Enable

This feature exists to allow the NOWTrak logic to be completely overridden for an individual probe. The probe tool enable is only controlled manually. NOWTrak will continue to show the current state of the probe, but it will not change the state of the tool enable for any reason. To change the state of a probe tool enable during override, select the Diagnostics tab on the NOWTrak controller, then select the probe to be overridden from the tree view and press the ON or OFF button for the tool enable.

6.1.3.7 Database change

NOWTrak has the ability to change "on the fly". If one of its databases changes, it can reconfigure itself to match the newly defined environment. For instance, NOWTrakEditor is used to change the Chemicals.xml and ProbeTemplates.xml databases. the NOWTrak controller is aware of changes in these databases. When one of these databases change, NOWTrak rereads the database. It then tells all of the probe monitor processes to reevaluate their current state. This mechanism is also used to detect a change in the ProbeAssociation.xml, which is edited and changed within the NOWTrak controller. This means that a probe can be brought online or taken offline while the NOWTrak controller is running. As a result, downtime is minimized.

6.1.3.8 Expiration date

The expiration date feature ensures that an expired chemical is detected and not used. One of the fields in the chemical definition defines the expiration date of the chemical. As an added feature for more flexibility, the expiration date can be extended. This expiration extension is located in the definition of the chemical. the NOWTrak controller checks for an expiration condition every minute. Since expirations are date based, all expirations occur at midnight of the expiration date.

6.1.3.9 Expiration date warning

The expiration date warning feature provides warnings at 96 hours, 24 hours and each hour for the last 12 hours until the expiration occurs. These warnings appear in the alert list as text on a yellow background. These warnings can be cleared from the alert list via the alert clear operator action.

6.1.3.10 Pre-connect verification (PCV)

The PCV feature adds one more step to assure the correct chemical is connected to the correct probe. This is done by identifying one of the NOWTrak probes as a PCV probe. The PCV probe has an attribute that defines the scope of its usefulness. Available scope values are "TOOL", "CABINET", or "DRAWER". When a NOWPak is presented to the PCV probe, the green LED for the probes within the defined scope and a chemical match will blink for one minute. The PCV test step can also be made a requirement before adding the bottle and making it operational.

6.1.3.11 Databases modified

There are three global databases that are monitored for change. The first application that monitors the global databases is the Network Database Manager (NDM). There is an NDM running on each local controller. When the NDM detects that a global database has changed, it copies the updated database to the local controller's database directory. Now the NOWTrak controller gets involved. It also monitors these same database files for change, but it only monitors its local copy of the databases. When it detects that a database has changed, it updates the local controller copy of the database and then signals all probe monitor processes that they need to reevaluate the state of their probes. The following are examples of where a change could have an impact on the state of a probe:

- Add more days to an expiration extension. This could cause a probe currently showing a warning or an expiration to change to an operational condition with no warnings.
- Change a probe template to be more restrictive on its match criteria. This could cause a probe currently showing a match state to go into a chemical mismatch state.
- Change a probe template to be less restrictive on its match criteria. This could eliminate a chemical mismatch condition from recurring. .

6.2 Network Database Manager - NDM

The Network Database Manager's sole purpose in life is to make sure that the local controller copy of the database is current. The NDM runs on every NOWTrak controller computer. It monitors global databases RFIDTagMemoryMap.xml, Chemicals.xml, ProbeTemplates.xml and pass.dat for change and copies them to the local computer if changes are detected..

6.3 NOWTrakEditor

The NOWTrakEditor allows editing of three global databases, Chemicals.xml, ProbeTemplates.xml and pass.dat. If the global databases are located on a NOWTrak controller, the databases must be in a directory other then the NOWTrak system directory. The NOWTrakEditor provides the ability to add, delete or modify entries in each of

the databases. The NOWTrakEditor provides four tabs to choose from. The tabs are: Chemical, Probe Template, Password, and History. Each of the database editors is customized to the database for which it is responsible. All editing requires users with password level 3. If a different tab is selected or you attempt to quit the program before the changes have been written to disk, you are prompted to save the changes.

6.3.1 Chemical database editor

The chemical editor displays all of the defined chemicals in columns. It provide the option of viewing all defined chemicals, hiding obsolete chemicals, changing a chemical between being hidden or shown, adding a new chemical, or change the shelf life. Chemicals can only be added. They can never be deleted or modified, except for the shelf life days extension.

6.3.1.1 Add a new chemical

To add a chemical, press the **Add Chemical** button. A password dialog will appear and require a level 3 user to add a chemical. Once accepted, a **New Chemical or Copy Chemical** dialog is shown. When **Copy Another Chemical** or **Create New Chemical** is selected, the **Chemical Attribute Editor** dialog will be shown. When the fields contain the desired data, press **Accept Changes**. This will save the new chemical to the database for use by a template.

6.3.1.2 Change the shelf life days extension

When the list of chemicals is shown, clicking the mouse on any field of a chemical will display the **Chemical Attribute Editor**. At this point the chemical's shelf life days extension can be edited. Pressing **Accept Changes** saves the new value and closes the attribute editor.

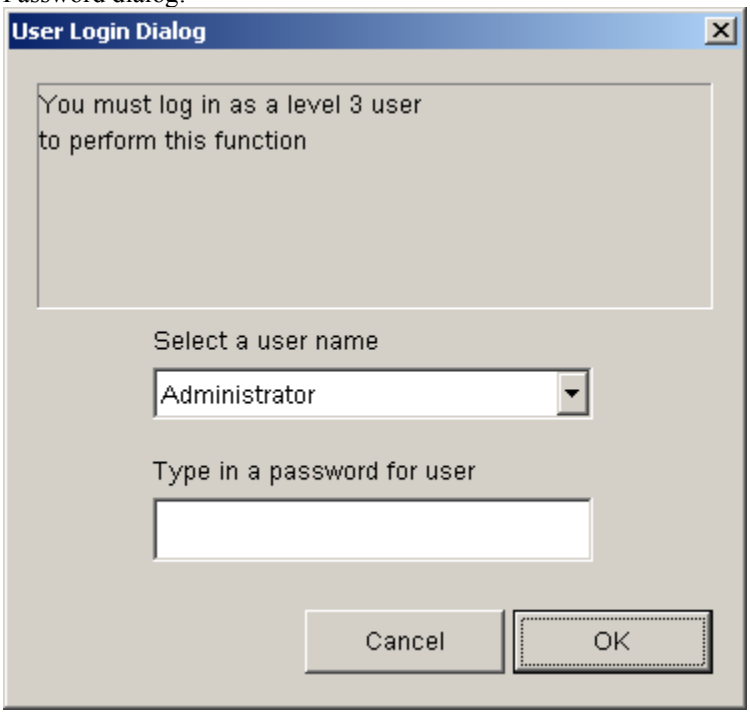
6.3.1.3 Hide/Show a chemical

When the list of chemicals is shown, clicking the mouse on any field of a chemical will display the **Chemical Attribute Editor**. At this point the chemical can be changed between hidden and shown. Once the desire state is selected, pressing **Accept Changes** saves the change and closes the attribute editor. If the action is to hide a chemical, a warning will be presented stating that a hidden chemical will not be available in the probe template editor.

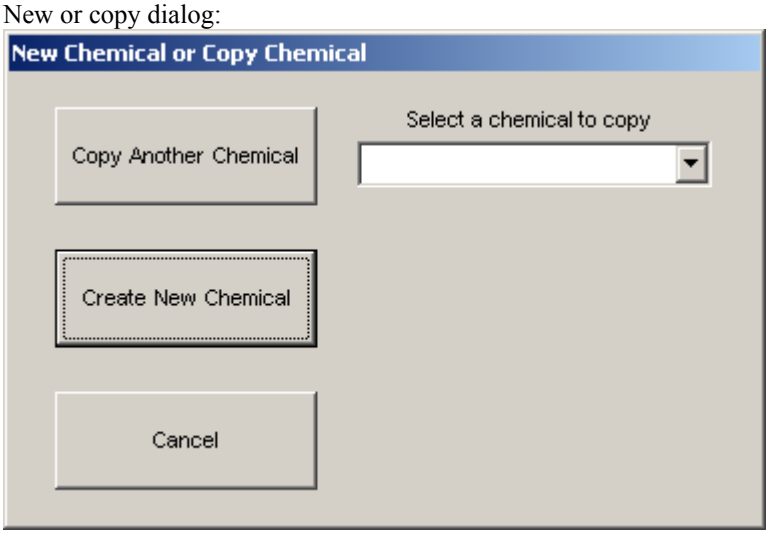
6.3.1.4 Show or hide hidden chemicals

The chemical list view allows you to show or hide hidden chemicals by pressing **Show All Chemicals** or **Hide Marked Chemicals**.

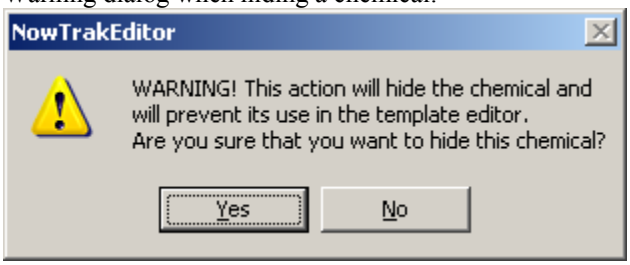
Password dialog:



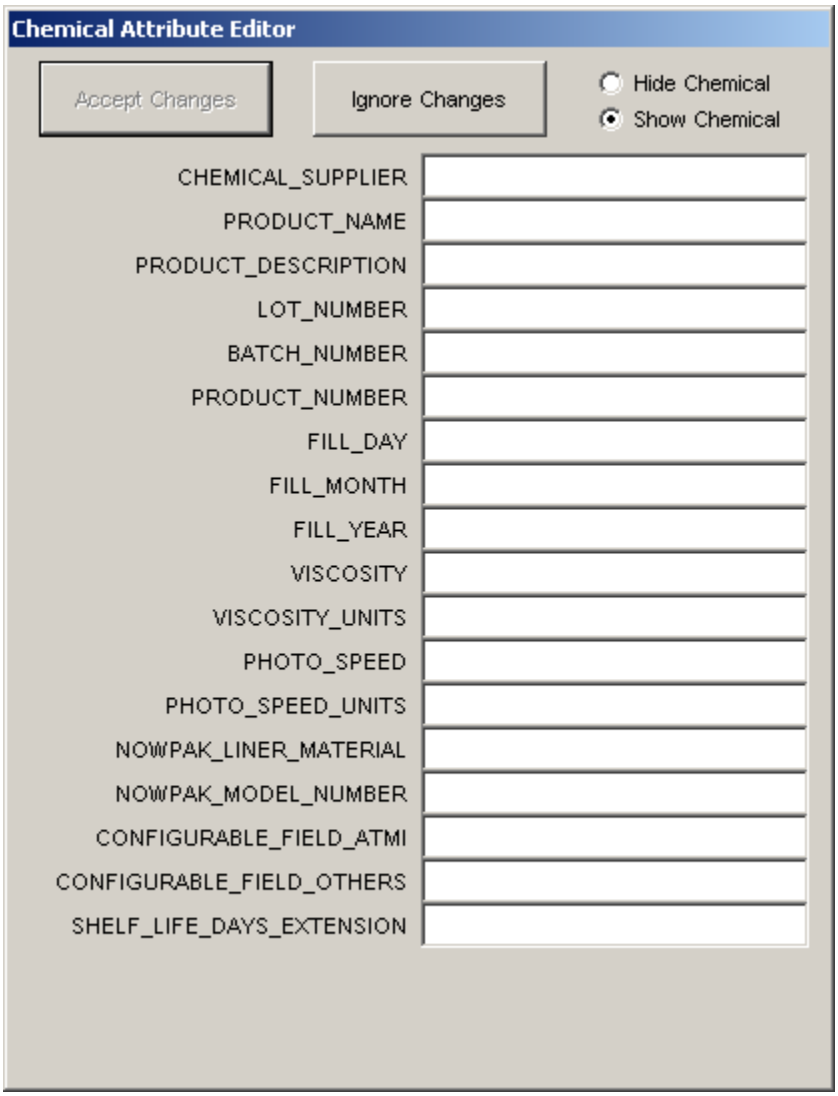
New or copy dialog:



Warning dialog when hiding a chemical:



Attribute editor:



All chemicals view:

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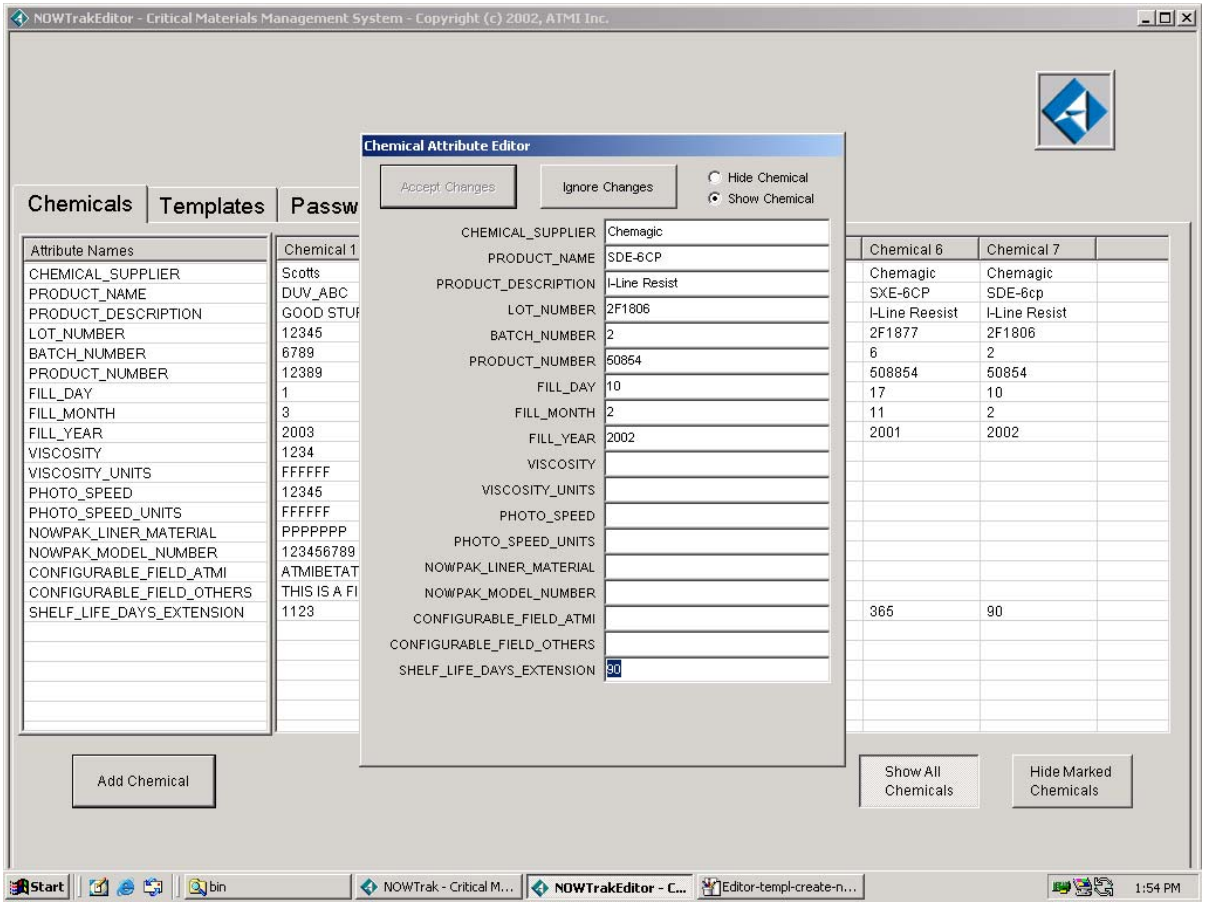
Chemicals | Templates | Password | History | Version

Attribute Names	Chemical 1	Chemical 2	Chemical 3	Chemical 4	Chemical 5	Chemical 6	Chemical 7
CHEMICAL_SUPPLIER	Scotts	Chemagic	Chemagic	Chemagic	Chemagic	Chemagic	Chemagic
PRODUCT_NAME	DUV_ABC	RSR-32CP	SDE-6CP	KH-70EG	KOD-19CP	SXE-6CP	SDE-6cp
PRODUCT_DESCRIPTION	GOOD STUFF	I-Line Resist	I-Line Resist	I-Line Resist	I-Line Resist	I-Line Reesist	I-Line Resist
LOT_NUMBER	12345	2F1805	2F1806	2F1807	2F1808	2F1877	2F1806
BATCH_NUMBER	6789	1	2	3	4	6	2
PRODUCT_NUMBER	12389	50853	50854	50855	50856	508854	50854
FILL_DAY	1	5	10	15	20	17	10
FILL_MONTH	3	1	2	3	4	11	2
FILL_YEAR	2003	2002	2002	2002	2002	2001	2002
VISCOSITY	1234						
VISCOSITY_UNITS	FFFFFF						
PHOTO_SPEED	12345						
PHOTO_SPEED_UNITS	FFFFFF						
NOWPAK_LINER_MATERIAL	PPPPPPP						
NOWPAK_MODEL_NUMBER	123456789						
CONFIGURABLE_FIELD_ATMI	ATMIBETATEST						
CONFIGURABLE_FIELD_OTHERS	THIS IS A FIEL...						
SHELF_LIFE_DAYS_EXTENSION	1123	90	90	120	90	365	90

Add Chemical | Show All Chemicals | Hide Marked Chemicals

Start | bin | Windows Task Manager | NOWTrak - Critical M... | bin | NOWTrakEditor - C... | 1:24 PM

Individual chemical edit



6.3.2 Probe template editor

The probe template editor lets you view and edit an individual probe template. The editor has a drop down list of all of the probe templates. When a probe template is selected, the selected template is shown for viewing and editing. All shown chemicals will appear in the columns of the probe template. Another feature of the editor is the ability to drag any of the chemical columns into a column position. To do this, press and hold the left mouse button on the column header and drag the column to the desired position. Any time during the edit session, the probe template name can be edited. The name is simply a description. Once a template has been defined and the data saved, it can be edited but the editing cannot make the probe template more restrictive. This means that a chemical can be added to the template, but not changed or deleted.

6.3.2.1 Add a chemical to a template

To add a chemical to a probe template, click on a chemical attribute. It is then added to the probe template match criteria.

6.3.2.2 Remove a chemical from a template

To remove a chemical from a probe template, all of its attributes must be unselected (not green). A chemical can only be removed from a template if the template has never been saved.

6.3.2.3 Hide/Show a template

A template is hidden when it is no longer in use. To hide/show a probe template, press **Hide Template** or **Show Template**.

6.3.2.4 Update template

To update the database, press **Apply**.

6.3.2.5 Cancel template changes

To cancel an editing session, press **Cancel**.

6.3.2.6 Add template

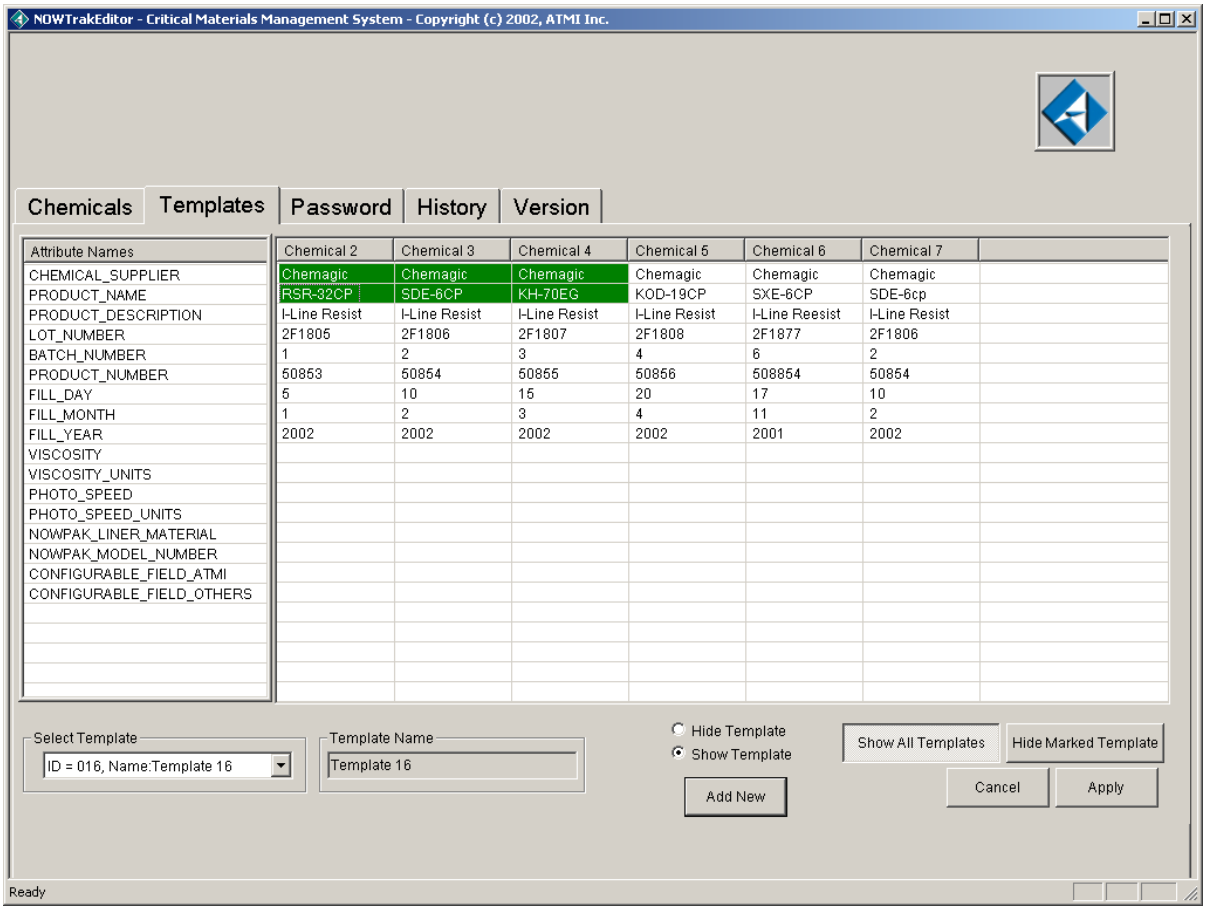
To add a new probe template, press **Add New**.

6.3.2.7 Show/Hide hidden templates

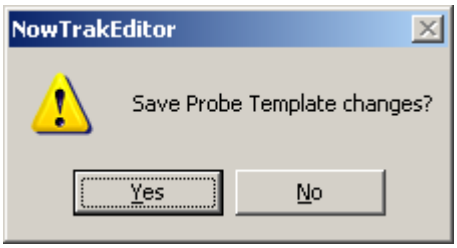
To show hidden templates, press **Show All Templates**.
To hide hidden templates, press **Hide Marked Templates**.

6.3.2.8 GUI samples

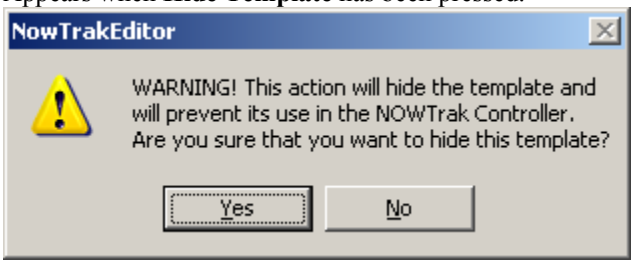
Shows existing template



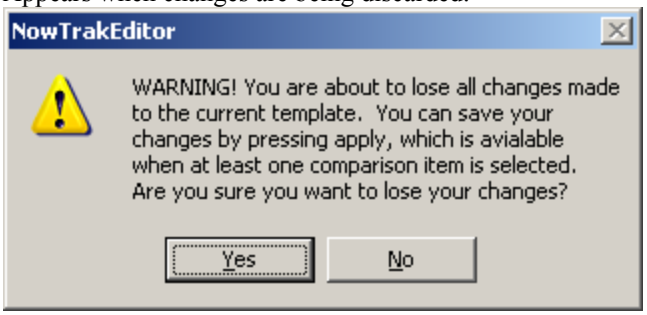
Appears when you attempt to leave the templates editor or change the template without applying the changes that were made.



Appears when **Hide Template** has been pressed.



Appears when changes are being discarded.

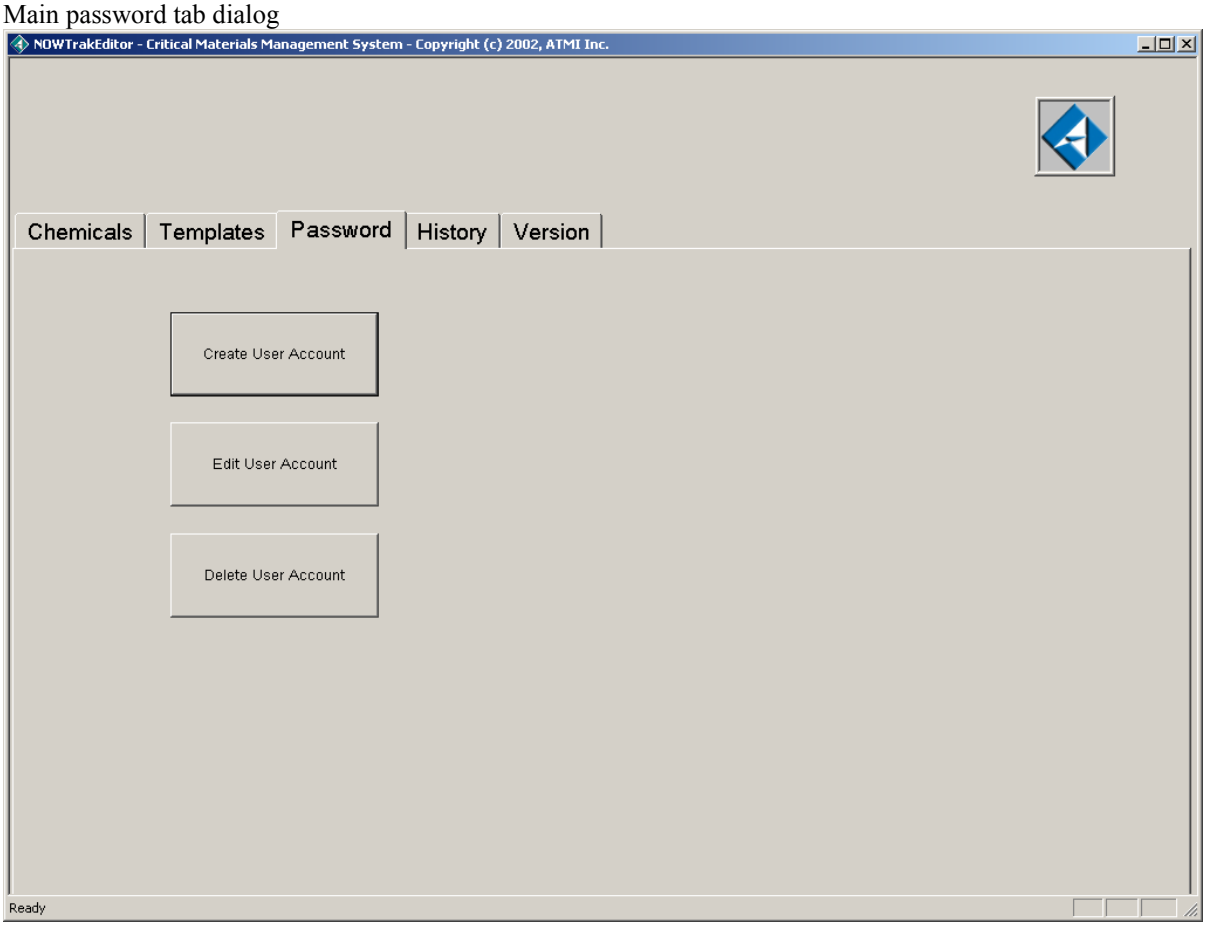


6.3.3 Password Editor

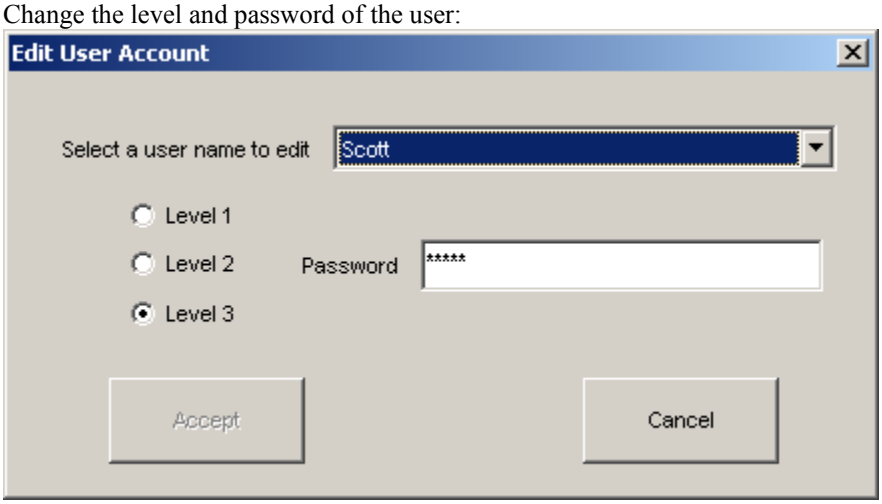
The password editor allows for adding, editing, or deleting user accounts. Each user account has a username, password and level. You must be a password level 3 user to edit user accounts.

