MSC-LIMS™

Laboratory Information Management System for Microsoft Access

User's Guide

Version 5.0 for SQL Server

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Chapter 1: Overview

MSC-LIMS is a Windows-based laboratory information management system (LIMS) used to manage the daily information processing requirements of an analytical laboratory. From sample login to final report generation, MSC-LIMS will help organize, secure, track, analyze and manage your data. This document provides an overview of the components of MSC-LIMS along with detailed instructions for configuring and operating the system.

User's Guide Overview

This User's Guide is intended for both end users and personnel responsible for overall administration of the system. End users responsible for day-to-day data entry should read chapters one through six. LIMS administrator(s) should also be familiar with topics in chapters seven and eight that are devoted to System Setup and System Administration.

This User's Guide assumes that you understand and are comfortable using the Windows operating system. If you are new to Windows, you may find the Windows Help files useful. To open the Windows Help files, click the Start button on the taskbar and then click Help.

This Guide is organized into the following chapters:

Chapter 2: Quick Start

A brief introduction to setting up and operating the system, from configuring the system, logging a sample and printing a work order, to entering test results, printing a Sample Summary Report and customer Invoice.

Chapter 3: System Essentials

An overview of the forms environment, report previewing, common keystrokes, the login process, security roles, and the system's main menu.

Chapter 4: Samples

Using the Samples menu to log and track samples, enter sample results, enter QC data for analytical batches, generate reports with sample data, and create and generate user-defined reports.

Chapter 5: Laboratory Notebook

Using the Laboratory Notebook menu to maintain laboratory methods, define sample schedules, view schedule histories, and print work sheets.

Chapter 6: Quality Control

Entering QC data by analytical batch and using the QC menu to create quality control samples, maintain lab instrument and procedure information, print monthly instrument and procedure calendars and generate QC data reports and control charts.

Chapter 7: System Setup

Using the Setup menu to configure the system by defining valid options and operating parameters for analyses, projects, requirements, units of measure, preservatives, sample types, customers, etc.

Chapter 8: System Administration

Using the Administration menu to create user login accounts, sampler and employee records, and define system and workstation configuration options.

Conventions used in this Guide

[OK] [Cancel]	The names of form buttons are displayed enclosed in brackets.
TAB	Upper case letters are used for the names of keys.
SHIFT+F2	A plus sign between key names indicates a combination of keys. For example, SHIFT+F2 means hold down the SHIFT key while pressing the F2 key.
File|Close	Menu items are separated by vertical bars.

System Overview

*See the **MSC-LIMS Release Notes** for installation instructions.*

MSC-LIMS was developed using Microsoft's Access 2010 Relational Database Management System for Windows. MSC-LIMS can be installed on a single PC or in a multi-user configuration.

Minimum System Requirements

Computer	500 MHz or faster processor
O/S	Windows XP SP3/Vista SP1/ 7 / 8 / 10
Hard Drive	3.0 GB free for typical installation
Monitor	1024 x 768 or higher resolution
RAM	512 MB
Database	Microsoft SQL Server 2008 R2 or newer
ODBC Driver	Either 'ODBC Driver 13 for SQL Server' or 'SQL Server Native Client 10.0' or newer ODBC driver.

	Note that it is recommended that all LIMS workstations use the same ODBC driver.
Miscellaneous	Microsoft Excel 2003 or newer (32-bit) Microsoft Outlook 2003 or newer (for MSC-LIMS Messaging) PDF viewer software

Additional Documents

Refer to the following documents for additional information on MSC-LIMS and the Access 2010 development environment.

Document	Author
MSC-LIMS Release Notes	Mountain States Consulting, LLC
MSC-LIMS Messaging User's Guide	Mountain States Consulting, LLC
MSC-LIMS Programmer's Guide (for Full System licenses)	Mountain States Consulting, LLC
Microsoft Access 2010 Help	Microsoft Corporation
Microsoft Visual Basic Help	Microsoft Corporation
Access 2010 Developer Reference	Microsoft Corporation

Chapter 2: Quick Start

This chapter offers a quick and painless tour of MSC-LIMS. It is a simplified introduction to configuring the system, logging a sample, printing sample summary and tracking reports, entering test results, and preparing a customer invoice. At any time, read this User's Guide in its entirety to become familiar with the rest of the system.

Installing the System

Complete installation instructions are included in the MSC-LIMS Release Notes in file ReleaseNotes.pdf, which is included in your MSC-LIMS Order email.

Note that workstations do not need a full copy of Access 2010. The setup program will automatically install the Access 2010 runtime on all MSC-LIMS workstations.

Familiarizing Yourself with the System

Follow the suggested strategy, below, to begin using the system and exploring its features. The step-by-step instructions guide you through starting the system, attaching an empty database, entering configuration data, and taking a sample from login, to results entry, to reporting, to invoicing. For more information, proceed to the pertinent sections of the User's Guide.

User's Guide. At any time when using MSC-LIMS, use Help|MSC-LIMS User's Guide to immediately access the User's Guide. Note that the file "MSC-LIMS User's Guide.pdf" must exist in the same folder as the MSC-LIMS software and PDF viewer software must be installed for this feature to work.

Installation. Install the software and database according to the MSC-LIMS Release Notes, as described above. As you follow the instructions in this *Quick Start* chapter, you will begin populating the MSC-LIMS database with your own data.

Exit MSC-LIMS. At any time during these exercises you may exit MSC-LIMS with confidence, because when you click [OK] to exit a data entry screen, or when you select Close to exit a setup screen, or when you click [Close] to exit the Main Menu, MSC-LIMS automatically saves your data entries. You then simply restart MSC-LIMS whenever you are ready.

Configuring the System

The discussion below will take you through system configuration. Follow the steps in order. We suggest this because the information you add to the system now will automatically populate picklists required to configure future screens in turn, and you will observe this phenomenon as you navigate the system. Of course you may return to any step at any time to amend your choices, security role permitting, as we will remind you periodically.

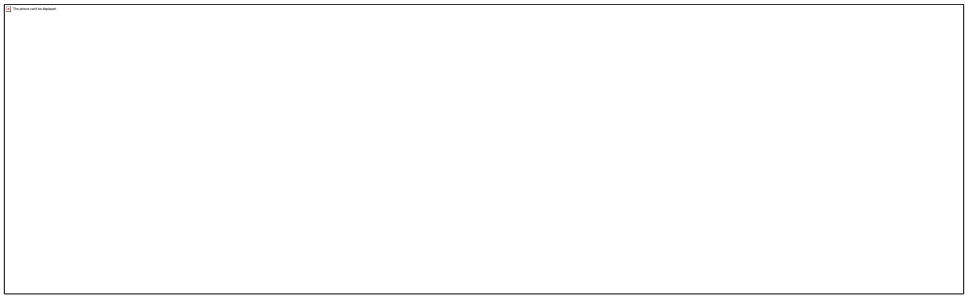
Users Guide. This *Quick Start* chapter includes numerous cross-references to pertinent sections of the User's Guide. You are encouraged to use the section name, page number, and figure number links embedded in this document to go immediately to the relevant pages where you will find more detail about the topic under discussion, including many screen captures. Page numbers are also provided in parentheses for easy reference.

Let us begin.

Refer to the MSC-LIMS Release Notes for installation instructions.

Start MSC-LIMS. Double-click the desktop MSC-LIMS icon, or use Start | All Programs | MSC-LIMS | MSC-LIMS to start the system. Start MSC-LIMS for the first time while logged onto the workstation as a Windows user with sysadmin or db_owner permission in SQL Server, which will enable access to the entire system. Full access is required to configure the system and the current workstation and create new users. See more on Security Roles (page 43).

Open the MSC-LIMS Database. At initial startup, before the Main Menu even appears, the system prompts you to select your MSC-LIMS database. You will want to select the empty database that is bundled with the system (see Installation under Familiarizing Yourself with the System, page 5).



In the Open MSC-LIMS Database dialog, select the ODBC driver from the pick list. If no drivers appear in the pick list refer to the MSC-LIMS Release Notes for driver installation instructions. Enter the Server in the form "server\instance", where "server" is the name of the server or workstation where SQL Server is installed and "instance" is the name of the SQL Server instance where the MSC-LIMS database was installed. Enter the name of the installed MSC-LIMS database then click [Connect], and the system will open the empty database, and the Main Menu will appear.

Main Menu

See Chapter 3: System Essentials, page 27, for basic navigation.

Each time a user starts MSC-LIMS, The Main Menu (page 44) is the first screen to appear. Today's date and the name and security role of the current user appear below the MSC-LIMS name and version number on the upper left. The database, server, and SQL Server instance names of your currently attached database appears at the bottom of the screen.

You will quickly become familiar with this user friendly, tab-style selection format. It is consistent throughout MSC-LIMS wherever multiple selection options are available.

The bottom half of the Main Menu features five tab-style menu options (six, if your system includes customizations): Samples, Notebook, QC, Setup, and Admin. Each of these tabs, or modules, has two scrolling picklists, or submenus: Data Entry/Inquiry and Reports. The Samples, Notebook and Admin modules each have a third submenu titled Actions/Other.

Only those options available for the current user's security role are displayed in the submenu picklists. For *Quick Start* you have logged on using an account in the Admins or Owners security role, so you will see all of the system's options.

Admin Menu

Refer to Chapter 8: System Administration , page 131, for detailed information on many more options available to those of the Admins security role.

The Administration, or Admin, menu is one of the Main Menu options. Click the Admin tab to activate the Admin menu.

TIP

It is important to follow these system configuration steps in order, because the information you add to the system now will automatically populate picklists required to configure future screens in turn.

Within the Admin menu, look at the options in the Data Entry/Inquiry menu on the left. Double-click System Configuration to open the MSC-LIMS System Configuration screen. Note that you can also single-click then use ENTER to select a menu option.

System Configuration. On the MSC-LIMS System Configuration screen (find more information on page 132), you will find eleven tab options: Reports, Labels, Time & Date, Data Entry, Audit Trail, Messaging, LimsCode, Misc, Options, System Info and DB Info.

Only the white fields accept data. The grayed fields are either read-only or unavailable, depending upon context.

The System Configuration screen opens on the Reports tab (page 132). Use the information on this tab to assign default page headers and footers and logo format to all your MSC-LIMS reports. Make selections by clicking radio buttons on or off, or selecting to activate or deactivate options. Enter text in the white text fields as appropriate.

Note that "Wind River Labs", the fictitious entity featured in MSC-LIMS' Example Database, is entered in the Footer field as an example. Select then [Delete], or backspace over the example text, and enter your lab's name or other lab-specific text now.

Review the other options available. Select your preferences now, or return to the Reports tab later.

You can return to the Admin menu at any time by clicking [OK].

TIP
If you are in doubt about the meaning of an action or field, simply activate it by clicking with your mouse, and then read the status bar at the bottom left of your screen. For quick reference, right-click in any field for a popup menu of shortcut options.

If you find yourself in a bind, press ESC on your keyboard to delete your current attempts and return to a menu.

Enter the next tab, Labels. Two pre-configured label styles and two configurable label styles are available. If your lab will use labels, eliminate "Wind River Labs" in favor of a Default Title which will appear on the first line of every label. For more information on configuring label styles, refer to Labels, page 133.

Those in the Admins security role can return to the System Configuration screen at any time to revise or update selections.

Then activate the next tab by clicking Time and Date (page 133), and make your selections from the picklists there.

Enter the Data Entry tab (page 134) and carefully consider your selection at each option. Select options that will speed or simplify data entry during Sample Login and Results Entry.

The "Less than" result type and "Approval" analyte picklists are empty in a new database, so you cannot complete this screen at this time. Those two picklists will be populated with Result Types and Analytes when we come to them, below, and we will remind you at that time to return and complete the Data Entry tab.

We won't address the next seven tabs just now: Audit Trail, Messaging, LimsCode, Miscellaneous, Options, System Information (System Info), and Database Information (DB Info). Refer to these in the User's Guide at your convenience.

Click [OK] when you are finished, and the system automatically returns you to the Admin menu.

Only users in the System Administrator security role have access to the Users setup screen and its records.

Users. From the Admin menu, Data Entry/Inquiry submenu, select the Users setup screen (page 137). This type of screen, containing multiple "records" (one record per row) each with multiple "fields" is common throughout the system.

Note

The term "record" refers to an entire block of information, such as all data for a single Employee. "Field" refers to a single piece of the "record", and also to screen real estate dedicated to a specific type of data, such as the employee's Last Name.

Enter the assigned Windows login name in the form "server\login name" of each employee who will use MSC-LIMS, one employee per record or, in other words, one employee per row. Login names are NOT case sensitive, and CANNOT BE CHANGED once entered. Sampler/Employee names will be entered later. Assign Security Roles to Users (page 43) by activating the appropriate radio button.

Tip

The left-most column of data entry screens with multiple records contains *record selectors*. An arrow in the record selector indicates the active record. An asterisk (*) in the record selector indicates the empty or new record. A pencil icon in the record selector indicates that the system has begun adding a new record but it has not yet been saved to the database. You may also click on the record selector to select a specific record. When a record is selected, you may use DELETE to delete the record. More options are available. Refer to Common Keystrokes and Mouse Actions (page 29).

Note that MSC-LIMS uses Windows authentication for system access. Only valid existing Windows users may be added to the Users setup screen.

When you are finished, pass your cursor over the icons in the toolbar. Select Close or use File | Close to save the data and exit the setup screen.

Tip

Users, Employees and Samplers: "Users" are the Windows users who will have access to MSC-LIMS, hence the importance of login name and security role.

"Employees" are individuals who work at your lab; you may enter all employees or only those who are expected to be MSC-LIMS users. Simplify data entry at the Employee setup screen by selecting from the picklist of Users already entered.

"Samplers" are individuals who are not employees, for example outside consultants, walk-in customers, concerned citizens, personnel of other labs.

Employees. Now, select the Employees option (page 131) from the Admin menu. Note that the Employees setup screen opens in the default ADD MODE. Try the drop-down picklist in the Login Name field, and you will see that the picklist is now populated by the entries you made in the Users setup screen. Select an employee's login name to begin a record for that employee.

Tip

Forgot to create a login account for an employee while populating the Users setup screen, above? Don't worry. In Add Mode on the Employees setup screen, simply double-click the Login Name field (or right-click and choose Add to List) to activate the Users setup screen. Enter the User's login name and security role, and select Close to return immediately to the Employees setup screen.

Complete the remaining information for the employee. If you select the Inactive option, that Employee will not appear in the Sampler picklist in the sample login screens.

Optionally, enter Training and Other Certification in the appropriate fields. You will find that you cannot enter an employee's Method Certification yet, as the Method picklist is still blank.

Tip

The Employees' and Samplers' Initials that you enter now will populate picklists in future screens. Sometimes the initials of the User currently logged on are entered by default, for example under "Sampler" when logging samples. Such initials appear on reports, and full names generally do not appear. For that reason, be sure that all Initials are unique.

If you attempt to close a setup screen before completing any required information, MSC-LIMS will alert you.

When you have finished entering an employee's information, return your cursor to one of the main screen fields (e.g. Employee ID, Last Name, etc.). Pass your cursor over the icons in the toolbar. Select New Record. MSC-LIMS saves your current record and presents a new, blank record for the next employee.

Follow the directions above to create, complete and save a record for each employee. When you are finished, select Close. MSC-LIMS will automatically save your last record and return you to the Admin menu.

Verify your work. Return now to the Users setup screen to confirm that your employees' first and last names have been added to their Users login record. Again, select Close to return to the Admin menu.

Tip

Edit Employees. Members of the Admins and Owners security roles may edit an employee's records in the future. Enter the Employees screen from the Admin menu. Click [Edit Data] in the toolbar to invoke EDIT MODE, and use the Select Employee drop-down picklist to open the employee's record. Make your changes or additions, then select Close to save the revised record and exit the screen.

This technique is valid in any data entry screen with Add and Edit modes.

By default all Employees are Samplers, but Samplers are not Employees.

Samplers. Your lab may deal with Samplers who are not necessarily Employees (for example, outside consultants or walk-ins - page 132).

All Employees are also Samplers by default. However, a Sampler is not automatically an Employee. Samplers' initials are available along with Employees' initials in the Sampler picklists when logging samples.

You may confirm the presence of Employees as Samplers if you select Edit Mode and inspect your choices in the Select Sampler pick list.

If your lab uses non-employee samplers, select the Samplers option from the Data Entry/Inquiry submenu in the Admin menu. In Add Mode, enter information for Samplers other than Employees.

You may designate an individual Sampler as the default sampler when logging samples, by selecting their initials under Sample Login Default. Otherwise, select Current User or leave the field blank. Click Close when you are finished.

Tip

Generic Samplers. Where you do not need to track individual samplers, consider creating "generic" samplers. For example, "Operators, Plant" and "Sampler, Client" are two options. That is, set the sampler's last name to "Operators", first name to "Plant" and enter appropriate initials.

If you want to designate a Sampler but not allow them to log samples, assign them the "Read Only" security role. Double-click the Login Name field to enter the Users setup screen to change security roles, or to create a new login name record if you omitted a Sampler.

Tip

Edit Samplers. Members of the Admins and Owners security roles may use the Edit Mode to modify a Sampler's record.

Tip

If a Sampler later becomes an Employee, members of the Admins and Owners security roles may change a Sampler's record to an Employee record, using [Change to Employee] in the Samplers setup screen under Edit Mode. Select the Sampler in the picklist, assign them a unique employee number and press ENTER on your keyboard. Then click [OK]. Likewise, you may change an Employee to a Sampler only, using [Change to Sampler] in the Employees setup screen under Edit Mode.

Recreate the Workstation Configuration separately at each licensed workstation.

Workstation Configuration. From the Admin menu, select the Workstation Configuration option to enter the MSC-LIMS Workstation Configuration screen (page 138). There are three tabs: Settings, Folders, and Label Printers. Setup data on all three tabs must be completed distinctively at each licensed workstation, and may be configured only by those in the Admins and Owners security roles.

Under the **Settings** tab, Populate Sample List refers to picklists of logged samples that are made available in many Results and Reports screens. A shorter duration results in more condensed picklists. Be sure to select a range of time broad enough to encompass all active analyses, depending upon your lab's typical work load. The remaining selections refer to automatic prompts and warnings. Select or deselect each option.

Under the **Folders** tab, The MS Excel Template folders identify the location of Microsoft Excel import and export templates used with MSC-LIMS' Excel interface. Initially, you may want to set these options to the folders with MSC-LIMS examples. Click [Browse…] to navigate to the folder where you installed the MSC-LIMS Workstation component during system installation, and in the Examples folder select the Excel Export Templates and Excel Import Templates folders, respectively

The Laboratory Documents field provides quick access to external documents you reference or create in other applications such as Word or Excel. Click [Browse…] to locate the appropriate folder (page 98).

If your lab will use labels, select the **Label Printers** tab to assign the label printer for each available label style, for example one of the supported Dymo LabelWriter printers.

Click [OK] when you are finished configuring all three tabs. You have finished with options in the Admin menu for now, but will return later.

Setup Menu

The Setup Menu is another of the five Main Menu options. Activate the Setup menu by clicking its tab.

Data Entry and Inquiry. The DataEntry/ Inquiry submenu on the Setup menu provides an extensive list of configuration screens. The data you enter in these screens will become available in picklists throughout MSC-LIMS.

The Setup data entry options are sorted alphabetically. Nevertheless, select options and enter information in the following order, because the picklists generated by your data entry are required in other setup screens as you continue configuring the system. This will become evident as you proceed.

Select and open each of the setup screens in the order suggested, and enter the appropriate information for your lab. Close each screen when you are finished to return to the Setup menu.

Units. Enter Units of measure typically used in your lab. Enter the name of the unit and an abbreviation, such as "cfu/g," "mg/L" (page 130).

Preservatives. Enter types of Preservatives typically used on samples in your lab, such as "Refrigeration," "Sulfuric acid," "n/a" (page 120).

Container Types. Enter Container Types or materials, such as "Plastic," "Glass," "n/a" (page 115).

Locations. Enter identifiable names of Locations where samples are collected, such as "Final Effluent" or "Hoback River" (page 119). Whenever a sample is logged in, a Location is required. Use the Description field to add optional notes or other information about the location. You may designate a Location as the default location when logging samples by selecting it under Sample Login Default, otherwise, leave the Sample Login Default field blank.

When you are finished entering Result Types, return to the System Configuration screen, Data Entry tab (page 134), to select a "Less Than" result type from the newly created pick list.

Result Types. Refer directly to page 127 of the User's Guide for detailed information on each of the Result Types fields. Enter result types.

Sample Types. Enter typical Sample Types processed in your lab, such as "Grab", "Potable water", "24-hr composite", "n/a" (page 129). When a sample is logged in, a Sample Type is required. Use the Description field to add optional notes or other information about the sample type. You may designate a Sample Type as the default sample type when logging samples by selecting it under Sample Login Default, otherwise, leave the Sample Login Default field blank.

Customers. Enter Customers information if appropriate for your lab (page 115). Complete fields on the main screen, then proceed through the seven tabs below. Text entered in Default Sample Description on the Notes tab will appear when you select that customer during Sample login.

Laboratories. Enter information for outside Laboratories if appropriate for your lab (page 119).

Sample Statuses. "Normal", "Rush" and "Immediate" Sample Statuses (page 128) are pre-configured. When a sample is logged in, sample Status is required. You may define additional Sample Statuses as necessary. You may designate a Sample Status as the default status when logging samples by selecting it under Sample Login Default, otherwise, leave the Sample Login Default field blank.

> **Note**
>
> These screens follow the multiple-record formats you first explored in the Admin menu's Users setup (where you simply edit or add single-line records) and Employees setup (where you enter more extensive data in either Add Mode or Edit Mode). Navigate using the Edit Data or Records menus. When you return to a setup screen to edit, you may see that your entries have been alphabetized or arranged in "sort order".

Analyses. Select Analyses (page 107). Use the default "Add Mode" to create a new analysis. Type the Analyte name and an abbreviation for its name in the appropriate fields then populate the remaining fields using the picklists to select from data you've entered during previous steps.

> **Tip**
>
> Double-click a field that contains a picklist, and the system presents the setup screen for that field. Add additional records if necessary and then select Close to return to the Analyses setup screen.

The lower portion of the Analyses setup screen contains five tab-style menu options. Values are required in many fields on the Specifications tab (page 109), as you will discover if you attempt to close the window prior to completing them. Only enter information in the Cost and Cost When Sent Out fields if you anticipate billing for the analysis.

Select the Results Entry tab (page 111). Limit result types for this analyte if appropriate. Activate the 'Admin privileges required for results entry' and 'Method certification required for results entry' options if appropriate.

Complete the information on the QC Specifications, Excel Interface and Notes tabs as necessary (pages 112, 112 and 114, respectively).

Save each completed Analysis record by selecting Save Record, New Record, or Close on the toolbar. The Analyses picklists generated by your efforts in the Analyses setup screens are now available, so let's complete the setup screens that require you to specify analytes.

Projects. Return to the Setup menu, and use the Projects option (page 120) to create your first project. During sample login, a Project is required. The

Project, such as "Potable Water Analyses", determines which analyses are automatically assigned to the sample, although you will have the opportunity to amend the list of required analyses.

While creating Projects, did you realize you forgot to include a Location or an Analyte? Double click the Location or Analyses field to activate the Locations or Analyses Setup screens. Edit or enter a new record, then select Close to return directly to the Projects setup screen.

During Project Setup, you are required to enter a Project name and at least one analyte. Note the picklist of available Analyses that you entered previously, and note that when you select an Analysis the analyte's specifications are displayed for your convenience.

Note the picklist of available Locations that you entered. Locations are optional, and Projects can have both default and location-specific analyses.

Enter data in the other tabs as necessary. Text entered in Default Sample Description of the Notes tab will appear during Sample login. Return your cursor to the Project field then select Save Record or New Record from the tool bar. Enter and save all of your Projects, then select Close.

Audit Trail Reasons, Label Scripts, Login Batches, QC Data Types, Requirements, SQL Expressions, Text Lists. There are a number of screens in the Setup menu that we have not yet explored. Enter data in the Audit Trail Reasons, Label Scripts, Login Batches, QC Data Types, Requirements, SQL Expressions and Text Lists screens as necessary or at your convenience, referring to the User's Guide for clarification (pages 114, 118, 119, 125, 126, 129, and 129 respectively).

Check Your Work – Record Count

This is a good opportunity to take a break and verify the accuracy of your data entry. Return to the Admin menu. Double-click to select Database Records under the Reports sub-menu. You will see a tally of the records you have entered into each table in the MSC-LIMS database (excluding Frequency, Main Menu, and Miscellaneous List tables, which are populated by the software itself). Left-click to zoom in and out. Click the arrows in the lower left corner to proceed to additional pages if necessary. Select Page Setup under the File menu and verify your print options, then click File |Print or select the printer icon in the toolbar to print a hard copy. Close the report.

Check Your Work – View and Print Reports

Note the appearance of the logo, headers and footers you assigned during System Configuration!

Return to the Setup menu. Under Reports (page 130), you will see that there is a report pre-configured for virtually every Data Entry option. Double-click on any report to view a summary of the configuration data and/or criteria you have already entered into the system. Some reports, such as "Analyses," "Projects" and "Requirements," ask you to select from available variables. Do so then click [Preview]. From any Report preview screen select [Print] from the toolbar to obtain a hard copy of the report.

Edits, Additions and Deletions

Your configuration data can be amended, security role permitting. Follow the procedures outlined below. Refer to Security Roles (page 43) for a discussion of revision options available to each system user.

EDIT MODE. Often, the data you entered under Setup and Admin can be amended by placing the screen in EDIT MODE, rather than ADD MODE. Select [Edit Data] from the toolbar, then select your subject from the picklist. Tab from field to field, and begin typing in the selected field or use the picklist. A safety feature will not allow you to save a new variable that is not already available in the picklist – see "Add to List" below.

ADD MODE. Continue to build your database using options available in the Setup and Admin menus by placing the screen in ADD MODE. Select [Add Data] from the toolbar, then enter a new customer, analysis, project, etc.

Add to List. In some data entry fields, if your picklist does not include your preference you may right-click and select Add to List. This command puts you directly into the picklist's Setup form. This is a handy timesaver when you realize you have forgotten to include certain options while building your picklists.

Double-click. As an alternative to using Add to List, above, it is often possible to double-click in a picklist to activate the setup screen for that field.

Delete a Record. Place your cursor in any field within a record, then use Edit | Delete Record. If the record is already related to another database record, a message will appear indicating that the record cannot be deleted. If the record can be deleted, you will be asked to confirm the deletion.

Logging a Sample

Note that anyone in the Samplers, Technicians, and Admins Security Roles (page 43) may log the samples

You should now have enough configuration data to log your first samples. To allow you to follow all of the examples for the various results entry methods in the next section, we suggest that you log at least five test samples at this time. Don't worry about precise samples. It is a simple matter to delete your test samples before going "live" with MSC-LIMS, and you will be reminded to do so at the end of *Quick Start*.

Samples Menu

The Samples menu is the first of the Main Menu's tab-style menu options. It is active by default whenever a user starts the system, because the options available from this menu are typically the most frequently used in a busy lab. If your Samples menu is not activated already, select it by clicking its tab.

Sample Login. First, we will use the Sample Login screen to perform a Single Sample Login (page 59). On the Data Entry/Inquiry menu of the Samples menu, select Sample Login. The Sample Login screen opens in the default Add Mode.

Note that a User may have a Login Name, but not be a Sampler or Employee. In that case, their initials will not be available on the Sampler picklist.

Every sample logged requires a Project, Location, Sample Type, and Sampler. Enter this information by selecting from the picklists. MSC-LIMS may automatically populate the Location, Sample Type, Sampler and Status fields according to your default settings in the Setup menus. Use the picklist to revise these fields if necessary.

Observe the Collected date field, and optional Collected Time, and Received Date and Time. MSC-LIMS will only automatically populate these fields according to your default settings in Data Entry under System Configuration (page 134). Note that time fields left blank will default to midnight for future queries.

Your manually entered text will precede any default text you have entered in the Default Sample Description field on the Notes tab of either the Project Setup or Customer Setup screen.

Use the picklist to enter an optional Customer and enter a Cust. Sample number if appropriate. Enter additional information in the Description and the Notes text fields if necessary.

Click within the analysis list in the lower half of the screen our use File | Save Record, and the analyses required by the assigned Project will automatically populate the sample's record. Revise the list of required analyses at this time if necessary, by clicking the [Add] analysis button to select additional analyses from the picklist. Or, click on the record selector arrow in the left margin of the analysis you wish to delete, and use DELETE or Edit | Delete Record. The system will prompt you to confirm this action.

Note

Note the Sample ID in the field above the Project name. When a sample is logged, the system automatically assigns a unique sample identification number, based on the date and time of login. MSC-LIMS even accounts for the possibility of two samples being logged on different workstations at the same moment by then setting the last character to 'A', 'B', etc., so that all Sample ID numbers are completely unique.

Alternatively, you may click [Results] to immediately perform Results Entry for a newly-logged sample.

When the sample record is complete, click [New Sample] and your first sample record is saved.

You may also now be prompted to print a label, according to your Workstation Configuration settings (page 138), at which time you may answer [Yes] or [No]. A new Sample Login screen is then generated. Enter and save a second, third, fourth and fifth sample in similar fashion, and when they are all completed click [Close] to exit the screen.

This is a good opportunity to take a break, and amend any configuration data you may have noted for modification during Sample Login.

Printing Reports

Introduction to Query Controls

The tab-style selection criteria menus are typical of screens where multiple selections are available.

MSC-LIMS' powerful query controls allow you to locate, compare and report samples across a broad range of criteria.

Let's view an example before embarking on the exercise below. On the Samples menu, Reports submenu, double-click Work Order. You are presented with the Work Order Setup screen. The query controls consist of

four tab-style selection criteria menus (five, if you have customizations), which are consistent throughout the system. See Querying Samples (page 33).

Examine the first tab. Users choose criteria by first selecting or deselecting criteria fields (Project, Location, Sample Type, Sampler, etc.). Once a query option is activated by clicking in its box, a date and time range field – or a picklist of the lab's data - appears. The more refined the selection criteria, the narrower the list of reported samples. Explore the other query options on the remaining tabs.

TIP

The query controls support querying to include AND to exclude the specified criterion. Click the criteria check boxes once (a check mark shall appear) to include items. Click again to exclude items in a query (a red X appears). Click again to clear the box.

For example, a query that includes the project "Wastewater" and excludes the location "Influent" will find all Wastewater project samples for any location other than Influent. Use the mouse, space bar or the control's hot key to toggle the criterion between include, exclude, and off.

Users select their range of criteria then click [Query] to instruct MSC-LIMS to search its database, collect the samples' information, and hold it for presentation. The system displays a tally of samples that meet the criteria.

If available, users click the [Select] button to open a data selection screen to fine-tune the query results by enabling/disabling individual records. Toggle the boxes in the left column. Click [OK] when finished.

Note that the number of Samples Queried has not changed, but if you fine-tuned the data selection screen the number of Samples Selected has changed.

When the sample selection is adequate, users click [Preview] to view a report in the selected format. If a more refined query is warranted, select Close to return to the query controls, enter additional or different criteria, and click [Query] again. The system will verify that the user wishes to abandon the previous query selections then execute the new query as before.

The resulting report may be printed from the preview screen or from the query setup screen. Click [Cancel] when finished.

We will explore a very simple example of querying in the following exercise.

Work Order

You may find that the quickest method for this exercise is to find all samples logged today. Activate the Login date and time box, then right-click in the start date range field. Select Insert Current Date then execute the query.

Let's print a bar-coded list of all the Samples you logged in during the exercise above (see Using Reports, page 41), including their required analyses. On the Samples menu, Reports submenu, select Work Order.

In the Work Order Setup screen, select any one or a combination of options on the Sample Criteria tab to locate the samples you just entered. For example, activate Multi-Select, activate Project then select multiple adjacent projects by holding down the SHIFT key while clicking your selections with your mouse. Select non-contiguous projects by holding down the CTRL key while clicking your selection with your mouse. Feel free to experiment with other options.

Click [Query], and check to see if the Samples Queried field on the right side of the screen indicates that the correct number of your samples were found.

Now click [Select] to view a summary of the samples on the Select Samples screen. Use the horizontal scroll bar at the bottom of this screen to view additional information for each sample. When scrolling, the Sample ID number remains visible but additional information appears, such as received date, etc. Activate or deactivate the check buttons in the left column to select or deselect individual samples to appear on the Work Order. Then click [OK].

