

Section 3. Lab User Role

This section provides instructions for a Lab User and Lab Approver User. The basic laboratory capabilities are shown in Figure 3-1.

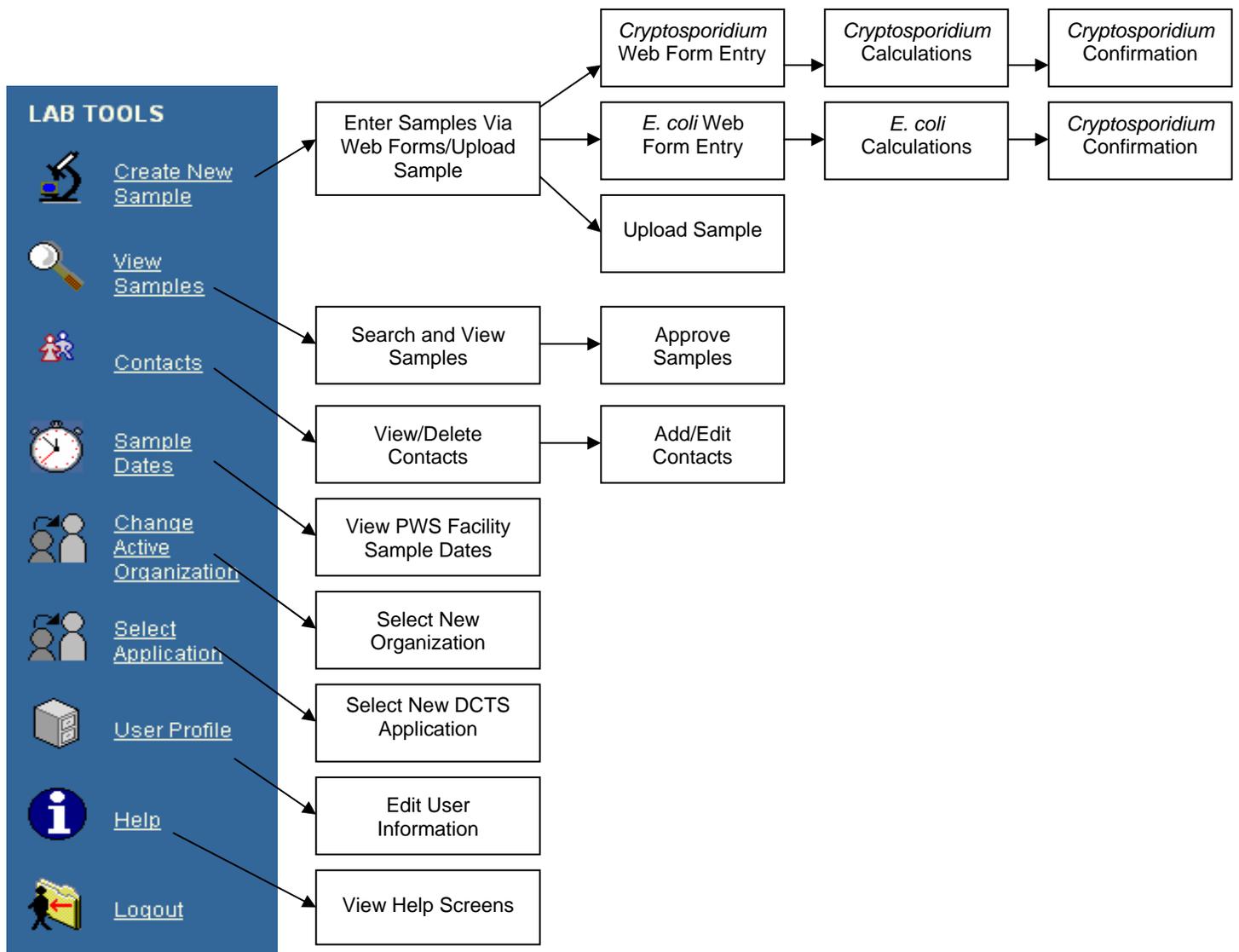


Figure 3-1. LT2 Data Collection System Lab User Basic Work Flow

All laboratory functions described in this section are initiated by logging into the LT2 DCTS Home Page, available on the Web at: <http://www.epa.gov/safewater/lt2/> and selecting the appropriate link from the navigation toolbar on the left-hand side of the screen.

3.1 Select Organization

The "Select Organization" screen is intended for those users who are associated with more than one organization. If you are only associated with one organization, you will not be directed to this screen after login. If you are registered for more than one organization, this screen will open automatically. You must select the organization you wish to access. Figure 3-2 provides an example of the "Select Organization" screen.