6.3.3.1 GUI samples

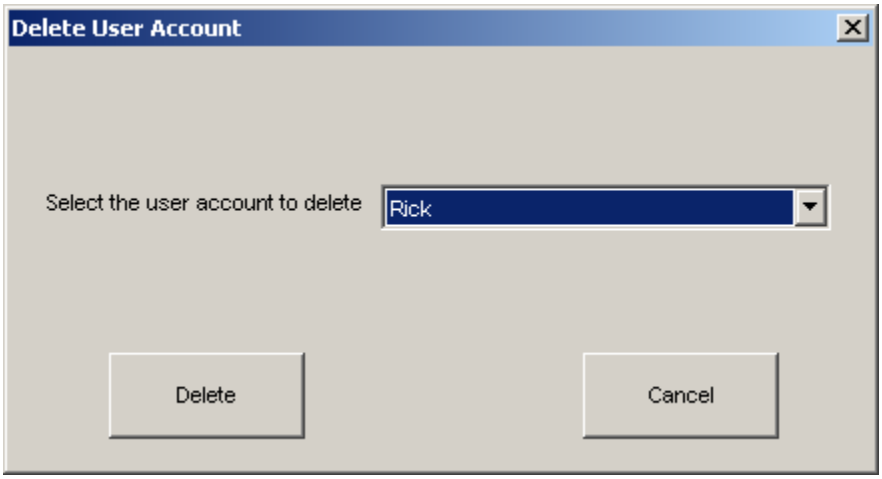
Main password tab dialog



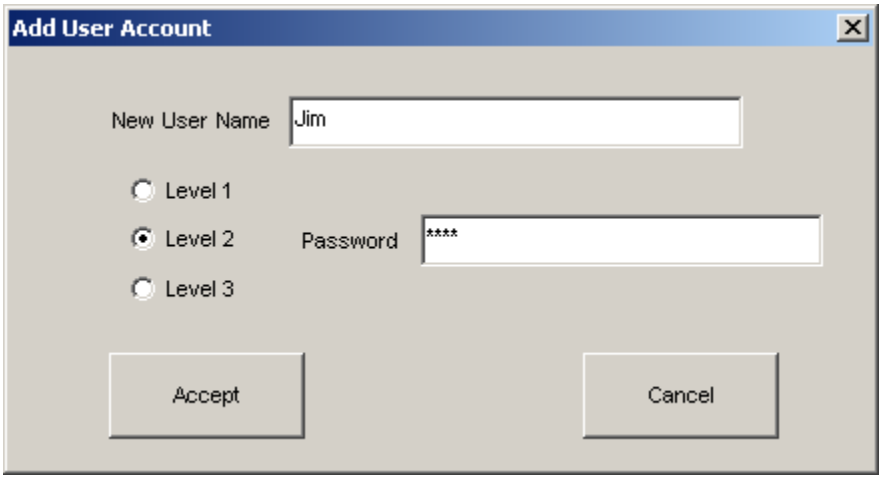
Change the level and password of the user:



Delete an account:

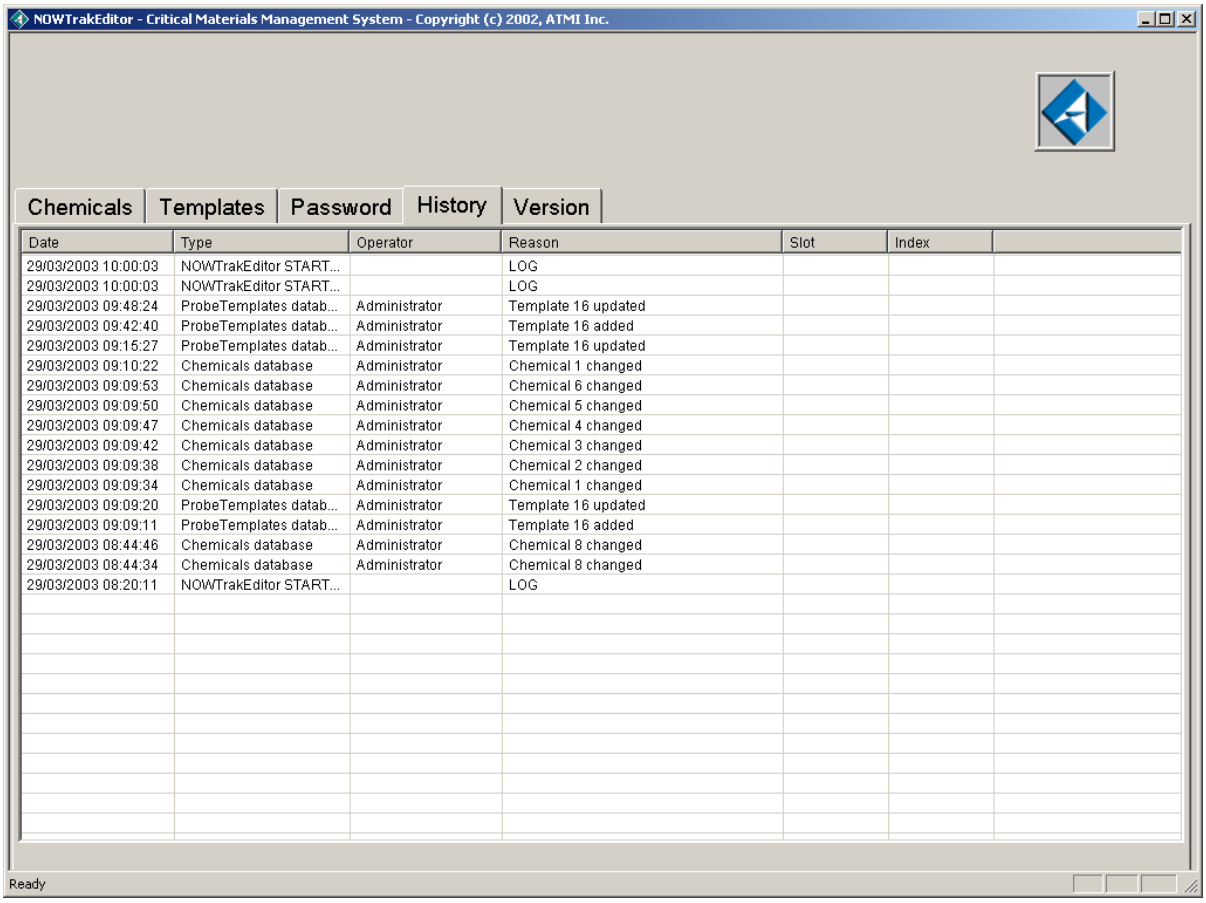


Add user account:



6.3.4 History tab

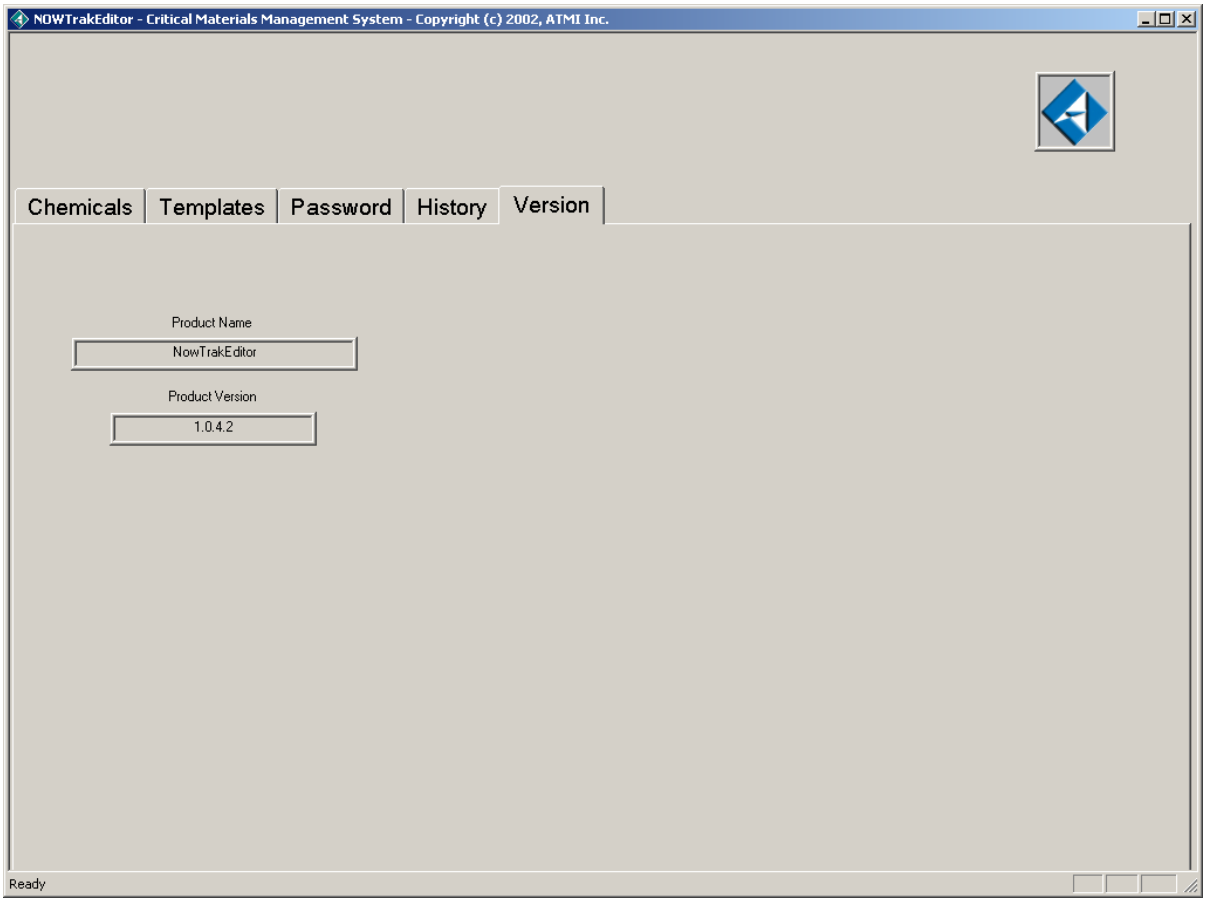
The history tab shows significant events that have occurred for the NOWTrakEditor. To sort this list by column, click the left mouse on the column header. The list can be sorted in ascending or descending order by simply clicking on the column header more than once.



Date	Type	Operator	Reason	Slot	Index
29/03/2003 10:00:03	NOWTrakEditor START...		LOG		
29/03/2003 10:00:03	NOWTrakEditor START...		LOG		
29/03/2003 09:48:24	ProbeTemplates datab...	Administrator	Template 16 updated		
29/03/2003 09:42:40	ProbeTemplates datab...	Administrator	Template 16 added		
29/03/2003 09:15:27	ProbeTemplates datab...	Administrator	Template 16 updated		
29/03/2003 09:10:22	Chemicals database	Administrator	Chemical 1 changed		
29/03/2003 09:09:53	Chemicals database	Administrator	Chemical 6 changed		
29/03/2003 09:09:50	Chemicals database	Administrator	Chemical 5 changed		
29/03/2003 09:09:47	Chemicals database	Administrator	Chemical 4 changed		
29/03/2003 09:09:42	Chemicals database	Administrator	Chemical 3 changed		
29/03/2003 09:09:38	Chemicals database	Administrator	Chemical 2 changed		
29/03/2003 09:09:34	Chemicals database	Administrator	Chemical 1 changed		
29/03/2003 09:09:20	ProbeTemplates datab...	Administrator	Template 16 updated		
29/03/2003 09:09:11	ProbeTemplates datab...	Administrator	Template 16 added		
29/03/2003 08:44:46	Chemicals database	Administrator	Chemical 8 changed		
29/03/2003 08:44:34	Chemicals database	Administrator	Chemical 8 changed		
29/03/2003 08:20:11	NOWTrakEditor START...		LOG		

6.3.5 Version tab

The version tab shows the version of the NOWTrakEditor.