Back on the Work Order Setup screen, type an optional Title and Notes in the fields at the bottom of the screen. Then click [Preview]. A Work Order Report is generated, populated with your samples, Title and Notes, pre-defined default report logo and headings, and the current date and time. Each sample's required analyses are listed.

You may use the print icon in the tool bar on the preview screen, select File | Print, or select Close to return to the Work Order Setup screen and then click [Print]. Then click [Cancel] to return to the Main Menu.

Work Sheet

The Work Sheet report locates and presents all samples which require one or more selected analyses, so you can use it to plan the most efficient testing schedule for all of your active samples. See Work Sheet under Reports (page 97) on the Notebook menu for more information.

From MSC-LIMS' main menu, click on the Notebook tab. Under the Reports submenu, locate and double click Work Sheet. This query setup screen is slightly different from the Work Order setup screen we worked with above.

In the Work Sheet Setup screen, select one or several analytes – select multiple adjacent analytes by holding down the SHIFT key while clicking your selections; select non-contiguous analytes by holding down the CTRL key while clicking. Since all of your samples are currently incomplete, you may safely activate the Incomplete radio button. Since your analyte(s) may be Inhouse or Sent Out, activate the All radio button.

Now use any one or a combination of the options on the Sample Criteria tab to locate your current samples. You may find that the quickest method is the shotgun approach, where you find all samples by Login date range and let MSC-LIMS present only those with your selected analyte(s), but feel free to experiment.

Then click [Query], and check the Samples Queried field for the correct number of samples. Note that your query may not have located all current samples, depending upon the presence or absence of your chosen analyte(s).

Again you may use [Select] to view a summary of the samples on the Select Samples screen. Select or deselect samples to appear on the Work Sheet then click [OK].

Back on the Work Sheet Setup screen, use the optional Sort By fields to manipulate the order in which data will appear on your report. If you have no preference in this regard, leave the fields blank. Type an optional Report Title in the field at the bottom of the screen. Then click [Preview].

A Work Sheet report is generated, populated with samples containing at least one of the analytes you selected, your pre-defined default report headings, Report Title and the current date and time. The Work Sheet contains spaces to hand-write results for the analyte(s). You may print from the preview screen, or select Close to return to the Work Sheet Setup screen and click [Print]. Click [Cancel] when you are finished.

Entering Results

Follow your lab's procedures to process the samples you logged above. Consider using a Work Sheet report to manually convey analyses results then enter the results into MSC-LIMS as directed below. We will explore several options for recording results in the LIMS. The first two options allow results entry organized by sample or multiple samples, and the final options allow results entry organized by analyte.

Results Entry by Sample

Sample Pick List. *If you haven't set a default populating mode for the current workstation, temporarily repopulate a Select Sample picklist. Right-click and select Update Sample List, or double-click on the picklist, to open the Update Sample Pick List dialog then pick a populating mode. Use Workstation Configuration to permanently change the Populate Sample List option.*

Enter Results for a Single Sample. In this example, we will enter results for one of the samples we logged above, by selecting the sample from a picklist of recent samples. From the Samples tab on the Main Menu, double-click Results by Sample to enter the Results Entry by Sample setup screen (page 68).

Under Single-Sample Results Entry, use the Select Sample picklist to select one of your samples. MSC-LIMS automatically presents a detailed Results Entry by Sample screen populated with all of the specified or default information for the chosen sample. In the middle of the screen is the list of analyses assigned to your sample. Note that each line is devoted to a single analysis. TAB from field to field. Right click in a field for access to shortcut menus. Double-click in the Result field or right-click and select Result Specifications for a reminder of the Results Specifications you assigned to that analyte under Specifications (page 109).

Enter the Date and optional Time the test was performed (if you tab through without typing in these fields, MSC-LIMS will respond according to your default settings in the System Configuration's Data Entry tab (page 134).

The default may include inserting the default date that appears in the date field above the analysis Date column).

Use the picklist to enter a Result Type, if applicable. Type the Result Value in its field.

> **Tip**
>
> To automatically insert less-than detection limit results, right-click the Result Value field and select Insert <MDL, or double-click the MDL (method detection limit) field. Note that this feature requires correctly configuring the "Less Than" result type on the System Configuration screen's Data Entry tab (page 134).

In the Tech field, MSC-LIMS will automatically enter the initials of the User who is currently logged on to the system. Only select an outside lab from the picklist if In House is not selected.

If you find yourself in a bind, use ESC on your keyboard to abandon your entry, then TAB out of the record.

Press TAB or ENTER on your keyboard to save this record and access the results entry fields for the next analyte in your sample. You may type text in the Conclusions text box at any time, or right click and select Text Builder for immediate access to pre-defined Text Lists (page 129).

When you are finished entering test results, click the [Sample Summary] button to view a Sample Summary report (or, depending on your Workstation Configuration, you may be automatically reminded to print a Sample Summary report when the sample is complete). From the Sample Summary Report preview screen, click the printer icon to print the report. Select Close to return to the Results Entry by Sample screen.

When you are finished, click [Close] to save your results and return to the Results Entry by Sample Setup screen, or click [Cancel] to abandon your changes and return to the Results Entry by Sample Setup screen. Click [Cancel] to return to the Main Menu.

Enter Results for Multiple Samples. In this example, you will enter results for two more of the samples you logged above. From the Samples menu, double-click Results by Sample to enter the Results Entry by Sample setup screen (page 68).

This time, instead of picking a single sample in the Select Sample picklist, refer to the tab-style selection criteria menus. Using options available on the Sample Criteria tab, locate your incomplete samples by activating and selecting one or a combination of sample criteria, such as Login date range or Project. Click [Query] to instruct MSC-LIMS to collect the required information. Note the number of Samples Queried in the lower right corner.

Then click [Select] to enter the Select Samples screen. For this example, click [Clear All], then use the selection boxes in the left column to select two of your incomplete samples. Now click [OK] to return to the Results Entry By

Sample Setup screen. Note the number of Samples Selected in the lower right corner.

Click [OK] again to access the Results Entry by Sample screen, populated with all of the specified or default information for the first of your chosen samples. This screen is identical to the Results Entry screen we saw during Single Sample Results Entry above, except that in this case where multiple samples were selected, the [Previous Sample] and [Next Sample] buttons in the upper left corner are available.

Enter all data to complete each analyte record for your first sample in the Results Entry by Sample screen, as described for the Single Sample Results Entry above. Then click [Next Sample] to automatically save the data entered in your first sample, and continue to the Results Entry by Sample screen for the next selected sample.

Enter the results of the next selected sample as described above, and optionally click [Sample Summary] to print or view a report for one or more of the samples selected for results entry. Select the samples to include on the report in the Select Samples screen then click [OK] to preview the report. Select Close to return to the Results Entry by Sample screen for your second sample. Then click [Close] to save the data and return to the Results Entry by Sample Setup screen. Click [Cancel] to return to the Main Menu.

Results Entry by Analyte

Enter Results for a Single Analyte. You will now enter results by first locating all samples which contain a specific analyte. Select Results by Analyte on the Samples menu to enter the Results Entry by Analyte Setup screen (page 72).

Under Single-Analyte Results Entry, use the Analyte picklist to select an analyte for which you have results. Next you may specify whether you wish your query to produce a list of all samples containing this analyte, or only samples where the analyte is complete, or only samples where the analyte is incomplete. For this exercise, leave the default radio button All activated.

Then refer to the tab-style selection criteria menus. Using options available on the Sample Criteria tab, locate all the samples you recently logged by activating and selecting one or a combination of sample criteria, such as Login date range. Click [Query] to instruct MSC-LIMS to collect the required information. Note that the tally of samples queried is shown in the Single-Analyte Results Entry box.

Optionally, you may click [Select] to enter the Select Analyses screen. Then click [OK] to return to the Results Entry by Analyte setup screen.

Click [OK] and MSC-LIMS opens the Results Entry by Analyte screen. This screen is populated with many sample records for a single analyte. You can see from the Sample ID column that each line is devoted to a single sample that contains the selected analyte, rather than on each line a single analyte for the selected sample as in the Results by Sample exercise above. Also, you may observe that in some cases a sample's analyte record is completed, if you

had entered test results for the subject analyte in that particular sample during the Results by Sample exercise above. This is because you queried All (both Complete and Incomplete analyses).

Click [Show Sample] to view more login details of each sample. As you move from record to record, the active sample's details are updated.

Enter the appropriate test results to complete each analyte record in the Results Entry by Analyte screen. At any time, you may double-click a Sample ID number to automatically preview the Sample Summary Report for the active record or click [Sample Summary] to print or view a report for one or more of the samples listed. You may print from the Sample Summary Report, or select Close to return to the Results Entry by Analyte screen.

Click [Close] when you are finished entering test results to save your entries and return to the Results Entry by Analyte Setup screen. Or select [Cancel] to abandon your entries and return to the Results Entry by Analyte Setup screen. Now click [Cancel] to return to the Main Menu.

Enter Results by Multiple Analytes. Finally, you will enter results by querying all analytes. Select Results by Analyte on the Samples menu to enter the Results Entry by Analyte Setup screen (page 72), as in the exercise above.

This time, skip the Single-Analyte Results Entry box, but leave the default radio button All (Complete or Incomplete) activated. Go straight to the tab-style selection criteria menus, and locate all the samples you recently logged by activating and selecting one or a combination of sample criteria, such as Login date range. Click [Query] to instruct MSC-LIMS to collect the required information. Note that this time the tally of samples queried is shown in the box below the Query button.

Click [OK] to access the Results Entry by Analyte screen. This screen is identical to the Results Entry screen we saw during Single Analyte Results Entry above, except that in this case the [Previous Analyte] and [Next Analyte] buttons in the upper left corner are available.

Just as in the Single Analyte Results Entry exercise above, the screen is populated with many sample records for a single analyte, where each line is devoted to a single sample that contains the selected analyte. And again, because you queried All, a sample's analyte record may already be complete if you had entered test results for the subject analyte in that particular sample during either the Results by Sample or Results for a Single Analyte exercises, above.

In the next section we will print an Analyte Comparison Report.

Click [Show Sample] to view more login details of each sample. Double-click a Sample ID number or click [Sample Summary] to automatically preview or print the Sample Summary Report for either the active record or all samples listed.

Analytes will appear alphabetically by name, OR in the order you specified for Sorting analytes.

Enter the appropriate test results to complete the analysis record in the Results Entry by Analyte screen. When you are finished entering test results for the first analyte, click [Next Analyte] in the upper left corner of your screen to save your entries and move to the next analyte. You will now see a

list of all samples containing your second analyte. Use the [Previous Analyte] and [Next Analyte] buttons to move from analyte to analyte, entering data as necessary, again noting that some analyses already contain results entered previously.

As an alternative to paging to the Next or Previous Analytes, you may use the Analyte picklist to move directly to another analyte. The picklist is populated with all of the analytes for the samples queried.

Click [Close] or click [Cancel] to return to Results Entry by Analyte Setup screen. Click [Cancel] to return to the Main Menu.

Sample Reports

Sample Summary Report

Select Sample Summary under Reports on the Samples menu. In the Sample Summary Setup screen, you will find the tab-style selection criteria menus. Locate the samples you logged and completed above, by activating and selecting from one or a combination of sample criteria, such as Login date range or Project. Near the bottom of the setup screen, determine whether you want to see 'Each sample on a new page,' and select or deselect this option. Enter a title for your summary report if you desire.

Click [Query] to instruct MSC-LIMS to collect the required information. Click [Preview] to view the Sample Summary report. The report shows all of your sample identification, results, and your designated report headings. Use the scroll bars and page navigation buttons to view the pages. Print from the preview screen, or select [Close] to return to the Sample Summary Setup screen and click [Print]. Click [Cancel] when you are finished.

Analyte Comparison Report

Select Analyte Comparison under Reports on the Samples menu. At the top of the Analyte Comparison Setup screen, select up to five Analytes to be listed, using the SHIFT key to select multiple contiguous analytes and using the CTRL key to select multiple non-contiguous analytes.

Now select up to five report fields, or sample characteristics, again using SHIFT and/or CTRL. Activate the radio buttons to select All (meaning all samples), leaving the Complete or Incomplete for later experimentation, and select All, leaving Inhouse or Sent Out for later. You may also choose to use the tab-style selection criteria menus to refine your query, but it is not necessary for this report so you may skip it for now.

Click [Query] to instruct MSC-LIMS to collect all samples that include at least one of the selected analytes. View the tally of samples queried in the lower right corner of the screen. Click [Preview] to view an Analyte Comparison report. The report shows all queried samples, listing their Sample IDs, your selected report fields, and then the results in a column for each selected analyte.

Click [Close] to return to the Analyte Comparison Setup screen, and explore the Sort By pick lists, using [Preview] to see the results of your selections. When you are satisfied, print the Analyte Comparison report from the preview screen, or select [Close] to return to the Analyte Comparison Setup screen and click [Print]. Click [Cancel] when you are finished.

Customer Invoice

If you have completed a sample with an associated customer and earlier assigned analysis costs, you may prepare an invoice for the service directly from MSC-LIMS.

Double-click Invoice under Reports on the Samples menu. The Customer Invoice Setup screen features the tab-style selection criteria menus. As you may have noticed, one field of the Sample Criteria tab is for Customer. Use this or other criteria to locate the sample(s) you are prepared to invoice.

Tip

You may choose to select 'Customer' as your only criteria, and then click [Query]. MSC-LIMS will collate ALL samples associated with that Customer, including completed and incomplete samples. Or, enter a Completed date range. Select the Complete Samples option on the Additional tab to query only completed samples, and click [Query] again. Or click [Select], and in the Select Samples screen you may select or deselect individual samples. Click [OK] to return to the Customer Invoice Setup screen.

Enter optional text for a Title for your invoice in the Title field. Determine how you would like your samples grouped, and make your selection under Group By. Make your selections in the remaining fields. Click [Preview] each time you change your preferences to quickly observe the ramifications of your choices. You may print directly from the Invoice Summary preview screen or from the Customer Invoice Setup screen.

Tip

Do not be alarmed if the report omits a sample that you know has been logged. The sample may have been omitted because its analyses do not have associated costs. Verify that the analyses have assigned costs using the Analysis Setup screen, and that your choices on the System Configuration screen, Misc. tab, instruct the system to either assign sample costs at login, or at sample completion, or both.

Refer to Edit Sample Costs, page 131, to correct existing samples.

Continuing Your Explorations

Congratulations! You have successfully completed a very condensed tour through MSC-LIMS' basic capabilities. Once you are familiar with the single sample login you will want to explore other features such as Batch Login (page 63) and QC (Chapter 6: Quality Control, page 99).

Delete Hypothetical Test Samples. If your test samples entered during this *Quick-Start* training session were hypothetical, you may delete them now. See Deleting Samples, for instructions (page 75).

On-Line Information. At any time when using MSC-LIMS, you may select Help on the menu bar and choose the MSC-LIMS.com web site. Check MSC-LIMS.com for useful Excel spreadsheet examples, Knowledge Base Articles, and the *MSC-LIMS Insights* newsletter archive.

Chapter 3: System Essentials

This chapter describes the structure of the system's data entry/inquiry forms and the operation of the sample query controls, text builder, and report print preview window. Commonly used keystrokes and mouse actions are outlined. A description of the system's security roles and the operation of the Main Menu are also discussed.

Data Entry/Inquiry Forms

All of the LIMS data entry and inquiry functions are provided through forms or screens. Figure 1 is an example of a data entry/inquiry form showing common form elements. This section describes some of the common screen elements, menu options and keystrokes used to enter and query data in a LIMS form.

MSC-LIMS forms use the current Windows system colors. Use Control Panel to change the Windows color scheme.

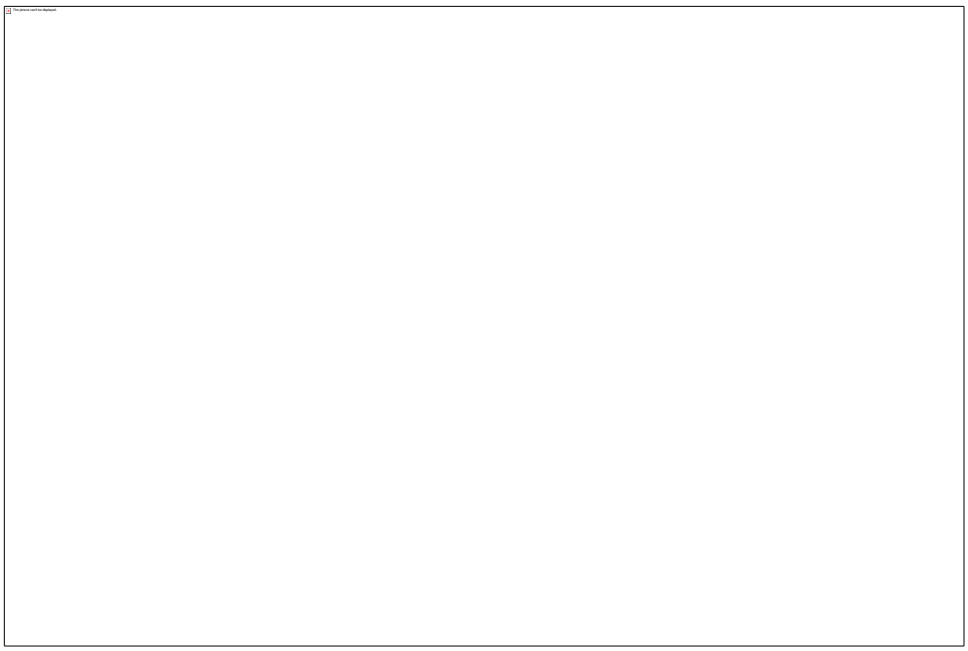


Figure 1 Forms Environment

Menu Bar. The menu bar contains the dropdown menus for the current form.

Toolbar. The toolbar contains buttons for frequently used form actions. Use these buttons as an alternative to the same actions available through the dropdown menus on the menu bar. Position the mouse pointer over a toolbar button to display the name of the button in a caption below the pointer.

Window Tabs. Each MSC-LIMS data entry form and previewed report appears in its own tabbed window.

Form Commands. Form-specific command buttons appear at the top of the form. Most forms include a [Main Menu] button to leave the form open and switch to the Main Menu and a [Close] button to save the form's data and close the form. Many of the forms operate in either Add or Edit mode allowing existing records to be edited and new records added. When such a form is opened, the form includes buttons to change mode. Use the [Add Data] button to place the form in Add mode and the [Edit Data] button to place the form in Edit mode.

Form Mode. An Add/Edit form (see form commands above) uses a form mode label to display the current mode of the form. When the form is in Edit mode an additional record selection field appears below the form mode label.

Record History. To provide additional LIMS management information, many of MSC-LIMS' data entry forms include a record history display. The record history identifies the user who added and last updated the current record and the date and time the record was added and last updated.

Form Area. The form area contains all of the data entry fields, picklists, command buttons and other controls for the current form.

Status Bar. The status bar displays data entry hints for the current field as well as status and error messages. The status bar also shows the state of the keyboard Caps Lock and Num Lock keys.

Menu Commands

While each MSC-LIMS form may have a unique menu, many of the forms share common menu options. Following is a summary of the standard menu entries used in the forms.

File Menu	Key	Description
Close		Save the current record, close the form and return to the previous form.
Save Record	SHIFT+ENTER	Save the current record without exiting the form.

Edit Menu	Key	Description
Undo Typing	ESC, CTRL+Z	Undo typing in the current field.
Undo Current Field/Record	ESC, CTRL+Z	Use this command once to undo changes to the current field and a second time to undo all changes to the current record.

Edit Menu	Key	Description
Cut	CTRL+X or right click and select Cut	Cut selected text and copy to the clipboard.
Copy	CTRL+C or right click and select Copy	Copy selected text to the clipboard.
Paste	CTRL+V or right click and select Paste	Paste text from the clipboard at the current cursor location.
Select Record		Select the current record for deletion.
Delete	DEL	After selecting a record, use this command to delete the record.
Delete Record		Selects and deletes the current record.

Records Menu	Key	Description
Go To		If a form displays more than one record, use the commands on this submenu to navigate to the first, last, next, or previous record.
Go To|New		To add new records in a form use this command to save the current record and navigate to a new blank record.
Refresh		If other users in a multi-user environment are changing a record while you are viewing it, use this command to display the most current data immediately.

Common Keystrokes and Mouse Actions

This section provides a summary of common keyboard and mouse techniques when using the LIMS. If you have a full copy of Microsoft Access, search the online Help system for "keyboard" for a complete summary of keyboard shortcuts. The following tables list keyboard techniques and mouse actions for navigating in a form and editing data.

Navigating Between Fields and Records	Press
To move to the next field	TAB
To move to the previous field	SHIFT+TAB
To move to the last field in the current record, in Navigation mode	END
To move to the last field in the last record, in Navigation mode	CTRL+END
To move to the first field in the current record, in Navigation mode	HOME
To move to the first field in the first record, in Navigation mode	CTRL+HOME
To move to the current field in the next record	CTRL+PAGE DOWN
To move to the current field in the previous record	CTRL+PAGE UP
To exit the subform and move to the next field in the master form or next record	CTRL+TAB
To exit the subform and move to the previous field in the main form or previous record	CTRL+SHIFT+TAB

Entering and Editing Data	Press
To open the MSC-LIMS Text Builder	CTRL+T, or right click and select Text Builder
To undo typing	CTRL+Z or ALT+BACKSPACE
To undo changes in the current field or current record, if both have been changed, press ESC twice to undo changes first in the current field and then in the current record	ESC
To move the insertion point within a field	ARROW keys
To select or deselect the current field	F2
To insert the current date	CTRL+SEMICOLON (;), or right click and select Insert Current Date
To insert the current date in fields using a date input mask	CTRL+D
To insert the current time	CTRL+COLON (:)

Entering and Editing Data	Press
To insert the default value for a field	CTRL+ALT+ SPACEBAR
To insert the value from the same field in the previous record	CTRL+APOSTROPHE (')
To add a new record	CTRL+PLUS SIGN (+)
To delete the current record	CTRL+MINUS SIGN (-)
To save changes to the current record	SHIFT+ENTER
To switch between the values in a check box or option button	SPACEBAR
To insert a new line	CTRL+ENTER
To open the zoom window	SHIFT+F2 or right click and select Zoom
To open a dropdown list box	ALT+DOWN ARROW

Special Characters. All of the data entry fields in the LIMS use the Verdana font, available on all Windows systems. Special characters available in this font can be entered in any LIMS field by selecting Tools | Character Map from the menu bar. Select the Verdana font, then select a character. Click [Select], then [Copy], then [Close] to return to the LIMS. Now right-click within the LIMS text field and select Paste to insert the character.

*See the MSC-LIMS .com Knowledge Base article "**Use a Text List to Enter Special Symbols**" for more options to enter symbols.*

Alternatively, enter a character by holding down the ALT key while entering the character's code on the numeric keypad. For example, to enter a degree (°) symbol press ALT+0176 and to enter a micro (µ) symbol press ALT+0181.

Mouse productivity aids. The LIMS includes several productivity aids available during data entry. Many of these functions are invoked by double-clicking the mouse within specific field types. For example, double-click within any date field to open the popup calendar for date selection (for more information see Using the Popup Calendar on page 37). Other functions are invoked by right clicking the mouse within specific field types. The following table lists the available mouse productivity aids.

Mouse Productivity Aids	Do This
To open the popup calendar for date selection	Double-click within any date field, or right-click within any date field and select Calendar.
To insert the current date	Right-click within any date field and select Insert Current Date.

Mouse Productivity Aids	Do This
To insert the current time	Right-click within any time field and select Insert Current Time.
To open the Text Builder	Right-click within any text field and select Text Builder.
To open the Zoom window	Right-click any field and select Zoom to open an enlarged text field.
To cut, copy or paste	Select text in any field and right click, then select cut or copy, and then move the cursor to another position, right click to select paste.
To open the setup form to add new picklist items	Right-click in a picklist field and select Add to List to open the setup form. Alternatively, double-click within the picklist to open the setup form. Add the new record and close the form to return to the original form.
To view result specifications for an analysis	Right-click within the Result Value Field and select Result Specifications, or double-click within the Result Value Field.
To insert a "less than detection limit" analysis result	Right-click within the Result Value Field and select Insert <MDL, or double-click the method detection limit (MDL) field.
To insert a date, time, or date/time serial value analysis result	Right-click within the Result Value Field and select Date/Time Value to display the “Insert Date/Time Serial Value” popup.
To view the method for an analysis in a Results Entry form	Right-click the Analysis name and select Method, or double-click the Analysis name.
To temporarily repopulate a Select Sample picklist	Right-click the Select Sample picklist and select Update Sample List, or double-click the picklist to open the Update Sample Pick List dialog. (Use Workstation Configuration to permanently change the Populate Sample List option).

Mouse Productivity Aids	Do This
To increase or decrease the number of replicates for a QC sample analysis	Double-click the replicate field in the QC results entry form

Querying Samples

To retrieve sample data for viewing, editing or report generation, MSC-LIMS supports both query-by-example (QBE) and structured query language (SQL). Use QBE to create query criteria by selecting sample characteristics from picklists, checking options to include or exclude specified criterion, and entering date ranges and other values. Use SQL to save frequently used or complex criteria and to extend the QBE criteria or to enter criteria that cannot be represented using the QBE controls. Throughout the system, MSC-LIMS uses a common collection of query controls wherever sample querying is supported (see Figure 2).

Use Multi-Select to choose more than one entry in a pick list on the Sample Criteria tab.

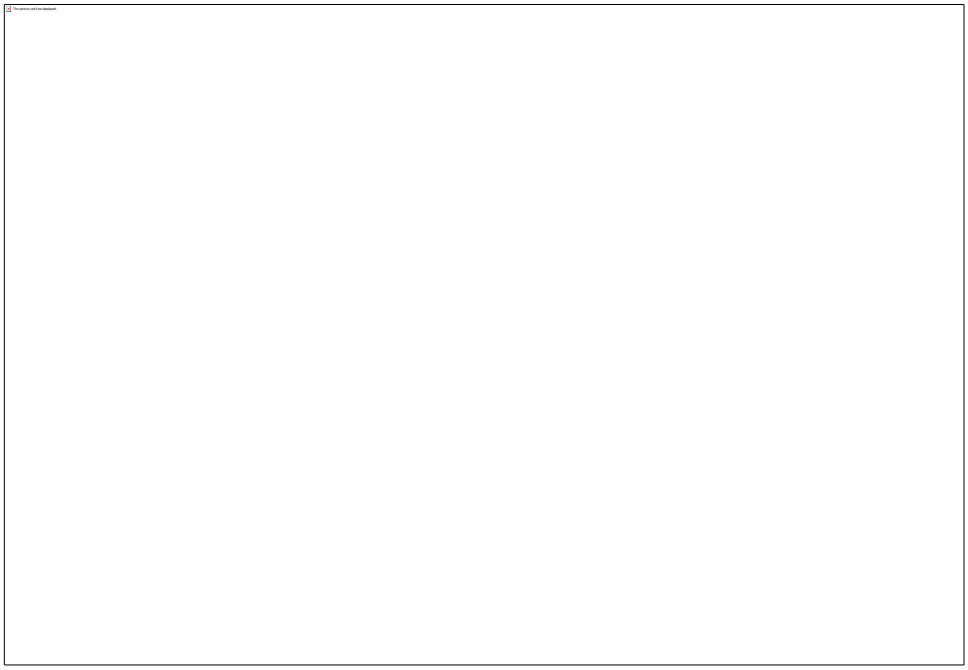


Figure 2 Querying Samples

The query controls are distributed among the five tabs listed below. Note that the Custom tab will only appear on systems with added customizations. Any combination of controls on all four (or five) query tabs may be used to construct an appropriate query. After entering the appropriate criteria, use the [Query] button to execute the query. Most dialogs that use the QBE controls will display a counter to show the results of the query. If available, use the [Select] button to open a data selection screen to fine-tune the query results by enabling/disabling individual records. Click [OK] to close the selection screen.

Sample Criteria. To use the controls on the Sample Criteria tab, first check the appropriate characteristic to display the picklist or date and time range fields. Depending on the current context, radio buttons may appear on this tab to allow querying either regular samples only, QC samples only, or both regular and QC.

Use the mouse, space bar or the control's hot key to toggle the criterion between include, exclude, and off. A single click within a criterion check box produces a check mark in the box, indicating that the query will include the criterion selected. A second click produces a red X in the selection box, indicating that the query will exclude the criterion selected. The third click clears the box.

Use the drop-down picklists to select Project, Location, Sample Type, Sampler and Customer, if necessary. Date ranges may be populated with typed entries, by inserting the current date, or by using the popup calendar.

Login, Collected, Received, Completed, and Reported fields include date and time options. When entering values for a date and time range criteria, only a start date value is required. If omitted, the end date will default to the start date, which creates a single day query criterion. Omitted time fields default to midnight (00:00:00) for start time fields and one second before midnight (23:59:59) for end time fields. Database fields without a time value such as collected time and received time are treated as a midnight time. The following table shows example field values and the resulting query criterion.

Start Date	Start Time	End Date	End Time	Query Criterion
1/23/2012				Between 1/23/2012 00:00:00 And 1/23/2012 23:59:59
1/23/2012		1/31/2012		Between 1/23/2012 00:00:00 And 1/31/2012 23:59:59
1/23/2012	08:00 AM			Between 1/23/2012 08:00:00 And 1/23/2012 23:59:59
1/23/2012			2:00 PM	Between 1/23/2012 00:00:00 And 1/23/2012 14:00:00
1/23/2012	08:00 AM	1/24/2012		Between 1/23/2012 08:00:00 And 1/24/2012 23:59:59

TIP

When specifying query criteria that includes characteristics such as Project and Sample Type which automatically restrict the results to either regular or QC samples, use the default "Regular and QC" criterion (if available) for faster queries.

Use the Multi-Select option to transform all default single-selection picklists into multi-selection lists. When this option is selected, the picklists will automatically pull down when the list receives the focus. To select more than one picklist item, hold down the CTRL key, and then click the items you want. To select several contiguous items, click the first item, then hold down the SHIFT key and click the last item.

TIP

To give a multiple-selection picklist the focus, either tab into the list using TAB or SHIFT+TAB or toggle the list's criterion check box off then back on using the mouse or the control's hotkey. Turning the check box off then back on does not alter the picklist's current selections.

Use the Inactives option to include or exclude inactive items for project, location, sample type, sampler, and customer pick lists. Enable the Inactives option to include inactive items in the pick lists. The Inactives option is disabled by default to minimize the number of items in each pick list.

Additional. Use the Additional criteria tab to find samples using wildcard pattern matching for sample IDs, notes, descriptions, conclusions, and customer sample IDs. Double-click within these fields to view pattern matching syntax. Note that beginning with MSC-LIMS version 5.0 the pattern matching characters changed for SQL Server syntax.

This tab also includes options to limit searches to complete or incomplete samples, reported or unreported samples, invoiced or uninvoiced samples, unapproved samples, and to find samples with either any analysis or a specific analysis performed by a given technician or outside lab.

See Sample Approval on page 75 for more information.

Use the "Unapproved samples" query criterion to find samples whose only incomplete analysis is the "Approval" analysis.

Use the "Analysis by" option to find samples with either any analyses or a specific analysis performed by a specific technician or outside lab. Use the "Analytical Batch" option to find all samples that are members of the selected analytical batch.

Analytes. Use these controls to query samples with complete or incomplete analyses, analyses with specific result types and/or values, and analyses with

result values in a specified range. Use just the first of the result value range fields to find an exact match. When either a single result value or range is entered, the Complete/Incomplete/Either radio buttons are ignored. Query criteria with up to five analytes can be constructed. When using a multiple-analyte criteria, note that the logical AND operator has higher precedence than the OR operator. For example the expression:

Analyte1 AND Analyte2 OR Analyte3 AND Analyte4

is evaluated as:

(Analyte 1 AND Analyte 2) OR (Analyte 3 AND Analyte 4)

Use the "Has Requirement" option to find samples with at least one analyte added to the sample via the requirement.

*See the **MSC-LIMS.com Knowledge Base** for more information on SQL expressions.*

SQL. Use the SQL tab to enter an SQL expression or select an existing expression from the picklist. Whenever the [Query] button is used, the system automatically displays the last SQL expression constructed from the QBE and SQL controls. This feature provides both an SQL tutorial and a method for saving frequently used or complex queries. Members of the Admins and Owners security roles can select and copy the SQL for the last query and save it to the SQL Expressions screen on the Setup menu (see page 129 for more information). An SQL expression is a valid SQL SELECT statement WHERE clause without the word WHERE.