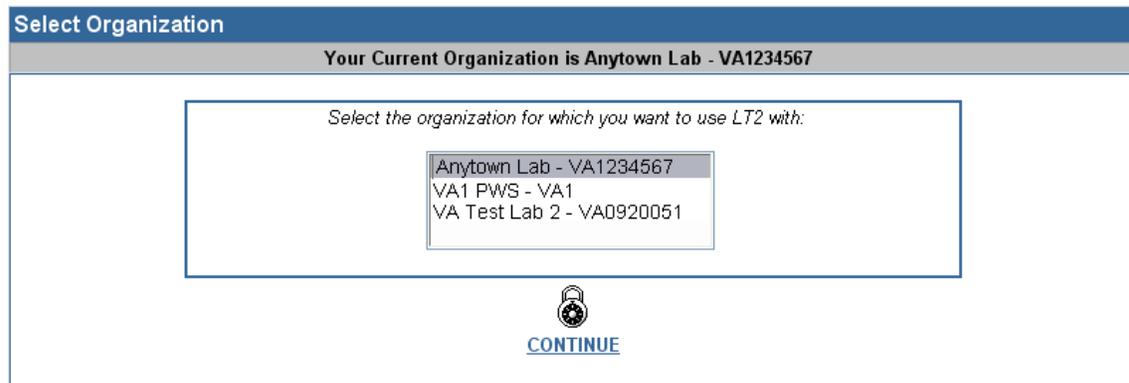


Figure 3-2. Select Organization Screen

The LT2 DCTS will display a list of associated organizations, and you will be required to select the organization for which you would like to edit/view/enter data. At any given point, you can only enter/view/review samples for one organization. To switch to another organization, click the "CHANGE ACTIVE ORGANIZATION" link that appears in the side navigation toolbar. The "Select Organization" screen will display, and you may choose to work within a different organization. The organization that you are currently working under will display at the top of each screen.

The LT2 DCTS will, by default, link you to the first organization that appears on your list. You can change this default by selecting a new organization from your list box. The page will refresh, and you will be associated with the new organization. For example, by default you may be entered as Anytown Lab. If however, you would like to review samples for VA1 PWS, select VA1 PWS by clicking on its name in your list box. The page will refresh and VA1 PWS will appear as the active organization at the top of the screen.

Click "CONTINUE" to complete the "Select Organization" procedure. After selecting your current organization, you will be directed to the "Search for a Sample for Lab" screen, as seen in Figure 3-15. The navigation toolbar will appear in the side toolbar with the links appropriate to the selected user role.

3.2 Creating a New Sample

The LT2 DCTS allows both laboratory data approvers and those who enter laboratory data to enter *Cryptosporidium* and *E. coli* data via web entry forms and an XML upload process. If you are registered only as an *E. coli* laboratory, the only sample option available to you will be *E. coli* method types, and you will only be able to upload *E. coli* XML files. Alternatively, if you are registered as only a *Cryptosporidium* laboratory, the only sample option that you can choose is *Cryptosporidium*, and you will only be able to upload *Cryptosporidium* XML files. If you are registered as both a *Cryptosporidium* and *E. coli* laboratory, all sample method types and uploads will be available to you.

To enter data, select the "CREATE NEW SAMPLE" link from the navigation toolbar on the left. Figure 3-3 displays the "Create New Sample" screen.

Figure 3-3. Create New Sample Screen

To import *Cryptosporidium* or *E. coli* data already entered in your Laboratory Information Management System (LIMS) or data tracking database, click the "UPLOAD SAMPLE(S)" link on the right side of the screen. Details for using the upload process are discussed in Section 6.

To enter data manually into the LT2 DCTS via the web entry forms, you must first select the analyte for which data will be entered. *Cryptosporidium* is the default analyte.

To enter data for *E. coli* samples, click on the radio button to the left of "*E. coli*." Then, select the appropriate method type from the drop-down menu. The four *E. coli* method types include the following:

- 15-tube MPN
- ONPG-MUG, 51-well
- ONPG-MUG, 97-well
- Membrane Filtration

Details on the specific methods associated with each of these method types are provided in the *Microbial Laboratory Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule* [EPA-815-R-06-006].

After the appropriate analyte information is selected, you must click the "ENTER SAMPLE(S)" link to the right to be directed to the appropriate data entry form. The following sections discuss the data entry process for each analyte and method:

- *Cryptosporidium* Samples - Section 3.3
- *E. coli* 15-tube MPN Samples - Section 3.4
- *E. coli* ONPG-MUG, 51-well Samples - Section 3.5
- *E. coli* ONPG-MUG, 97-well Samples - Section 3.6
- *E. coli* Membrane Filtration Samples - Section 3.7

3.3 *Cryptosporidium* Samples

The following section details data entry and data review for *Cryptosporidium* samples.