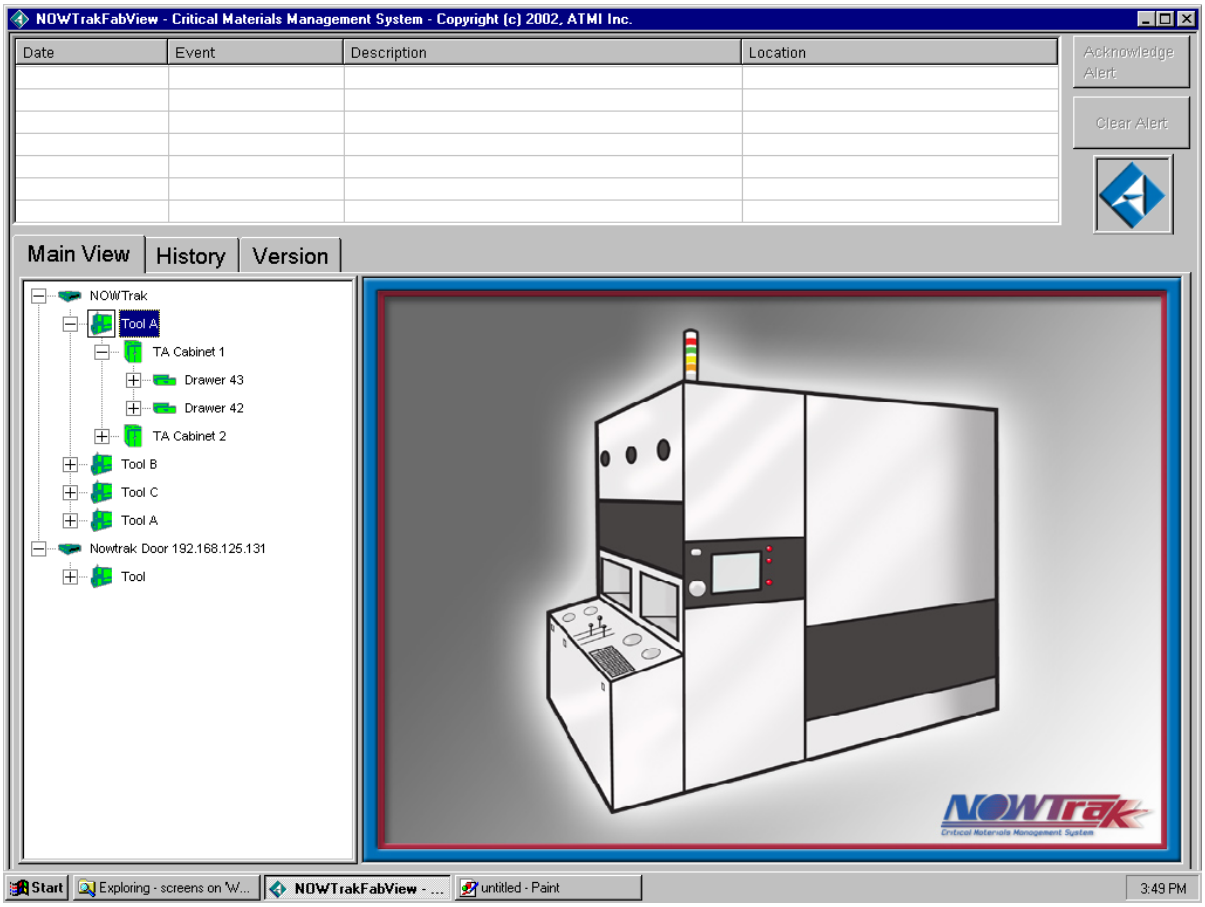
6.3.6 Historical database

The NOWTrakEditor uses the HistoricalDatabases.xml database to log significant events related to the editing session. The following events are logged:

- Program startup
- Program shutdown
- Chemical changed
- Probe template updated or added.

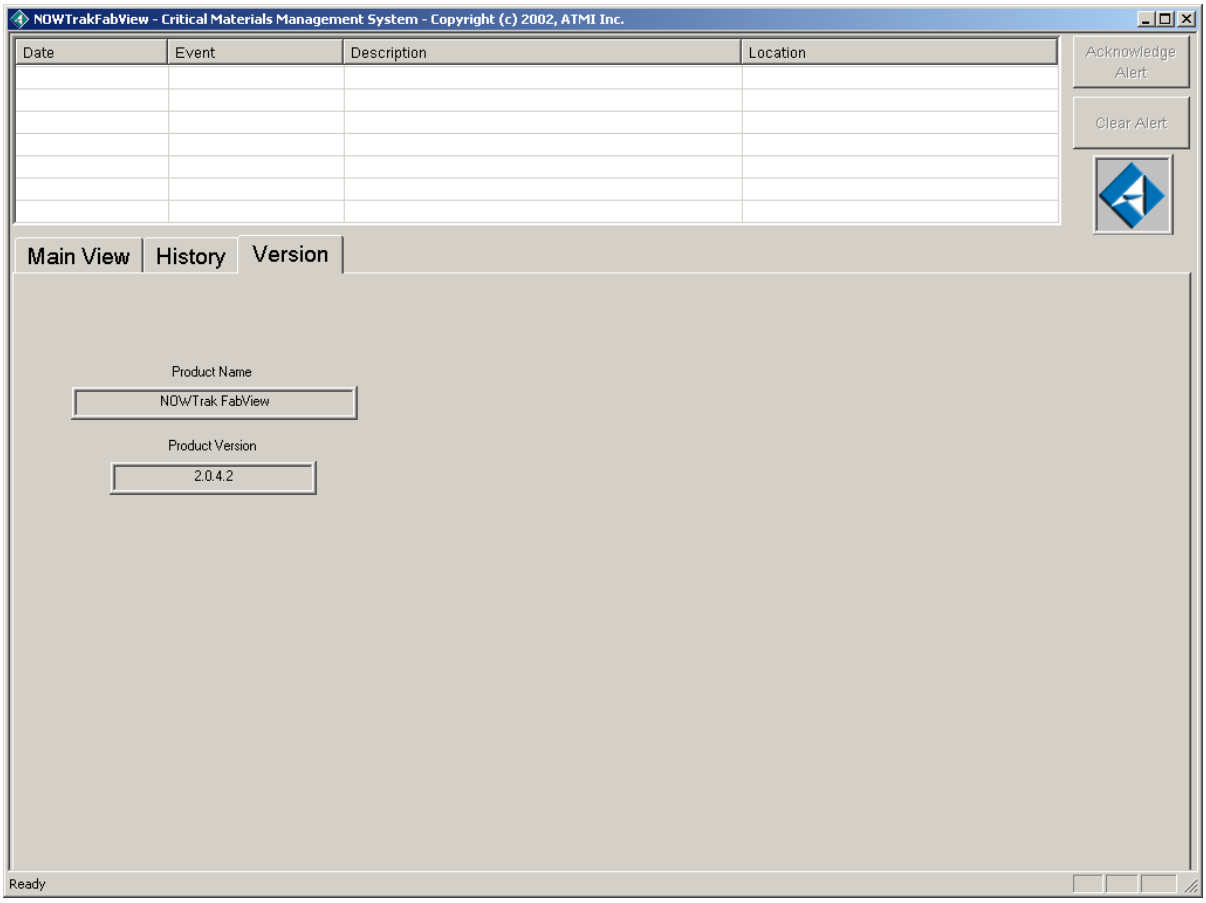
6.4 NOWTrakFabView Application

The NOWTrakFabView application allows you to view all of the individual NOWTrak controllers from one user interface. The user interface is very similar to the NOWTrak interface. It shows the alert list of the selected controller and provides the ability to see all of the individual probes of the controller via the html window. The tree view on the Main View tab contains all of the NOWTrak controllers defined by the FabViewNodes.xml database. To display the state of a probe, simply select the NOWTrak controller from the tree view and traverse to the desired probe. As stated earlier in this document, you traverse deeper (expand) into the tree by clicking the left mouse button while the cursor is over the "+" of the node. You can close the tree by clicking the left mouse over the "-" of the node. This behavior is identical to traversing a directory structure in Windows. The NOWTrakFabView application updates its data when it detects that a NOWTrak controller changes. As with the NOWTrak controller, you also have the ability to acknowledge and clear alerts shown in the alert list. The History tab at present does not display any data.



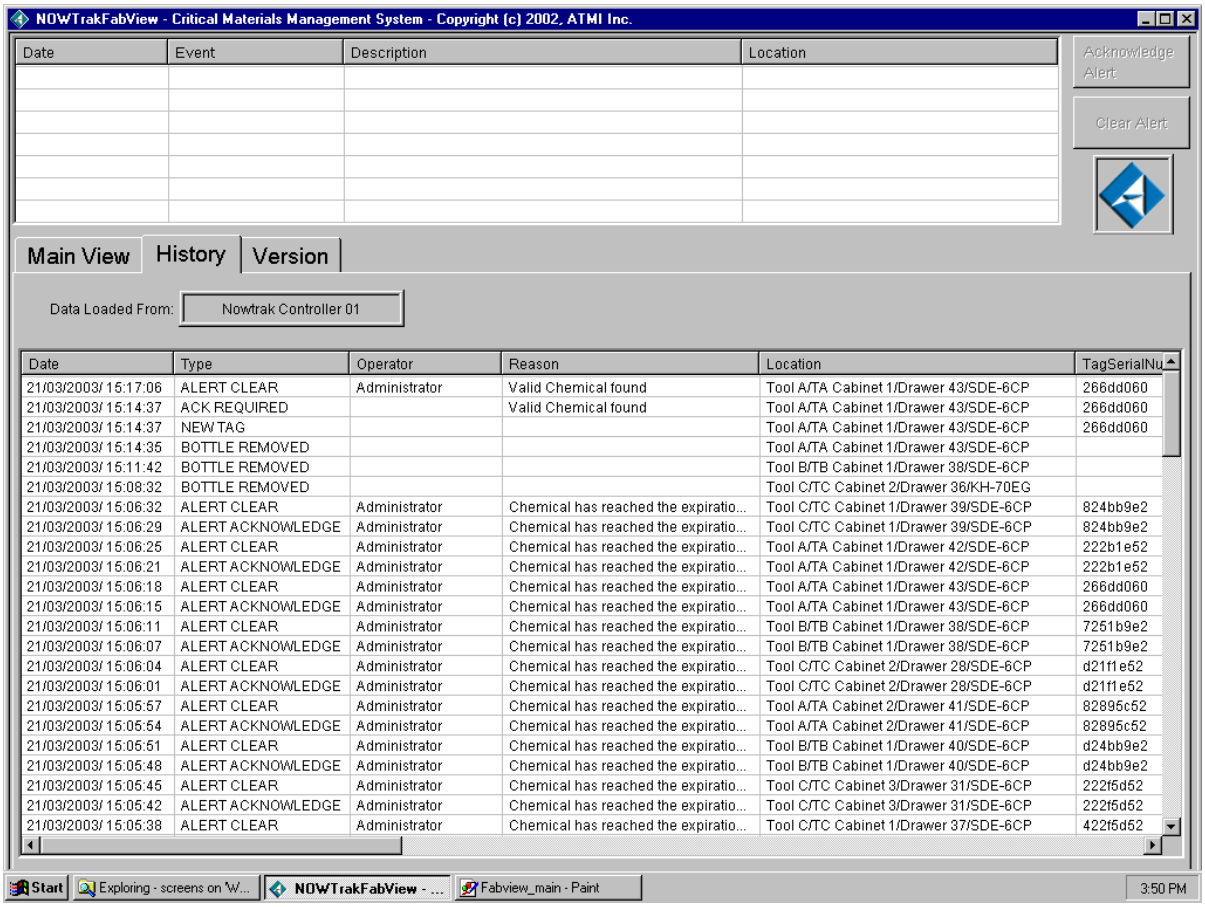
6.4.1 Version Tab

The version tab displays the version of the fab view application.



6.4.2 History Tab

The history tab shows the history data of the NOWTrak controller selected in the **Main View** tab. The list can be sorted in ascending or descending order by simply clicking on the column header more than once.



6.4.3 Databases used

The NOWTrakFabView application uses the databases located on the local NOWTrak computer and another database to tell where the NOWTrak computers are on the network. The databases are listed below.

6.4.3.1 FabViewNodes.xml

This database defines the NOWTrak computers to be viewed. It is a very simple database. Each NOWTrak computer is defined by a name and a network address. This database is located at C:/NOWTrak/FabView/FabViewNodes.xml. A simple example of this database is as follows:

```
<NODES>
        <NODE NAME="Nowtrak Controller 01" ADDRESS="192.100.100.130"/>
        <NODE NAME="Nowtrak Controller 03" ADDRESS="192.100.100.131"/>
</NODES>
```

6.4.3.2 ProbeAssociation.xml

This database is the actual database used by the NOWTrak controller on the local NOWTrak controller. This database contains the mapping information for the NOWTrak probes.

6.4.3.3 CurrentProbeStates.xml

This database is the actual database used by the NOWTrak controller on the local NOWTrak controller. This database contains all of the current probe state information of the given NOWTrak controller.

6.4.3.4 HistoricalDatabases

This database is the actual database used by the NOWTrak controller on the local NOWTrak controller. This database contains all of the historical information of the given NOWTrak controller.

6.4.3.5 Pass.dat

This is the password database used by all NOWTrak applications. This database is a global database located on the computer that contains all of the global databases.

6.4.4 Viewing alert list

The alert list is scoped to the specific NOWTrak controller selected from the tree view. The items in the alert list change when a different NOWTrak controller is selected in the tree view.

6.4.5 Acknowledge and clear alerts

The “acknowledge and clear alert” actions are identical to those performed at the local controller via the NOWTrak controller. The “acknowledge alert action” implies that the alert has been seen and corrective action is in process. The “clear alert action” implies the condition that caused the alert is no longer valid.

In the case of the NOWTrakFabView application, these actions cause the NOWTrakFabView application to send a request to perform the desired action to the NOWTrak controller running on the selected controller. If the selected controller is offline when the request is made, the request to acknowledge or clear will fail.