Custom. This tab is reserved for custom site-specific query controls.

Selecting Samples

Wherever sample querying is available using the common query controls (see Querying Samples on page 33), you can refine your query by enabling or disabling individual samples. After using the [Query] button to query samples, use the [Select] button to open the Select Samples screen (see Figure 3). Use the Selected column to enable or disable individual samples.

Figure 3 Selecting Samples

The Selected and SampleID fields are locked on the left side of the Select Samples screen and the remaining fields can be viewed by scrolling. The columns can be rearranged by clicking to select then clicking a second time and dragging. Right-click within any column then select either Sort Ascending or Sort Descending to sort the list. Multiple column sorts are available by selecting the columns then right-clicking above the column headers. For example, to ensure that samples remain in login order when sorting by another column, drag the LoginOrder column to the right of the primary sort column then select both columns and right-click above the columns then select either ascending or descending order. Column arrangements are automatically saved for members of the Technicians, Admins, and Owners security roles.

Use the [Select All] and [Clear All] buttons to select all or clear all selections, respectively. Sort the sample selection list as necessary then use the [First N] or [Last N] buttons to select the first N or last N samples, where N is the number specified in the field adjacent to the button. Use this option, for example, to select the N most recent samples in the list of queried samples. Use the [OK] button to close the Select Samples screen and return to the previous screen.

Using the Popup Calendar

To speed entry of dates, MSC-LIMS includes a popup calendar for easy date selection. To open the popup calendar, double-click within any date field or right-click within any date field and select Calendar and the calendar will appear with either the field's existing date selected or today's date selected if the field is empty.

Double-click within any date field to open the popup calendar

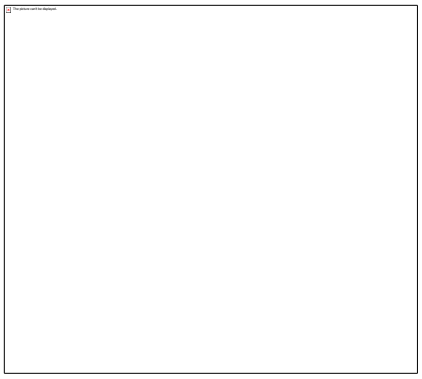


Figure 4 Popup Calendar

To close the calendar and insert a date into the date field, either press ENTER to choose the selected date or double-click on any calendar date. Press ESC to close the calendar without inserting a date. The following table lists the keyboard techniques available within the calendar.

Using the Popup Calendar	Press
To close the calendar without selecting a date	ESC
To choose the selected date and close the calendar	ENTER
To move to today's date	HOME
To move to today's date in the currently selected year	SHIFT+HOME
To move to the previous day	LEFT ARROW
To move to the next day	RIGHT ARROW
To move to the previous week	UP ARROW
To move to the next week	DOWN ARROW
To move to the previous month	SHIFT+UP ARROW or PAGE UP
To move to the next month	SHIFT+DOWN ARROW or PAGE DOWN
To move to the previous year	SHIFT + LEFT ARROW or SHIFT+PAGE UP
To move to the next year	SHIFT+RIGHT ARROW or SHIFT+PAGE DOWN

Using the Text Builder

Use CTRL+T to open the Text Builder from any LIMS screen field.

The MSC-LIMS Text Builder is a popup screen used to speed data entry by selecting or building frequently entered text and inserting the text into a text field on any LIMS screen. Use CTRL+T anywhere in MSC- LIMS to open the Text Builder (see Figure 5), or right click with your mouse in any text field and select Text Builder.

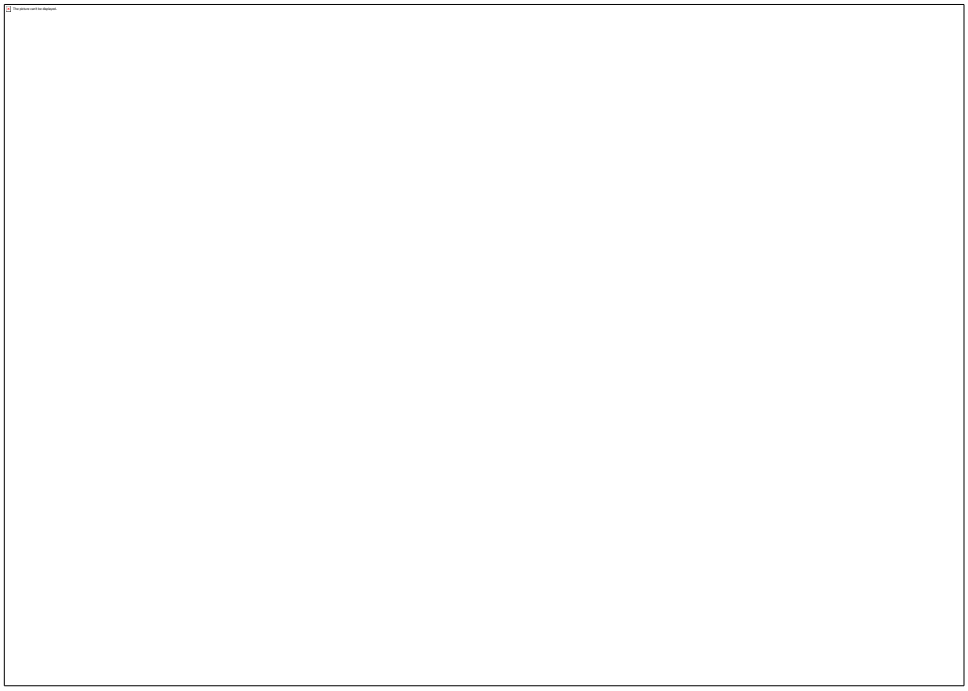


Figure 5 Text Builder

The Text Builder displays all of the system's current text lists. Although they may be empty, the Conclusions, Notes, and Titles lists are always present. These three lists are created by the system and they are automatically selected when you open the Text Builder while the cursor is in a Conclusions, Notes, or Title field on any form. Any other lists available in the Text Builder are user-defined lists. Members of the Admins and Owners security roles can create any number of named lists using the Texts Lists option on the Setup menu. See Text Lists on page 129 for more information. The example in Figure 5 includes a user-defined Dates list with entries for the current year's months and quarters since these are frequently included in report titles.

A good way to demonstrate the benefits of text lists and the Text Builder is with the example shown in Figure 5. Let's say you will frequently generate an analyte comparison report showing the results of solids analyses for your wastewater samples for a given month or quarter. In the report's setup dialog you might enter the title "*Wastewater Analysis - Solids Results for January through March, 2012*." Knowing you will generate the report often, you can use CTRL+T to open the Text Builder and add the text "*Wastewater Analysis Solids Results for*" to the Titles list with the Name "*Analyte Comparison*" to help

you quickly locate the title. With a separate list of dates you commonly append to your report titles, you can now quickly add your title with a few keystrokes and mouse clicks. With the cursor in the report setup dialog's title field, use CTRL+T or right-click and select Text Builder to open the Text Builder popup screen. Since you opened the Text Builder from a title field, the Titles list is automatically selected. Double-click your "*Wastewater Analysis Solids Results for*" item to add the text. Now click the Dates list and double-click "*January through March, 2012*" to append this text to your title. Click the [Insert] button or use ENTER to close the Text Builder and insert your text into the Title field.

Following is a list of some of the fields and controls on the Text Builder screen.

Field/Control	Description/Notes
Text box	The text box at the top of the screen contains the text to be inserted into the LIMS.
Between selections insert	When building text using multiple selections, use this control to insert either a space or begin a new line between selections.
List	This control displays a sorted list of all text lists. Select a list to see the list's contents.
Name / Text	These controls display the contents of the selected list sorted by Name. Double-click an item in the list or highlight and click [Insert] to insert the item's Text into the text box.
[Insert]	Use this button to close the Text Builder and insert the contents of the text box into the LIMS field.
[Cancel]	Use this button to close the Text Builder without inserting any text.
[Clear]	Click this button to clear the contents of the text box.
[Paste]	Use this button to add the selected list text to the text box.
[Add to List]	Enter the Name and Text in this button's adjacent controls then click to add the item to the selected text list. Members of the Owners, Admins and Technicians security roles can use this feature to add items to any text list.

Using Reports

Using Print Preview

All of the MSC-LIMS reports can be displayed in print preview mode. This feature allows any report to be viewed on screen making each report a valuable query tool and an alternative to the data inquiry screens. Many of the reports use setup forms to query and select report data and to set report options such as titles and sort order.

Use ALT+V from any report setup screen to preview the report.

When a report is displayed in preview mode, an image of each report page is available for viewing. Use the scroll bars and page navigation buttons to view report page data. Use the View menu or toolbar buttons to change the size and number of pages displayed. To close the report without printing select File|Close or use the equivalent toolbar button.

To print the report select File|Print or use the toolbar's printer icon button. Use the print dialog to select the destination printer, the number of copies to print and other print setup options. When attempting to print or preview a report with no data, the system will normally display a "Report has no data" message instead of displaying or printing a blank report page.

Exporting and Mailing Report Data

To export the report's data for use with other application software, select File|Output To and choose the appropriate export format. Use this feature for example, to transfer invoice data to an accounting system's accounts receivable module. Use the Send toolbar button to attach the report to an email message using one of the available export formats.

NOTE

If the Send command isn't available, your mail application might not be properly installed, or might not support Messaging Application Programming Interface (MAPI). Check your program's documentation to confirm that it supports MAPI, and if so, try reinstalling the mail application to make the Send command available.

Exporting to Excel or Word

Use the Publish It With MS Word toolbar button to export the report's data to Microsoft Word. The output is saved as a Rich Text Format (.rtf) file in the folder where MSC-LIMS is installed. Word automatically starts and opens the file.

Use the Analyze It With MS Excel toolbar button to export the report's data to Microsoft Excel. The output is saved as a Microsoft Excel file (.xls) in the folder where MSC-LIMS is installed. Microsoft Excel automatically starts and opens the file.

Export to MS Excel Template

Use the Export to MS Excel Template toolbar button to export the report's data to an existing Excel template. Use this option to create custom reports from data in any LIMS report. See Excel Interface on page 46 for more information.

> **NOTE**
>
> Not all data from all reports can be exported using the File|Output To option and the Excel and Word interfaces. When a report has been constructed with subreports within a main report, Access will only export the main report's data. However, Excel templates can be created to query the additional data from the LIMS.

Creating Report PDF or XPS Files

Use the Send toolbar button to attach report PDF or XPS files to an email message.

Any report can be saved or emailed in Portable Document Format (PDF) and XML Paper Specification (XPS). Use File | Output To or File | Send while previewing a report then select the file format. XPS provides an open standard for electronic paper and provides an alternative to PDF documents. An XPS document viewer is included with Windows Vista, Windows 7, and can be downloaded for Windows XP.

Starting the System

To start MSC-LIMS, locate and double-click the MSC-LIMS icon on the Windows desktop. If you do not have an icon on your Windows desktop, use Start | All Programs | MSC-LIMS | MSC-LIMS to start the system.

MSC-LIMS is configured with security roles (see Security Roles on page 43) and each user requiring access must have their Windows login account added to the system. Contact your LIMS administrator to obtain LIMS access.

Depending on the current workstation's configuration (see Workstation Configuration on page 138), when MSC-LIMS is started the system may automatically find and display any sample or schedule warnings. A sample warning occurs when a sample has an analysis that has either expired or is close to expiration. A schedule warning occurs when a schedule is either past due or almost due. If any sample or schedule warnings exist, a popup dialog displays the warnings before the MSC-LIMS main menu appears. You may review the warning information at any time using the Warnings option on the Samples menu and the Sample Schedules option on the Notebook menu. Each menu also has a report option to print the warnings.

Security Roles

Access to MSC-LIMS is controlled by security roles, which are used to restrict access to all system data and database objects including forms, reports, and software code. Your LIMS system administrator creates user login accounts and assigns the user to one of the following security roles:

Security Role	Privileges
ReadOnly	Read-only access to all forms, queries, and reports. The user Guest is a member of this group.
Samplers	All privileges of the ReadOnly role. Samplers can log individual samples and sample batches.
Technicians	All privileges of the Samplers role. Technicians can add new analyses to existing samples, enter analysis results, create analytical batches and enter QC data. If enabled, Technicians can edit analysis results they entered (see Data Entry configuration on page 134 for more information). Technicians can create and edit their own user-defined reports.
Admins	System administrator role with full capabilities throughout the system.
Owners	Database owner role with full capabilities throughout the system with either sysadmin or db_owner permission in MSC-LIMS' SQL Server database.

The Main Menu

The Custom menu is used to access site-specific custom additions to MSC-LIMS.

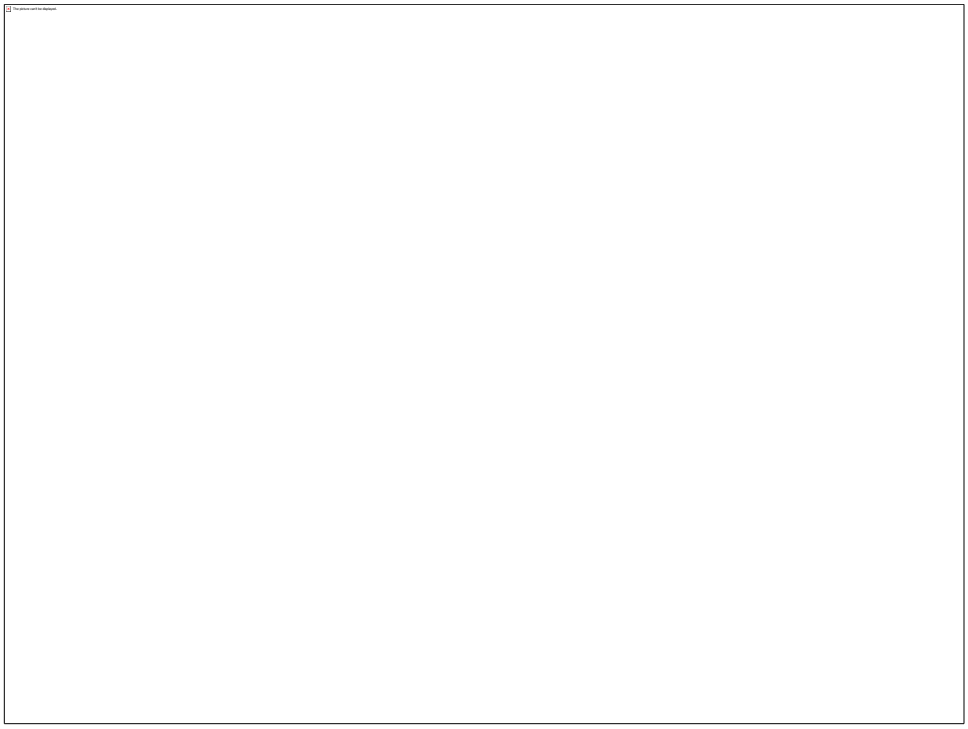


Figure 6 Main Menu

After successful login, the MSC-LIMS main menu is displayed. The main menu is a notebook tab-style menu that subdivides the LIMS into five modules: Samples, Laboratory Notebook, Quality Control, Setup, and Admin. If you have customized the system, you may have a sixth tab: Custom (the custom tab may be renamed in System Configuration on the Miscellaneous tab, see page 136). Click the appropriate tab to display the options for that module.

The main menu uses three scrolling picklists to provide menu options. To select a menu option either double-click or highlight and press ENTER. Use the cursor keys or enter the first character of a menu option to highlight the option. Use hotkeys or TAB and SHIFT+TAB to move among the lists in a menu. When moving between menus, the menu's previously selected options are maintained so commonly used options are quickly selected when returning to the menu. Only the options available for the current user's security role are displayed in the menu picklists.

Listed below the MSC-LIMS version number are the current date and the login name and security role of the current user. The attached database in the form "database on server\instance" is listed at the bottom of the screen immediately above the status bar. Use File | Open LIMS Database to display the Open MSC-LIMS Database dialog to open a different LIMS database. Note that the main menu's File menu maintains a list of up to four most recently used databases for quick access to frequently used databases.

Figure 7 Open MSC-LIMS Database

To open an MSC-LIMS database, select the ODBC driver from the pick list. If no drivers appear in the pick list, install the ODBC Driver 13 for SQL Server. Enter the Server in the form "server\instance" then enter the name of the database and click Connect.

To exit MSC-LIMS, close the main menu by either selecting File|Exit, clicking the Exit toolbar button or the [Exit] button below the MSC-LIMS logo. The remaining chapters of this User's Guide describe each of the main menu's modules in detail.

Tools

A Tools menu is available on the menu bar of all MSC-LIMS screens. Use it to access Windows' calculator, character map and notepad applications. Refer to Windows Help for information by clicking the Start button on the Windows taskbar and then click Help.

System Messages

MSC-LIMS can produce many informational messages under a variety of circumstances. Generally, these messages are information, warning or error messages. Information messages are displayed in a popup dialog with a lower-case "i" icon. For example, Figure 8 shows an information message when attempting to log a new sample.

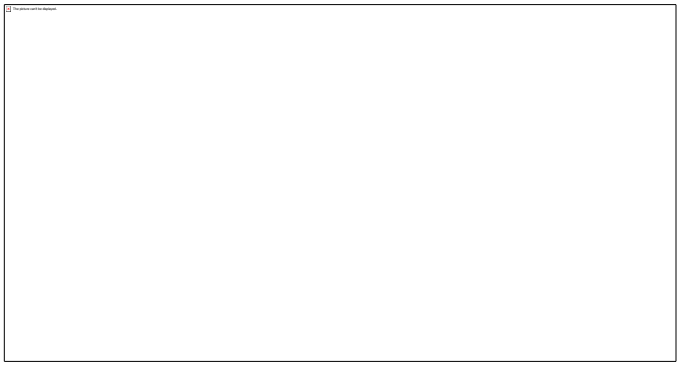


Figure 8 Information Message

The information message above indicates that the sample could not be saved because several required fields were omitted. To proceed, simply click the [OK] button to dismiss the information message, complete the required fields and save the record again.

Warning messages are most often displayed in a popup dialog with an exclamation point (!) icon. Many of these warnings are generated when attempting to add or delete database records that would violate the integrity rules defined for the database. For example, Figure 9 shows a warning message generated while attempting to delete a customer record.

Figure 9 Warning Message

The warning message above indicates the customer could not be deleted because existing samples or login batch sample records exist for the customer. Click the [No] button to dismiss the message or click [Yes] to see the internal ODBC message for additional information.

An error message describes a more serious condition. These messages are displayed in a popup dialog with a stop sign icon. These messages are also saved to the system error log so the LIMS administrator and software development personnel may review them. Contact the LIMS administrator when an error message is displayed. See Error Log on page 132 for more information.

Excel Interface

MSC-LIMS includes an integrated Microsoft Excel interface. Using Excel templates with required macros, the Excel interface can be used to import results from instrument data files, create custom reports from data in any LIMS report, and to create custom analyte-specific data entry screens to calculate and import final results and associated QC data. Using workbooks without macros, the Excel interface can also be used during batch login to import sample data or to import complete samples.

NOTE
Holding down the SHIFT key while clicking the OK button in the Excel Data Transfer popup will bypass running the selected Excel export template's macros. Use this feature during template development to debug and single-step through the AfterTransferFromLIMS macro.

The sections below include examples to import results, import samples, and export LIMS data, which demonstrate the capabilities of the Excel interface. To follow all of the examples, you will need the MSC-LIMS example database, example Excel templates, and Excel 2002 or newer must be installed on your workstation. The MSC-LIMS setup software automatically installs the example templates during system installation. Check the File Library at www.msc-lims.com for additional Excel template examples and for a current version of the example database.

To import sample data no Excel templates or macros are required. However, to import results and to export LIMS data an Excel template is required and must include the following components:

LIMSData worksheet
The template file must contain a worksheet named "LIMSData." All LIMS data is written to this worksheet beginning at cell A1. Row one will contain the names of the fields exported and all data follows beginning on row two.

LIMSData.BeforeTransferFromLIMS macro
The LIMSData worksheet must include a "BeforeTransferFromLIMS" macro (Public Sub in VBA) which is called before writing the LIMS data to the LIMSData worksheet. Use this macro to perform any necessary action before the LIMS data is exported.

LIMSData.AfterTransferFromLIMS macro
The LIMSData worksheet must include an "AfterTransferFromLIMS" macro (Public Sub in VBA) which is called after writing the LIMS data to the LIMSData worksheet. Use this macro to perform any necessary tasks after the LIMS data is exported. For example, create named ranges for the exported data, perform calculations or data manipulation, and display an alternate worksheet with a final report.

In addition to the components above, any Excel template file used to import analysis results must also include the following components:

LIMSData.BeforeTransferToLIMS macro
The LIMSData worksheet must include a "BeforeTransferToLIMS" macro (Public Sub in VBA) which is called before the LIMS imports Excel data. Use this macro to perform any necessary action before the Excel data is imported.

LIMSData.AfterTransferToLIMS macro
The LIMSData worksheet must include an "AfterTransferToLIMS" macro

(Public Sub in VBA) which is called after the LIMS imports Excel data. Use this macro to perform any necessary action after the Excel data is imported.

To follow the examples below you must first specify the path to the example Excel template files. Start MSC-LIMS logging on as a member of the Admins or Owners security role then select the Workstation Configuration option on the Admin. On the Folders tab, use the [Browse...] buttons adjacent to the MS Excel Templates Export and Import fields to select the appropriate folder. Navigate to the folder where the MSC-LIMS Workstation software was installed, select the Examples folder then select the Excel Export Templates and Excel Import Templates folders for the Export and Import fields, respectively.

The Excel export and import examples below use the example database provided with the MSC-LIMS software. To install the example database, use SQL Server Management Studio to restore database backup file MSClimsExampleDatabase.bak located in folder C:\MSC-LIMS\Examples on any LIMS workstation. While logged on to the workstation as a user with sysadmin or db_owner permissions in SQL Server, start MSC-LIMS, use File | Open LIMS Database and specify the MSClimsExample database then open the Users screen on the Admin menu and add user logins in the appropriate security role to allow access to the database for specific users.

Once installed, use File | Open LIMS Database from the Main Menu and specify the MSClimsExample database to attach the database. To return to your own database, use the File menu and select your production database from the list of recently opened databases.

Export Examples

You can learn more about each available export template example by referring to the template's Read Me worksheet. Start Excel, open an example template then select the Read Me worksheet to view information about the MSC-LIMS report for which the template was designed along with an overview of the template's operation.

Analysis Count Chart. Follow the steps below to create a pie chart of analyses performed using the data in the Analysis Count report.

1. Start MSC-LIMS, ensure that the example database is attached then select the Analysis Count report on the Notebook menu.
2. Enter a login date range of 1/1/98 through 12/31/98, click the [Query] button then click the [Preview] button.
3. Use File | Export to MS Excel Template or the equivalent toolbar button.
4. In the Excel Data Transfer dialog select the "Analysis Count Chart" template and click the [OK] button.
5. The data is exported to the Excel template which automatically displays the count of in-house analyses on a pie chart. Position the cursor over the pie slices to view the analysis counts.

6. On the Excel Tools menu, choose Macro then Visual Basic Editor to view the Visual Basic for Applications (VBA) code. If the VBA code window is not visible, double-click the LIMSData object in the VBA Project window. Notice that the BeforeTransferFromLIMS macro does nothing. Review the code in the AfterTransferFromLIMS macro to see how the chart is displayed.

Sample Count Chart. Follow the steps below to create a bar chart of monthly sample processing using the data in the Sample Count report.

1. Start MSC-LIMS, ensure that the example database is attached then select the Sample Count report on the Notebook menu.
2. In the report's setup dialog select Month for the Group By option, enter a login date range of 1/1/97 through 12/31/97, click the [Query] button then click the [Preview] button.
3. Use File | Export to MS Excel Template or the equivalent toolbar button.
4. In the Excel Data Transfer dialog select the "Monthly Sample Count Chart" template and click the [OK] button.
5. The data is exported to the Excel template which automatically graphs the monthly count of logged and completed samples. Position the cursor over the graph's bars to view the sample counts.

Sample Tracking. Follow the steps below to create a quick back log report with all incomplete analyses in the system.

1. Start MSC-LIMS, ensure that the example database is attached then select the Sample Tracking report on the Samples menu.
2. With the Incomplete Analyses option set to the default “All”, click the [Query] button then click the [Preview] button.
3. Use File | Export to MS Excel Template or the equivalent toolbar button.
4. In the Excel Data Transfer dialog select the "Sample Tracking by Customer" template and click the [OK] button.
5. The data is exported to the Excel template which automatically summarizes the data using Excel’s subtotal feature. The initial view of the data shows counts of incomplete samples and analyses by customer. Use the plus/minus buttons in the outline section to drill down and view login dates, samples, and individual analyses. You can also use the outline level buttons at the top of the outline to automatically expand or collapse to the selected outline level.

The simple export examples above demonstrate how Excel templates can be integrated into the MSC-LIMS environment. To begin creating your own template, use the "Export to MS Excel Template" toolbar button from a report's print preview screen and select the "MSC-LIMS Export Template" which already has empty macros ready for editing. You can cut and paste

VBA code from existing templates, use the macro recorder facility or edit VBA code directly then save the template to a new template file.

Import Results Examples

Follow the two examples below to learn how you can import analytical results from Excel using MSC-LIMS' Results by Sample and Results by Analyte screens.

Results by Sample. The steps below demonstrate importing a single sample's results into the Results by Sample screen.

1. Start MSC-LIMS and ensure that the example database is attached.
2. The ability to import single sample results is configured using the Project setup screen. Select the Projects data entry/inquiry option on the Setup menu to open the Project setup screen. Choose the Edit Data toolbar button then select My Project from the picklist. Click the Excel Interface tab to view this project's configuration. The configuration identifies the Excel workbook and worksheet where results will be retrieved. The configuration also identifies the starting cell where results and analyte names begin and the direction and cell offset (1 = every cell, 2 = every other cell, etc.) the system will use to locate and import result values. Close the Project setup screen.
3. Select the Results by Sample option on the Samples menu.
4. Double-click the Select Sample picklist, choose All and select [OK] to populate the list with all samples.
5. Select the first sample in the list for project My Project (sample ID 981216J005)
6. Select New from the Spreadsheet menu to initialize a new Excel workbook using the My Project.xlt template configured for this project. Although the workbook may not need the data, the Results by Sample screen's underlying data is automatically exported to the template's LIMSData worksheet.
7. Select the My Project worksheet in Excel. For this example we will enter the results interactively. In practice the data can be imported from instrument data files or any other data source Excel can access. Note that for MSC-LIMS to import the data, the analyte name in the worksheet must exactly match the name in the Results by Sample screen.
8. Enter result values of 3, 2, and 1 for the three analytes in the worksheet.
9. Use Alt-Tab or the Windows taskbar to return to MSC-LIMS
10. Select Import Results from the Spreadsheet menu. Notice that the Excel Data Import verification screen shows that some of the results obtained from the worksheet can be imported. The Status column identifies the problem. Select the [Cancel] button to abandon the data and return to the Results by Sample screen.

11. Select the Open option on the Spreadsheet menu to return to Excel. Change the worksheet's analysis results to 300, 200, and 100.
12. Use Alt-Tab or the Windows taskbar to return to MSC-LIMS
13. Select Import Results from the Spreadsheet menu. The Import column now indicates all three result values can be imported. Select the [Import] button and answer Yes to the confirmation prompt to import the results.
14. In the Results by Sample screen you can now use either the [OK] button to save the results or the [Cancel] button to abandon the imported data.

Results by Analyte. The steps below demonstrate importing multiple results for a single analyte into the Results by Analyte screen.

1. Start MSC-LIMS and ensure that the example database is attached.
2. The ability to import multiple results for a single analyte is configured using the Analysis setup screen. Select the Analyses data entry/inquiry option on the Setup menu to open the Analysis setup screen. Choose the Edit Data toolbar button then select Total Suspended Solids from the picklist. Click the Excel Interface tab to view the configuration. The configuration identifies the Excel workbook and worksheet where results will be retrieved. The configuration also identifies the starting cell where results and sample IDs begin and the direction and cell offset (1 = every cell, 2 = every other cell, etc.) the system will use to locate and import result values. The configuration can also include cells, directions, and offsets for QC data. Compare the configuration for Total Suspended Solids and Volatile Suspended Solids. Note that both use the same workbook. Close the Analysis setup screen.
3. Select the Results by Analyte option on the Samples menu.
4. In the Results by Analyte Setup screen, select Total Suspended Solids for the analyte, and specify the project My Project for the query criteria. Use the [Query] button to query then use the [OK] button to open the Results by Analyte screen.
5. Select New from the Spreadsheet menu to initialize a new Excel workbook using the TSS and VSS Calculations.xlt template configured for this analyte. The Results by Analyte screen's underlying data is automatically exported to the template's LIMSData worksheet and the AfterTransferFromLIMS macro redisplays some identifying data on the TSS VSS worksheet. MSC-LIMS requires the sample ID to import the result value.
6. Although a robust import template will lock cells with formulas, for this example position the cursor in cell H3 and enter the values 10, 20, ... , 60 for TSS results then position the cursor in cell I3 and enter the values 5, 10, ... , 30 for VSS results.
7. Use Alt-Tab or the Windows taskbar to return to MSC-LIMS

8. Select Import Results from the Spreadsheet menu. Notice that the Excel Data Import verification screen shows that all results can be imported although some results have warnings. The Status column identifies the problem. Since the Excel interface configuration for our analysis included worksheet, cells, direction and offset for QC data, the screen informs us that it requires an existing analytical batch to import QC data. Select the [Cancel] button to abandon the data and return to the Results by Analyte screen.
9. Select the QC Data button and create the analytical batch. Click the [OK] button to close the QC data entry screen (we'll import the data).
10. Select Open from the Spreadsheet menu to return to Excel then Select the QC Data worksheet. Enter example results and reference values for the QC types.
11. Use Alt-Tab or the Windows taskbar to return to MSC-LIMS
12. Select Import Results from the Spreadsheet menu. The Excel Data Import verification screen now shows the status of both analysis results and QC results.
13. Select the [Import] button and answer Yes to the confirmation prompt to import the results.
14. In the Results by Analyte screen use either the [OK] button to save the results or the [Cancel] button to abandon the imported data and return to the setup dialog.
15. Since our example template is used to calculate results for both Total Suspended Solids and Volatile Suspended Solids we can now import our VSS results. In the Results by Analyte setup dialog change the analyte to Volatile Suspended Solids. Use the [Query] button to query then use the [OK] button to open the Results by Analyte screen. Our worksheet is ready so select Import Results from the Spreadsheet menu. The Excel Data Import verification screen now shows the status of the results for VSS.
16. In the Results by Analyte screen use either the [OK] button to save the results or the [Cancel] button to abandon the imported data and return to the setup dialog. Use the [Cancel] button to close the setup dialog.

The simple import examples above demonstrate how Excel templates can be integrated into the MSC-LIMS environment. Begin creating your own templates by copying file MSC-LIMS Import Template.xlt which includes empty versions of the required macros. You can cut and paste VBA code from existing templates, use the macro recorder facility or edit VBA code directly.

Import Sample Data Example

Follow the example below to learn how you can import sample data from Excel using MSC-LIMS' Batch Login screen. This example demonstrates importing sample fields into existing samples in the Batch Login screen. See Import Samples Example below to import and add samples to the Batch Login screen.

1. Start Excel and enter data for one or more sample fields you want to import. Enter the data for at least three samples then select all data cells for the first sample field (see Figure 10).