3.3.1 *Cryptosporidium* Data Entry

Approved *Cryptosporidium* laboratories use the LT2 DCTS to enter *Cryptosporidium* sample data for new monitoring (and not grandfathered data). *Cryptosporidium* analyses conducted in support of the LT2 Rule must be performed using the 2005 version of *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA* [EPA-821-R-01-026] or the 2005 version of *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA* [EPA-821-R-01-025]. The full versions of these methods are available for download in Adobe Acrobat (.pdf) format from the following sites:

- <http://www.epa.gov/nerlcwww/1622de05.pdf>
- <http://www.epa.gov/nerlcwww/1623de05.pdf>
- <http://www.epa.gov/microbes/>

Guidance on the use of these methods during the LT2 Rule is provided in the *Microbial Laboratory Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule* [EPA-815-R-06-006].

Figure 3-4 displays an example of a “*Cryptosporidium* Data Entry” screen. Users may enter data for up to four *Cryptosporidium* samples using this screen.

Cryptosporidium - Anytown Lab - VA1234567				
<p>Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering Cryptosporidium sample data into the LT2 Data Collection System: all holding times for the sample were met; the sample was received by the laboratory in acceptable condition; and results for the associated method blank, OPR, and positive and negative staining controls were acceptable (EPA Method 1622/1623).</p>				
<p>Enter data for up to four different samples. Click the field name for more information. Save  Clear Form </p>				
FIELDS COMMON TO ALL SAMPLES				
Sample Status	New Sample	New Sample	New Sample	New Sample
Resample	No <input type="button" value="v"/>	No <input type="button" value="v"/>	No <input type="button" value="v"/>	No <input type="button" value="v"/>
Sample ID (optional)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
PWS ID	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>
PWS Name	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
PWS Facility ID	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>
PWS Facility Name	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sample Collection Point ID	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>	- Please Select - <input type="button" value="v"/>
Sample Collection Point Name	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sample Collection Date	<input type="text"/> 	<input type="text"/> 	<input type="text"/> 	<input type="text"/> 
Sample Type (Field or MS)	Field <input type="button" value="v"/>	Field <input type="button" value="v"/>	Field <input type="button" value="v"/>	Field <input type="button" value="v"/>
Sample Volume Filtered (L)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Was 100% of Filtered Volume examined?	Yes <input type="button" value="v"/>	Yes <input type="button" value="v"/>	Yes <input type="button" value="v"/>	Yes <input type="button" value="v"/>
Number of Oocysts / Total of All Slides*	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
DATA TO CALCULATE OOCYST CONCENTRATION (NEEDED ONLY FOR SAMPLES IN WHICH < 100% OF FILTERED VOLUME WAS EXAMINED)				
Volume of Resuspended Concentrate (mL) Generated	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Volume of Resuspended Concentrate Transferred to IMS (mL)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
DATA TO VERIFY COMPLIANCE WITH SAMPLE VOLUME ANALYSIS REQUIREMENTS (NEEDED ONLY FOR SAMPLES IN WHICH VOLUME FILTERED IS < 10 L OR LESS THAN 100% OF THE FILTERED VOLUME WAS ANALYZED)				
Number of Filters Used	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Packed Pellet Volume (mL) Generated	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
DATA FOR MATRIX SPIKE SAMPLES				
Sample Volume Spiked (L)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Number of Oocysts Spiked	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Lab Comments	Add	Add	Add	Add
PWS Comments	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
CLICK  TO DELETE SAMPLE	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<p>Click save to continue. Save  Clear Form </p>				
<p>*Total number of oocysts in sample (sum of counts from all slides) that meet fluorescence, size, and shape criteria under IFA and cannot be ruled out using DAPI or DIC.</p>				

Figure 3-4. Cryptosporidium Data Entry Screen

Each of the four columns on the screen represents an individual sample. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of each column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Fields Common to All Samples

The following fields are entered in the top section of the screen labelled "Fields Common To All Samples." The majority of these fields must be completed with information that is required for each analysis. Three of the fields are auto-populated and should be verified and corrected if needed.

Sample Status - The Sample Status indicates the status of the sample in the sample review process. The default setting is "New Sample" for sample data entry. Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The Resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

PWS ID - The PWS ID is the public water system ID, which is usually comprised of a two-letter state code followed by a seven-digit number. The PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *Cryptosporidium* laboratory will display in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *Cryptosporidium* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the public water system associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. Compare the name in this field to the PWS name supplied by the PWS on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. The PWS Facility ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will display in the drop-down menu.

PWS Facility Name - The PWS Facility Name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS Facility ID entered. Compare the name in this field to the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. The Sample Collection Point ID is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only ID's for the sampling points associated with the selected facility will display in the drop-down menu.