7 Warranty

7.1 Service and Support

8 Maintenance

8.1 Recommended Spares

8.2 System Backup and Restore

8.2.1 NOWTrak dual redundant drive features

NOWTrak provides the option of having a hardware platform with dual redundant hard drives. This system allows for immediate recovery in the event of a single hard drive failure. It works by having a primary and secondary disk drive in the system. The secondary drive is continuously being kept up to date when data is written to the primary drive. It allows you to insert and remove a drive without stopping the system. When a drive is inserted, the system will update this drive to be identical to the primary drive. All of this can be done while the NOWTrak controller is running. Another alternative is to have a third drive that can be stored in a remote location. On a periodic basis, this third drive could be inserted into the system and updated to the current state of the NOWTrak controller.

8.2.2 Directories to back up

Regardless of the NOWTrak application, the default folder/directory for back up is c:\NOWTrak and all of its subdirectories.

8.2.3 Backup reasons

8.2.3.1 Recovery from corrupt database

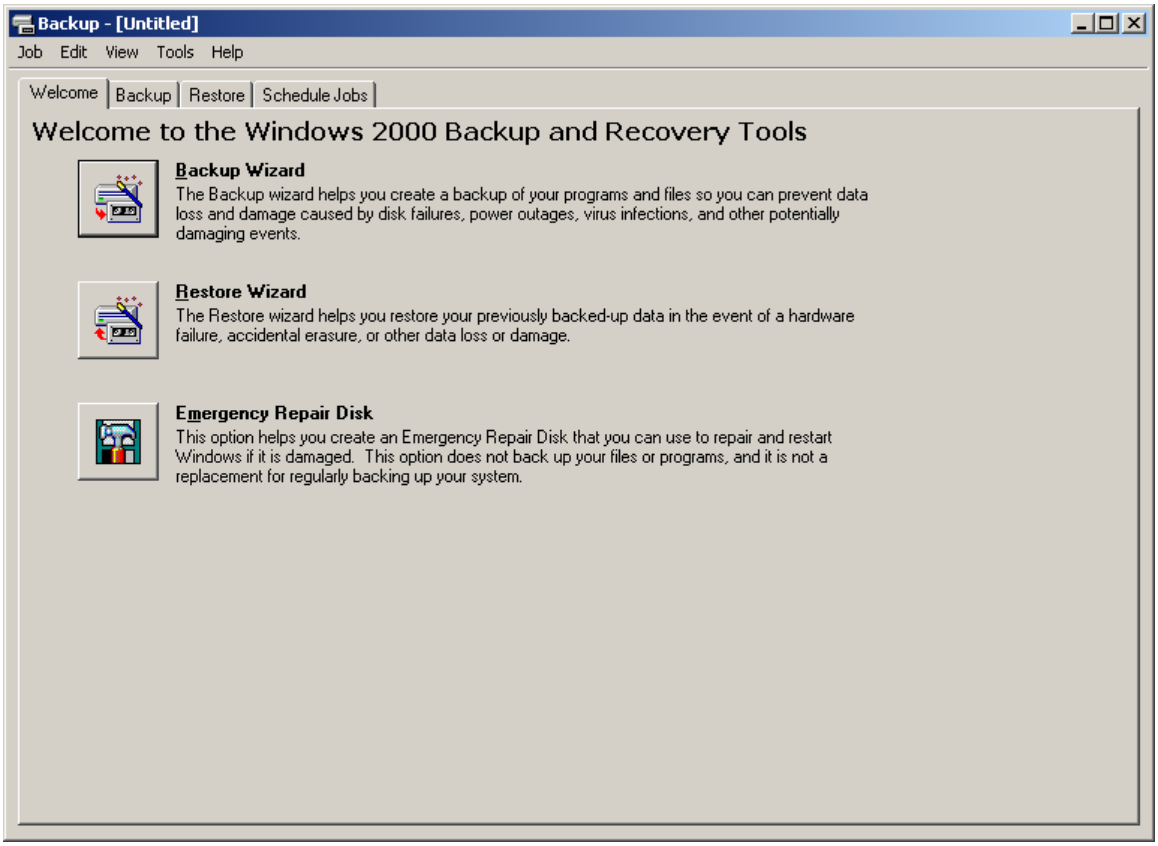
Creating a back up file is important so the database can be recovered in the event of data corruption or other catastrophic occurrence. If the databases are backed up regularly, the data can be recovered.

8.2.3.2 Hard drive failure

Another reason for backup is to recover in the event of a hard drive failure. If the applications and data are backed up, recovery is much easier.

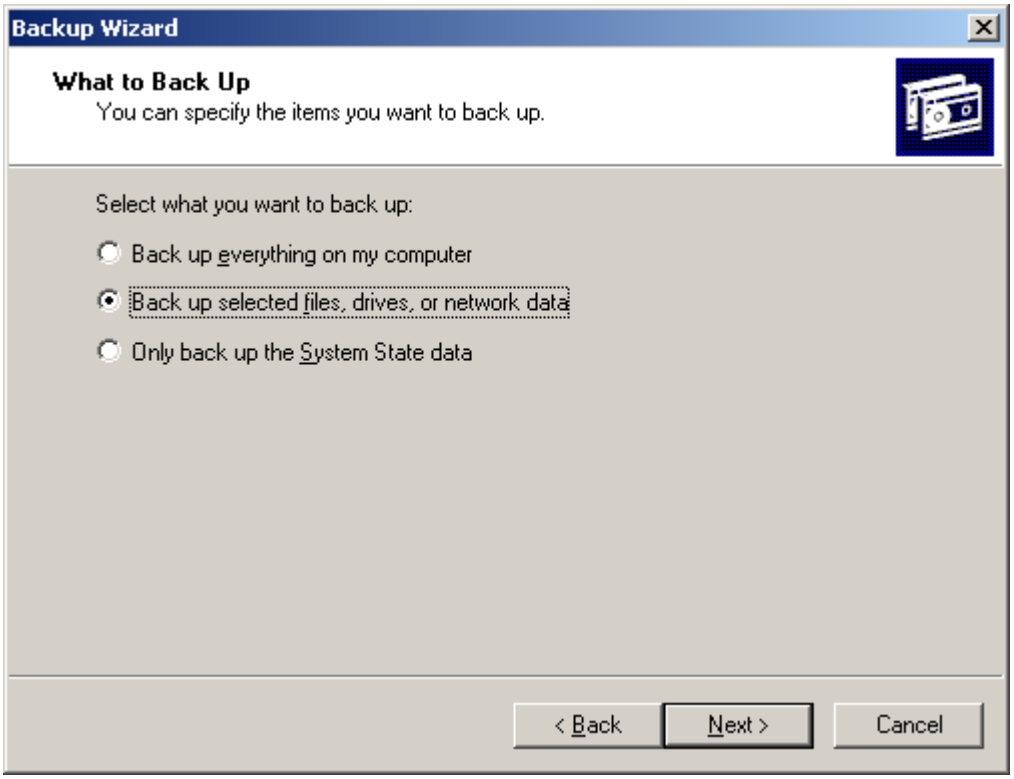
8.2.4 Backup procedure

MS Windows 2000 provides a backup utility that allows you to perform periodic and incremental backups of any file. It also provides the ability to restore files from any incremental date. The backup utility provides a wizard to define the files to be backed up, the destination, and the ability to schedule the backup to occur periodically. The backup utility can be started via the “Start” menu and is located at “Programs/Accessories/System Tools/Backup”. The opening dialog looks like the following:

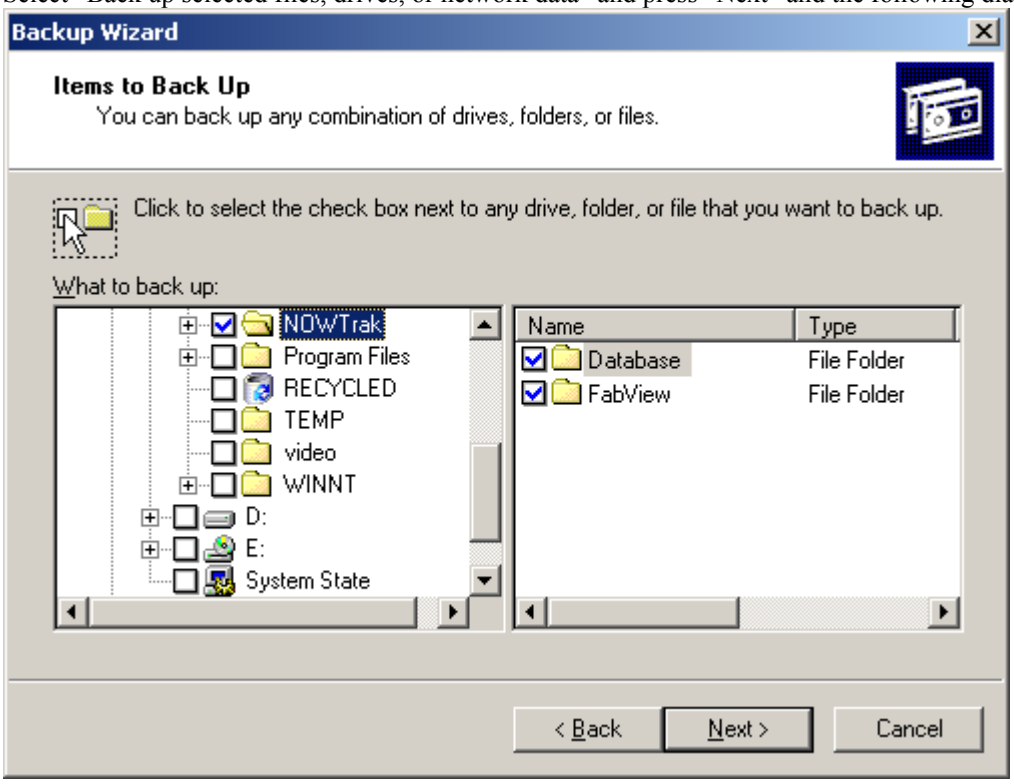


Select the Backup Wizard and the following dialog appears:

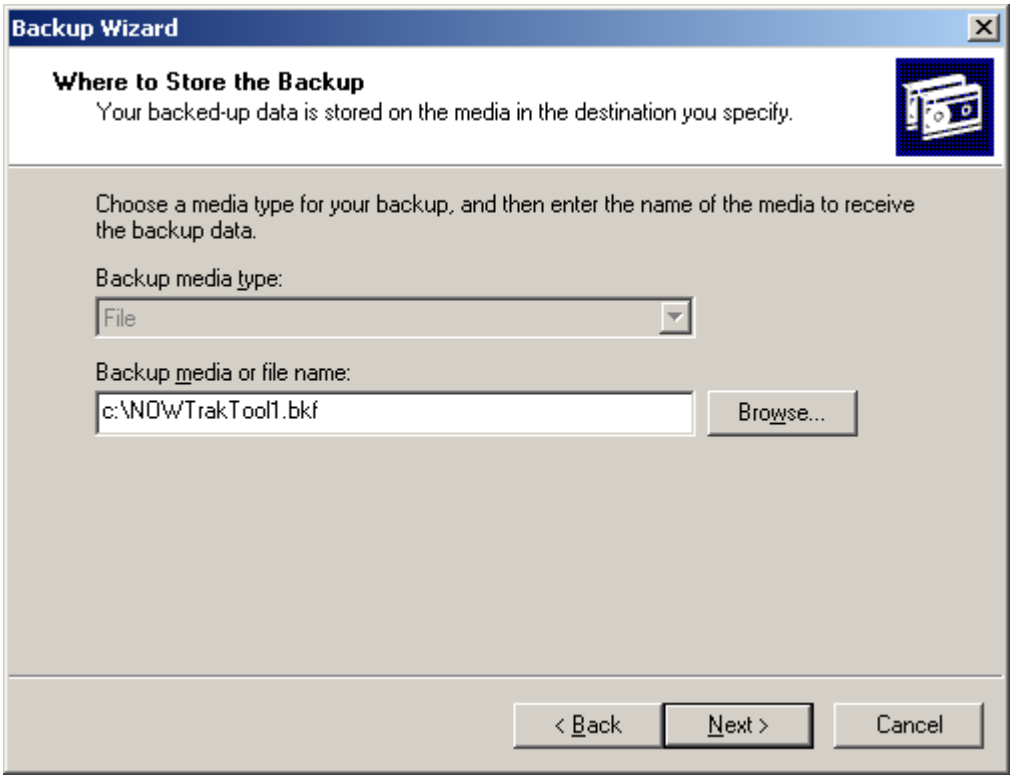
Select “Next” and the following dialog appears:



Select “Back up selected files, drives, or network data” and press “Next” and the following dialog appears:

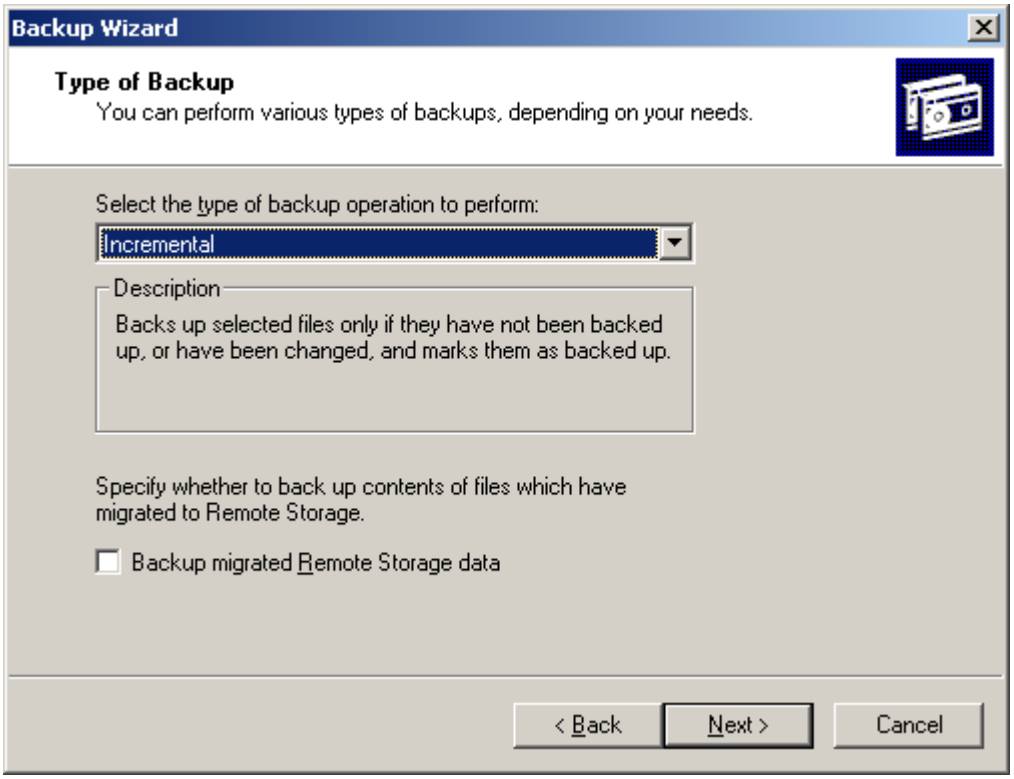


Click the check box for the NOWTrak folder and press “Next” and the following dialog appears:

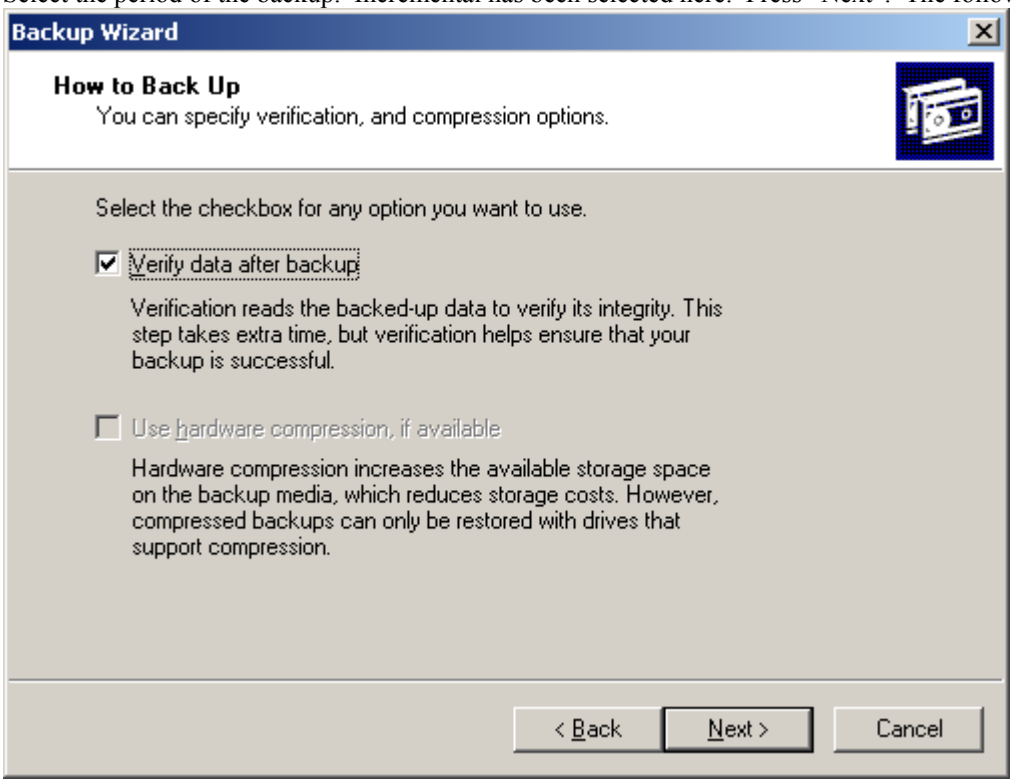


This is the step that allows you to backup your data to a remote system. You can browse to the desired destination and name the backup file using the NOWTrak controller name as the backup file name. Once you have selected the destination, press "Next" and the following dialog appears:

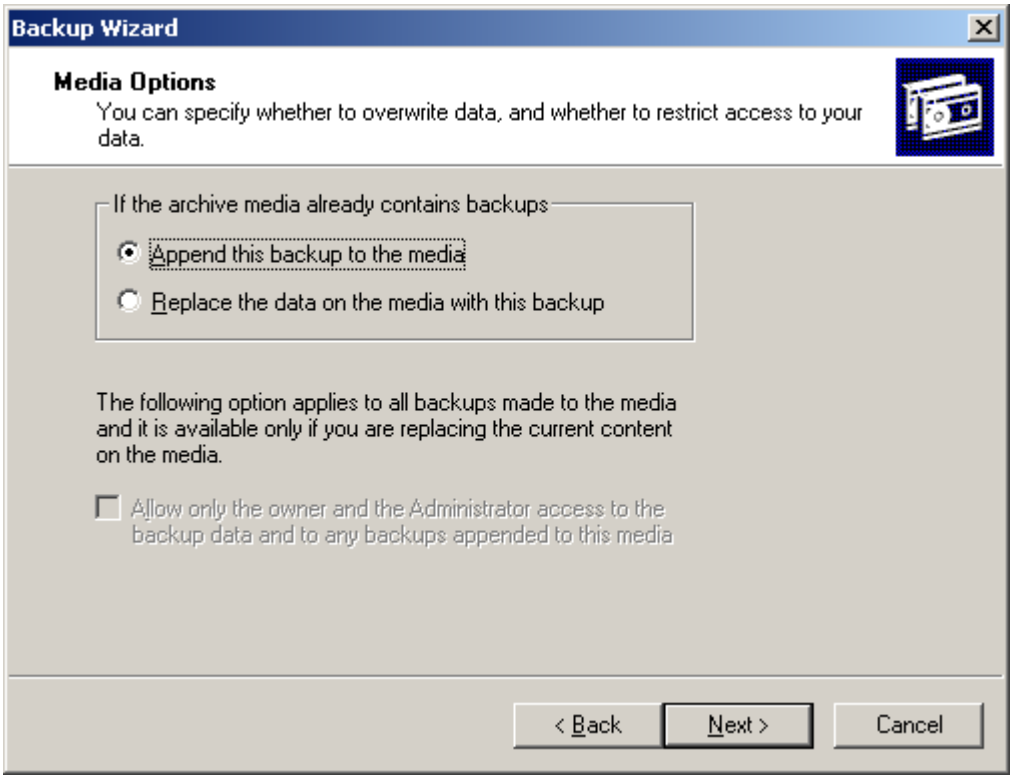
This dialog says that we're done, but the next step is to get this to happen periodically. To do this press "Advanced…" so that the backup can be scheduled. The following dialog appears:



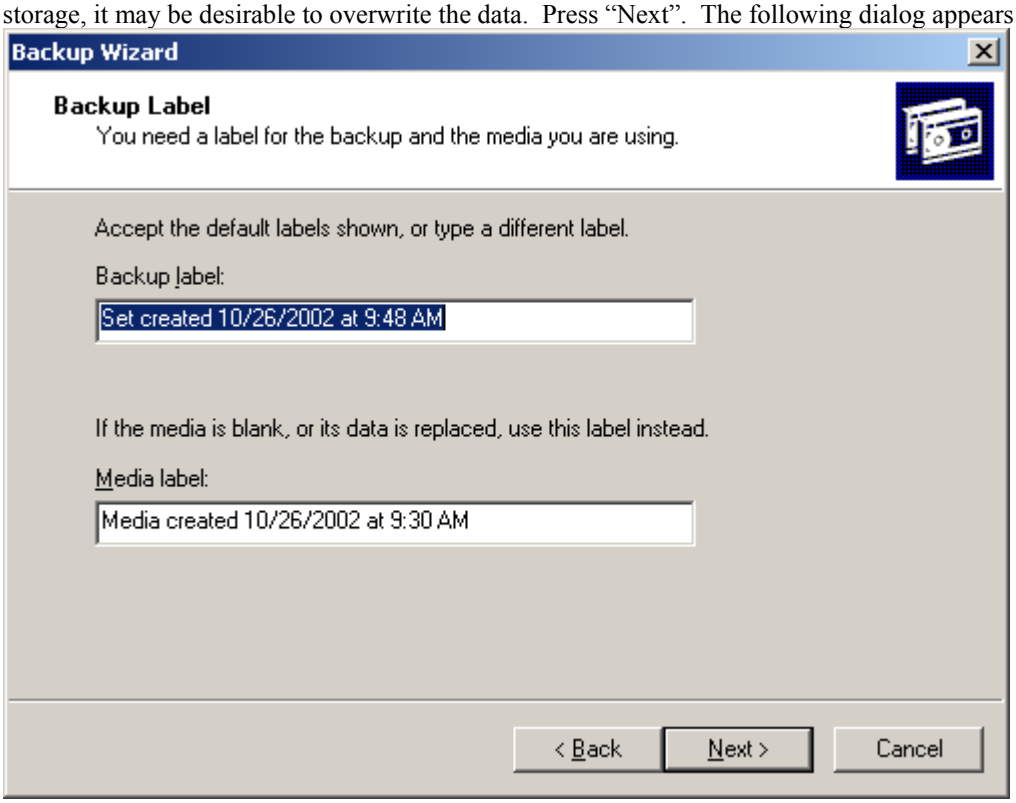
Select the period of the backup. Incremental has been selected here. Press "Next". The following dialog appears:



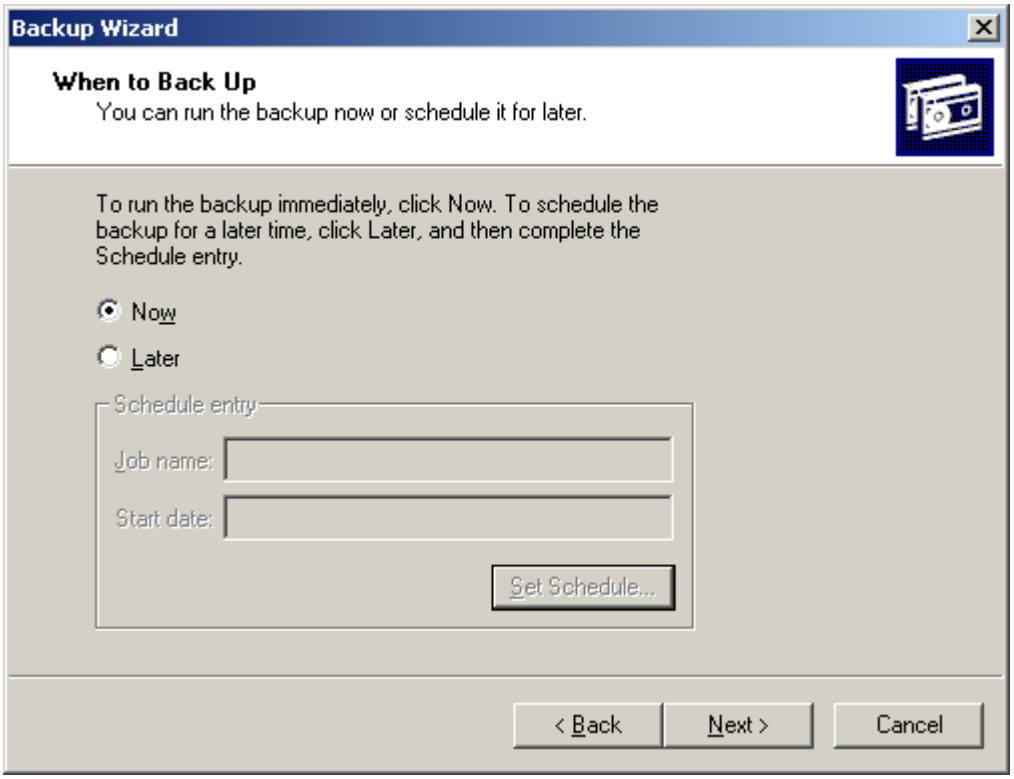
Choose verify data after backup. It's important to know the backup just created is indeed a valid backup. Press "Next". The following dialog appears:



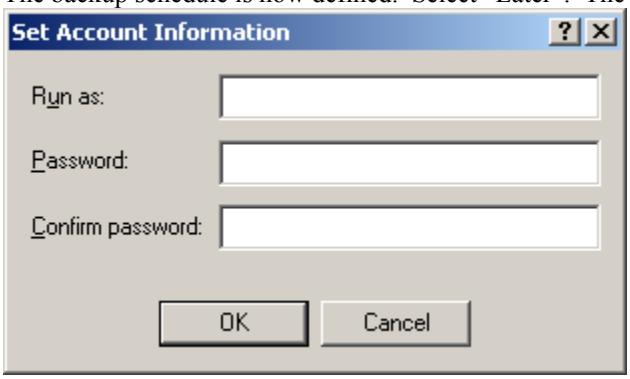
Use the above selection if the data is being backed up to a network drive. If it is being backed up to removable storage, it may be desirable to overwrite the data. Press "Next". The following dialog appears:



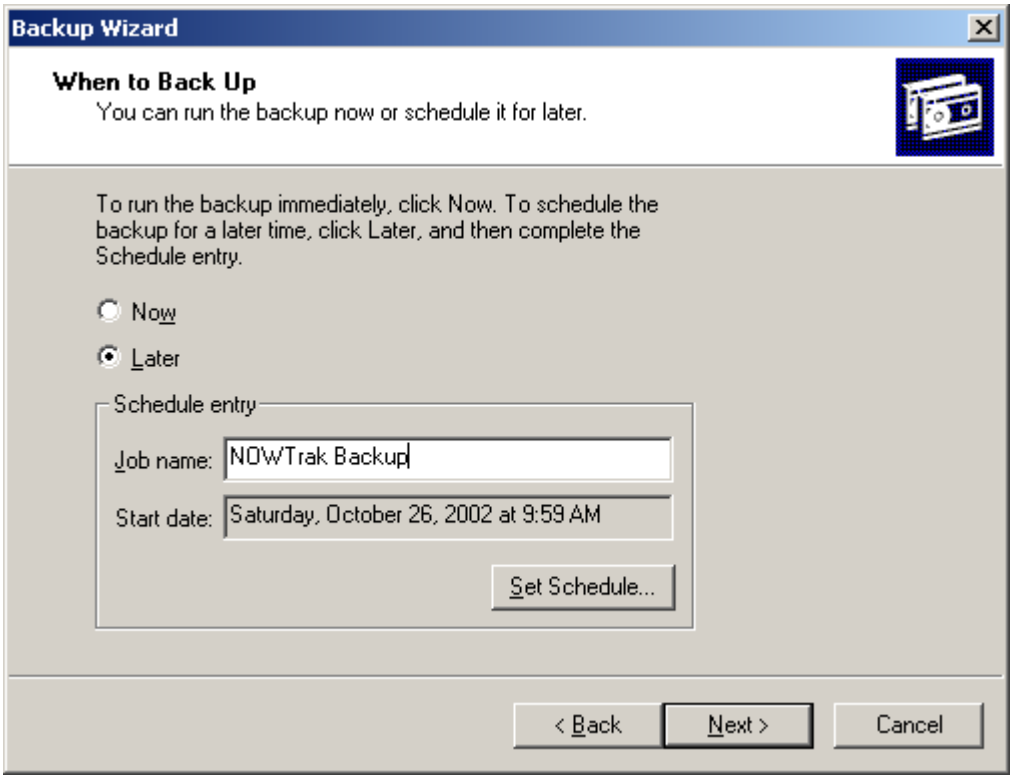
Enter label comments as desired. Press "Next". The following dialog appears:



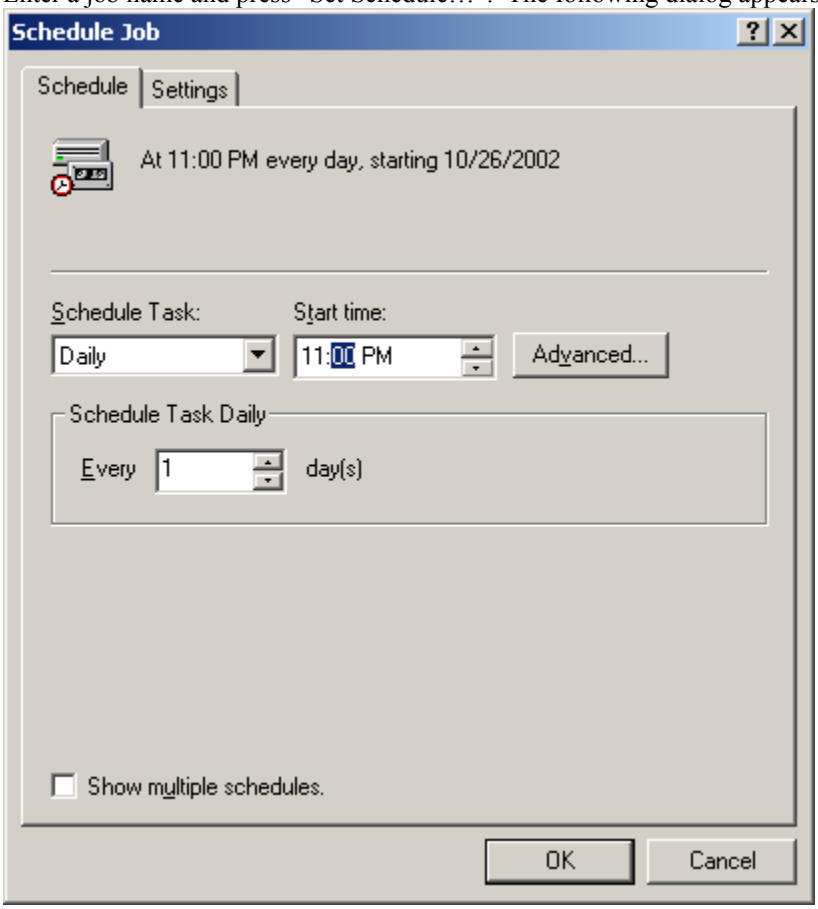
The backup schedule is now defined. Select "Later". The following dialog appears:



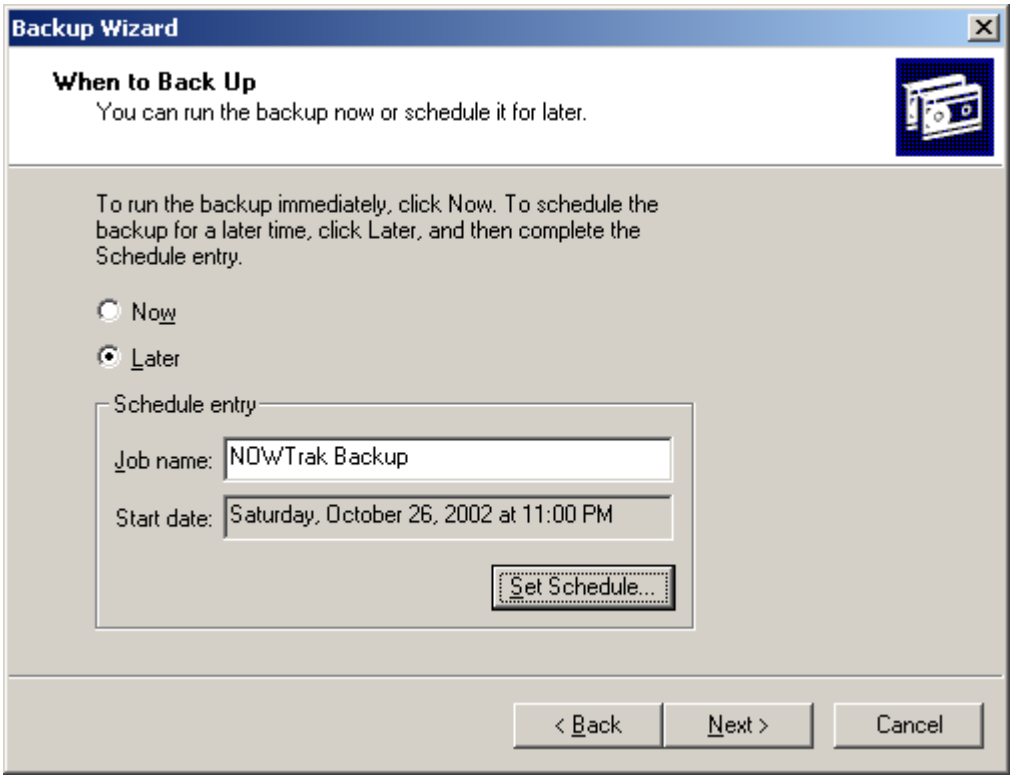
A valid account on the computer is required to be entered at this time. Press "OK" when finished. The following dialog appears:



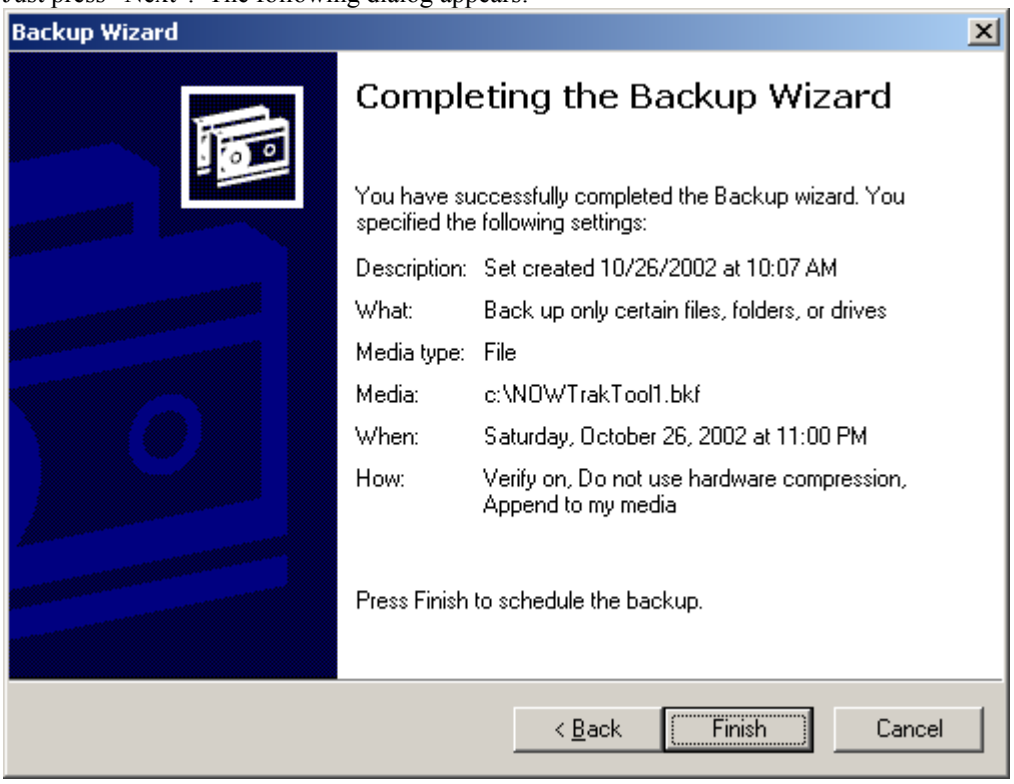
Enter a job name and press "Set Schedule…". The following dialog appears:



Select the frequency of backup here. "Daily" has been chosen. Also choose a time of day when the system or network is not going to be busy. Press "OK". The following dialog appears:



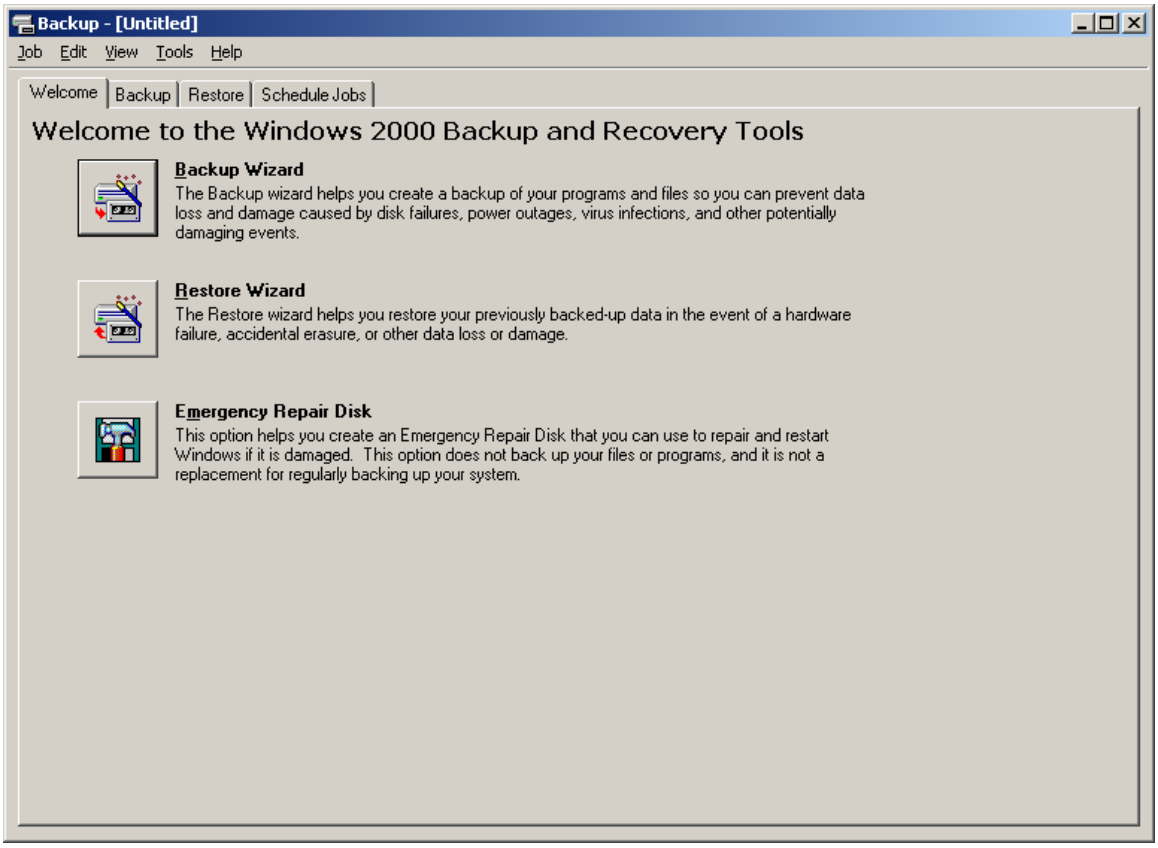
Just press "Next". The following dialog appears:



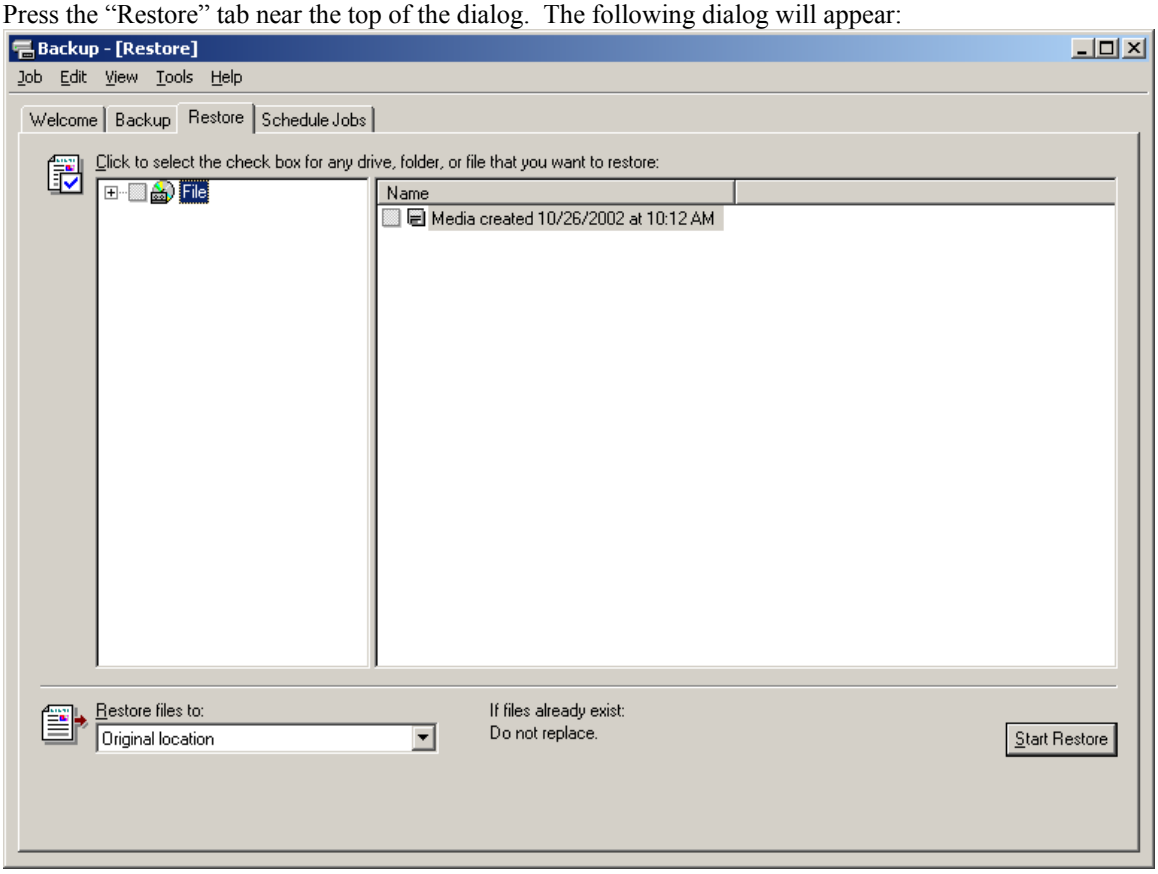
What has been done here is to create a job that runs on the computer every day at 11:00 PM. This job saves only those files that have changed in the C:\NOWTrak folder/directory.

8.2.5 Restore Procedure

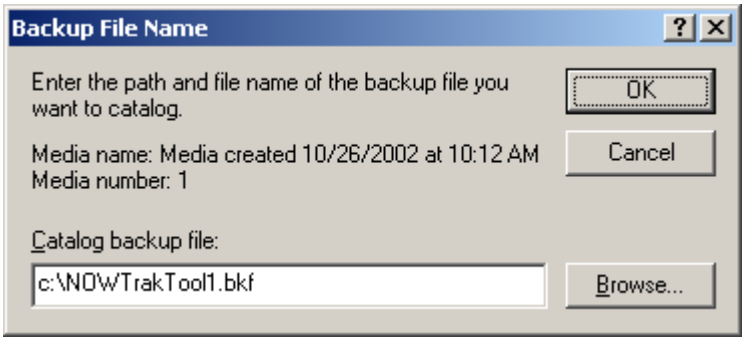
The restore procedure uses the same MS Windows 2000 backup utility as the backup procedure. The restore utility allows you to restore folders and subfolders and individual files. The following illustratiojn highlights the steps involved in restoring an individual file. To start the restore process, simply double click on the backup file. The opening dialog looks like the following:



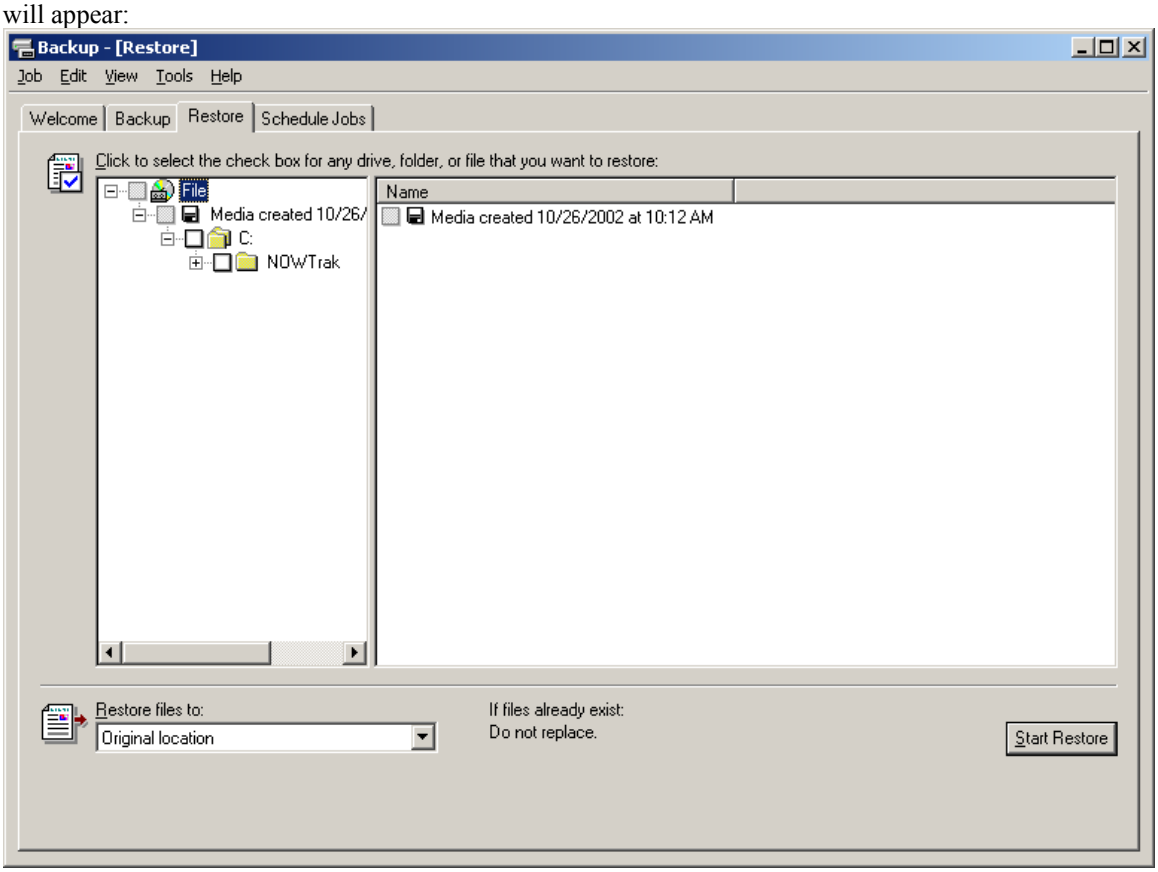
Press the "Restore" tab near the top of the dialog. The following dialog will appear:



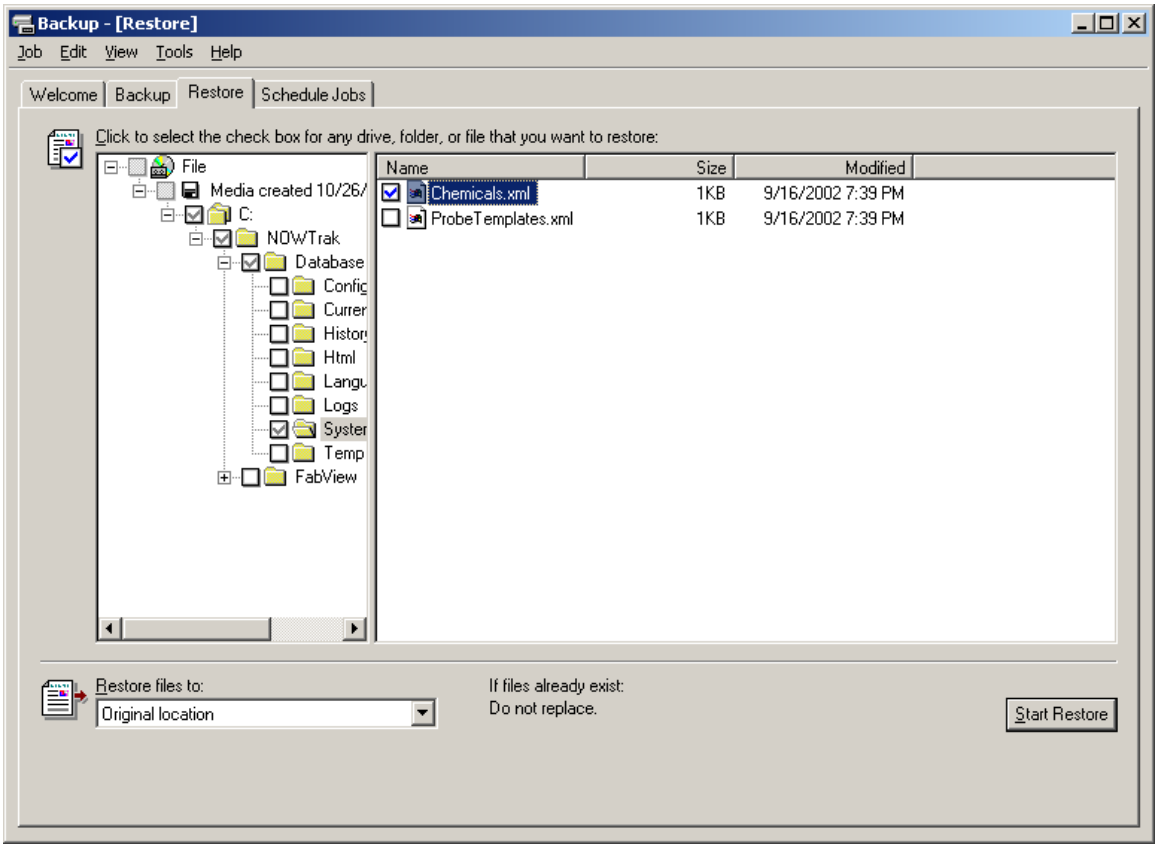
The next step is to open the tree view to the file to be restored. In the process of doing this, the following dialog will appear:



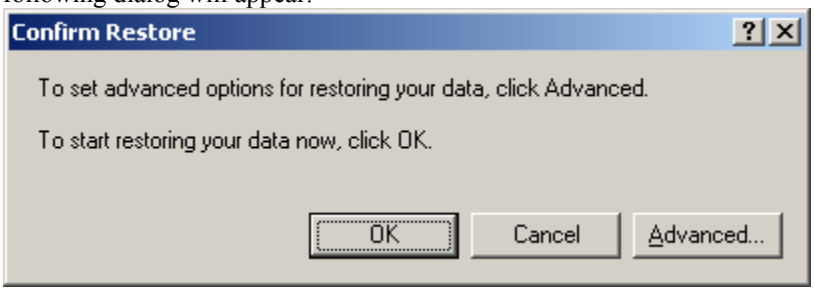
Browse to the backup file to be used for the restore and eventually press "OK" on this dialog. The following dialog will appear:



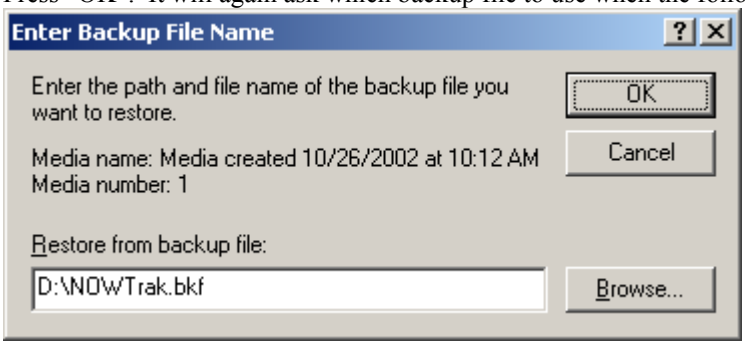
Now open the tree view to the selected file. Be sure only the file to be restored has the check box selected. Once this has been done, the dialog should look similar to the following:



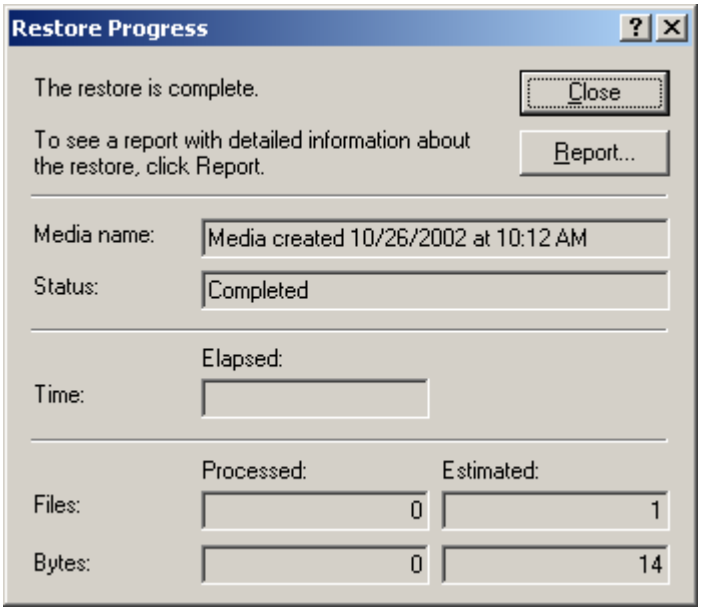
This dialog shows that Chemicals.xml will be restored. This is the only file selected. Press "Start Restore". The following dialog will appear:



Press "OK". It will again ask which backup file to use when the following dialog appears:



Press "OK". The restore process will begin. Depending on the time to copy the file, a dialog will appear to show the progress of the restore. If it is quick, the progress dialog will not be seen or will only be seen for an instant. After the restore has completed, the following dialog will appear:



The restore has been completed. To finish, simply close all of the dialogs related to the restore.

9 Regulatory Information

9.1 United States

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

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