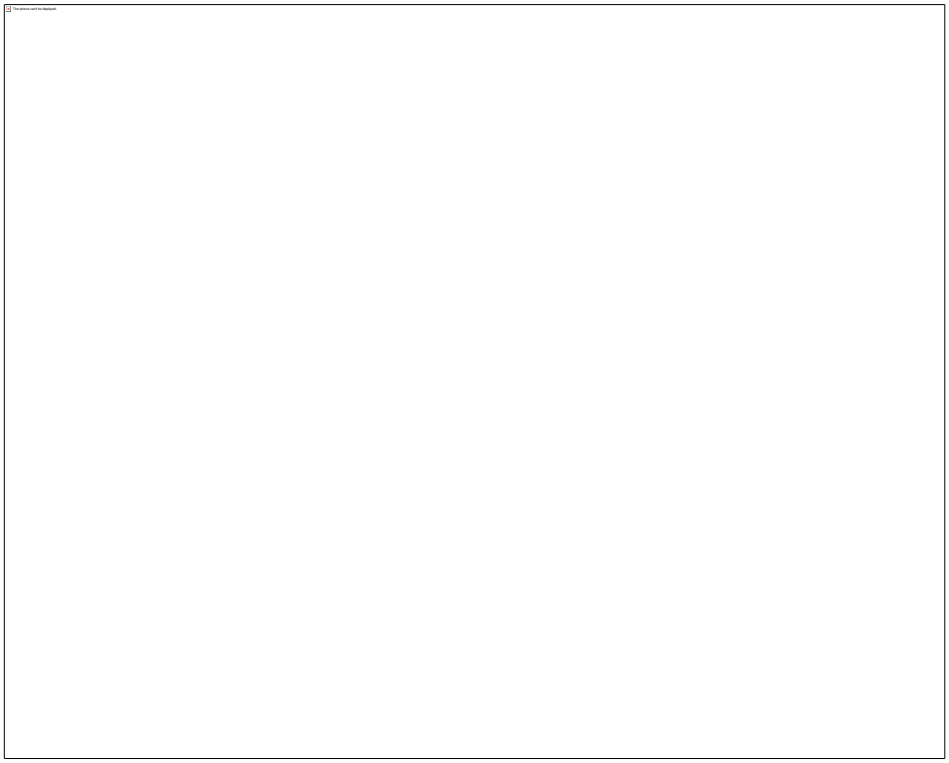


Figure 10 Excel Sample Data

2. Start MSC-LIMS and use Batch Login on the Samples menu. Select any batch and click [OK] to proceed to the Batch Login screen. If necessary, add samples so the batch has at least three samples.
3. Use Spreadsheet | Import Data to open the Excel Data Import screen, which will list one data row for each sample on the Batch Login screen. Note that the screen also lists the active Excel workbook, worksheet, and selected cells. Click [Add >] to add the cell range and worksheet to the import specifications. Now select the Import Field for the data in the cell range.
4. Return to Excel and select the data cells for the next sample field to import. Return to the Excel Data Import screen in the LIMS and click [Refresh] then [Add >] then select the Import Field for the data in this

cell range. Repeat for each sample field to import, up to a maximum of five fields.

5. Click [Get Excel Data] to retrieve the data into the Excel Data Import screen (see Figure 11). Verify the data then click [Import] to add the data to the Batch Login screen's samples.

Figure 11 Excel Data Import

6. Return to Excel, select the data cells for the first sample field then enter a name for the cells in the Name box. The Name box appears immediately above the intersection of row and column labels and typically displays the cell reference of the active cell. If you like, add names for the data cell ranges for the remaining sample fields.

7. Return to the Batch Login screen and use Spreadsheet | Import Data to open the Excel Data Import screen. Now select your first Import Field then select the name you created for the field's data in the From Cells picklist. Complete the import specifications for each field then click [Get Excel Data] to retrieve the data. Click [Cancel] to return to the Batch Login screen without importing the data.

8. Return to Excel, and create a two-column table on the same worksheet as your data. In the table's first column list each sample field name to be imported (i.e. any field in the Excel Data Import screen's Import Field picklist) and list the cell range where the data is found in the table's second column. If you like, add labels above your two-column table. Select the table's data (i.e. omit the column labels) and enter the name "LIMSInterface" without spaces in the Name box to name the table (see Figure 12).

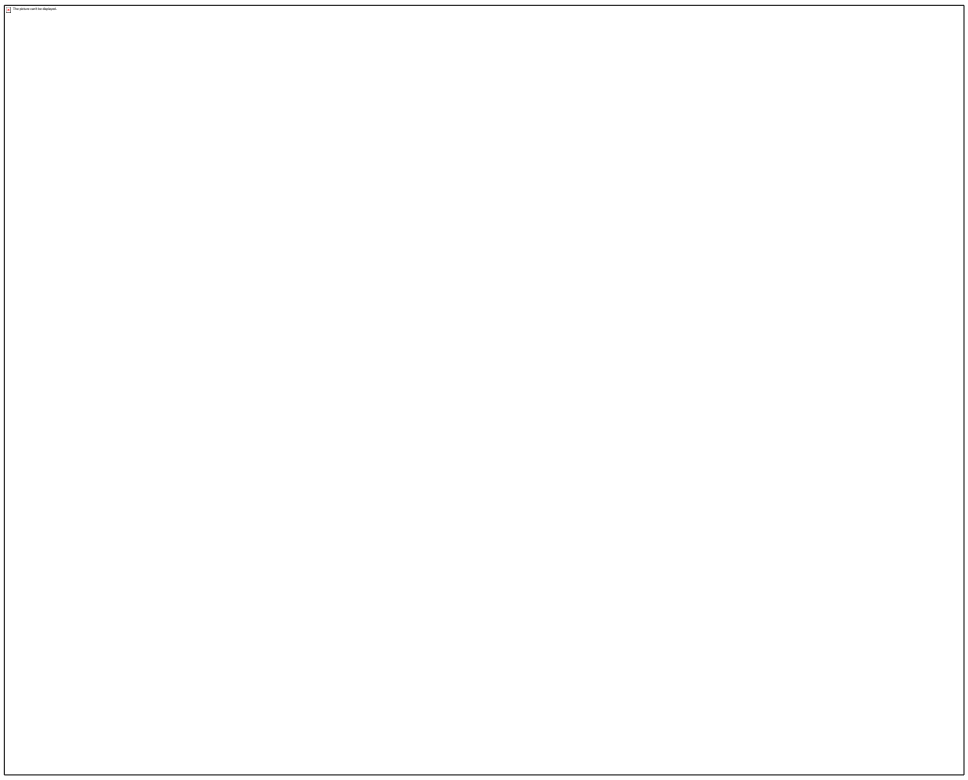


Figure 12 Excel Sample Data with LIMSInterface

9. Return to the Batch Login screen and use Spreadsheet | Import Data to open the Excel Data Import screen. Notice how the LIMS used the Excel worksheet's LIMSInterface named range to automatically configure the import specifications in the Excel Data Import screen. Click [Get Excel Data] then [Import] to add the data to the Batch Login screen's samples.

The example above demonstrates how you can easily import sample data. Use quick cell selection for one-time imports or use named ranges for more frequent imports. Add a LIMSInterface table and named range to predefine the worksheet's import specifications.

Import Samples Example

Follow the example below to learn how you can import samples from Excel using MSC-LIMS' Batch Login screen. This example demonstrates importing and adding samples in the Batch Login screen. See Import Sample Data Example above to import one or more sample fields into existing Batch Login screen samples. Note that if you followed the previous example, you can use the workbook you created for this example.

1. Start Excel and enter data for one or more sample fields you want to import. Enter the data for at least three samples.
2. Create a two-column table on the same worksheet as your data. In the table's first column list each sample field name to be imported (i.e. any field in the Excel Data Import screen's Import Field picklist) and list the

cell range where the data is found in the table's second column. If you like, add labels above your two-column table. Select the table's data (i.e. omit the column labels) and enter the name "LIMSInterface" without spaces in the Name box to name the table. TIP: Include additional blank rows in your LIMSInterface named range to accept additional fields later.

3. Start MSC-LIMS and use Batch Login on the Samples menu. Select any batch and click [OK] to proceed to the Batch Login screen.
4. Use Spreadsheet | Import Samples to open the Excel Sample Import screen. Select the worksheet from the picklist to retrieve the sheet's samples into the Excel Sample Import screen (see Figure 13). Verify the data, select any sample characteristics that should be applied to all samples and click [Import] to add the samples to the Batch Login screen.

Figure 13 Excel Sample Import

5. In the Batch Login screen click [Show Analyses] to verify that the sample's analyses were added from the project imported or selected in the Excel Sample Import screen. No analyses are added if a project was not imported or selected.
6. Return to Excel and add additional data for analyses you want to add to the imported samples. Any non-blank cell in an analyte range will add the analysis to the imported sample. In the first column of the worksheet's LIMSInterface named range add "Analyte:*name*", where *name* is the LIMS analyte name. Enter the data range for the analyte in the second column of the LIMSInterface named range (see Figure 14). Be

sure your LIMSInterface range encompasses the new rows added to the table.

Figure 14 Excel Samples and Analyses

7. Return to the Batch Login screen and use Spreadsheet | Import Samples to open the Excel Sample Import screen. Select the worksheet from the picklist to retrieve the sheet's samples into the Excel Sample Import screen. Verify the data, select any sample characteristics that should be applied to all samples and click [Import] to add the samples to the Batch Login screen.
8. In the Batch Login screen click [Show Analyses] to verify that this time the sample's analyses were added from Excel data and not from the sample's project. An analysis is only added if the analyte's cell in the worksheet is non-blank.

The example above demonstrates how you can easily import samples with or without analyses from Excel workbooks. Use multiple worksheets, each with its own LIMSInterface named range, to import different samples from the same workbook.

Chapter 4: Samples

Use the Samples menu to log and track samples, enter sample results, enter QC data for analytical batches, generate reports with sample data, and create and generate user-defined reports. Select the Samples tab on the main menu to display the Samples menu. The following sections describe each of the data entry/inquiry screens and the reports available on the Samples menu.

Single Sample Login

Select Sample Login from the Samples menu to open the single sample login form (see Figure 15). Use this form to log a new sample and optionally print labels for the sample's container(s).

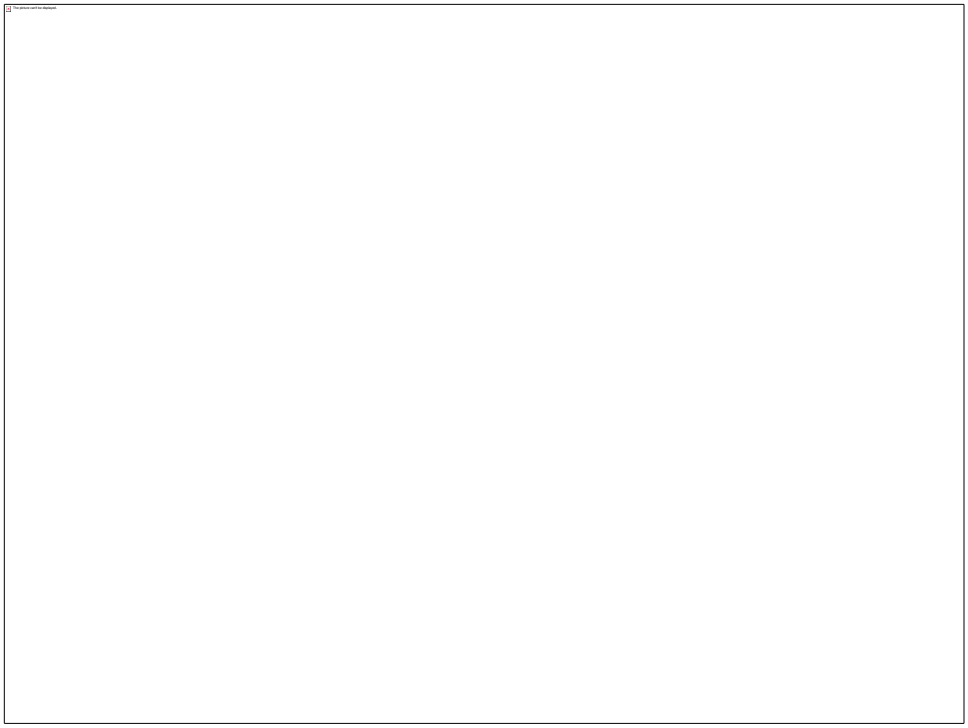


Figure 15 Single Sample Login

Double-click the Location pick list to open the Location setup form to add a new Location.

To log a new sample, first ensure that the form is in Add mode. If the form is in Edit mode, select the [Add Data] button to return to Add mode.

Enter the sample's required characteristics by selecting the project, location, sample type and sampler.

TIP

If customer-specific options were pre-defined during Customer Setup, enter the Customer first. If necessary, use the options button […] adjacent to the customer pick list to display the customer's Sample Login Options; select the data to add it to the sample login screen. Utilizing this shortcut does not prevent making modifications or selecting other sample characteristics.

TIP

Always select the Project before the Location. The project's configuration may restrict locations to only those defined with location-specific analyses within the project. See Project setup on page 120 for more information.

Select the sample Status. Using the default *Immediate* status will immediately add the sample's analyses to the sample warning screen and report. Using the default *Rush* status will double the normal number of days before expiration for each of the sample's analyses so they appear more quickly on the sample warning screen and report. Note that these defaults can be modified on the Sample Statuses setup screen, page 128.

Double-click any date field to open the popup calendar. Click [Enter] to insert the current date in the field, or double-click on the correct date.

Enter or verify the sample's Collected date and the optional collected Time to record when the sample was collected. Enter or verify the optional sample Received date and time to record when the sample was received in the lab. Enter or verify the optional Started date to record when tests were begun.

Note

Selections made on the Data Entry tab of the System Configuration screen on the Admin menu may cause default dates and/or times to automatically populate specific fields within the Sample Login and Results Entry screens. Sample fields without a time value, such as collected time and received time, are treated as midnight time (00:00) for query purposes.

Optionally, enter a Due date to record the date sample results are due. Optionally, select a Customer from the available picklist, and enter the customer's sample ID in the Cust.Sample field.

Enter any sample description in the Description field. Enter any sample comments or notes in the Notes field. Note that, if configured, default

project and/or customer sample descriptions may be automatically appended to any text you manually enter in the description field when the sample is saved.

If configured, a default label script may automatically appear when the project is selected. Double-click the Labels field to open the Select or Build Label Script dialog to select or build an alternate label script for this sample. Note that label prompting/printing at sample login can be enabled/disabled using the Workstation Configuration option on the Admin menu. See Label Scripts on page 118 for more information.

After the appropriate sample characteristics are entered, save the sample by either pressing the TAB or ENTER key from the Label Script field, clicking within the analyses section of the form, using SHIFT+ENTER or the toolbar button. When the sample is saved, MSC-LIMS automatically assigns a unique sample ID and displays the required analyses for the sample's project. Using the current date and time, sample IDs are automatically assigned by the system in the form 'YYMMDDHHMM'. When an assigned sample ID already exists (e.g., two samples logged within the same minute) the last character of the ID is set to 'A', 'B', etc. until a unique ID is created.

NOTE

The sample's required analyses are obtained from either the project's default analyses or from the project's analyses defined specifically for the selected location.

Edit or Delete Analyses

Use the [Add] analysis and [Add] requirement buttons to add additional analyses and/or requirements to the sample. In the Add Analyses and Add Requirements popup screens, hold down the CTRL key to select multiple non-contiguous analyses/requirements or use the SHIFT key to select contiguous analyses/requirements. Click the [OK] button to add the analyses to the sample.

To delete an analysis immediately upon logging in the sample, select the analysis using the record selector adjacent to the analysis name then use either Edit|Delete Record or the DEL key to delete the analysis. Note that you may drag the mouse over the record selectors to select multiple records. A delete confirmation dialog will prompt you to confirm your deletion or multiple record deletions.

To delete an analysis or analyses in multiple samples queried in Edit Mode, click [Delete] analysis to activate the Delete Sample Analyses popup. Select the analysis or analyses from the list, activate "Delete from all queried samples" if appropriate, enter or select a reason for deleting the analyses in the text box if appropriate, then click [Delete].

Note that members of the Technicians security role may use this feature to delete incomplete analyses in the Sample Login screen for samples they logged, or for samples logged by others, only if the LIMS Administrator has enabled that option on the Data Entry tab of the System Configurations screen.

TIP

Clear the In-house check box to change an analysis normally performed in-house to one sent out. An analysis defined as one sent out cannot be changed to in-house during sample login.

When your sample is complete, close the screen or select the [New Sample] button to save the sample and optionally print the container labels (see Container Labels on page 66 for more information on labels, and Workstation Configuration on page 138 for enabling/disabling label printing during login). When you save the sample the system will validate the entered information.

If the sample does not have at least one analysis a warning is issued. In this case, either use [Cancel] to exit without saving the sample or add at least one analysis. If the sample has duplicate analyses a warning is also issued. If the duplicates are intentional, acknowledge the warning to continue saving the sample.

After saving the sample the system will automatically update a sample schedule if the sample satisfies a schedule for the selected project (see page 96 for more information on Sample Schedules). Use the [Cancel] button to discontinue sample login and discard the sample data.

See Dynamic Batches on page 66 for another method to log multiple similar samples.

As an alternative to the [New Sample] button, use the [Results] button to save the sample and immediately open the Results by Sample screen to enter analysis results. Use the [Copy Sample] button to save the sample and log a new sample by copying the current samples characteristics or characteristics and analyses. The [Copy Sample] button is useful when logging multiple similar samples.

Edit or Delete Existing Samples

To edit existing samples, use the [Edit Data] button to place the Sample Login form in Edit mode. Use the sample selection picklist to enter or select an existing sample ID to retrieve the sample information. Use the [Query Samples] button to query multiple samples for editing. Use any of the methods described above to add, edit, or delete sample analyses.

Note

When an sample characteristic is changed, depending upon the Audit Trail configured under System Configuration, the Sample Audit Trail dialog may prompt for a reason for the change. Enter or select an appropriate reason then click [OK] to complete the change. An audit trail is created for each changed date or time.

Use the [Add] analysis button to enter the Add Sample Analyses popup, and select single or multiple additional analyses. Likewise, use the [Add] requirement button to enter the Add Sample Requirements popup. Hold down the CTRL key to select multiple non-contiguous analyses/ requirements or use the SHIFT key to select contiguous analyses/ requirements. To add the new analysis or requirement to multiple samples at once, activate Add to all queried samples. Note that Technicians can only add analyses to incomplete queried samples.

When either a single analysis or multiple analyses are deleted, the Sample Audit Trail dialog will prompt for a reason for the deletion. Enter an appropriate reason then click [OK] to complete the deletion. An audit trail is created for each deleted analyte.

To delete an entire sample, position the cursor within any field in the main part of the form (fields above the analyses) and use Edit|Delete Record to delete the sample. A dialog box will ask you to confirm the deletion and if you proceed, the sample audit trail dialog will request a reason for deleting the sample. Enter a reason and click [OK] to delete the sample. For information on viewing the sample audit trail see Reports on page 91.

NOTE

Only members of the Owners, Admins and Technicians security roles can edit existing samples. Technicians can edit sample characteristics and delete incomplete analyses if the LIMS administrator has enabled this feature on the System Configuration screen (see page 134).

Batch Login

Select Batch Login from the Samples menu to open the Batch Login Setup form (see Figure 16). Use this form to quickly log either a predefined batch of routinely logged samples or to dynamically construct a batch of samples having similar characteristics.

Figure 16 Batch Login Setup

See Sample Login on page 117 for more information on customer sample login options.

To log a sample batch, first select the batch from the picklist or use the [Customer] button to select customer-specific batch options. If the selected Batch includes predefined samples, the number of samples is displayed and the Apply to all Samples options are enabled. Enter any sample characteristic(s) that should be applied to all the batch samples. Sample fields without a time value such as collected time and received time are treated as midnight time (00:00) for query purposes.

See Label Scripts on page 118 for more information on label script syntax.

Click the [OK] button to open the batch login screen (see Figure 17) that shows the characteristics for each sample in the batch. Use this screen to change individual sample characteristics and to add or delete samples. If necessary, edit a sample's label script to change the quantity and type of labels to print. Double-click the label script field to select from a list of frequently used label scripts or build a label script. Note that label prompting/printing at sample login can be enabled/disabled using the Workstation Configuration option on the Admin menu.

Use the Analysis [Add] and Requirement [Add] buttons to add additional analyses and/or requirements. In the Add Sample Analyses and Add Sample Requirements popups hold down the CTRL key to select multiple non-contiguous analyses/ requirements or use the SHIFT key to select contiguous analyses/ requirements. Activate 'Add to all batch samples', to add the selected analyses/requirements to every sample in the batch. Activate 'Do not add duplicate analyses,' to prevent inadvertent duplication of required analyses. Click [OK] or [Cancel].

Use the [Delete] analysis button to delete an analysis. In the Delete Sample Analyses popup select the analyses you want to delete, then click [Delete].

Note that the Delete Sample Analyses popup includes all possible analyses, not just those previously assigned to the Batch.

Use this datasheet view at the top of the screen to quickly edit samples. Click in any field then use the picklist to select from available options. Delete a sample by selecting its record, then using the keyboard DEL key. Copy a sample by clicking [Copy Sample]. Sort the samples by clicking in a column to select then right-click above the column and select the sort order from the popup menu. Click [OK] to return to the Batch Login screen.

TIP

Clear the In-house check box to change an analysis normally performed in-house to one sent out. An analysis defined as one sent out cannot be changed to in-house during sample login.

Click the [Close] button to log the samples. When the batch is logged MSC-LIMS assigns sample IDs for batch samples having the form YYMMDDHnnn where YYMMDD is the current date, H is the hour ('A' = 0, 'B' = 1, ... , 'W' = 23) and nnn is a sequence number. Note that construction of batch sample IDs implies a login limit of 999 batch samples per hour. Batch samples will also update the sample schedule if applicable.

Samples logged via batch login are automatically assigned a sequential batch number, which is displayed in the batch login confirmation. The Batch number appears on the Sample Login screen, Results Entry screens, Sample Summary report and UDR column expressions list.

Tip

The Additional tab of the Query controls includes a Batch number field to query samples by batch. Note that the Batch number query field also supports valid SQL expressions such as: >=10, <20, Between 10 And 20, etc.

The batch number may be edited by members of the Admins and Owners security roles to add or remove a sample to or from an existing batch or to move a sample to a different batch. For example, in the Sample Login screen's Edit mode for the chosen sample, enter the correct Batch number, and click [Save Sample] or [OK] to add the sample to the existing batch.

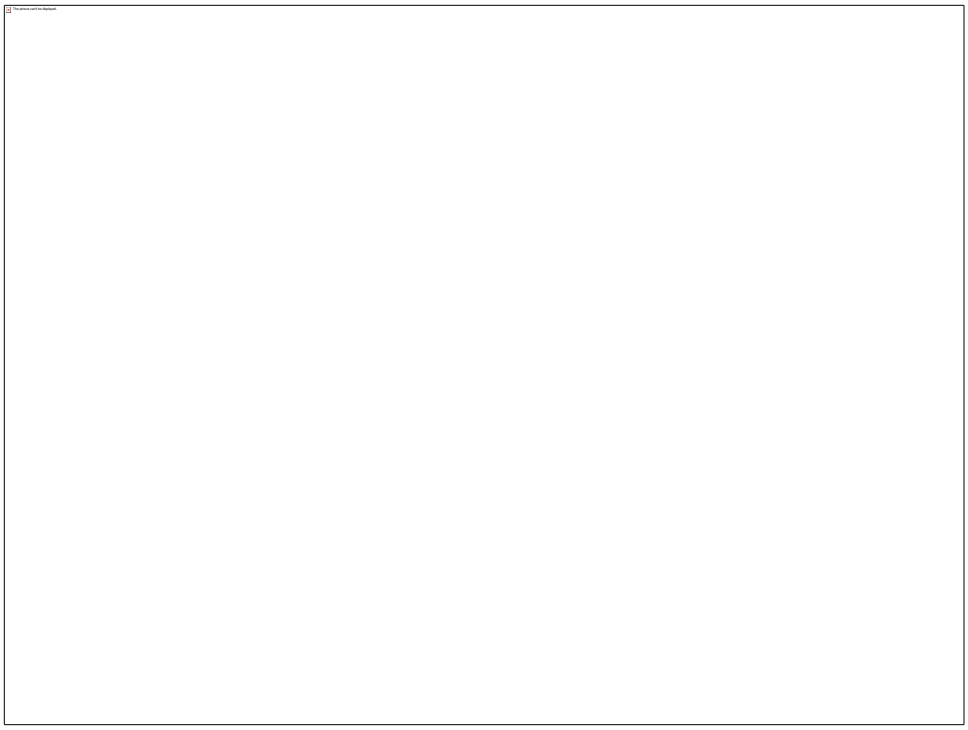


Figure 17 Batch Login

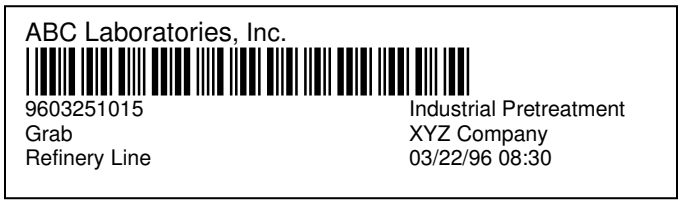
Creating a Dynamic Batch

As an alternative to single-sample login, a non-routine collection of samples having similar characteristics can be quickly logged by dynamically creating a login batch. If your LIMS administrator has defined an appropriately named login batch that does not include any predefined samples, simply select this *dynamic* batch in the batch login setup screen and click [OK] to open an empty batch login screen. Create the first sample with the appropriate characteristics then use the [Copy Sample] button to copy the sample record the number of times specified. Now edit the sample characteristics in the new records as necessary.

Container Labels

Use the System Configuration screen (see page 132) to change the container label title.

MSC-LIMS supports multiple barcoded container label styles. A label style determines the layout of the printed label.

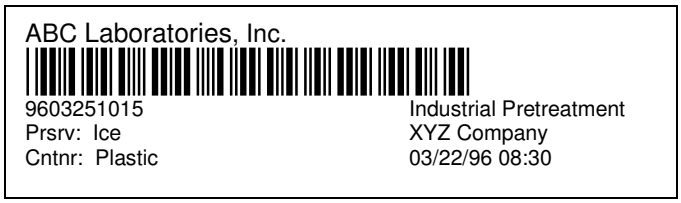


The System Administrator may configure label styles under System Configuration on the Admin menu and may assign a label style or label script to each Project during Project Setup. The label style assumed by a particular

sample is determined by the sample's Project (see page 120 for more information on projects).

Additional site-specific label styles can be added through customization.

MSC-LIMS includes one default (example, above), one environmental (example, right) and two additional configurable label styles. All label styles display the laboratory name. The default and environmental style labels display the sample ID in barcoded and text formats. All remaining fields (project, customer, collected date and time, etc) are configurable.



In its default configuration, the environmental style label displays Preservative and Container Type below the sample ID. When generating environmental style labels during single sample login or single sample reprints, a label setup dialog may appear. Use the [Add n Labels] button to specify quantity of labels to print, specify preservative and container type, then use the [Print] button to generate the labels. If the labels are being printed from the Sample Login screen, they are automatically sent to the printer, otherwise the labels are displayed in the print preview window.

Under Settings on the Workstation Configuration screen, the System Administrator determines whether or not MSC-LIMS will "Prompt to print labels at sample login".

To reprint labels for one or more samples, use the Container Labels option on the Samples menu (see Figure 18). For a single sample reprint, select or enter the sample ID in the Select Sample picklist.

To reprint labels for multiple samples, enter query criteria using the query tools. Select a Label Style or double-click the Label Script field to pick or build a label script (for more on Label Script building, see Label Scripts on page 118).

Note

Single sample reprints are previewed but reprints for multiple samples are automatically printed.

When previewed, container labels for the given sample are available as separate "pages" in preview mode. To print all labels select File|Print or the toolbar icon. To print an individual label, navigate to the appropriate label page, select File|Print and enter the page number (or range) in the print setup dialog. Note that you may specify the number of copies of the labels in the print setup dialog.

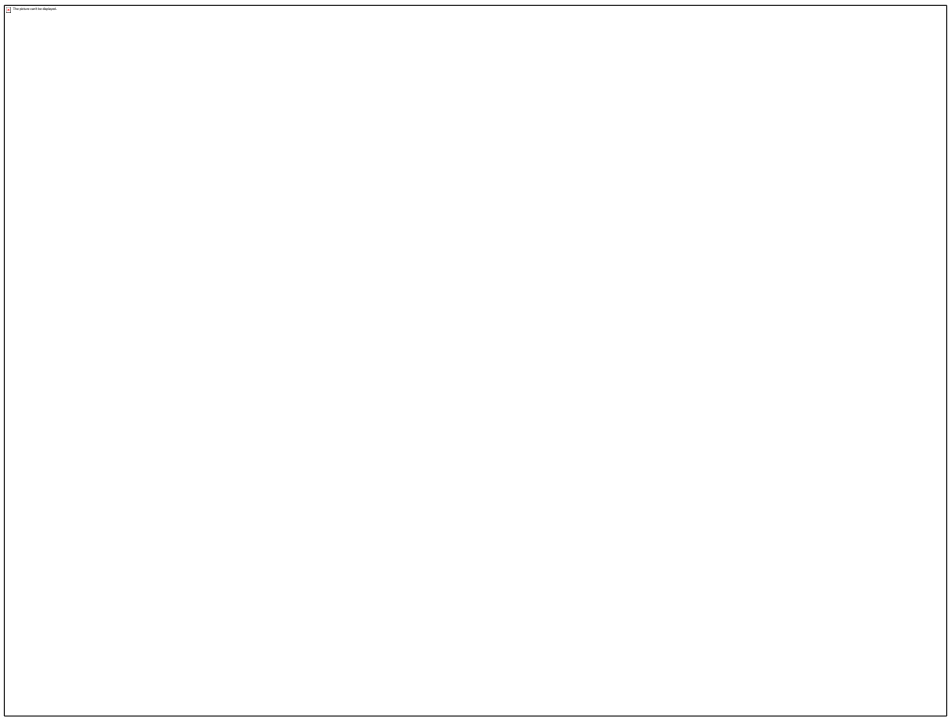


Figure 18 Reprinting Labels

Results Entry by Sample

Double-click the sample pick list to update the list's contents.

Use the Results by Sample option on the Samples menu to enter analysis results by sample for one or more samples. When you select Results by Sample from the Samples menu, the results by sample setup form is displayed (see Figure 19).

To enter results for a single sample, use the sample picklist to enter the sample ID using the keyboard, dropdown list or barcode scanner. After entering or selecting a sample, the system will automatically display the results by sample screen listing all analyses for the given sample.

TIP

To improve performance with large databases, the sample picklist should only be populated with recent samples. Double-click the sample picklist to update the list's contents. See Workstation Configuration (page 138) for more information on setting default populating options for sample picklists.

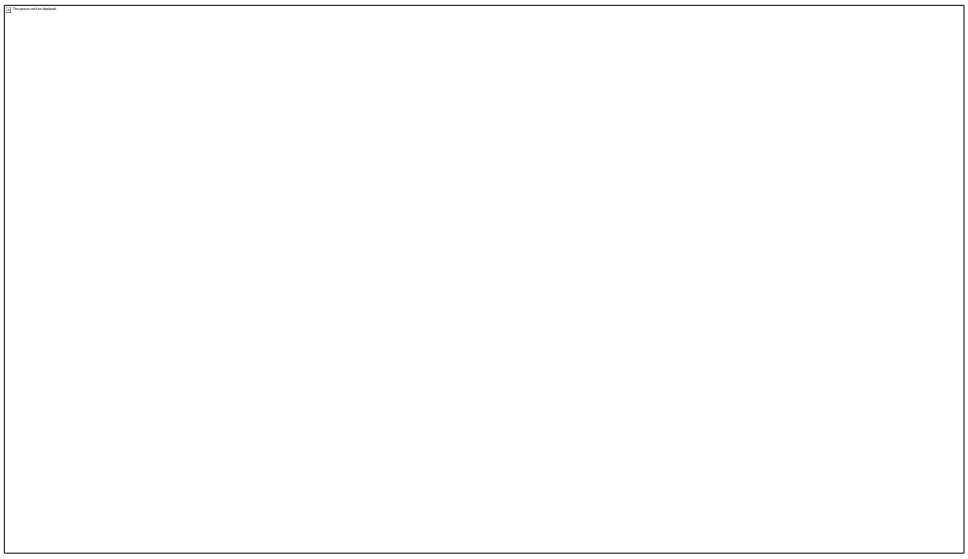


Figure 19 Results by Sample Setup

To enter Results by Sample for more than one sample, or to search for a single sample instead of using the picklist, use the sample query controls (see Querying Samples, page 33) in the setup form to enter your query criteria.

Tip

Use the Sample Order option to move through samples in Ascending order, chronologically by login date/time, or in Descending or reverse chronological order. The Sample Order option setting is automatically saved between LIMS sessions with the workstation settings.

Click the [Query] button to locate the samples and, if necessary, use the [Select] button to refine your query. Use the [OK] button to open the results by sample screen (see Figure 20) to enter results for each of the samples queried. When entering results for more than one sample, the results by sample screen will include a sample picklist and [Previous Sample] and [Next Sample] buttons. Use the picklist or buttons to navigate to another sample.

Set the Data Entry tab (page 134) on the System Configuration screen to automatically insert the current date and time when entering results.