Sample Collection Point Name - The Sample Collection Point Name is the name of the sample collection point associated with the Sample Collection Point ID selected. This field is auto-populated by the LT2 DCTS, based on the Sample Collection Point ID entered. Compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - The date that the sample was collected by the facility. The Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a sample collection date was not supplied with the sample, contact the PWS to obtain the correct date. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 Data Collection System.

Sample Type (Field or MS) - Use the drop-down menu for this field to select whether the sample is a field sample (a routine, unspiked source water sample) or a matrix spike (MS) sample (a source water sample spiked with a known number of *Cryptosporidium* oocysts to determine method recovery). If MS is selected, data must be entered in the supplemental fields provided to calculate the Analytical Accuracy.

Sample Volume Filtered (L) - Enter the Sample Volume Filtered, in L, in this field. If the sample was filtered in the field, use the sample volume filtered reported by the PWS on the LT2 Sample Collection Form. The sample volume filtered value must be greater than 0 and may be reported to the nearest hundredth (for example, 10.41). However, the value should not be more precise than the measurement method (for example, if a flow totalizer that provides measurements to the nearest tenth is used, the value should be reported to the nearest tenth (10.4), NOT the nearest hundredth (10.40).

Was 100% of Filtered Volume examined? - Use the drop-down menu for this field to select "Yes" or "No." "Yes" is selected when all of the filtered volume was processed through the entire method and examined. "No" is selected when not all of the volume filtered is examined (for example, if the filtered volume yields > 2.0 mL of packed pellet volume, and only 2 mL is examined). If "No" is selected, data must be entered into supplemental fields provided to calculate oocyst concentration and verify that LT2 Rule sample volume analysis requirements were met for the sample.

Number of Oocysts / Total of All Slides - Enter the total number of oocysts identified on all slides from the sample. *Cryptosporidium* oocysts to be reported using EPA Method 1622/1623 are defined as the following: Those determined by brilliant apple-green fluorescence under UV light, size (4 to 6 μm in diameter), and shape (round to oval), excluding atypical organisms specifically identified as other microbial organisms by FITC & DIC (for example, those possessing spikes, stalks, appendages, pores, one or two large nuclei filling the cell, red fluorescing chloroplasts, crystals, spores, etc.).

Volume to Calculate Oocyst Concentration... Fields

Additional fields are required by the LT2 DCTS to calculate oocyst concentrations for samples in which less than 100% of the sample volume filtered was examined:

Volume of Resuspended Concentrate (mL) Generated - Enter the volume, in mL, of the resuspended concentrate for the sample that you measured in Section 13.2.4 in the 2005 version of EPA Method 1622/1623. This volume should have been entered on line 25(a) of the Method 1622/23 Bench Sheet. The value entered for this field must be a whole number.

Volume of Resuspended Concentrate Transferred to IMS (mL) - Enter the volume, in mL, of the resuspended concentrate that was actually transferred to immunomagnetic separation (IMS) for processing through the remainder of the Method. This volume is the total of the volumes of the multiple, individual resuspended concentrates transferred to flat-sided sample tubes for IMS processing in Section 13.2.4.2 of the 2005 version of EPA Method 1622/1623. This volume should have been entered on line 25(b) of the Method 1622/23 Bench Sheet. The value entered for this field must be a whole number, which is less than or equal to the Volume of Resuspended Concentrate (mL) Generated entered for this sample.

Data to Verify Compliance with Sample Volume Analysis Requirements... Fields

Additional fields required by the LT2 DCTS to verify compliance with sample volume analysis requirements if the sample volume filtered was less than 10 L, or less than 100% of the filtered volume was examined:

Number of Filters Used - Enter the number of filters used. The value entered must be a whole number greater or equal to 0 if direct centrifugation (no filter) was used.

Packed Pellet Volume (mL) Generated - Enter the total packed pellet volume, in mL, that was generated for the sample after centrifugation and measured in Section 13.2.1 of the 2005 version of Method 1622/1623. The value entered for this field may be reported to the nearest tenth of a mL (for example, 2.6 mL).

Using the information entered into the data fields on this screen, the LT2 DCTS can determine whether the requirements for sample volume have been met. Under the LT2 Rule, PWSs are required to analyze, at a minimum, either 10 L of sample, *OR* 2 mL of packed pellet volume, *OR* as much volume as two filters can accommodate before clogging. The two-filter condition applies only to filters that have been approved by USEPA for nationwide use with Methods 1622/1623: the Pall Gelman Envirochek™ and Envirochek™ HV filters, and the IDEXX FiltaMax™ foam filter.