To record results, first enter the date and optional time of the analysis. If the option "Use current date for default analysis date" is enabled on the Data Entry tab of the System Configuration Screen, the system automatically inserts the current date in the Date field on each analysis record, or you may revise the date in the default analysis date field once to automatically insert the revised date in each record. Double-click or right click to access the popup calendar.

Now enter the analysis result which is either a result type (e.g. positive, negative, test beyond parameters), a floating-point result value, a combination of type and value (e.g. < 0.1), a date, a time, or a date and time. See Result Types (page 127) for more information on configuring result

types. A result value outside the valid range for the analysis cannot be entered. If the result value is within the warning range specified for the analysis a "MIN" or "MAX" warning is displayed. "BDL" is displayed if the entered value is below the detection limit. Optionally, enter a dilution factor. Note that the dilution factor can be used on an Excel-based final report to adjust the reported detection limit.

The Results Entry by Sample screen supports several mouse productivity aids. Double-click the analyte name to view the method. Double-click the result value field to view the analysis' specifications. Double-click the MDL field to insert a "less than detection limit" result. If a dilution factor has been entered the value inserted is the default detection limit multiplied by the dilution factor. See the Data Entry tab of the System Configuration screen (page 134) to identify the "less than" result type to enable this feature.

Use the Default Outside Lab field on the Analysis setup screen (see page 111) to enable the system to automatically insert the outside lab.

If the analysis was not performed in-house, select the outside laboratory from the picklist. For analyses performed in-house, MSC-LIMS automatically identifies the technician who performed the analysis by inserting either the current user's initials or login name. To locate the user's initials, the system searches the Sampler and Employee records for the current user's login name. If no match is found the system identifies the technician by inserting the user's login name.

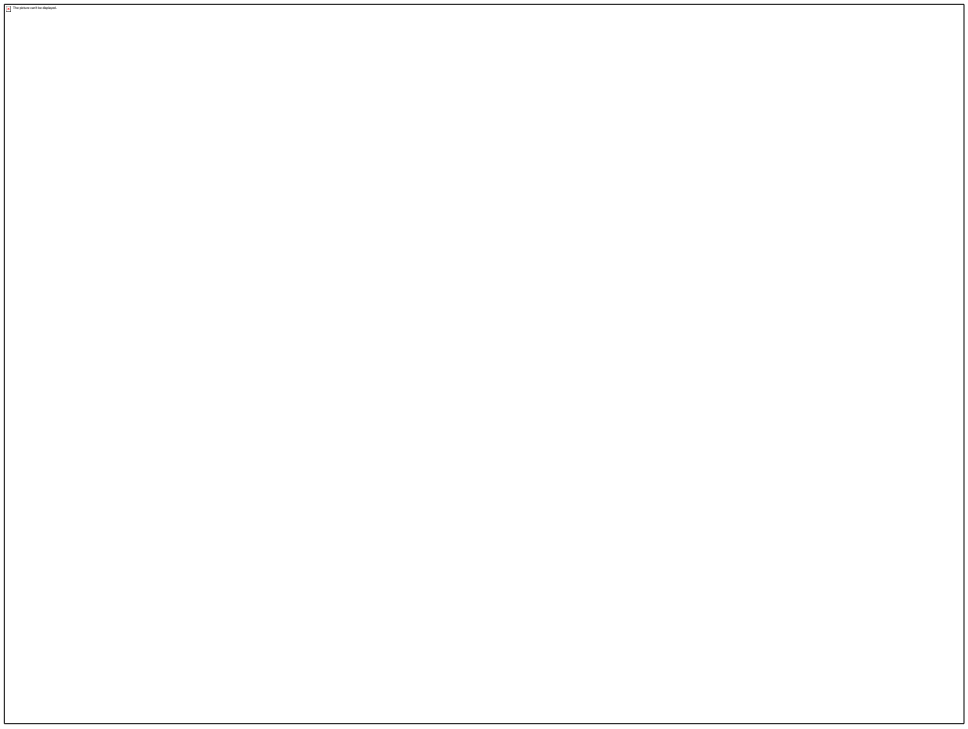


Figure 20 Entering Results by Sample

Members of the Technicians security role can only change an analysis result if the LIMS administrator has enabled Technician result edits (see page 134).

If enabled on the Data Entry tab during System Configuration, you may enter Notes, which will appear on the Sample Summary report.

You may link a Document for reference. Click the hyperlink icon, navigate to the external document, and double-click to insert it into the field. To link

multiple documents to a sample, create a single container document with links to multiple documents.

After you have entered results, notes, conclusions, etc., carefully verify the entered data then select either the [Close] button to save your results and return to the results by sample setup screen or use the sample picklist, [Previous Sample] or [Next Sample] button to save your results and proceed to another sample. Use the [Cancel] button to abandon any changes and return to the results by sample setup form.

When all analysis results have been entered, the sample's completion event occurs. Several processes may occur during the sample completion event. First, the sample's completion date and time are automatically assigned. Next, depending on the current workstation's configuration (see Workstation Configuration, page 138), you may be asked whether the sample summary report should be printed. You may also use the [Sample Summary] button to print the summary at any time. The system may also automatically assign sample costs during the completion event. Costs can be assigned at login, completion or both. See System Configuration for more information on cost assignment. Finally, sample completion may also automatically dispatch fax or email messages with the sample's results. See the *MSC-LIMS Messaging User's Guide* for more information.

Members of the Owners and Admins and Owners security roles can double-click the audit trail reason field to add standard reasons.

When an existing result is changed the sample audit trail dialog will request a reason for the change. Enter an appropriate reason for the change and select [OK] to close the audit trail dialog.

Importing Data from Excel

If a sample's project includes an Excel interface configuration, results for the sample can be imported from an Excel workbook. Use Spreadsheet|New to initialize a new workbook from the Excel template. Use Spreadsheet|Open to quickly switch to Excel if it is already running. Use Spreadsheet|Import to read the Excel data and display the Excel Data Import verification screen. Use the verification screen to view the data that can be imported into the results by sample screen. The verification screen's status field will identify the reason why any data cannot be imported. Use the verification screen's [Import] button to import the data or the [Cancel] button to abandon the Excel data. See Excel Interface on page 46 for examples and additional information on importing Excel data.

NOTE

When importing data from Excel, the system can parse formatted results into Result Type and Result Value fields. The system uses the result type's Report Format field to translate the Excel cell's contents into the appropriate result type. For example, to import "< 5" a result type with a Report Format of "< #" must exist. See result type setup (page 127) for more information.

Results Entry by Analyte

See page 99 for more information on creating analytical batches and entering QC data.

Use the Results by Analyte option on the Samples menu to enter results for either a single analyte or for all analytes for the samples queried. When you select Results by Analyte from the Samples menu, the results by analyte setup form is displayed (see Figure 21).

Figure 21 Results by Analyte Setup

To enter results for a single analyte, select the analyte then either select an existing analytical batch or enter appropriate sample query criteria. Use the "Complete" or "Incomplete" analyses options to restrict the queried analyses to those with or without an existing result. Click the [Query] button to locate the desired analyses and use the [Select] button to open a data selection screen to fine tune the query results by enabling/disabling individual analysis records.

To enter results for all analytes in multiple samples, leave the options under "Single-Analyte Results Entry" blank. Click the [Query] button to locate the samples and, if necessary, use the [Select] button to refine your query.

Use the Display picklist to choose a sample characteristic (e.g. project, location, customer, etc.) other than the default Collected Date to distinguish the analyses. Optionally, use the Sort By option to select a characteristic to specify the order in which analyses will be displayed. Use the [OK] button to open the results by analyte data entry screen (see Figure 22). When entering results for more than one analyte, the results by analyte screen will include an analyte picklist and [Previous Analyte] and [Next Analyte] buttons. Use the picklist or buttons to navigate to another analyte.

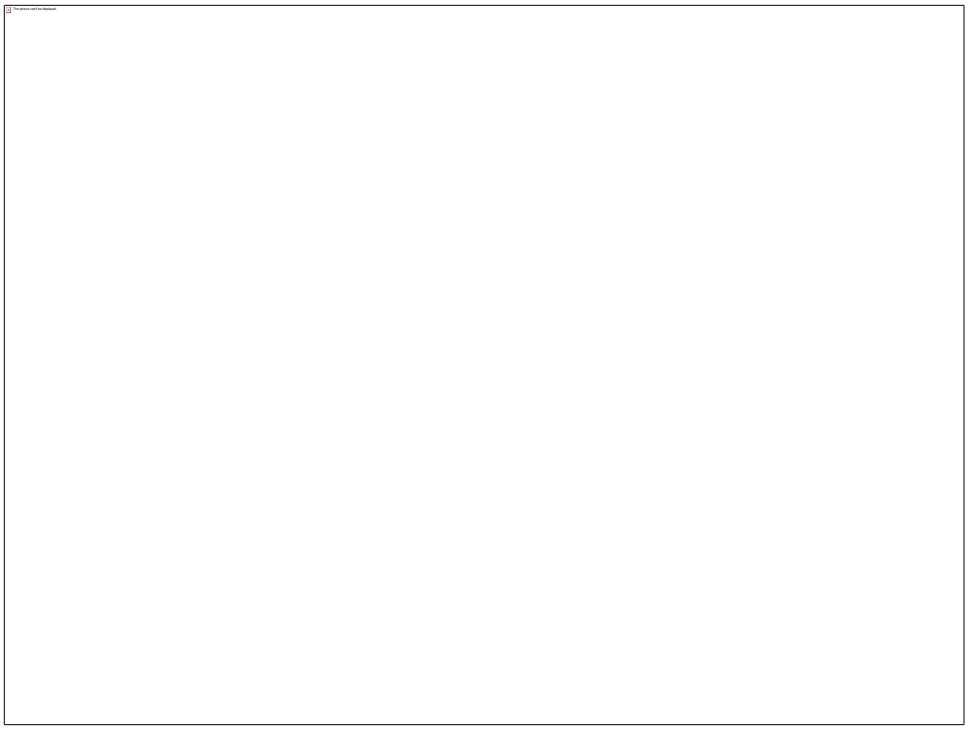


Figure 22 Entering Results by Analyte

See Data Entry configuration on page 134 to automatically insert the current date and time when entering results.

To record analysis results, enter the date and optional time of the analysis. If enabled, use the default analysis date field to change the date (defaults to the current date) to be inserted automatically while entering results. Now enter the analysis result, which can be a result type (e.g. positive, negative, test beyond parameters), a floating-point result value, a combination of type and value (e.g. < 0.1), a date, a time, or a date and time. See Result Types (page 127) for more information on configuring result types. A result value outside the valid range for the analysis cannot be entered. If the result value is within the warning range specified for the analysis a "MIN" or "MAX" warning is displayed. "BDL" is displayed if the entered value is below the detection limit. Optionally, enter a dilution factor. Note that the dilution factor can be used on an Excel-based final report to adjust the reported detection limit.

When many of the analyses have the same result (e.g. < MDL), complete the first record then use the [Copy Record] button to copy the current record to all blank records on the form.

The results by analyte screen supports several mouse productivity aids. Double-click the analyte name to view the method. Double-click the sample ID to view the sample summary report. Double-click the result value field to view the analysis' specifications. Double-click the MDL field to insert a "less than detection limit" result. If a dilution factor has been entered the value inserted is the default detection limit multiplied by the dilution factor. See the Data Entry tab of the System Configuration screen (page 134) to identify the "less than" result type to enable this feature.

Use the Default Outside Lab field on the Analysis setup screen (see page 111) to enable the system to automatically insert the outside lab.

If the analysis was not performed in-house, select the outside laboratory from the picklist. For analyses performed in-house, MSC-LIMS automatically identifies the technician who performed the analysis by inserting either the current user's initials or login name. To locate the user's initials, the system searches the Sampler and Employee records for the current user's login name. If no match is found the system identifies the technician by inserting the user's login name.

The results by analyte screen is also used to create analytical batches and enter QC data. See QC Data by Analytical Batch on page 99 for more information.

Use the [Show Sample] toggle button on the results by analyte screen to enable/disable the sample characteristics display. As you navigate through the analysis records, this display is updated to show the sample characteristics of the current analysis. Note that this display also enables sample conclusion editing which could be used, for example, to select "footnote" result types (e.g. *1, *2, etc.) and then enter footnote text in the conclusions field. The sample characteristics display also enables linking a Document for reference. Click the hyperlink icon, navigate to the external document, and double-click to insert it into the field. To link multiple documents to a sample, create a single container document with links to multiple documents.

Double-click the sample ID to open the sample summary report for the sample. Use the Sample Summary options fields to configure the report's options. Use the [Sample Summary] button to generate a sample summary report for one or more of the samples displayed.

Use the "Find ID" field to locate an analysis for a specific sample. Enter or scan a bar-coded sample ID and the cursor will be positioned within the first analysis record for the specified sample.

The results by analyte screen uses the same security functions as the results by sample screen. Members of the Technicians security role can only change an analysis result if they entered the original result and the LIMS administrator has enabled Technician result edits (see page 134). Any result change triggers an audit trail event.

Importing Data from Excel

If an analysis' configuration includes Excel interface specifications, results for the analysis and QC data for the analytical batch can be imported from an Excel workbook using the results by analyte form. Use Spreadsheet|New to initialize a new workbook from the Excel template. Use Spreadsheet|Open to quickly switch to Excel if it is already running. Use Spreadsheet|Import to read the Excel data and display the Excel Data Import verification screen. Use the verification screen to view the data that can be imported into the results by analyte screen. The verification screen's status field will identify the reason why any data cannot be imported. Use the verification screen's [Import] button to import the data or the [Cancel] button to abandon the Excel data. See Excel Interface on page 46 for examples and additional information on importing Excel data.

NOTE

When importing data from Excel, the system can parse formatted results into Result Type and Result Value fields. The system uses the result type's Report Format field to translate the Excel cell's contents into the appropriate result type. For example, to import "< 5" a result type with a Report Format of "< #" must exist. See result type setup (page 127) for more information.

Deleting Samples

Did you use hypothetical data during Quick Start or other MSC-LIMS practice or training sessions? Delete the test samples in their entirety to avoid future confusion.

To delete a single sample, use the single sample login screen on either the Samples menu for regular samples or the QC menu for QC samples and switch to edit mode then select the sample. With the sample to delete displayed, ensure that the cursor is in one of the sample characteristic fields (i.e. not in an analysis record) then use Edit | Delete Record to delete the sample and its analyses. Confirm the delete then enter a reason for deleting the sample in the audit trail dialog.

To delete multiple samples, use the Delete Samples option on the Samples menu. Enter query criteria then click the [Query] button to locate the samples. Now use the [Select] button to open a selection screen for the queried samples and mark the samples to be deleted. Use the [Select All] button to mark all queried samples for deletion. Click the [OK] button to return to the sample delete setup dialog. Enter an audit trail reason for the deletion and click the [Delete] button to delete all selected samples and their analyses. Note that only members of the Owners and Admins security roles can delete samples.

TIP

Before using the Delete Samples option to delete a large number of samples, make a backup of the LIMS database as a precaution. There is no way to restore or undelete deleted samples.

Sample Approval

MSC-LIMS includes several features that can be used to implement a sample approval facility. Use sample approval, for example, when a member of the Admins security role such as a QA/QC officer should only complete certain samples. Sample approval may also be necessary when using MSC-LIMS Messaging features, which can automatically deliver sample results for completed samples via email or fax. Using an approval facility to control

when a sample is marked completed ensures that only approved sample results are emailed or faxed.

See analysis setup on page 111 for more information on creating Admin-only analyses.

To implement an approval feature, first create a new Admin-only "Approved" analysis. Be sure to check the "Admin privileges required for results entry" option on the Data Entry tab of the Analysis setup screen. If necessary, create any new result types to be used with the Approved analysis (e.g. Yes, No, etc.). If appropriate, use the new Result Type, Result Value, and Validation Message options on the Data Entry tab of the analysis setup screen to limit results for the analysis. Now add the new analysis to appropriate projects and/or requirements whose samples will require approval.

To enable sample queries using the "Unapproved Samples" option on the Additional tab of the sample query controls, open the System Configuration screen on the Admin menu, select the Data Entry tab then select your sample approval analysis using the "Approval analyte" option. Note that the "Approval analyte" picklist includes only Admin-only analyses.

With "Show Exceptions" checked, double-click any red exclamation (!) marks in the results by analyte screen to review any sample exceptions.

The QA/QC officer can now use the "Show Exceptions" option of the results by analyte screen to periodically query unapproved samples, review exceptions, review the sample summary report, and approve valid samples by completing the Approved analysis. When querying samples using the "Unapproved Samples" option on the Additional tab of the query controls, the system locates samples whose only incomplete analysis is the "Approval analyte" specified on the System Configuration screen.

TIP

To allow Technicians to approve samples, create the "Approved" analyte as outlined above, add the analyte to the "Approval analyte" option on the System Configuration screen, then clear the analyte's "Admin privileges required for results entry" option on the Analyses setup screen. To limit sample approval to specific employees, add a new method for the "Approved" analyte, enable the analyte's "Method certification required for results entry", then add employees to the method's certification list on the Methods setup screen.

Sample Audit Trail Events

MSC-LIMS includes an integrated sample audit trail to record changes to sample data. When an audit trail event occurs, the system displays the audit trail dialog (see Figure 23) asking the user to enter a reason for the change. The system records the type of event, reason, user's login name, date and time, analyte (if applicable), and the result before and after for result changes.

The audit trail data becomes a permanent part of the sample's historical record. A sample's audit trail data can be viewed with the sample summary report. Audit trail data can also be viewed and printed, using the Audit Trail report on the Samples menu.

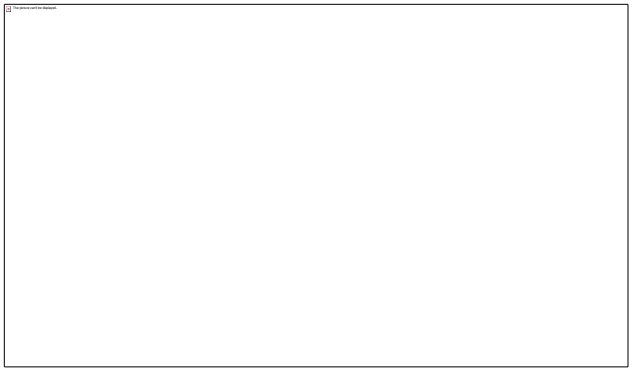


Figure 23 Audit Trail Dialog

An audit trail event automatically occurs when the system detects any of the following:

- An analysis result is changed
- An analysis technician is changed
- An analysis is deleted from a sample
- An analysis replicate is deleted from a QC sample
- A QC data result or reference value is changed
- A QC data result is deleted from an analytical batch
- An entire sample is deleted
- A single sample login is cancelled (does not display the audit trail dialog)

In addition, depending upon options selected under the Audit Trail tab of the System Configuration screen (page 135), an audit trail event occurs whenever the system detects changes to any of the designated sample characteristics.

User-Defined Reports

See Exporting to Excel or Word on page 41 for additional reporting options.

MSC-LIMS includes facilities to generate both predefined system reports and user-defined reports (UDR). System reports appear under the Reports heading on each tab of the main menu. Use the user-defined report feature to create and generate application-specific reports to list, calculate, format, and summarize sample data.

*See the **MSC-LIMS .com Knowledge Base** for additional UDR tips.*

Additional information and tips to create UDRs can be found in the following *MSC-LIMS.com Knowledge Base* articles:

- Developing and Testing a UDR Without Requerying Data
- Hiding a UDR Column

- UDR Formula and Expression Dependency Rules

The following sections describe procedures to create and generate user-defined reports.

Creating a Report

Use the Sample menu's Define Report option to open the report definition screen (see Figure 24) to add, edit, and delete UDR definitions. A report definition is used to view and print sample data in a tabular-style report. A UDR can display sample characteristics, analysis results, calculated values derived from analysis results, and the results of Visual Basic for Applications (VBA) expressions.

Figure 24 Report Definition

*See the **MSC-LIMS Programmer's Guide** for instructions to add your own custom UDR templates.*

To add a new UDR, place the form in Add mode then enter a unique report name and select an appropriate report template from the list of available templates. A report template describes the predefined report columns (e.g. sample ID and location), the orientation of the printed report (i.e. landscape or portrait) and the maximum number of user-defined columns. To complete the report, enter appropriate header and footer text or Visual Basic for Applications (VBA) expressions (see VBA Expressions below) then add report columns. A report column can display either an analysis result, a derived value calculated from a given formula, or the result of a VBA expression.

To edit an existing report, select the [Edit Data] button on the toolbar to place the form in Edit mode then select the appropriate report from the report picklist. In Edit mode you can also use the [View All] button and the

PgDn/PgUp keys or the record navigation controls to navigate to a specific report. Note that members of the Technicians security role can only edit reports they created. Members of the Admins and Owners security roles can edit and delete any report. Following is a description of some of the fields and controls on the report definition form. See Creating Report Columns below for a description of the controls on the Columns tab of the form.

Report Field/Control	Description/Notes
Report Name	A unique name to identify the report. The report name is used as the default report title that can be edited when generating the report.
Sort By	Sort the report's rows by selecting a sample characteristic and ascending or descending sort order. If you leave this field blank, the default sorting is by ascending login date and time.
Template	The report template identifies the fixed columns, print orientation, and the number of available user-defined columns.
Max. Columns	This display-only field shows the number of user-defined columns available on the selected template. Since columns are labeled A, B, C, etc. the column letter of the last available column is also listed.
Inactive	Mark the report inactive to prevent it from being selected in the report generator. While under development you may want to check this field to prevent others from generating the unfinished report.
Allow statistics on result values preceded by	Use this field to allow the values preceded by non-numeric characters in specific formatted results to be included in summary statistics for the report. For example, to include "< MDL" values in summary statistics enter the "<" character in this field.
Notes	Enter any notes regarding the structure or use of the report. These notes are not printed but are displayed when the report is selected for generation.
Header 1 and 2	These two header lines appear below the report title on each page of the report. Enter text or VBA expressions in the left and right-justified fields to format the header lines. These values can be entered or edited when the report is generated.

Report Field/Control	Description/Notes
Text	Use this field to include unlimited-length text such as notes and disclaimers on the last page of the report following the report's data. Use a VBA expression, for example, to display the results of cross-column calculations and statistics.
Footer 1 and 2	These two footer lines appear at the bottom of each page of the report. Enter text or VBA expressions in the left and right-justified fields to format the footer lines. These values can be entered or edited when the report is generated. Note that when creating a new report the report footer text or VBA expressions for system reports are automatically inserted in the second footer (see system report configuration on page 132 for more information). You may replace these defaults with any appropriate text or VBA expression.
[Print Definition]	Use this button to print a report definition summary for the current report.
[Copy To]	Use this button to create a new report from the current report definition by copying either the report specifications (i.e. header, footer, template, sorting, etc.) or the report specifications and all column definitions.
[View All]	When the form is in Edit mode, use this toggle button to enable all UDR definitions for editing. When this option is selected, use the PgUp/PgDn keys or record navigation controls in the lower left of the form to navigate to a specific report definition. This feature is particularly useful to quickly edit the same field(s) in multiple report definitions.

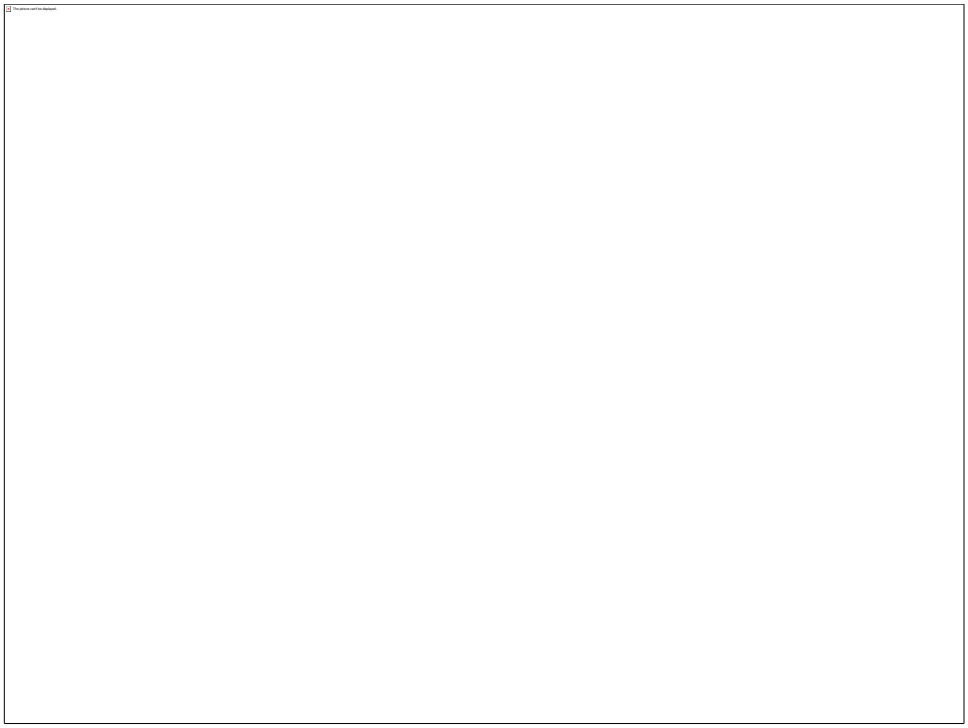


Figure 25 Report Definition Columns

Creating Report Columns

Select the Columns tab on the report definition form to add, edit, or delete UDR columns (see Figure 25). Following is a description of some of the fields and controls on the UDR column definition form.

Column Field/Control	Description/Notes
Column	Similar to a spreadsheet, columns are labeled using letters A-Z for a maximum of 26 columns. Note that you may define more columns than a template can display, which is useful when exporting the report's data to Excel. To successfully generate a report the report generator requires that columns be labeled contiguously beginning with 'A'. Note that you can reorder columns by temporarily changing the letters. For example, you can swap the order of columns A and B by changing the 'A' to an 'X', 'B' to 'A', then 'X' to 'B'.
Analysis	Select the appropriate analysis if the column's value should be obtained from analysis result data.

Column Field/Control	Description/Notes
Label	Enter an appropriate column label to display on the report. For analyses, this field is automatically filled with the analysis' abbreviation or the full analyte name if the analyte does not have an assigned abbreviation.
Units	Enter the appropriate units to label the report's column. For analyses, this field is automatically filled with the analysis' units.
Formula	To include a derived column, enter a formula to calculate the column's value. A formula may contain column letters A-Z, mathematical operators +, -, *, /, ^, (, and), and the functions @Abs(x), @Exp(x), @LN(x), and @Log(x). For example, the formula '(A+B)/100' will sum the values in columns A and B then divide by 100. The formula '@Log(B)' will display the common logarithm of the value in column B. If the result of the calculation generates an error (e.g. error in formula, division by zero, column has no value, log of a negative, etc.) no result will be displayed on the report. Use the VBA Expression field for more complicated formulas.
Nulls	Enter appropriate substitution text to display when the value for the column is null or missing.
Warning Max./Min, Warning Character	To highlight values exceeding a limit, enter appropriate limits in these fields. If the value exceeds a limit the specified warning character (e.g. "H" for high, or "L" for low) are displayed adjacent to the value in the report. Note that these values are automatically set to an analysis' warning limits. These fields are ignored when using a UDR template that does not support warning columns.
Decimal Places	Determines the number of decimal places used to display the column's numbers. Use 'Auto' to allow numbers to appear as specified by the Format setting. If you specify a number it determines the number of digits to the right of the decimal point and the Format setting determines the appearance of digits to the left of the decimal point.
Alignment	Click the appropriate radio button to center, left-justify, or right-justify the column's data.

Column Field/Control	Description/Notes
Format	Specifies the format for displaying dates, times, and numbers. Select an appropriate format for the column's data type from the dropdown list.
VBA Expression	A VBA column expression can be used to perform advanced formatting, calculations, or to specify a database field for the column's value (e.g. collection date, sampler, analysis date, technician, etc.). Use the dropdown list to select one of the predefined expressions for database fields. See VBA Expressions below for expression examples.
Statistics	To include column summary statistics check the appropriate field. Options are included for minimum, maximum, sum, average, geometric mean, and standard deviation.
[Sort]	Use this button to sort and redisplay the columns after changing column letters.

See Result Types on page 127 for more information on result type report formatting.

NOTE

When a report column's displayed result includes non-numeric characters (e.g. <100) due to a formatted result type, formulas and summary statistics will ignore any column values where a non-numeric character appears to the left of the result value unless the non-numeric character has been specified in the "Allow statistics on values preceded by" field.

Results with a non-numeric character to the right of the value (e.g. 100 *) are supported in formulas, summary statistics, and VBA expressions. To properly interpret formatted results in your own VBA expressions use the Val() function (see expression examples below) to return the numeric value up to the first non-numeric character. For example, the expression Val("100 *") will return 100 while Val("< 100") will return 0.

VBA Expressions

Visual Basic for Applications (VBA) Expressions are a powerful Microsoft Access feature supported by the MSC-LIMS report generator. An expression is any combination of operators, constants, literal values, functions and names of fields, controls, and properties that evaluates to a single value. Expressions are specified with a leading equal sign "=" and are supported in any of the report header and footer fields and in a column's VBA expression field. While some knowledge of VBA, the Microsoft Access programming language, is required to create complex expressions, the following list offers an introduction to some useful expressions.

Expression	Result
=Date()	The current date
=Time()	The current time
=Now()	The current date and time
=Format(Now(), "Medium Date")	The current date in medium date format (e.g. 25-Feb-04). There are short, medium, and long formats for both date and time.
=[Page]	The current report page number
=[Pages]	The total number of pages in the report
="Page " & [Page] & " of " & [Pages]	Displays "Page N of M" where N is the current page number and M is the total number of pages
=[Project.Name]	Displays the contents of the project name *field*. Note that the width of user-defined report columns may be insufficient to display long text strings. See below for a complete list of available fields.
="Project: " & QueryProject()	Displays the literal "Project: " followed by the name of the project specified in the report generation form's query criteria. Each of the query criteria fields has a corresponding *query function* that returns the value of the field. See below for a complete list of available query functions.
=Day([CollectedDate])	Displays a number between 1 and 31 representing the day of the month the sample was collected. Month() and Year() functions are also available.
=IIf(A < 0, "Negative", "Positive")	If the value in column A is less than zero, the literal "Negative" is displayed, otherwise "Positive" is displayed.

Expression	Result
=IIf(B < 5, "< 5", B)	If the value in column B is less than 5, displays the literal "< 5", otherwise the value is displayed.
=IIf(C < 5, "< 5", IIf(C > 10, "> 10", C))	If the value in column C is less than 5, displays the literal "< 5". If the value is greater than 10, displays "> 10", otherwise the value is displayed.
=IIf(Not IsNumeric(A), A, Format$(A, IIf(A < 10, "0.00", IIf(A < 100, "0.0", "0"))))	If the value is column A is not numeric just display it unchanged, otherwise display numeric values with three significant figures.
=IIF(Val(A) > 0, Val(A) / 100, "")	If the formatted result in column A has non-numeric characters to the right of the value return an empty string, otherwise return the value of column A (after stripping any non-numeric characters to the right of the value) divided by 100.
=SampleAnalysisField("Technician", IDa)	Displays the technician who performed the analysis displayed in column A (IDa for column A, IDb for column B, etc). The UDR column's expression picklist includes predefined expressions for the following sample analysis *fields*: cost, analysis date, outside lab, result max, result min, target, technician, analysis time, warning min., and warning max.
="Total Tests: " & DCount("Value", "sysReportData", "Column='D' And (Value='Neg' Or Value='Pos')") & "Percent Negative: " & DCount("Value", "sysReportData", "Column='D' And Value='Neg'") / DCount("Value", "sysReportData", "Column='D' And (Value='Neg' Or Value='Pos')") * 100	Used in the report Text field (follows report's data) this expression shows the total number of Positive and Negative tests results in column D followed by the percent of the tests that were Negative.

Expression	Result
=DateDiff("h", [AddedDate], [CompletedDate])	Displays a sample's turnaround time in hours by calculating the number of hours elapsed between the sample's login time and completion time. Use "d" for elapsed days and "n" for elapsed minutes.
="Average Turnaround: " & Avg(DateDiff("h", [AddedDate], [CompletedDate])) & " Hours."	Used in the report Text field (follows report's data) this expression shows the average turnaround time in hours for all samples on the report.

TIP

When using an expression in a report column use the IsNumeric() function to test for a numeric value before using the column's value in any arithmetic comparisons or functions. For example, if the value of column B could contain non-numeric data (e.g. a formatted result type) instead of the expression =IIf(B < 5, "< 5", B) use =IIf(IsNumeric(B), IIf(B < 5, "<5", B), B).

NOTE

If a report column uses an expression, decimal place formatting will only work if the result of the expression is a numeric value. Any arithmetic expression will automatically return a numeric value (e.g. B/100). However, to explicitly convert a column value to a numeric value use the Val() function. Following the example in the tip above, use the expression =IIf(IsNumeric(B), IIf(B < 5, "<5", Val(B)), B) to convert to a numeric value.

Below is a list of the field names that can be used to display sample characteristics in a column expression. Field names must be enclosed in brackets when used within an expression. Note that using a field name in a header or footer expression will display the field value for the first sample on a report. If all of the samples on a report should have the same field value (e.g. project name) use the equivalent query function (e.g. QueryProject()) in a header or footer expression to avoid generating misleading reports.

Field	Description
[CollectedDate]	Collection date

Field	Description
[CollectedDateTime]	Collection date and time
[CollectedTime]	Collection time
[CompletedDate]	Completion date and time
[Customer.Name]	Customer name
[CustomerSampleID]	Customer's sample ID
[DueDate]	Due date
[Location.Name]	Location name
[AddedDate]	Login date and time
[UpdatedUser]	Login name of user who last edited the sample
[AddedUser]	Login name of user who logged the sample
[Project.Name]	Project name
[Line]	QC replicate or duplicate analysis count
[QualityControl]	QC sample (yes/no)
[Notes]	Sample notes
[SampleType.Name]	Sample type name
[Initials]	Sampler's initials
[Sampler]	Sampler's name
[UpdatedDate]	Updated date and time

Below is a list of available query functions that can be used in a report expression to display the value of a specific query criteria field from the report generation setup form. Use these functions in place of the field names above for example, when all of the samples on a report should have the same attribute. If the expression ="Project: " & QueryProject() is used in a header, the expression will only show a project name if the report's query criteria included a project. This guarantees that all samples listed in the report have the same project.

Function	Returns
QueryCollectionEnd()	End date of the collection date range
QueryCollectionStart()	Start date of the collection date range
QueryCompletionEnd()	End date of the completion date range
QueryCompletionStart()	Start date of the completion date range
QueryCustomer()	Customer name

Function	Returns
QueryDueEnd()	End date of the due date range
QueryDueStart()	Start date of the due date range
QueryLocation()	Location name
QueryLoginEnd()	End date of the login date range
QueryLoginStart()	Start date of the login date range
QueryProject()	Project name
QueryReceivedEnd()	End date of the received date range
QueryReceivedStart()	Start date of the received date range
QueryReportedEnd()	End date of the reported date range
QueryReportedStart()	Start date of the reported date range
QuerySampler()	Sampler's last name followed by first name
QuerySampleType()	Sample type name
QuerySQLWhere()	Complete SQL WHERE clause constructed from all sample query criteria (i.e. QBE and user SQL)
QueryUserSQL()	User-specified SQL WHERE clause
QueryWhichSamples()	Returns 1 for regular and QC, 2 for regular only, and 3 for QC only

TIP

When constructing a frequently used SQL expression to add to the system's SQL expression list, you can often speed queries for expressions that use a subquery by replacing the subquery with a list of internal IDs. For example, the expression ProjectID IN (SELECT ProjectID FROM Project WHERE Name IN ("MyProject", "Project A")) can be replaced with the faster expression ProjectID IN (3, 5) after obtaining the internal ProjectID number for the desired projects. Internal ID numbers also exist for customers, locations, sample types, samplers, etc.

To quickly determine the internal ID number for a specific sample characteristic, select the characteristic in any report setup dialog (e.g. sample summary report) then click the [Query] button. Now use the SQL tab of the query controls to view the internal IDs for the selected characteristics in the "SQL for last query" field.

Excel Interface

If the UDR's data will frequently be exported to a specific Excel template, use the Workbook Template field on the Excel Interface tab of the report definition screen to specify the template. If a template has been defined for a UDR, you can use the [Export to Excel] button in the report generate dialog (see below) to send the data directly to Excel bypassing the print preview window.

Generating a Report

Use the Sample menu's Generate Report option to open the report generation setup form (see Figure 26). To generate a report, begin by selecting the report from the list of user-defined reports. Now enter sample query criteria using any combination of the available query controls. Although you may enter query criteria before selecting the report, the report's notes may include instructions for querying samples so you may want to select the report first. Use the [Query] button to query the database and display the number of samples satisfying your criteria. If necessary, use the [Select] button to refine your query by excluding individual samples.

NOTE

The system will normally display a report row only if it contains analysis result data. Use the "All Samples Queried" option to display a report row for each sample queried. This option is particularly useful when generating reports that only list sample characteristics.

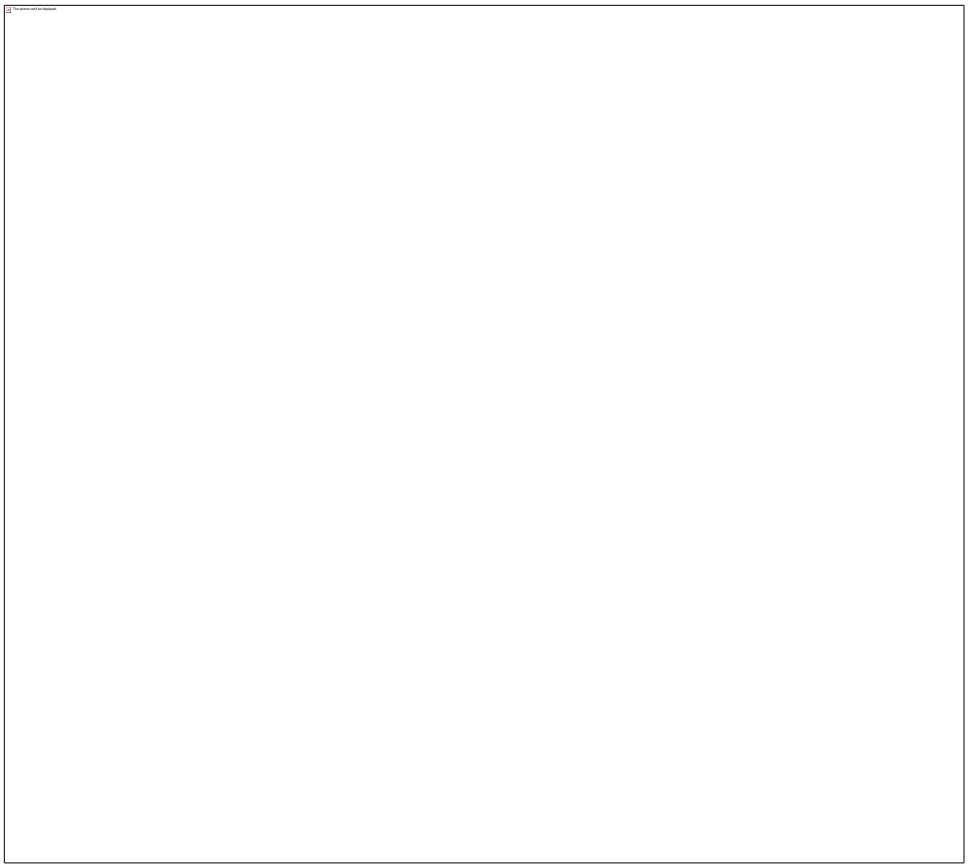


Figure 26 Report Generation

After selecting the desired report you may modify the report title, headers, footers, and sorting as necessary. For example, you may want to add descriptive information to identify the data being printed since the report definition has no knowledge of your query criteria. You may include sample notes and conclusions and add report grid lines by marking the appropriate option. Use the [Print] or [Preview] buttons to generate your report. If enabled, use the [Export to Excel] button to export the report's data directly to the report's associated Excel template. When you close the preview window you will automatically return to the report setup window with your selections intact. Use this feature to quickly regenerate the report with altered characteristics or to generate different reports using the same query criteria.

Note
If your Lims Administrator has enabled the Reported Date prompt on the Reports tab of the System Configuration screen, the system will automatically prompt you to set the Reported Date for each report sample when the report is printed or the Print Preview screen is closed.

The reported date can only be set for completed samples where the reported date has not previously been set. Note that setting the reported date is only available to members of the Technicians, Admins, and Owners security roles.

Reports

Following is a summary of the system reports available on the Samples menu. See Using Reports (page 41) for more information on previewing reports, exporting report data, and creating report snapshots.

Analyte Comparison. Use the analyte comparison report to select and compare analytes across samples. You may select up to five analytes and up to five sample characteristics to display on a report and enter query criteria to locate samples. You may use any of the selection criteria to refine your report, limit your selection to complete or incomplete analyses, and analyses performed in-house or sent to outside labs. This report also includes an option to display the data in a graph. Select two or more analytes to display one bar graph for each sample selected. Select a single analyte to generate a single line graph for all samples.

See page 76 for more information on sample audit trail events.

Audit Trail. Use the audit trail report to view either a complete list of all audit trail events or audit events meeting audit-specific query criteria such as date range, audit type and reason. Significant changes to an existing sample such as deleting an analysis, deleting the entire sample, or changing a result value all generate audit trail events. When an audit trail event occurs, the user is automatically prompted to enter a reason for the action. This report displays audit trail events in their order of occurrence. The sample summary report can also include audit trail data.

See Container Labels on page 66 for more information on labels.

Container Labels. Use the container labels report to reprint one or more labels for a given sample. Enter or select the sample ID in the report setup dialog and select [OK] to proceed. If the label style of the sample's project includes a setup form it will be displayed allowing you to specify the quantity and characteristics of the labels. Complete the setup form and select [Print] to preview the labels. Use the standard print dialog to print one or more copies of all labels or individual labels.

Exceptions. Use the sample exceptions report to locate samples with analyses that have expired, have results above or below the warning limits, or have results below the minimum detection limit. To generate an exception report, mark the appropriate exceptions and enter your query criteria in the report setup dialog. Select the [Query] button to locate samples matching your criteria with at least one of the selected exceptions.

Invoice. Use this option to generate detail or summary reports. See Invoices for more information (page 93).

Sample IDs. Use this report to quickly print a list of bar-coded sample IDs for samples collected within a specified date range.

Sample Summary. Use this report to print a sample summary showing sample characteristics, notes, conclusions, analysis results, QC data, and audit trail data. Note that the report uses the characters "H" and "L" (for high and low) adjacent to the analysis' result value if the value is greater than or less than the analysis' warning limit.

Note

If your Lims Administrator has enabled the Reported Date prompt on the Reports tab of the System Configuration screen, the system will automatically prompt you to set the Reported Date for each Sample Summary sample when the Sample Summary report is printed or the Print Preview screen is closed.

The reported date can only be set for completed samples where the reported date has not previously been set. Note that setting the reported date is only available to members of the Technicians, Admins, and Owners security roles.

Sample Tracking. Use the sample tracking report to generate a list of all incomplete analyses, incomplete analyses with warnings, or incomplete analyses sent out. The following warnings may be displayed on this report:

Warn	The analysis is within its *warning* days of expiration. Note that the normal number of warning days is doubled if the sample has a Rush status.
DUE	The analysis is either due today or the sample has an Immediate status.
EXP	The sample has expired for this analysis.

TIP

The list of all incomplete analyses may produce a very lengthy sample tracking report. Export this report's data to one of the example sample tracking templates provided with the MSC-LIMS software to produce a summary with sample and analysis counts grouped by project or customer. See Excel Interface on page 46 for more information.

Work Order. Use the work order report to print a list of bar-coded sample IDs along with the sample's required analyses for samples matching your query criteria.

Invoices

Use the Invoice option on the Sample menu to generate customer invoice reports. Use the invoice setup form (see Figure 27) to query invoice samples and select invoice options. Select the appropriate Group By option for sorting and subtotaling. Use a detail-type invoice to include a breakdown of each sample and its analyses. Note that there is no detail option when grouping by analyte.

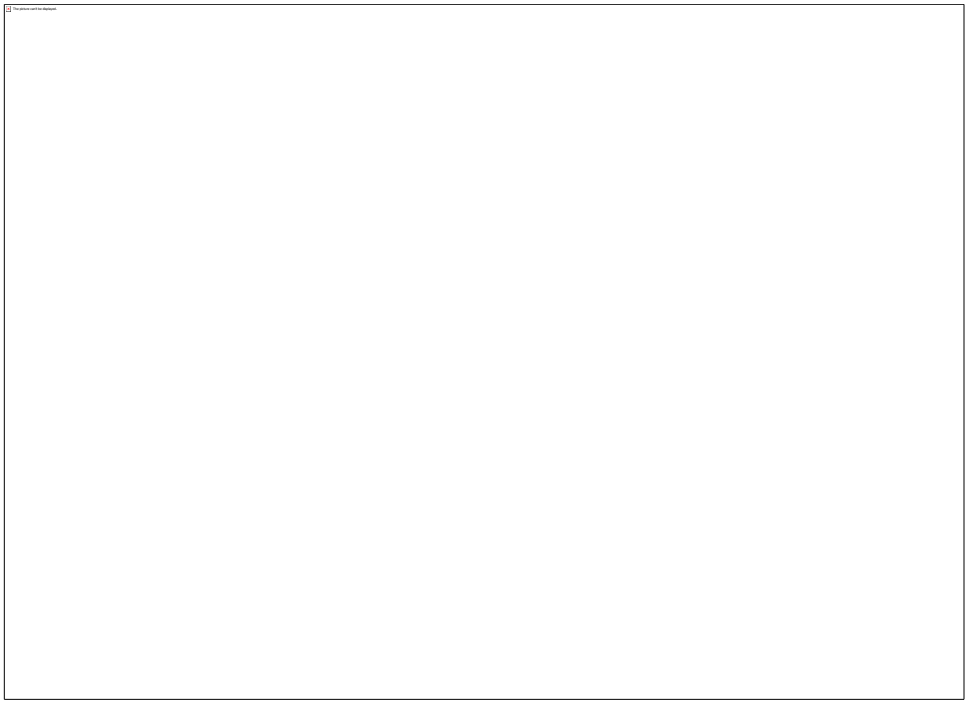


Figure 27 Invoice Setup

Use either the [Print] or [Preview] buttons to generate the resulting invoice report. Use File|Output To from the preview window to export the data to other file formats. Use this capability for example, to export the invoice data for import into your accounting system's accounts receivable module. Use File | Export to MS Excel Template or the equivalent toolbar button from the preview window to export the report's data to your own Excel invoice template (see the example invoice templates in folder C:\MSC-LIMS\Examples\Excel Export Templates for more information).

Chapter 5: Laboratory Notebook

Use the Laboratory Notebook menu to maintain laboratory methods, define sample schedules, view schedule histories, and print laboratory work sheets and bench sheets.

Methods

To assign a method to an analysis, see Analysis setup on page 107 for more information.

Select Methods from the Notebook menu to open the methods data entry form (see Figure 28). Use this form to add, edit, and delete laboratory methods. While methods can be created for any purpose, they are most often associated with an analysis. When used for this purpose, each analysis may have only one method. An analyte obtained with different methods should be set up as distinct analyses with an analyte name suggesting the difference.

Use the [Add Data] button to place the form in add mode to add new methods. Use the [Edit Data] button to switch the form to edit mode to select and update existing methods. Use the [Print] button to print the current method. Use the [Copy To] button to create a new method by copying the current method.

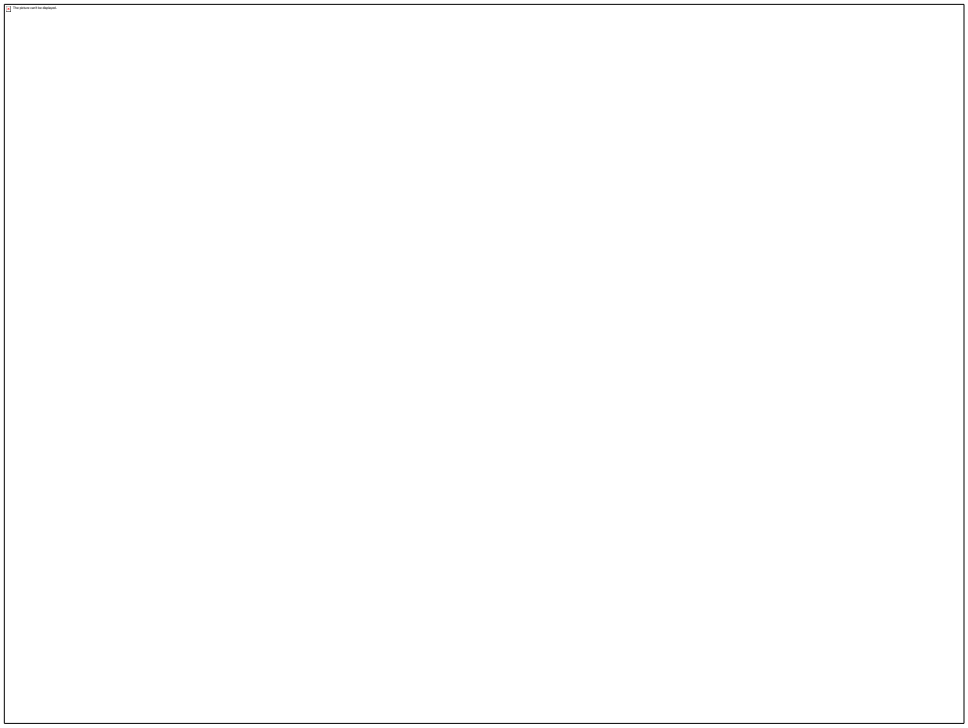


Figure 28 Methods Form

If the lab's methods are already available in an external document, use the Document field to add a hyperlink to the document. A hyperlink will open

the document in its original application, allowing you to maintain your existing document management practices. This also has the advantage that you will see the document in its original format when viewed via the link.

Alternatively, you may copy and paste text into the Procedure field, using the Windows clipboard to transfer lengthy method procedures from existing documents. For example, if the method procedure exists in a Word document, transfer the procedure text from Word to MSC-LIMS by copying the text using the Windows clipboard. In this case, select all of the procedure text in Word and copy the text to the clipboard by choosing Edit|Copy or use CTRL+C. Switch to the Methods form, position the cursor in the Procedure field and paste the clipboard text by choosing Edit|Paste or use CTRL+V.

The method procedure text is stored in an Access database memo field. While a memo field does not offer the formatting options (e.g. bold, underline, super/subscripts) of a word processor, you can insert special characters to simulate certain effects. All of the data entry fields in MSC-LIMS use the Verdana font available on all Windows systems. Use Tools | Character Map to open Windows' Character Map program to view the characters available in the Verdana font. Select a character in the character map to view the keyboard sequence necessary to enter the character. For example, character 175 in the Verdana font can be used to produce an underline effect. To insert the character in the method procedure field, hold down the ALT key while entering '0175' on the numeric keypad. Use this method to add special characters to any memo field.

NOTE

When an analysis has an associated Method, either double-click the analysis name field, or right-click and choose Method, to view the method's Procedure text and the Document link for reference within any Results Entry screen.

Employee Certification. Use this subform to record employees' certification in the selected method. MSC-LIMS will use this data for verification when an analysis' results entry is restricted to only those employees who have received certification for the analysis' associated method. This data also appears on the Method Certification subform in the Employees setup screen on the Admin menu.

Sample Schedules

Use the Sample Schedules option on the Notebook menu to maintain project sample schedules. Adding a schedule indicates that a sample for the project should be logged by a specific date and optionally repeated at a specific

frequency (e.g. weekly, every other week, monthly, etc.). The sample schedule form shows current schedules and allows schedule records to be added, edited, and deleted. A schedule status of *Warn* indicates the schedule is within its warning days of being due. A schedule status of *Due* indicates the schedule is past due. Use Records|Goto|New or the toolbar button to add a new schedule. To delete an existing schedule, select the record and use Edit|Delete or the DEL key. Use the [Print] button to print the current schedule.

See Workstation Configuration on page 138 to enable automatic detection of schedule warnings at system startup.

When a new sample is logged, the system automatically determines if the sample satisfies a schedule and if it does it *closes* the schedule. Closing a schedule adds the sample ID to the schedule history, removes the schedule from the schedule form, and adds a new schedule if the schedule has a repeating frequency. Use the Current Schedule and Schedule History reports to print schedule information (see Reports below).

Reports

Following is a summary of the system reports available on the Notebook menu. See Using Reports (page 41) for more information on previewing reports, exporting report data, and creating report snapshots.

See Excel Export Examples on page 48 for an Excel example to graph the analysis counts.

Analysis Count. Use this report to calculate and display the total number and cost of analyses in all samples queried. With or without sample query criteria, you can also locate all analyses performed (both in house and sent out) during a given date range.

*See the **MSC-LIMS Programmer's Guide** for instructions to create custom bench sheets.*

Bench Sheets. Use this option to print laboratory bench sheets. Use the Bench Sheet picklist to select the appropriate bench sheet then enter or select a lab/plant name and date to appear in the bench sheet's title when printed (see page 136 for more information on configuring the lab/plant list). If the selected bench sheet requires additional information before printing, additional setup fields will appear in the setup dialog when the bench sheet is selected. For example, bench sheets may use the standard sample query controls to select samples to list on the printed bench sheet. Complete the additional information as necessary then print or preview the report.

Current Schedule. Use this report to print the current sample schedule. The report includes a status of *Warn* if the schedule is within its warning days of the due date and *Due* if the schedule is past due. See Sample Schedules (page 96) for more information.

Methods. Use this report to print all or selected laboratory methods. The report setup dialog displays the total number of methods in the system. Use the [Select] button to open a method selection form displaying all methods. Use the [Select All] button to select all of the displayed methods or mark the "Selected" check box for the individual methods of interest. Use [OK] to close the method selection form and return to the report setup form. Use either the [Print] or [Preview] button to generate the report.

See Excel Export Examples on page 48 for an Excel example to graph the sample counts.

Sample Count. Use this report to count the number of samples logged and completed for samples matching your query criteria. The report can group the sample counts by day, week, or month.

Schedule History. Use this report to print a history of samples that satisfied past schedules. Enter a sample login date range in the report setup dialog then use either the [Print] or [Preview] button to generate your report. See Sample Schedules (page 96) for more information.

Work Sheet. Use this report to create a barcoded list of samples with specific analyses. To generate a work sheet, select the required analytes individually or select a requirement to select each requirement analysis. Enter your query criteria then use the [Query] button to query the database for samples matching your criteria with at least one of the selected analytes. The number of samples found is automatically displayed. If necessary, use the [Select] button to open a sample selection form to refine your query. Enter a descriptive title and select either the [Print] or [Preview] button to generate your report.

Laboratory Documents

Use this option to view a list of laboratory documents, forms, standard operating procedures, etc., created in other applications such as Word or Excel. Click on Laboratory Documents to view a list of documents. Double-click a document or single-click and click the [Open] button to open the document in its native application.

The top folder in the Laboratory Documents hierarchy is specified on the Folders tab of the Workstation Configuration screen on the Admin menu (page 138).

Chapter 6: Quality Control

Use the QC menu to create quality control samples, maintain lab instrument and procedure information, print monthly instrument and procedure calendars and generate QC data reports and control charts.

QC Data by Analytical Batch

MSC-LIMS includes features to create analytical batches, enter associated QC data, and print sample results with associated QC data. To create analytical batches and enter QC data, MSC-LIMS must first be configured to accept the data. Your LIMS administrator will enable these features using the following system elements:

QC Data Types	QC data types are used to identify QC types such as blanks, spikes, and duplicates, and the units of measure for their result values (see QC Data Types on page 125 for more information).
Analysis Setup	An analysis' QC Specifications define the acceptable QC data types and corresponding min/max specifications (page 112).

Select Results by Analyte on the Samples menu. Use the Results Entry by Analyte screen (see Figure 22 on page 73) to create new analytical batches for the selected analyte and to enter and edit QC data for existing analytical batches.

NOTE

The [QC Data] button on the Results Entry by Analyte screen will be enabled IF:

1. The current analyte has been assigned at least one QC data type (see analysis QC Specifications on page 112), and
2. Either none of the analyses displayed are already members of an analytical batch, or all of the analyses displayed are members of the same analytical batch and the analyses make up the entire batch.

When the [QC Data] button is disabled, hover the mouse over the button to view the reason why the button is currently unavailable.

QC Data Entry

Click the [QC Data] button on the Results Entry by Analyte screen to open the QC data entry screen (see Figure 29) for the current analytical batch. If a batch does not yet exist, a confirmation dialog will prompt to create the batch. When creating the batch, members of the Admins and Owners security roles can assign the batch to a specific technician. The analyte, date and time the batch is created, and the technician name identify an analytical batch.

Only members of the Technicians, Admins, and Owners security roles can create analytical batches and enter QC data. Technicians can only edit QC results they entered, and that only if the LIMS Administrator has enabled this capability on the Data Entry tab of the System Configuration screen (page 134). Only Admins and Owners can delete batches and add or remove batch analyses (see Editing an Analytical Batch in this section).

Figure 29 QC Data Entry

Use the batch's Analytical Batch QC Data Entry screen to enter any number of QC data records. Select the QC type from the picklist. The picklist includes all QC data types that have been assigned to the batch's analysis. Enter the result value and, if the QC type includes a reference value name, enter a reference value. Double-click within the result value field to pop up a Result Specifications display for the QC data type. Enter or select the sample ID of a related sample. Double-click the Related Sample pick list to repopulate as necessary.

Click [OK] to return to the Results Entry by Analyte screen, and click [OK] then click [Cancel] to return to the Main Menu.

Editing an Analytical Batch

Delete any batch QC data before deleting the batch.

Members of the Admins and Owners security roles can use the Edit Analytical Batch option on the QC menu to edit or delete existing analytical batches. Select the existing analytical batch using the Analyte and Batch picklists.

Use the "Add Analysis from Sample" picklist and the [Add] button to add an individual sample analysis to the batch. Use the [Delete] button adjacent to an analysis record to remove a sample analysis from the batch. This option does not delete a sample's analysis: it simply removes its association with this particular analytical batch.

Use the [Delete Batch] button to delete an entire batch. Note that this button is only enabled if the batch has no associated QC data. If necessary, first use the batch's QC data entry screen to delete all QC data before deleting the batch.

QC Data Reports

Sample Summary	The regular Sample Summary report's setup dialog includes an option to Append QC data to the sample's analysis results. The generated report lists all associated QC data for the sample's analyses.
QC Data	Use the QC Data report on the QC menu to locate and print all QC data for either a single analyte or all analytes for all samples queried. This report offers an alternative to the Sample Summary report. For example, after generating a multiple-sample user-defined report (UDR) the same sample query criteria can be used to generate a corresponding QC Data report that could be attached to the UDR. This may generate less paper if many of the UDR's analyses are part of the same analytical batch.
Analytical Batch	Use the Analytical Batch report on the QC menu to list all of the analyses and QC data that comprise the batch. The report's setup dialog allows both single and multiple-batch reports to be generated.

QC Samples

Quality Control samples are an MSC-LIMS feature that can be used to record analysis results for special QC projects. QC sample results are separated from regular sample results in the MSC-LIMS database to improve query performance. For example, periodic QC for instrument verification and calibration could be configured using a QC project.

Use the QC Sample Login and QC Sample Results Entry options on the Quality Control menu to log and record results for quality control samples. The data entry procedures for quality control samples are similar to those for

standard samples. When logging a quality control sample on the QC Sample Login form, the selection picklists for project, sample type, and location only include entries created specifically for quality control purposes.

The QC Sample Results Entry form includes additional fields for reference value and replicate number. To increase or decrease the number of replicates for an analysis, double-click on any of the analysis record's replicate fields, then enter the number of replicates in the popup dialog. Note that when decreasing the number of replicates, the highest numbered replicates are deleted first. See Single Sample Login (page 59) and Results Entry by Sample (page 68) for more information on data entry procedures for regular samples.

Instruments

Use the Instruments option on the Quality Control menu to add, edit, and delete instrument records. Enter the appropriate calibration and maintenance intervals in days and the calibration check frequency. Use the [Print Calendar] button to print the monthly instrument calendar report (see Reports below), which uses the instrument information to generate a list of instrument maintenance, calibrations, and calibration checks for a given month. The following information can be maintained for each instrument:

Field/Control	Description/Notes
Instrument	Instrument name. This is the unique ID for the instrument.
Serial No.	Instrument's serial number
Vendor	Vendor's name
Purchased	Date purchased
Document	A hyperlink field to enter a link to external documents such as instrument manual, vendor web site, etc. Note the hyperlink base, designated under the Folders tab of the Workstation Configuration screen.
Last Calibrated	Date last calibrated
Calibrate Interval	Number of days between calibrations
Calibration Check	Calibration check interval: weekly, every other week, monthly, every other month, quarterly, semi-annually, annually
Calibration Check Value	Last calibration check value
Last Maintenance	Date of last preventative maintenance
Maintenance Interval	Number of days between preventative maintenance

Field/Control	Description/Notes
Notes	Instrument notes, records, etc.

Procedures

Use the Procedures option on the Quality Control menu to add, edit, and delete laboratory procedures. Enter an appropriate procedure frequency to include the procedure on the monthly Procedure Calendar report (see Reports below). Use the [Print Calendar] button to print the Procedure Calendar report. The Procedures data entry form has the following fields:

Field/Control	Description/Notes
Procedure	The unique procedure name
Check Frequency	Procedure check interval: weekly, every other week, monthly, every other month, quarterly, semi-annually, annually.
Description	Procedure description
Notes	Procedure notes, records, etc.

Reports

Following is a summary of the system reports available on the Quality Control menu. See Using Reports (page 41) for more information on previewing reports, exporting report data, and creating report snapshots.

Analytical Batch. Use the Analytical Batch report to list all of the analyses and QC data that comprise an analytical batch. The report's setup dialog allows both single and multiple-batch reports to be generated.

Control Chart. Use this option to generate a Control Chart for any of the following:

1. Analysis results for regular samples
2. Analysis results for QC samples
3. Analysis results for regular and QC samples
4. Analytical batch QC data

To generate a control chart begin by selecting an analyte. To chart analysis results, leave the QC data type field blank. Use the optional reference value field to restrict results to QC sample analyses with the selected reference value. The reference value list will show all existing reference values used with the selected analyte in QC samples only. Enter your sample query criteria and select the [Query] button to query the database for matching points. Use the [Select] button to open a point selection form displaying each data point queried. Use the [Select All], [First N Pts.], or [Last N Pts.] buttons to select the appropriate data points or mark the "Selected" check

box for the individual points of interest. Use [Close] to close the point selection form and return to the chart setup form.

The control, warning, and target lines are optional. The default, project, requirement, or QC data type specifications for the current analyte can be used for the control, warning and target lines using the toggle buttons adjacent to the field. Note that the control, warning, and target fields accept mathematical expressions. For example, use the [Calculate] button to calculate statistics for the points queried then copy and paste statistics results into the actual target, control, and warning limit fields and enter simple arithmetic expressions (e.g. *copied Std.Dev. value* * 2). Enter a descriptive title and select either the [Print] or [Preview] button to generate your chart.

General Outline. Use this report to print a list of all quality control procedures and instrument calibration checks and associated frequency.

Instrument Calendar. Use this report to print an Instrument Calendar for a given month. Enter the month and year in the report setup dialog then use either [Print] or [Preview] to generate the calendar. The calendar shows all instrument maintenance, calibrations, and calibration checks due during each week of the month selected. Use the calendar to record the instrument procedures performed and then update the instrument records accordingly, using the Instruments form on the QC menu, page 102.

Instrument List. When you select this report the system generates a list of all instruments listed in Instruments, page 102, along with their last calibration and maintenance dates and intervals.

Procedure Calendar. Use this report to print a QC Monthly Procedure Calendar for a given month. Enter the month and year in the report setup dialog then select either [Print] or [Preview] to generate the calendar. The calendar shows all procedures to be performed during each week of the month selected, as listed in

QC Data. Use the QC Data report to locate and print all QC data for either a single analyte or all analytes for all samples queried. This report offers an alternative to the sample summary report. For example, after generating a multiple-sample user-defined report (UDR) the same sample query criteria can be used to generate a corresponding QC Data report that could be attached to the UDR. This may generate less paper if many of the UDR's analyses are part of the same analytical batch

QC Sample Summary. Use this report to print a sample summary showing sample characteristics, notes, conclusions, and analysis results for QC samples. Note that the report uses the characters "H" and "L" (for high and low) adjacent to the analysis' result value if the value is greater than or less than the analysis' warning limit.