Data for Matrix Spike Samples Fields

Additional fields required by the LT2 DCTS if the sample is a matrix spike to calculate MS recoveries include:

Sample Volume Spiked (L) - Enter into this field the sample volume spiked, in L. The value may be reported to the nearest hundredth (for example, 10.41). However, the value should not be more precise than the measurement method. For instance, if a graduated carboy is used to measure the volume to be spiked before filtration, and you cannot determine measurements with more precision than the nearest tenth, the value should be reported to the nearest tenth (10.4), *NOT* the nearest hundredth (10.40). If you use a graduated carboy calibrated to the nearest quarter liter, you should report to the nearest quarter

liter (for example, 10, 10.25, 10.5, or 10.75 L). The volume entered for this field must not be less than the value entered for Sample Volume Filtered.

Number of Oocysts Spiked - Enter into this field the estimated number of oocysts spiked in the matrix spike sample, based on the information provided with your flow cytometer-sorted oocysts.

If you have made errors in data entry for one or more samples and have not yet clicked "SAVE," you may erase all of the data entered on the screen by clicking "CLEAR FORM."

If data are not entered into all of the required fields are not entered, an error message will display at the top of the screen when you select "SAVE." You will not be permitted to continue until all necessary values are supplied.

After primary measurements (such as Sample Volume Filtered and Number of Oocysts / Total of Slides Identified) are entered on this screen, and you have clicked "SAVE" to continue, the LT2 DCTS will automatically calculate the oocyst concentration in the sample.

Note: If any information is entered onto the bottom portion of the data entry screen that is not required for a particular sample, this information will not be saved.

Lab Comments (optional) - As a Lab User, you can click "ADD" to incorporate comments concerning the sample into the information sent to the PWS. After entering comments into the comments box, click "SAVE" to save the comment. By clicking "CANCEL" in the comment box, the comment box will close and any information entered will not be recorded to the sample.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the laboratory.

If the sample is a resample, additional data must be provided for the following fields:

Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason why this resample is required.

3.3.1.1 *Cryptosporidium* Resample Data

If the resample field is marked as "Yes" for any of the four samples, you will be required to enter the original sample collection date, as well as comments on why the resample is being collected. Click "SAVE" to continue and "CANCEL" to return to the previous page. Figure 3-5 displays the "*Cryptosporidium* Resample" screen.

<i>Cryptosporidium</i> - Anytown Lab - VA1234567	
The following item(s) were marked as a resample and if editable, require additional collection information.	
<u>Sample Status</u>	New Sample
<u>Sample ID</u>	Oct1
<u>PWS ID</u>	VA1
<u>PWS Name</u>	VA1 PWS
<u>PWS Facility ID</u>	VA011
<u>PWS Facility Name</u>	VA011 fac
<u>Sample Collection Point ID</u>	SP2
<u>Sample Collection Point Name</u>	SP2
<u>Sample Collection Date</u>	10/04/2005
<u>Original Sample Collection Date</u>	<input type="text"/> 
<u>Resample Explanations</u>	Add
Save Cancel	

Figure 3-5. *Cryptosporidium* Resample Screen

3.3.2 Calculations Associated with *Cryptosporidium* Data Processing

The LT2 DCTS will help users perform the required method calculations by using the data entered by the laboratories to automatically calculate the sample results. After the user has entered data into all of the required fields for a *Cryptosporidium* sample, the LT2 DCTS will automatically calculate the sample results and present the "Calculated *Cryptosporidium* Sample Results Ready for Submission" screen as shown in Figure 3-6.

Cryptosporidium - Anytown Lab - VA1234567

Calculated Sample Results

Click the field name for more information.

Status	Pending Release	Pending Release
Sample ID (optional)	Oct1	Oct1a
PWS ID	VA1	VA1
PWS Name	VA1 PWS	VA1 PWS
PWS Facility ID	VA011	VA011
PWS Facility Name	VA011 fac	VA011 fac
Sample Collection Point ID	SP2	SP2
Sample Collection Point Name	SP2	SP2
Sample Collection Date	10/04/2005	10/04/2005
Sample Type	Field	MS
Sample Volume Analyzed (L)	8	12
Pellet Volume Analyzed (mL)	23	
Contaminant/Parameter	Cryptosporidium	Cryptosporidium
Analytical Method Number	1622/1623	1622/1623
Analytical Result - Value	0.25	0.25
Analytical Result - Unit of Measure	oocysts/L	oocysts/L
Analytical Accuracy (%) (MS only)		0%
Flags		D
Resample	Yes	Yes
Original Sample Collection Date	09/06/2005	09/06/2005
Resample Explanation	View	View
CHECK THE BOX TO DELIVER SAMPLE(S) TO PWS	<input type="checkbox"/>	<input type="checkbox"/>

*A flag is associated with your sample for non-compliance to LT2 rule requirements. Please contact your PWS regarding recollection of the sample.