Statistics. Use this report to calculate basic statistics for analytes across any number of samples. You may select up to five analytes to display on a report and enter query criteria to locate samples. The following statistics are automatically calculated for each series of analyte values:

Mean (arithmetic average)
Average Deviation
Standard Deviation
Variance
Relative Standard Deviation
Coefficient of Variation

Chapter 7: System Setup

Use the Setup menu to configure the LIMS by defining valid options and operating parameters for analyses, projects, requirements, units of measure, preservatives, sample types, etc.

Analyses

Use the Analyses option on the Setup menu to open the analyses setup form (see Figure 30) to add, edit, and delete system analyses. Use the [Add Data] button to place the form in add mode to add new analyses. Use the [Edit Data] button to switch the form to edit mode to select and update existing analyses.

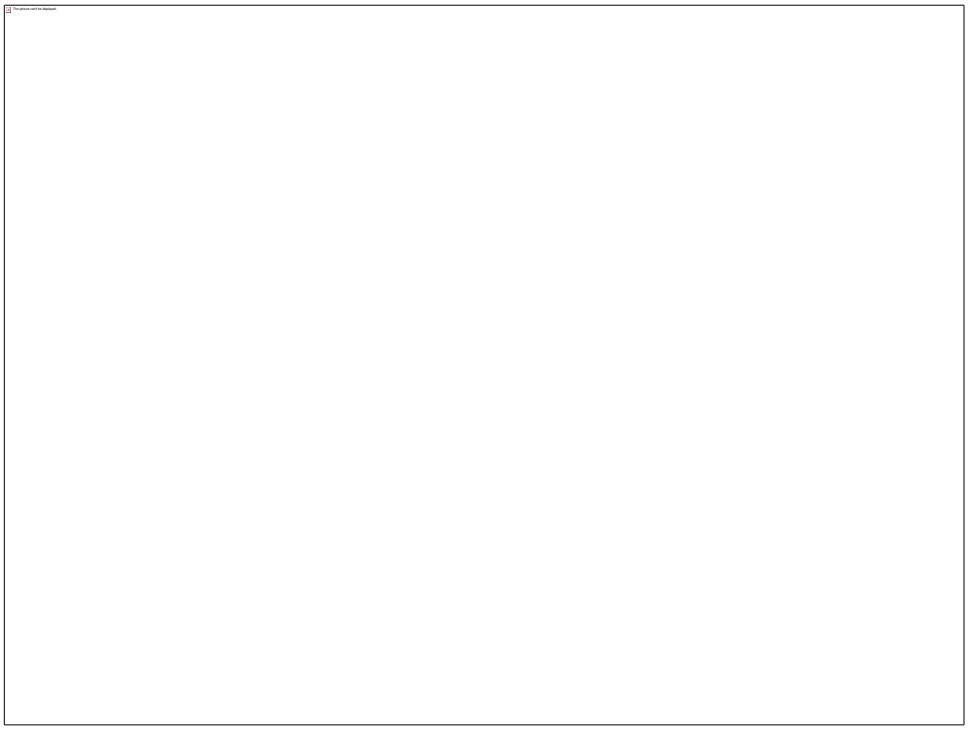


Figure 30 Analysis Setup

Double-click within a picklist to open the list's setup form.

Following is a description of the fields and controls on the main part of the Analyses setup form. The sections below describe the fields and controls on the form's tabs.

Field/Control	Description/Notes
Analyte	The unique analyte name. Use distinct names when an analysis uses different units or methods.

Field/Control	Description/Notes
Abbreviation	An optional analyte abbreviation used on reports to conserve space.
Units	Analysis units of measure.
Report Name	An optional analyte name that can be used on Excel templates for final reports, COAs and invoices, and in custom reports, etc. For example, when a more descriptive name is required on reports to be sent to customers, use a unique name in this field. The Analyte name will continue to be used on all screens and system reports.
Report Format	The optional analysis report format. Use this field to configure analysis result report formatting and significant figures or decimal place rounding. Report formats are only used for final reports and have no effect on how result values are entered, imported, or stored. Select from options on the picklist, or enter any format, such as date and time formats recognized by Excel, or numeric formats recognized by the VBA Format function. Consult the Microsoft Access online help system for the Format function for other options. NOTE: MSC-LIMS analysis result values can be a date, time, or date/time serial value entered by right-clicking and choosing Date/Time Value.
[Test…]	Use this button to open a popup window to enter a test value and view it in the selected report format.
Preservative	The required preservative.
Container Type	The required container type.
Method	An optional analysis method. If a method is specified, double-clicking the analyte name within a results entry form will display the method's procedure for reference.

Field/Control	Description/Notes
Sort Order	An optional numeric sort order value. Use this field to enable non-alphabetic analysis sort orders on reports and sample login and results entry screens. This field accepts numeric values between -32,768 and 32,767. Note that sorting is performed by sort order number then alphabetically by analysis name. See Requirements setup (page 126) for requirement sort orders.
[Analysis Sorting…]	Use this button to open the Analysis Sort Order editing screen to enter or edit the sort order for all analyses.
[Copy To]	Use this button to create a new analysis by copying the current analysis.
[Edit in Sort Order]	Use this button in Edit Mode to place the screen's selection pick lists and the [View All] record order in sort order rather than alphabetical order (see above). Use the PgUp/PgDn keys or the record selector at the lower left of the Analyses Setup screen to advance through analyses in order.
[View All]	Use this button in Edit Mode to make all analytes available and to activate the record selector to advance through analytes in order.

Specifications

Double-clicking within the result value field on any results entry form will display the analysis' results entry specifications.

Following is a description of the fields and controls on the Specifications tab of the Analysis setup form. Note that the results entry specifications are the analysis' default specifications, which can be changed when the analysis is assigned to a project, project location, or requirement.

Field/Control	Description/Notes
Detection Limit	Method detection limit. Result values below this limit display *BDL* on related forms and reports. Note that this value can be adjusted by an analysis' dilution factor on Excel final reports.
Result Max.	Maximum value allowed during results entry.
Warning Max	A results entry warning is generated for values above this limit.
Target Value	An optional analysis target. This value can be used as the target line on a control chart.

Field/Control	Description/Notes
Warning Min.	A results entry warning is generated for values below this limit.
Result Min.	Minimum value allowed during results entry.
Report Spec.	Optional report specification for final reports.
[Update Min/Max]	Use this button to change any of the analysis' min/max values in existing projects, requirements, and incomplete sample analyses. Note that this facility will overwrite existing values in all of the records for the option(s) selected and should be used with caution. This facility should not be used where the min/max values must differ by project, requirement, etc.
Sample Amount and Units	Optional sample amount required to perform the analysis. These fields are used only for documentation purposes.
Expiration Days	The number of days from the collection date until expiration.
Warning Days	The number of days before expiration to begin warning the analysis is due
Cost	Optional default cost to perform the analysis. This cost can be overridden by costs assigned to individual requirements, projects, and customers.
Cost When Sent Out	Optional cost used when an outside lab performs the analysis. This cost can be overridden by costs assigned to individual requirements, projects, and customers.
Account #	Optional accounting item number. When invoice data will be exported to an external accounting system, use this field to link the analysis to an accounting inventory or service item.
CAS #	Optional Chemical Abstracts Service registry number. Use this field to list the CAS# on your Excel final reports.
Performed In-house	Check this field if the analysis is performed in-house or leave unchecked if an outside laboratory performs the analysis. If the analysis is not performed in-house, selection of an outside laboratory is required during results entry. Use the Default Outside Lab option on the Results Entry tab to select the lab.

Field/Control	Description/Notes
Internal Data	Check this field for an approval analyte, surrogates, internal standards, spiking compounds, cost analyte, etc. or any internal analyses that you may wish to exclude from final reports. The sample summary report, MSC-LIMS Messaging emails and faxes, and Excel template reports all include options to exclude internal data analyses.
Inactive	Use this field to mark an analysis inactive. Inactive analyses cannot be added to a sample during login and the analysis cannot be added to projects or requirements. Use this field as an alternative to deleting the analysis, because an analysis cannot be deleted without deleting all existing LIMS data that reference the analysis.
Measurement Uncertainty Factor and Description	Optional numeric measurement uncertainty factor and description. Use these fields to document, calculate, or report the analysis' measurement uncertainty on Excel final reports.

Results Entry

Following is a description of the fields and controls on the Results Entry tab of the Analysis Setup form.

Field/Control	Description/Notes
Result Types	Move any of the available result types to the Limit To list to restrict which result types can be entered for the analysis. For example, a salmonella analysis might limit result types to Positive and Negative.
Result Values	Use this option to configure result value entry for the analysis. For example, in a salmonella analysis, which only accepts Positive and Negative, this field should be set to result values Not Allowed.
Validation Message	An optional message to display when either result type or result value validation during results entry fails. The salmonella example above might use the validation message "Only Positive or Negative result types are allowed for Salmonella."

Field/Control	Description/Notes
Admin privileges required for results entry	Check this option to restrict results entry for the analysis to members of the Admins and Owners security roles. See Sample Approval (page 75) for an example.
Method certification required for results entry	Check this option to restrict results entry to only those employees who have received certification for the analysis' associated method. Record method certifications either in Methods (page 95) or Employees (page 131).
Default Outside Lab	For an analysis that is sent out, pick the outside lab that normally performs the analysis. The system will use the contents of this field to automatically set the outside lab field on the results entry screens to the default lab as soon as you begin entering a result.
Auto Complete	Use this option to add special costs to samples. The analysis is given the designated result automatically during login or when adding the analysis to an existing sample. No results entry is required and any results entry validation is ignored. Enter a Result Type and/or result Value. If applicable, activate the "Internal Data" option on the Specifications tab to exclude the analyses from reports.

QC Specifications

See QC Data by Analytical Batch on page 99 for more information.

Use the QC Specifications tab on the Analysis setup form to assign QC data types to the analysis. Analytical batches and associated QC data can only be entered for analyses with defined QC data types. Add any number of QC data types and set the appropriate data entry specifications.

Excel Interface

See Importing Data from Excel on page 74 for more information. See Excel Import Results Examples on page 50 for examples.

Use the Excel Interface tab on the analysis setup form to configure Excel data imports from the results by analyte screen. To use the Excel interface to import Excel data, all Excel template files must include the following components:

LIMSData worksheet. The template file must contain a worksheet named "LIMSData." All LIMS data is written to this worksheet beginning at cell A1. Row one will contain the names of the fields exported and all data follows beginning on row two.

LIMSData.BeforeTransferFromLIMS macro. The LIMSData worksheet must include a "BeforeTransferFromLIMS" macro (Public Sub in VBA), which is called before writing the LIMS data to the LIMSData worksheet.

Use this macro to perform any necessary action before the data is exported from the LIMS.

LIMSData.AfterTransferFromLIMS macro. The LIMSData worksheet must include an "AfterTransferFromLIMS" macro (Public Sub in VBA), which is called after writing the LIMS data to the LIMSData worksheet. Use this macro to perform any necessary tasks after the data is exported from the LIMS. For example, create named ranges for the exported data, perform calculations or data manipulation, and display an alternate worksheet with a final report.

LIMSData.BeforeTransferToLIMS macro. The LIMSData worksheet must include a "BeforeTransferToLIMS" macro (Public Sub in VBA), which is called before the LIMS imports Excel data. Use this macro to perform any necessary action before the Excel data is imported to the LIMS.

LIMSData.AfterTransferToLIMS macro. The LIMSData worksheet must include an "AfterTransferToLIMS" macro (Public Sub in VBA), which is called after the LIMS imports Excel data. Use this macro to perform any necessary action after the Excel data is imported to the LIMS.

TIP

Use relative paths for workbook template files rather than absolute paths for added flexibility. For example, by placing all template files in a shared folder and setting the workstation's default Excel import folder to this folder, no paths are saved with the template file name. This allows all template files to be easily moved in the future and only the workstation's configuration will require updating to change the default folder location.

Following is a description of the fields and controls on the Excel Interface tab of the analysis setup form. Note that all cell addresses use the A1 reference style where columns are represented by letters and rows are represented by numbers (e.g. A1, A2, B3, etc.).

Field/Control	Description/Notes
Workbook Template	The Excel template file to use when initializing a new workbook to calculate and import this analysis' results. Use the [Browse] button to select an existing template.
Default Folder	This display only field shows the current Excel import template folder selected on the Folders tab of the Workstation Configuration screen.
Result Worksheet	The name of the worksheet within the workbook where result values are located.

Field/Control	Description/Notes
Result Start Cell	The cell where result values begin.
Result Direction	The direction to traverse from the starting cell when retrieving results: row (horizontal) or column (vertical).
Result Offset	The cell offset to use when retrieving results (1=every cell, 2=every other cell, etc.)
Sample ID Start Cell	The cell where sample IDs begin. Each result value must have an associated sample ID to import the result.
Dil. Factor Start Cell	The cell where optional dilution factors begin.
QC Data Worksheet	The name of the worksheet within the workbook where QC results are located.
QC Type Start Cell	The cell where QC data type names begin. Each QC result must have a corresponding QC data type name to import the result.
QC Type Direction	The direction to traverse from the starting cell when retrieving results: row (horizontal) or column (vertical).
QC Type Offset	The cell offset to use when retrieving results (1=every cell, 2=every other cell, etc.)
QC Data Result Value Start Cell	The cell where QC result values begin.
QC Data Reference Value Start Cell	The cell where QC reference values begin.
QC Data Related Sample ID Start Cell	The cell where QC related sample IDs begin.

Notes

Use the Notes field to record any comments or notes regarding the analysis. These Notes are for internal use only and do not appear on any reports.

Audit Trail Reasons

Use the Audit Trail Reasons option on the Setup menu to open the Audit Trail Reasons setup form to maintain a list of standard audit trail reasons that can be selected from the audit trail dialog. Use this option to create a list of frequently used reasons to speed completion of audit trail events. See Sample Audit Trail Events (page 76) for more information.

Container Types

Use the Container Types option on the Setup menu to create and maintain a list of container types (e.g. Glass, Plastic, Teflon, etc.). Container types can be assigned to analysis definitions and can be selected and displayed on environmental-style container labels. Note that names must be unique and you cannot delete a record if it is referenced by an existing analysis.

Customers

Use the Customers option on the Setup menu to create and maintain a list of customers. Use the Customers setup form to add, edit, and delete customer information and to override default analysis costs by customer. During sample login a sample can be assigned to a customer. When a sample is completed the analysis costs are assigned to each sample analysis by using either the default analysis cost or the customer's analysis cost.

Following is a description of the fields and controls on the main part of the customer setup form. The sections below describe the fields and controls on the form's tabbed control.

Field/Control	Description/Notes
Customer Name	Unique customer name.
Report Name	Optional customer name to use on mailing/shipping labels and custom Excel reports. For example, when more than one customer from the same company will be maintained in the LIMS, use unique names in the Company Name field (e.g. "XYZ Company - Atlanta" and "XYZ Company - Houston") and the same "XYZ Company" name in this field.
Contact	Optional name of the customer's contact person.
Phone	Optional voice phone number, up to 30 characters in length to accommodate international numbers.
Fax	Optional fax phone number, up to 30 characters.
Mobile	Optional mobile phone number, up to 30 characters
Email	Optional email address. Use the button adjacent to this field to compose and send a new email message.

Field/Control	Description/Notes
Account #	Optional account number. When invoice data will be exported to an external accounting system, use this field to link the customer to a customer record in the accounting system.
Login	Optional customer login name to restrict access to sample data by customer. Add the customer's LIMS login name to this field and the system will automatically impose a customer-specific criterion in the sample query dialog whenever the customer logs on to the LIMS. While this capability can be used to provide some restricted access, it should not be used to secure sensitive data.
Standing PO	Optional standing purchase order number. Add the customer's standing PO to automatically copy the PO to the sample's PO field during sample login.
Inactive	Use this field to mark the customer inactive. Inactive customers can not be assigned to new samples during login. Use this field as an alternative to deleting the customer. A customer can not be deleted without deleting all LIMS samples for the customer.
[Copy To…]	Use this button to create a new customer by copying the current customer.

Billing

Use the controls on the Billing tab of the customer setup form to maintain the customer's billing address. Use the [Print Mailing Label] button to print a mailing label with the billing address at any time.

Shipping

Use the controls on the Shipping tab of the customer setup form to maintain the customer's shipping address if it differs from the billing address. Use the [Print Mailing Label] button to print a mailing label with the billing address at any time. Note that mailing labels for the shipping address will use shipping address fields if they exist otherwise the billing address fields are used so only shipping fields that differ need to be entered.

Messaging

Use the controls on the Messaging tab to configure recipients, subject lines, and message styles to automatically send emails with sample login and/or completion messages for the customer's samples. Double-click the Recipients field to view message-addressing syntax or use the [Build] button to open the Message Recipients setup form. Double-click the Subject field

to view subject expression syntax. Note that use of the messaging features requires installation of MSC-LIMS Messaging software. See the *MSC-LIMS Messaging User's Guide* for more information.

Costs

Use the controls on the Costs tab of the customer setup form to override default analysis, requirement, and project costs for the customer. Choose an analysis and enter a cost to override the default cost, default cost when the analysis is sent to an outside lab, or both. When costs are assigned to samples for the customer, the system will first look here for customer costs, otherwise the project, requirement, or analysis defaults are used. Use the Default Analysis Cost Multiplier field to apply discounts or premiums to all default analysis costs for the customer's samples. Note that the overridden analysis costs continue to take precedence over default analysis costs.

Contact History

Use the options on the Contact History tab to keep a running record of interactions with customers. The User and Contacted fields default to the current User and current date and time. Enter any length of text in the Notes field, hitting [Enter] to begin a new line. To enter or read lengthy text, right click and select Zoom to view all. Use the Document field to link to an external document (the paths to linked documents are relative to the hyperlink base address configured on the Workstation Configuration screen).

Click [Print] to preview the Customer Information report, and use the print icon on the toolbar or use File | Print to print a hard copy from the preview screen. Click [Close] to return to the Customers setup screen.

Sample Login

Use the options on the Sample Login tab to configure customer-specific sample login options using any combination of the available sample characteristics. Use the Login Batch field to configure batch login options.

For example, list all customer-specific projects then pick from the customer's options during sample login instead of picking from the complete project list. Enable the "Automatically display these options during sample login" item and the options will automatically appear after the customer is selected during sample login.

Notes

Use the Notes field to record any comments or notes regarding the customer. These Notes are for internal use only and do not appear on any reports.

Use the Default Sample Description field to enter any text that should be applied to all samples logged for the customer, for example, to define a default sample description or template for the customer's samples. When a customer's sample is saved during sample login, the Default Sample Description text is automatically appended to the sample's description, where it can be edited as necessary.

Label Scripts

Use the Label Scripts option on the Setup menu to maintain a list of frequently used label scripts. Label scripts can be used during sample login to specify the quantity and style label to print for any sample. Double-click within any Label Script field to access the Select or Build Label Script dialog (see Figure 31). Label scripts may also be specified when reprinting labels using the Container Labels option on the Samples menu. Note that a label script allows printing multiple label styles for a single sample.

When configuring Projects, specify a label style, or specify a label script as the Project's default label style and quantity.

*See the **MSC-LIMS Programmer's Guide** for more information on creating custom label styles.*

Each line of the label script defines the quantity and style of label to be printed, using elements of the form "token=value" separated by a comma. Valid token names are 'Style', 'Quantity', and style-specific tokens such as 'ContainerType' and 'Preservative' for the environmental style labels (names are not case-sensitive). Valid values for the style token are 'Default', 'Environmental', 'Configurable3', 'Configurable4' and any custom label style names. Values for the quantity token must be a whole number. Valid values for the container type and preservative tokens are any container type and preservative names defined in the system. Following is an example label script that will generate one default style label and two environmental style labels with specific container type and preservatives:

```
Style=Default, Quantity=1
Style=Environmental, Quantity=2, ContainerType=Glass,
Preservative=Refrigerate
```

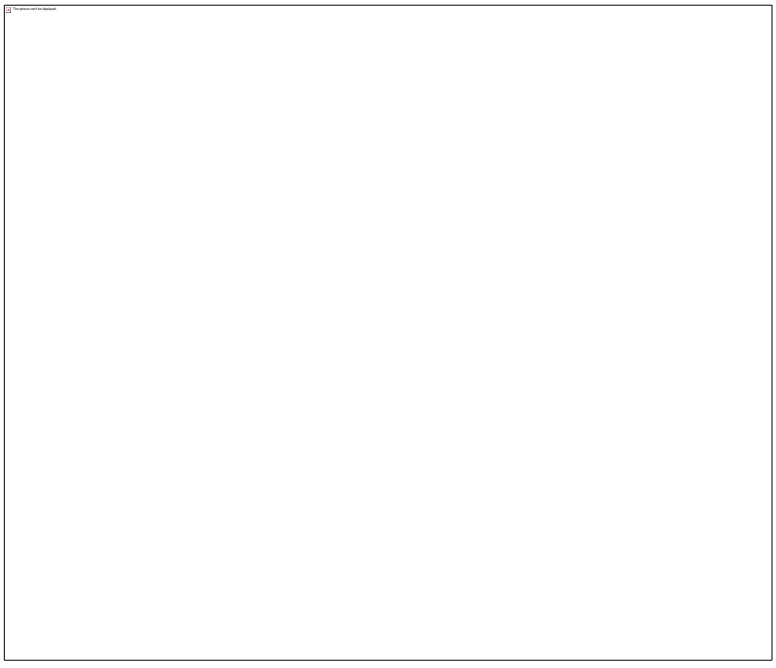


Figure 31 Select or Build Label Script

Laboratories

Use the Laboratories option on the Setup menu to create and maintain a list of outside laboratories. Use the Outside Laboratories setup form to add, edit, and delete information on outside laboratories. When an analysis is not performed in-house, users entering sample results in the results entry forms must pick a laboratory from this list to identify the laboratory supplying the result. Note that names must be unique and you cannot delete a laboratory record if it is referenced by an existing sample.

TIP
For analyses normally sent out, use the Default Outside Lab field on the Results Entry tab (page 111) of the Analysis setup screen to configure the system to automatically select the outside lab during results entry.

Mark an Outside Laboratory inactive to prevent its selection in results entry screens. When a laboratory is marked inactive, it sorts to the bottom of picklists and cannot be selected. If an outside lab that has been specified as the default outside lab for at least one analysis is subsequently marked Inactive, a status message will appear and the system will offer to remove the default outside lab associations for that analysis.

Locations

See Projects setup on page 120 for information on using location-specific project analyses.

Use the Locations option on the Setup menu to maintain a list of sampling locations. Use the Sample Locations setup form to add, edit, and delete sampling location names. Note that location names must be unique and you cannot delete a location name if it is referenced by an existing sample. Use the Description field to add optional notes or other descriptive information about the location. Check the QC option to create a location for use only with QC samples. Assign a location as the Sample Login default location if appropriate, otherwise, leave the Sample Login default field blank. Users in the Samplers and Technicians security groups have full access to the Sample Locations list and they can quickly add new locations during single sample login by double-clicking the Location field to open this form.

Login Batches

See Batch Login on page 63 for more information.

Use the Login Batches option on the Setup menu to add, edit, and delete batch definitions. To create a batch definition, enter a unique batch name and optional notes. The batch notes are displayed on-screen when a user selects the batch during login, so this field can be used to provide additional user instructions.

To help prevent duplicate batch logins, the system automatically saves the login date and time and user for the last successful login, and it displays the information when the batch is selected during Batch Login Setup. Use the "Warn when login occurs less than N days" field to enable a warning message if batch login is attempted within the specified number of days since the last login.

Add any number of batch samples by entering default characteristics. The sample characteristics can be changed during batch login. Note that project, location, sample type, and sampler are required. Enter optional numeric sort values to define the order in which the samples should be logged within the batch (useful for ordering batch labels and records on the Results by Analyte screen).

Use the optional Label Script field to specify any number of labels for the sample. Double-click the Label Script field to select from a list of frequently used label scripts. (Tip: use right-click and select Zoom, or SHIFT+F2 to open the zoom window and CTRL+ENTER to move to a new line). See Label Scripts (page 118) for label script syntax.

Click to the next Record, or select New Record, to add each additional Sample to the Batch.

Use the [Print] button to preview a Login Batches report for the current batch. Use the print icon on the tool bar, or File |Print to print a hard copy of the report.

Preservatives

Use the Preservatives option on the Setup menu to create and maintain a list of preservatives. Preservatives can be assigned to analysis definitions and can be selected and displayed on environmental-style container labels. Note that names must be unique and you cannot delete a preservative record if it is referenced by an existing analysis.

Projects

Use the Projects option on the Setup menu to open the Projects setup form (see Figure 32) to add, edit, and delete system projects. A Project defines the default list of analyses assigned to a sample. All samples logged in the system must be assigned to a Project. Use the [Add Data] button to place the form in add mode to add new projects. Use the [Edit Data] button to switch the form to edit mode to select and update existing projects.

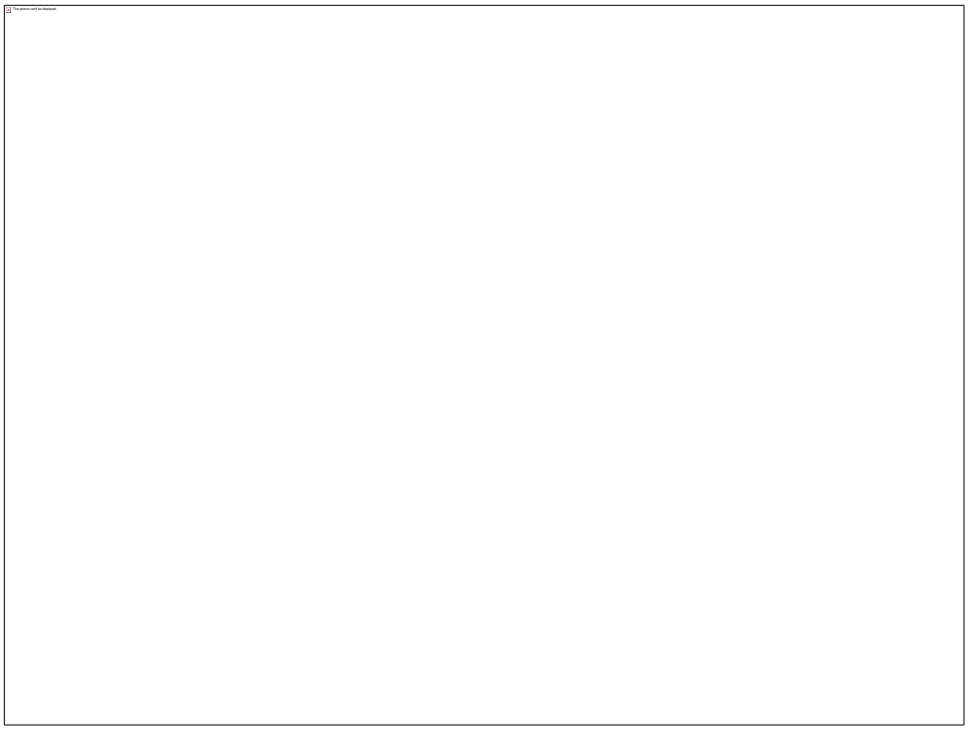


Figure 32 Project Setup

Double-click within a pick list to open the list's setup form.

Following is a description of the fields and controls on the main part of the project setup form. The sections below describe the fields and controls on the form's tabbed control.

Field/Control	Description/Notes
Project	The unique project name.
Code	An optional abbreviation of up to six characters that can be used on label styles.
Inactive	Use this field to mark a project inactive. Inactive projects do not appear on the picklist during sample login. Use this field as an alternative to deleting the project. Projects with existing samples cannot be deleted.
Quality Control	Use this field to designate QC projects for logging QC samples.
Only Project Locations	If the project has location-specific analyses, use this option to limit location selection during sample login to only the project's locations. Leave this field unchecked to enable project default analyses (i.e. analyses where the location field is blank).
[Print]	Use this button to print the current project's configuration.

Field/Control	Description/Notes
[Copy To]	Use this button to create a new project by copying the current project.

Analyses

Double-clicking within the result value field on any results entry form will display the analysis' results entry specifications.

Following is a description of the fields and controls on the Analyses tab of the project setup form. When an analysis is selected, the analysis' default results entry specifications are automatically inserted. Change the specifications as necessary for samples for this project or for this project and location if the analysis is location-specific.

Field/Control	Description/Notes
Location	Leave this field blank to define default analyses for any sampling location. Select a location to define analyses for a specific sampling location.
Analysis	Select existing analyses or double-click to add a new analysis.
Result Max.	The maximum value allowed during results entry. Defaults to the analysis' result maximum.
Warning Max.	A results entry warning is generated for values above this limit. Defaults to the analysis' warning maximum.
Target	An optional analysis target. This value can be used for the target line on control charts.
Warning Min.	A results entry warning is generated for values below this limit. Defaults to the analysis' warning minimum.
Result Min.	The minimum value allowed during results entry. Defaults to the analysis' result minimum.
Report Spec.	Optional report specification for final reports.

Requirements

Following is a description of the fields and controls on the Requirements tab of the project setup form. See Requirements (page 126) for more information.

Field/Control	Description/Notes
Location	Leave this field blank to define default requirements for any sampling location. Select a location to define requirements for a specific sampling location.
Requirement	Select existing requirements or double-click to add a new requirement.

Labels

Following is a description of the fields and controls on the Labels tab of the project setup form. Use the options on the Labels tab if you will be printing container labels during sample login. See Label Scripts (page 118) for more information.

Field/Control	Description/Notes
Label Style	**Interactive**. Use this field to designate a default label style for all Project samples. This option allows users to interactively select quantity and other label parameters during single-sample login and single-sample label reprints.
Label Script	**Automatic**. Use this field to define a label script to automatically print specific quantity and style labels for Project samples during single-sample and dynamic batch login and single-sample label reprints. Use the [Build…] button to select a predefined script or build a new script, including quantity of labels to print. A Label Script takes precedence over Label Style.

Excel Interface

See Importing Data from Excel on page 74 and Excel Import Results Examples on page 50 for more information.

Use the Excel Interface tab on the project setup form to configure Excel data imports from the results by sample screen. To use the Excel interface to import Excel data, all Excel templates must include the following components:

LIMSData worksheet. The template file must contain a worksheet named "LIMSData." All LIMS data is written to this worksheet beginning at cell A1. Row one will contain the names of the fields exported and all data follows beginning on row two.

LIMSData.BeforeTransferFromLIMS macro. The LIMSData worksheet must include a "BeforeTransferFromLIMS" macro (Public Sub in VBA), which is called before writing the LIMS data to the LIMSData worksheet. Use this macro to perform any necessary action before the data is exported from the LIMS.

LIMSData.AfterTransferFromLIMS macro. The LIMSData worksheet must include an "AfterTransferFromLIMS" macro (Public Sub in VBA), which is called after writing the LIMS data to the LIMSData worksheet. Use this macro to perform any necessary tasks after the data is exported from the LIMS. For example, create named ranges for the exported data, perform calculations or data manipulation, and display an alternate worksheet with a final report.

LIMSData.BeforeTransferToLIMS macro. The LIMSData worksheet must include a "BeforeTransferToLIMS" macro (Public Sub in VBA), which

is called before the LIMS imports Excel data. Use this macro to perform any necessary action before the Excel data is imported to the LIMS.

LIMSData.AfterTransferToLIMS macro. The LIMSData worksheet must include an "AfterTransferToLIMS" macro (Public Sub in VBA), which is called after the LIMS imports Excel data. Use this macro to perform any necessary action after the Excel data is imported to the LIMS.

TIP

Use relative paths for workbook template files rather than absolute paths for added flexibility. For example, by placing all template files in a shared folder and setting the workstation's default Excel import folder to this folder, no paths are saved with the template file name. This allows all template files to be easily moved in the future and only the workstation's configuration will require updating to change the default folder location.

Following is a description of the fields and controls on the Excel Interface tab of the project setup form. Note that all cell addresses use the A1 reference style where columns are represented by letters and rows by numbers (e.g. A1, A2, B3, etc.).

Field/Control	Description/Notes
Workbook Template	The Excel template file to use when initializing a new workbook to import results for project samples. Use the [Browse] button to select an existing template.
Default Folder	This display only field shows the current Excel import template folder selected on the Folders tab of the Workstation Configuration screen.
Result Worksheet	The name of the worksheet within the workbook where analysis results are located.
Result Start Cell	The cell where result values begin.
Result Direction	The direction to traverse from the starting cell when retrieving results: row (horizontal) or column (vertical).
Result Offset	The cell offset to use when retrieving results (1=every cell, 2=every other cell, etc.)
Analyte Start Cell	The cell where analyte names begin. Each result value must have an associated analyte to import the result.
Dil. Factor Start Cell	The cell where optional dilution factors begin.