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date
B	Sample volume analysis requirements not met
C	Matrix spike sample was spiked with greater than 500 oocysts
D	The matrix spike volume analyzed is not within +/- 10% of the volume analyzed for the associated field sample
E	An associated E. coli sample has not been submitted

[Display Data Elements](#)

[Deliver Sample\(s\) to PWS](#)

[Enter New Sample\(s\)](#)

[Logout](#)

Figure 3-6. Calculated *Cryptosporidium* Sample Results Ready for Submission Screen

To help you identify the sample, several previously entered data elements will be redisplayed at the top of the screen, including the following:

- Sample ID
- PWS ID
- PWS Facility ID
- Sample Collection Point
- Sample Collection Date
- Resample
- Original Sample Collection Date
- Resample Explanation

The following fields are the DCTS-calculated values resulting from the DCTS calculations and values that are automatically populated to provide the data needed for later storage in Safe Drinking Water Information System (SDWIS) will display. These calculated and auto-populated elements include the following:

Sample Volume Analyzed (L) (LT2 DCTS-calculated) - If less than 100% of the sample volume filtered is examined, then the sample volume analyzed and the pellet volume analyzed must be calculated. Otherwise, the sample volume analyzed equals the sample volume filtered. The sample volume analyzed is calculated using Formula 1:

Formula 1

$$\text{Sample volume analyzed} = \text{Volume filtered} * \frac{\text{Resuspended concentrate volume transferred to IMS}}{\text{Resuspended concentrate volume}}$$

Pellet Volume Analyzed (mL) (LT2 DCTS-calculated; only for samples in which less than 100% of the filtered volume was examined) - The pellet volume analyzed is calculated using Formula 2:

Formula 2

$$\text{Pellet volume analyzed} = \text{Pellet volume} * \frac{\text{Resuspended concentrate volume transferred to IMS}}{\text{Resuspended concentrate volume}}$$

Contaminant Parameter (automatically populated with “*Cryptosporidium*”)

Analytical Method Number (automatically populated with “1622/1623”)

Analytical Result - Value and Unit of Measure (LT2 DCTS-calculated) - The analytical result is measured in oocysts/L and is calculated using Formula 3:

Formula 3

$$\text{Analytical Result} = \frac{\text{Number of oocysts}}{\text{Sample volume analyzed}}$$

Analytical Accuracy % (LT2 DCTS-calculated; MS samples only) - If MS was entered as the sample type, then the analytical accuracy must be calculated to display the percent recovery for matrix spike samples. The analytical accuracy is calculated using Formula 4:

Formula 4

$$\text{Analytical Accuracy} = \frac{\text{Calculated \# of oocysts/L (MS sample)} - \text{Calculated \# of oocysts/L (associated field sample)}}{\text{Estimated number of oocysts spiked/L}} * 100\%$$

The final component of the DCTS calculations is assignment of data qualifier flags. These flags are placed at the bottom of the screen. If data is not compliant with LT2 Rule monitoring requirements, it will automatically be flagged in the DCTS, and the appropriate flag key identifying the noncompliant monitoring requirement will display in the Flags field of the sample results information. Table 3-1 displays the five flags that can apply to *Cryptosporidium* data, as well as the conditions that trigger each flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

Table 3-1. *Cryptosporidium* Data Flags

KEY	FLAG	TRIGGER
A	Sample schedule not met.	The sample collection date is not within +/- 2 days of the predetermined sampling date.
B	Sample volume analysis requirements not met.	The LT2 requirements for sample volume analyzed were not met (and this flag is triggered) when: 1 filter was used and <10 L was analyzed AND <2 mL packed pellet was analyzed. -OR- More than 1 filter was used AND <100% was examined AND <10 L was analyzed AND <2 mL packed pellet was analyzed.
C	Matrix spike sample was spiked with greater than 500 oocysts.	The number of oocysts entered is a value greater than 500.
D	The matrix spike volume analyzed is not within +/- 10% of the volume analyzed for the associated field sample.	The matrix spike volume entered into the field is not within +/- 10% of the entered analyzed volume for the associated field sample.
E	An associated <i>E. coli</i> sample has not been submitted.	An <i>E. coli</i> sample has not been submitted for the same PWS, facility, sampling point, and sample collection date.

3.3.3 *Cryptosporidium* Data Review

The LT2 DCTS allows the Principal Analyst at a laboratory to review, edit, and approve *Cryptosporidium* sample results for submission to the PWS. Principal Analysts are identified as Lab Approver Users in the LT2 DCTS. If you are the designated Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS. Rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the DCTS calculation page displayed in Figure 3-6 to review data. As a Lab Approver User, you will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the "EDIT SAMPLES" link in the bottom right corner. If you would like to approve the sample, check the box at the bottom of each column of a pending release sample and click the "DELIVER SAMPLE(S) TO PWS" link in the bottom right corner.