Messaging

Use the controls on the Messaging tab to configure recipients, subject lines, and message styles to automatically send emails with sample login and/or completion messages for project samples. Double-click the Recipients field to view message-addressing syntax or use the [Build] button to open the Message Recipients setup form. Double-click the Subject field to view subject expression syntax. Note that use of the messaging features requires installation of MSC-LIMS Messaging software. See the *MSC-LIMS Messaging User's Guide* for more information.

Costs

If applicable, add project-specific costs for the analyses. To define a single cost for the project, add a *cost-only* internal data analyte with the appropriate cost then set the cost for each remaining project analysis to zero. Note that customer-specific analysis costs take precedence over project costs. Use the "Group by project and requirement" option on the Analyses report's setup screen to view project analysis costs.

Notes

Use the Notes field to record any comments or notes regarding the project. These Notes are for internal use only and do not appear on any reports.

Use the Default Sample Description field to enter any text that should be applied to all samples logged for the Project, for example, to define a default sample description or template for the Project's samples. When a Project's sample is saved during sample login, the Default Sample Description text is automatically appended to the sample's description, where it can be edited as necessary.

QC Data Types

See QC Data by Analytical Batch on page 99 for additional information.

To enable the *QC data by analytical batch* features, use the QC Data Types option on the Setup menu to define appropriate QC data types (see Figure 33). The result value name and units fields are required and identify the result value for the QC data type. The reference value name and units are optional. If a reference value name is specified, a reference value is required during QC data entry. Just like an analysis result, a QC data type's result is a final result and is either a single floating point value, a predefined result type, or a combination of result type and value (e.g. < 1). Enable the "Requires SampleID" option to require a related sample during QC data entry.

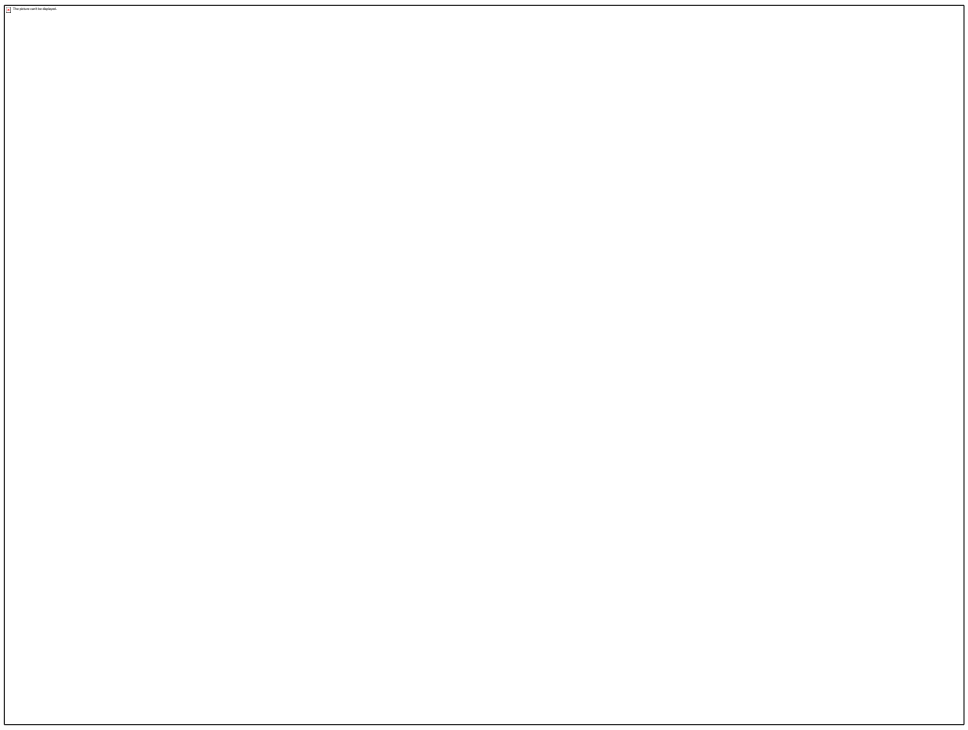


Figure 33 QC Data Type Setup

Requirements

Use the Requirements option on the Setup menu to create named lists of analyses. These Requirements can then be used to quickly add frequently used groups of analyses to projects and individual samples during login.

For example, a wastewater lab may frequently test for trace metals in many different samples. By creating a "Metals" requirement with all the necessary analyses, the metals analyses can quickly be added to all appropriate projects by simply adding the Metals requirement. Similarly, all metals analyses can be added during single sample login by adding the single Metals requirement.

To add a new requirement, enter a unique requirement name and add any number of analyses with appropriate results entry and report specifications. Double-click on the analysis field to add a new analysis.

If applicable, add requirement-specific costs for the analyses. To define a single cost for the requirement, add a *cost-only* internal data analyte with the appropriate cost then set the cost for each remaining requirement analysis to zero. Note that customer-specific analysis costs take precedence over requirement costs. Use the "Group by project and requirement" option on the Analyses report's setup screen to view requirement analysis costs.

Use the requirement's Sort Order field and [Requirement Sorting] button to assign an optional numeric sort order to define a non-alphabetic order for requirements on the Single Sample Login and Results by Sample screens and

the Sample Summary report. See Analyses setup (page 107) for analysis sort orders.

In Edit Mode, use the [Edit in Sort Order] button to place the screen's selection pick lists and the [View All] record order in sort order rather than alphabetical order. Use the [View All] button in Edit Mode to make all Requirements available for editing.

Use the [Print] button to preview the summary report for the current requirements. Use this feature while creating or editing a requirement to quickly view a summary of the requirement's configuration.

Use the [Copy To] button copy all characteristics to a new Requirement. Enter the new Requirement's name in the Copy Requirement dialog. Use the navigation buttons in the lower left corner to locate the new Requirement and adjust its Sort Order or make other changes as necessary.

Result Types

Use the Result Types option on the Setup menu to maintain a list of analysis result types (see Figure 34). In MSC-LIMS an analysis result is either a single floating point value, a predefined result type, or a combination of result type and value (e.g. < 1).

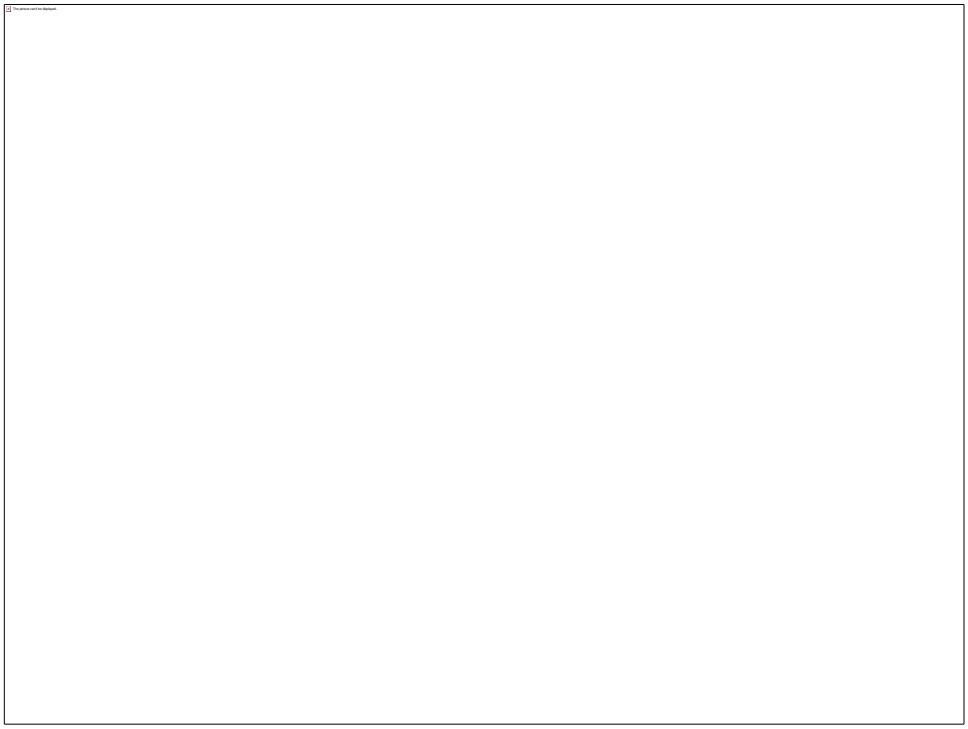


Figure 34 Result Type Setup

Following is a list of the fields and controls on the result type setup form.

Field/Control	Description/Notes
Sort Order	An optional numeric value to force the list to sort in a specific order. This is the order in which the Result Type picklist will appear in the results entry screens. The list is actually sorted by the combination of sort order and name so entries with the same sort order will appear sorted alphabetically by name.
Name	Enter the Result Type name, such as "negative", "positive", "TNTC", etc. This name appears in the results entry screen's Result Type picklist.
Result Value Entry	Use this control to specify whether a result value cannot be entered (None), is optional, or is required when the Result Type is used.
Report Format	Enter a format to display the Result Type on reports. If the Result Type can include a result value (i.e. Value Entry is optional or required) use '#' as a placeholder for the result value, such as "< #".
Description	An optional result type description for documentation purposes only.
Inactive	Mark this field to prevent further use of an existing Result Type.
[Sort]	Use this button to resort the list after altering the Result Type's name or sort order. After resorting, the list appears in the same order it will appear in the picklist in the results entry screens.

See QC Data by Analytical Batch on page 99 for additional information.

Sample Statuses

For example, if you normally charge a 50% premium for a 48-hour turnaround, create a new "48-Hour" status with an analysis cost multiplier of 1.5.

Use the Sample Statuses option on the Setup menu to create and maintain a list of sample statuses to define service types or turnaround times. Default options include Normal, Rush and Immediate. Rename or inactivate these statuses and add your own as necessary. Enter the appropriate data to define an optional Cost multiplier, and optional warning days multiplier to add analyses to the warning list more quickly. Select a sample status for the Sample Login Default status.

Sample Types

Use the Sample Types option on the Setup menu to create and maintain a list of sample types. Note that Sample Type names must be unique and you cannot delete a Sample Type if it is referenced by an existing sample. Use the Description field to add optional notes or other descriptive information about the Sample Type. Check the QC option to create a Sample Type for use only with QC samples. Assign a type as the default Sample Type if appropriate, otherwise, leave the Sample Login default field blank.

SQL Expressions

Use the SQL Expressions option on the Setup menu to save frequently used or complex SQL expressions that can be selected from any sample query dialog. Use this option to give casual users the ability to perform more complex queries without knowledge of SQL syntax. Enter a descriptive name to identify the purpose of the expression. See Querying Samples (page 33) for more information on using SQL expressions to query samples.

TIP
Test an expression in a sample query dialog for proper syntax then use the dialog's "SQL for last query" field to copy and paste into the SQL Expressions setup form.

Text Lists

Use CTRL+T or right-click and select Text Builder to open the Text Builder from any LIMS text field.

Use the Text Lists option on the Setup menu to create and maintain lists of frequently used text. Text from any list can be inserted in any MSC-LIMS text field using Ctrl+T to open the Text Builder popup. There are default lists for Conclusions, Notes, and Titles, which are automatically selected when the Text Builder is opened from these MSC-LIMS fields. See Using the Text Builder (page 39) for more information

You can also add your own lists to create and organize text any way you like. Members of the Technicians, Admins, and Owners security roles can add new items to any text list from the Text Builder popup. Admins and Owners can create new lists and add, edit, and delete list items.

Following is a list of the fields and controls on the Text Lists setup form.

Field/Control	Description/Notes
Select List	Use this list to select a Text List for editing. When a Text List is selected, its contents appear in the lower portion of the screen.

Field/Control	Description/Notes
New List	Use this field to create a new Text List. Enter a distinct list name and then click the [Create List] button to create the named Text List.
[Create List]	After entering a Text List name in the New List field, use this button to create the new Text List.
[Delete List]	Use this button to delete the currently selected Text List. Only empty Text Lists can be deleted. To delete a Text List, first delete the lists' contents using the record selectors (or CTRL+A to select all records) then press the DEL key. Note that the default Conclusions, Notes, and Titles lists cannot be deleted.
Name	Use the Name field to name and organize items in a Text List. The Text Builder sorts items in a Text List by name. For example, items in the Titles list might be named using the LIMS report on which the title text is used.
Text	Enter the text to be inserted when the item is selected in the Text Builder.

Units

Use the Units option on the Setup menu to create and maintain a list of valid units of measure. Enter an abbreviation, which is used to conserve space on screens and reports. Note that units must be unique and you cannot delete a record if it is referenced by an existing analysis.

Reports

Use the report options on the Setup menu to print lists for each of the configuration items on the Setup menu.

Use the Mailing Labels report to print a mailing label for either a customer or an outside laboratory or a one-time label with any information. See Using Reports (page 41) for more information on previewing reports, exporting report data, and creating report snapshots. Note that the Mailing Labels report uses the printer defined for the Default label style on the Workstation Configuration screen.

Chapter 8: System Administration

Use the Administration menu to create user login accounts, maintain sampler and employee records, define system and workstation configuration options, maintain the system error log, and perform other administrative functions. This chapter also includes important system maintenance and administration topics.

Edit Analysis Costs

Use the Edit Analysis Costs option on the Admin menu to edit default and customer analysis costs and to apply a multiplier to adjust all default or customer analysis costs. This screen provides access to the same cost data available in the Analysis and Customer setup screens.

Edit Sample Costs

Use the Edit Sample Costs option on the Admin menu to correct analysis costs for completed samples. Use this feature for example, to correct cost data in a number of samples that were completed before a cost adjustment was made to a specific analysis. Use this option to either edit costs for a single sample or to change the cost for a single analysis across multiple samples.

Employees

Use the Employees option on the Admin menu to add, edit, and delete employee records. Select the employee's login name from the picklist or double-click to open the Users setup form to add a new user login account (see Users, page 137). The sample login forms use the login name to default the sampler picklist to the current user and the results entry forms use the login name to locate and insert the employee's initials. The employee's initials can also be used in a column on user-defined reports.

Note that an Employee is also a Sampler, although a Sampler is not necessarily an employee. See Samplers (page 132) for more information.

Use the subforms on the Employees setup screen to enter and maintain records of the employee's Training histories and Other Certification histories.

Use the Method Certification subform to record employees' certification in selected methods. MSC-LIMS uses this data for verification when an analysis' results entry is restricted to only those employees who have received certification for the analysis' associated method. This data also appears on

the Employee Certification subform in the Methods setup screen (page 95) on the Notebook menu.

Use the [Change to Sampler] button to change an Employee to a Sampler.

Error Log

Use the Error Log option on the Admin menu to view the system error log for MSC-LIMS and MSC-LIMS Messaging. When a system runtime error occurs, a dialog box displays the error message and the user is instructed to contact the LIMS administrator. All such messages are automatically saved to the error log, along with the user's login name, workstation name, MSC-LIMS version, and the date and time the error occurred.

While serious runtime errors should be rare, the system error log is primarily a tool for software developers. Trapping all runtime errors and recording their occurrence in the system error log allows such errors to be quickly investigated and corrected. Use the form's record selectors to select and delete records from the error log as necessary.

Use the Error Log report option to print a hard copy of the current contents of the error log.

Samplers

Use the Samplers option on the Admin menu to add, edit, and delete sampler records. Since an employee (see Employees above) is also a sampler, use this form only to add records for non-employees. Select the sampler's login name from the picklist or double-click to open the Users setup form to add a new user login account (see Users below). The sample login forms use the login name to default the sampler picklist to the current user. The sampler's initials can be used in a column on user-defined reports. Use the [Change to Employee] button to upgrade a sampler to an employee. Enter a sampler in the Sample Login Default field, or select (current user) as the default sampler.

System Configuration

Use the System Configuration option on the Admin menu to configure various system features. The following sections describe the options available on each tab of the system configuration screen.

Reports

Use the controls on this screen to configure the appearance of all system reports. Use the logo options to control the appearance of your company logo:

Off No logo is displayed

Clip	Display the logo at actual size. If the logo is larger than the report's logo control, the image is clipped.
Stretch	Size the logo to fill the report's logo control. This setting may distort the image.
Zoom	Display the logo in its entirety after sizing to fill either the height or width without distorting the image.

See VBA Expressions on page 83 for more information.

Enter text or VBA expressions in the header and footer fields to display such things as company name, current date and time, and page numbers on all reports. For example, the VBA expression `="Page " & [Page] & " of " & [Pages]` could be used in a report footer to display "Page N of M" on all report pages.

Reported Date. These options are used to configure the system to either prompt or automatically update a sample's Reported date when a sample summary report or UDR is previewed or printed.

Tip

If you are using MSC-LIMS Messaging, you can enable the option to automatically set the reported date when any style sample completion message is sent. The reported date can only be set for completed samples where the reported date has not previously been set. Note that setting the reported date, whether automatically or via a user prompt, is only available to members of the Technicians, Admins, and Owners security roles.

Labels

Use the fields on this tab to assign default label information, and to configure customizable labels. Text entered in the Default Title field remains consistent on all labels. Use the Record selector to view the two pre-configured label styles, "Default" and "Environmental", and two configurable label styles, "Configurable3" and "Configurable4". Select the label style, change the label style name and description as necessary, then enter any literal text or valid VBA expression or select a predefined expression from the picklist to configure each label field. Note that custom label styles will not appear in the list of configurable label styles.

Time and Date

Use the time and date format options to select an appropriate time and date display format for data entry forms and system reports. Select a format with an input mask to avoid entering colons (:) for times and forward slashes (/) for dates.

NOTE

Although using formats without input masks requires entering the time and date separator characters, there are data entry advantages when no input mask is used. Without an input mask, times can be entered in 12 or 24-hour format. In 12-hour format, times default to AM and only a "P" must be entered for PM times. Without an input mask, dates can be entered without the year if the date is in the current year. The CTRL+COLON (:) and CTRL+SEMICOLON (;) shortcut keys can be used to insert the current time and date respectively, when no input mask is used.

Data Entry

Sample Login. Enable a specified number of day(s) before current date for default collected date. Enable the default collected time, received date and time, and started date to automatically insert the current date and/or time during sample login.

Enable the customer information option to display the customer's name, address, telephone, etc. adjacent to the customer pick list.

Enable the technician sample edits option to allow members of the Technicians security role to edit either samples they logged or any samples and delete incomplete analyses.

Results Entry. Enable the default analysis date or time options to automatically insert the current date or time during results entry. With these options enabled, when the first keystroke is entered in either the result value or result type field, the current date and/or time are inserted if the fields are currently empty.

Enable the default QC reference value option to automatically insert the analysis' target value (if defined) into the reference value field during results entry for QC samples.

Use the "Beep on min/max warnings" to enable an audible "beep" upon min/max warnings.

Use the "Enable Notes field" option to enable the Notes field during results entry.

Enable the customer information option to display the customer's name, address, telephone, etc. adjacent to the customer pick list.

Enable the technician result edits option to allow members of the Technicians security role to edit either result values they entered, or any results entered. Either way, any result change triggers an audit trail event. When this option is disabled, technicians cannot edit any results (and only Systems Administrators can edit results).

Select your "less than" result type to allow the system to automatically insert less than detection limit results by double-clicking the detection limit on the results entry screens.

See Sample Approval on page 75 for more information.

Select the "Approval" analyte option to designate an Admin-only "Approval" analyte added as part of an approval facility. When an Approval analyte is selected from the picklist, the "Unapproved samples" option on the Additional tab of the query controls is enabled. Use the "Unapproved samples" query criterion to find samples whose only incomplete analysis is the "Approval" analysis. Note that the System Configuration screen's "Approval" analyte picklist shows only Admin-only analytes as designated on the "Results Entry" tab of the Analysis Setup screen in the Setup Menu.

Audit Trail

Use the options on the Audit Trial tab to enable audit trailing of changes to specific sample characteristics. Audit trail events automatically occur for significant changes to a sample such as deleting an analysis or changing an analysis result. However, changes to sample characteristic fields do not automatically trigger an audit trail event. Use these options to enable audit trail events for changes to specific fields. See Sample Audit Trail Events on page 76 for more information.

Messaging

Use MSC-LIMS Messaging to automatically send an email or fax with sample information when a sample is logged or completed. Use the controls on this tab of the system configuration screen to configure system-wide messaging options. Message recipients, subject lines, and styles are configured by individual project or customer. See the *MSC-LIMS Messaging User's Guide* for more information on installing and configuring MSC-LIMS Messaging software.

LimsCode

Use the options on the LimsCode tab to automatically distribute updated MSC-LIMS software to each LIMS workstation. File LimsCode5.mde, the MSC-LIMS front end software, is installed on each LIMS workstation. With an MSC-LIMS Annual Subscription license, you will receive a new LimsCode5.mde file with each version update. With a Full System license, you will create a new LimsCode5.mde after installing a version update or customizing the system (see **Error! Reference source not found.** on page **Error! Bookmark not defined.**).

Use the following steps on the LimsCode tab to distribute an updated LimsCode5.mde to each LIMS workstation:

1. Use Windows Explorer to copy the updated LimsCode5.mde file to a file server folder accessible from all LIMS workstations.
2. Use the [Browse…] button to select the LimsCode5.mde file copied in step 1.

3. Use the [Update…] button to update the revision date and time in the file selected in step 2.
4. Select the minimum security role required to copy the updated LimsCode to the workstation. For example, users in the ReadOnly and Samplers security roles may be only casual users of the system. So that these users do not encounter the "Updated MSC-LIMS software is available…" message, set this option to Technicians so only Technicians, Admins, and Owners will see the message.
5. Check the "Enable automatic LimsCode update" option to enable the update. With this option checked, at startup the workstation's current LimsCode will compare its revision date to the date of the file set in step 3. If a newer LimsCode is available the user will receive the "Updated MSC-LIMS software is available..." message offering to install the update. If the user accepts the offer to install the update, MSC-LIMS exits and executes a BAT file to copy the update LimsCode to the workstation.

Miscellaneous

Use these options to:

1. Change the tab label for all "Custom" tabs to a site-specific label
2. Specify a title for container labels
3. Create a list of lab/plant names for bench sheets. Note that names must be separated by a semicolon (;).
4. Assign sample costs during login, at sample completion, or both. Assign costs at login, if you may need to generate sample invoices before analytical results are complete.
5. Multi-user: Use the Update Retry Interval and Number of Update Retries fields to reduce the number of lock conflicts occurring in a multi-user configuration. These options are set when MSC-LIMS is first started so each workstation must log back on to make any changes effective. Unless you are operating in an environment with extremely poor network performance, the default options on this screen rarely need to be adjusted.
6. Excel Interface: Set the maximum number of characters in a LIMS field exported for your version of Excel.

Options

Use this system configuration feature to enable special configuration and customization options for site-specific features. Instructions for adding and editing options on this screen will be provided by MSC and some may be found in knowledge base articles at MSC-LIMS.com. For a current list of options supported on this screen, see file MSC-LIMS SysCfg Options.doc in the File Library at MSC-LIMS.com. Contact MSC for more information.

System Information

Use this option to display system information for troubleshooting. This information may be requested during technical support calls.

Database Information

Use this option to view SQL Server database information. Data listed may be helpful during technical support calls.

System Permissions

Use the System Permissions option on the Admin menu to view and make changes to MSC-LIMS' default security model. Note that the System Permissions option is only available to members of the Owners security role. The following sections describe the options available on each tab of the System Permissions screen.

Main Menu

Use this option to disable items or to increase the privileges required for specific menu items. Use the Custom option of each menu item to select the new minimum security role required to access the menu item. Select "(disabled)" to disable the menu item for all users. Use Open Mode to change the default open mode for an Add/Edit form. For example, if you always log samples via batch login you can change the single sample login screen to always open in Edit Mode to edit existing samples.

Database

Use this option to view the SQL Server database table permissions by security role. Note that Owners have full permissions on all database tables. Database table permissions are managed by SQL Server scripts and utilities.

Users

MSC-LIMS uses a secure SQL Server back end database with Windows authentication to control access to data. That means a LIMS user must have a valid Windows login account and that user account must be added to the back end database. Since many of the system's data entry forms include a record history showing date and time of record additions and updates along with the user's name, it is recommended that LIMS users have unique login names to better manage system data.

See page 43 for a description of the system's Security Roles.

Select the Users option on the Admin menu to create and manage user login accounts. To create a new user, simply add a new user record with a login name in the form "domain\username" and select the appropriate security role. Members of the Admins and Owners security roles have permissions to use this screen.

Tip

If the user will be logging samples or entering results, create user accounts by double-clicking on the login name picklist in either the Samplers or Employees setup screens. Adding the login name to a sampler or employee record allows the sample login form to default its sampler selection list to the current user and allows the results entry forms to insert the employee's initials.

NOTE

If you have installed SQL Server Express on a workstation in a peer-to-peer network, you must add the identical Windows login names and passwords to the SQL Server Express workstation for all LIMS workstation logins that will be accessing SQL Server.

Workstation Configuration

Use the Workstation Configuration option on the Admin menu to set workstation-specific options. All workstation configuration settings are saved in an XML file with the same name and in the same folder as the current LimsCode (e.g. LimsCode5.xml). Where applicable, you can propagate one workstation's configuration settings to other LIMS workstations by exiting the LIMS on the workstations and copying the XML file to the workstation folder where the MSC-LIMS software is installed. MSC-LIMS loads the contents of the XML file at startup. If the file is missing (or deliberately renamed for troubleshooting), MSC-LIMS uses default workstation configuration settings and recreates the XML file when exiting the LIMS.

Following is a list of the fields or controls available on the workstation configuration screen's Settings tab, Folders tab, and Label Printers tabs.

Field/Control	Description/Notes
Populate Sample List	Select the default populating mode for all sample ID picklists. Note that users can temporarily change the populating option at any time by double-clicking any sample ID picklist.

Field/Control	Description/Notes
Check sample schedules at startup	Enable this option to automatically detect and display sample schedule warnings each time the system is started.
Check sample warnings at startup	Enable this option to automatically detect and display sample warnings each time the system is started.
Prompt to print labels at sample login	Enable this option to prompt the user to print container labels during sample login. Disable this option, for example, at workstations that do not have an attached label printer.
Prompt to print sample summary at completion	Enable this option to automatically prompt the user to print the sample summary report when a sample is completed during results entry.
Suppress "Not Compiled" startup warning	Enable this option during software development to suppress the system startup message displayed when the system detects an uncompiled LimsCode.
Show "Compact" startup warning when LIMSCode exceeds x MB	Enable this option to receive a startup warning when LimsCode exceeds a specified size threshold. Use this feature as a reminder to periodically compact LimsCode.
Compact LIMSCode at exit, and Delete temporary records at exit	Use these options to minimize the size of LimsCode and optimize performance of the MSC-LIMS front end by automatically deleting temporary records and compacting LimsCode when exiting the LIMS.
Always show full menus	Use this option to show all commands on menus. When this option is not selected, menus show only the most recently used commands and must be expanded to show all commands. Note that changing this setting affects all of your Office programs.
Automatically exit after N minutes of inactivity.	Use this option to automatically log off and exit the LIMS after the specified number of minutes of inactivity. Use this option, for example, to ensure an overnight database backup completes properly.

Field/Control	Description/Notes
MS Excel Templates	Use these fields on the Folders tab to specify the default folder for Excel import and export templates. See analysis and project Excel interfaces on pages 112 and 123 for more information.
Laboratory Documents	Use this field to provide quick access to lab documents, forms, standard operating procedures, etc. created in other applications such as Word or Excel. Specify the top folder in a hierarchy. Using Windows Explorer, add subfolders as necessary, then copy documents to the folder(s). Access the Laboratory Documents from the Notebook menu.
Hyperlink Base	Use this field to specify the base folder for hyperlinked documents. By adding hyperlinks to documents that are relative to a base folder, all documents can later be moved and only the hyperlink base must be changed to allow access to the documents in a new location. To aid in troubleshooting, the current hyperlink base is shown on the System Info tab on the System Configuration screen.
Show label style and printer names when previewing labels	Use this option to troubleshoot labels and printers. Enable this option to view the label style name and printer name in a popup message when previewing a label using the System Configuration and Container Labels screens.
Label Printer	Use the Printer option on the Label Printers tab to select a printer from the workstation's installed printers for each label style.

Administrative Reports and Actions

Following is a summary of the system reports and actions available on the Admin menu. See Using Reports (page 41) for more information on previewing reports, exporting report data, and creating report snapshots.

Database Records. Use this report to count and display the number of records in each of the tables in the attached database.

Employees. Use this report to generate an alphabetized list of all Employees and their information.

Error Log. Use this report to print the contents of the system error log. When necessary, the report or portions can be emailed for assistance during technical support.

Samplers. Use this report to display an alphabetized list of Samplers including their initials, login name, whether or not they are an Employee and any Notes recorded.

Install Version Update. Sites with MSC-LIMS Full System licenses use this option to install a version update. Follow the instructions provided with the version update software. Note that this option is only available when you are using an MDB file (i.e. LimsCode5.mdb) and you are logged on as user in the Owners security role.

Recompile. Use this option to recompile all VBA code during software development. Note that this option is only available when you are using an MDB file (i.e. LimsCode5.mdb).

Restore Window Size. MSC-LIMS screens require a minimum 1024 by 768 size to display data without truncating important buttons and status messages. At startup, MSC-LIMS will issue a warning if your screen resolution is less than 1024 by 768. If you have altered the size of the MSC-LIMS window, use the Restore Window Size option to restore the size and position of the MSC-LIMS window to the settings used when MSC-LIMS was started.

TIP
To restore the MSC-LIMS window to the minimum 1024 by 768 size, reduce the size of the window then exit and restart the LIMS. At startup, MSC-LIMS will offer to restore the windows to the required 1024 by 768 size.

View Current Users. This option allows members of the Admins and Owners security roles to view a list of users currently logged on to the system using the current SQL Server database. In a multi-user environment, use this feature prior to copying or backing up the database or whenever exclusive control of the database is necessary.

Command Line Options

All MSC-LIMS version 5.x software runs using an isolated installation of the Microsoft Access 2010 runtime. Command line options include the paths to the Access 2010 runtime, workgroup security file, and MSC-LIMS software. Right-click the MSC-LIMS shortcut and select Properties to view the command line in the shortcut's Target property. Following is an example of an MSC-LIMS command line:

```
"C:\Program Files (x86)\Common Files\Sagekey
Software\StartAccess5_2010.exe" /profile "MSC-LIMS" /wrkgrp
"C:\MSC-LIMS\System.mdw" /runtime /excl
"C:\MSC-LIMS\LimsCode5.mde"
```

Following is a list of the command line options supported by MSC-LIMS. Note that command line options are not case-sensitive.

Option	Description/Notes
d:\path\StartAccess5_2010.exe	Like other versions of Access, the Access 2010 runtime (msaccess.exe) redirects a number of Windows registry keys to itself each time the program runs including the key that registers the MDB extension. This causes problems if a user later double-clicks an MDB file in Windows Explorer expecting to open the file in a full copy of Access. File StartAccess5_2010.exe is a special-purpose utility used by all MSC-LIMS software to overcome this problem. StartAccess5_2010.exe records the state of the registry keys, starts the Access 2010 runtime, then waits a few seconds and restores the keys so a full copy of Access operates normally.
/runtime	When the workstation has a full copy of Access this option forces Access to behave like the runtime version. This option is ignored with runtime versions of Access. Omit this option when creating an "Edit LimsCode" shortcut (see the *MSC-LIMS Programmer's Guide*).
/excl	This option forces the database to be opened exclusively preventing Access from opening multiple instances of a database on a single machine. This switch should only be used with front end databases such as LimsCode5 and LimsMapi5.
/profile "MSC-LIMS"	This option instructs the Access runtime to use the MSC-LIMS profile, which identifies the program's title, icon, etc.
/wrkgrp	This option is followed by the full path name of the default workgroup file (System.mdw).

Database Backup and Maintenance

The LIMS administrator, with the assistance of a SQL Server database administrator (DBA) if available, should devise a database backup and

maintenance plan, which includes a series of tasks performed regularly to ensure acceptable database performance and availability. At a minimum, a database maintenance plan should include:

- Full database backups – the core of any disaster recovery plan.
- Transaction log backups – backs up the database's log files. In the event of a disaster, log files can be applied to a restored full backup to recover a databases to a point in time.
- Verify the physical integrity of the database using the DBCC CHECKDB command.
- Maintain the database's indexes to remove fragementation problems.
- Maintain index and column statistics to improve query performance.

Refer to SQL Server Management Studio for more information on database backup and maintenance.