The laboratory must verify that all holding times and other QC requirements were met. Before the sample(s) can be approved, you must agree to the following statement: "By approving these *Cryptosporidium* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all Method 1622/1623 and LT2 Rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample(s) to the lab-approved status, thereby making it available for PWS review. If "CANCEL" is clicked, the sample(s) will not be approved. Criteria for valid *Cryptosporidium* samples are provided in Appendix B.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *Cryptosporidium* sample(s) were successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.4 *E. coli* 15-tube MPN Method Samples

The following section details data entry and data review for *E. coli* 15-tube MPN method samples.

3.4.1 *E. coli* 15-tube MPN Method Data Entry

Laboratories certified to analyze *E. coli* using the 15-tube Most Probable Number (MPN) method format can use the LT2 DCTS to enter valid *E. coli* MPN sample data. If you analyzed the *E. coli* sample using a different method, click the "CREATE NEW SAMPLE" icon on the toolbar and select the appropriate *E. coli* analytical method type from the drop-down menu. The following 15-tube MPN methods are approved for LT2 *E. coli* analysis:

- Standard Methods 9221B/9221F (LTB to EC-MUG) 15-tube MPN
- Colilert (Standard Methods 9223)
- Colilert-18 (Standard Methods 9223)

Refer to the LT2 Rule at: <http://www.epa.gov/safewater/disinfection/lt2/index.html> for additional information on the approved analytical methods for *E. coli* detection. Guidance on the use of these methods under the LT2 Rule is provided in the *Microbial Laboratory Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule* [EPA-815-R-06-006]. Figure 3-7 displays the LT2 DCTS screen used by an approved *E. coli* laboratory to enter *E. coli* sample data generated using the 15-tube MPN method.

E. coli 15-Tube MPN - Anytown Lab - VA1234567

Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering E. coli sample data into the LT2 Data Collection System: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met; and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.

Enter data for the New Sample.
[Save](#) 
[Delete](#) 
[Clear Form](#) 

FIELDS COMMON TO ALL SAMPLES	
Sample Status	New Sample
Resample	No <input type="button" value="v"/>
Sample ID (optional)	<input type="text"/>
PWS ID	- Please Select - <input type="button" value="v"/>
PWS Name	<input type="text"/>
PWS Facility ID	- Please Select - <input type="button" value="v"/>
PWS Facility Name	<input type="text"/>
Sample Collection Point ID	- Please Select - <input type="button" value="v"/>
Sample Collection Point Name	<input type="text"/>
Sample Collection Date	<input type="text"/> 
Analytical Method Number	- Please Select - <input type="button" value="v"/>
Source Water Type	- Please Select - <input type="button" value="v"/>
Turbidity Result (NTU)	<input type="text"/>
Lab Comments	<input type="text"/>
PWS Comments	<input type="text"/>
ENTER YOUR CALCULATED E. coli/100 mL RESULT HERE OR HAVE THE SYSTEM CALCULATE IT FOR YOU USING THE SAMPLE RESULT CALCULATOR BELOW	
E. coli/100 mL	<input type="text"/>
SAMPLE RESULT CALCULATOR (ENTER PRIMARY DATA AND CLICK SAVE, BELOW, TO AUTOMATICALLY CALCULATE THE SAMPLE RESULT)	
Positive 10.0 mL tubes	<input type="text"/>
Positive 1.0 mL tubes	<input type="text"/>
Positive 0.1 mL tubes	<input type="text"/>
Positive 0.01 mL tubes	<input type="text"/>
Positive 0.001 mL tubes	<input type="text"/>
RESAMPLE INFORMATION (REQUIRED IF THE SAMPLE IS A RESAMPLE)	
Original Sample Collection Date	<input type="text"/> 
Resample Explanation	<input type="text"/>

Click save to continue.
[Save](#) 
[Delete](#) 
[Clear Form](#) 

Figure 3-7. E. coli 15-tube MPN Method Data Entry Screen

Only one sample may be entered at a time. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of the data entry column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Fields Common to All Samples

The following fields are required in the top section of the screen labelled "Fields Common To All Samples":

Sample Status - The Sample Status indicates the status of the sample in the sample review process. The default setting is "New Sample" for sample data entry. Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The Resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

PWS ID - The PWS ID is the public water system ID, which is comprised of a two-letter state code followed by a seven-digit number. If your laboratory is a PWS laboratory, the PWS ID for your utility will display in the drop-down menu that appears when you click the arrow next to the field. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *E. coli* laboratory will display in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *E. coli* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the public water system associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. If your laboratory is a PWS laboratory, confirm that the name in this field is your PWS name and verify that the PWS ID you selected is correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the PWS name supplied on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate PWS Facility ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS Facility ID for the sample is provided on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID

was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will display in the drop-down menu.

PWS Facility Name - The PWS Facility Name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated, based on the PWS Facility ID entered. If your laboratory is a PWS laboratory, confirm that the PWS Facility Name and the PWS Facility ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, verify that the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and the PWS ID you entered are correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate Sample Collection Point ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Point ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the sampling points associated with the selected facility will be displayed in the drop-down menu.

Sample Collection Point Name - The sample collection point name is the name of the sample collection point associated with the Sample Collection Point ID selected. This field is auto-populated, based on the Sample Collection Point ID entered. If your laboratory is a PWS laboratory, confirm that the Sample Collection Point Name and that the Sample Collection Point ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - The date that the sample was collected by the facility. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 DCTS. If your laboratory is a PWS laboratory, enter the date the sample was collected by the facility. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a Sample Collection Date was not supplied with the sample, contact the PWS to obtain the correct date.

Analytical Method Number - This is the method number used to designate the analytical method used for analysis, as listed at the beginning of Section 3.4.1. Only approved analytical methods for the given method format (in this example, 15-tube MPN) will be displayed in the drop-down menu.

Source Water Type - This is the type of water body used as the source for the drinking water facility from which the sample was collected, and is needed to evaluate the potential relationship between *Cryptosporidium* and *E. coli* concentrations. Select "Flowing Stream," "Lake/Reservoir," "Both FS and L/R" (for both Flowing Stream and Lake/Reservoir), "GWUDI-FS" (Ground Water Under the Direct Influence of Flowing Stream), or "GWUDI-LR" (Ground Water Under the Direct Influence of Lake/Reservoir).

Turbidity Result (NTU) (required only for filtered systems with a population greater than 10,000) - This is the measured turbidity reported as NTU. Turbidity should be measured by the facility at the time of sample collection. If your laboratory is a PWS laboratory, the turbidity should be reported with the sample when sent to your laboratory for analysis. If your laboratory is analyzing *E. coli* samples for a PWS client, the turbidity result is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If no turbidity result was supplied by the PWS with the sample, contact the PWS to obtain the turbidity result.

Lab Comments (optional) - As a Lab User, you can incorporate comments concerning the sample into the information sent to the PWS by entering comments into the Lab Comments field.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the laboratory.

Enter Your Calculated *E. coli*/100 mL... Fields

After entering the required fields, you may choose to enter the final calculated concentration of *E. coli* in the sample reported as *E. coli*/100 mL calculated in your laboratory, or have the LT2 DCTS calculate your results based on primary measurements. If you do not want the LT2 DCTS to automatically calculate your result using your primary measurements, complete the *E. coli* result – value field. This value may be reported to the nearest tenth. *Note:* Do not complete the bottom section if you complete this field - any data entered will be ignored.

***E. coli*/100 mL** - The final calculated result of *E. coli* per 100 mL.

Sample Result Calculator... Fields

To enter primary measurements from the sample and have the LT2 DCTS automatically calculate the final result, complete the bottom section of the screen. *Note:* Do not enter a value for "*E. coli*/100 mL" in the middle section. If a value is entered for this field, any additional primary measurements entered will be ignored by the DCTS. Additional fields required by the DCTS to calculate results for the *E. coli* 15-tube MPN method may include the following primary measurements:

Positive 10.0 mL tubes - This is the number of positive tubes containing 10.0 mL of sample. This value must be reported as a whole number between 0 and 5.

Positive 1.0 mL tubes - This is the number of positive tubes containing 1.0 mL of sample. This value must be reported as a whole number between 0 and 5.

Positive 0.1 mL tubes - This is the number of positive tubes containing 0.1 mL of sample. This value must be reported as a whole number between 0 and 5.

Positive 0.01 mL tubes - This is the number of positive tubes containing 0.01 mL of sample. This value must be reported as a whole number between 0 and 5.

Positive 0.001 mL tubes - This is the number of positive tubes containing 0.001 mL of sample. This value must be reported as a whole number between 0 and 5.

Resample Information... Fields

If the sample is a resample, additional data must be provided for the following fields:

Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason why this resample is required.

After the first section and either the middle section or bottom section have been completed, click "SAVE" to continue. If you have made errors in data entry and have not yet clicked "SAVE," you can erase all of the data entered on the screen by clicking "RESET ENTIRE FORM." You cannot save sample data unless all required fields for the sample have been completed.

3.4.2 Calculations Associated with *E. coli* 15-tube MPN Method Data Processing

The LT2 DCTS will allow you to perform the required method calculation by using the primary data entered by the laboratory to automatically calculate the sample results. After you have entered all of the required and primary measurement fields for an *E. coli* sample, the LT2 DCTS will automatically calculate the sample results and present the "Calculated *E. coli* 15-tube MPN Method Sample Results Ready for Submission" screen as show in Figure 3-8.

E. coli 15-Tube MPN - VA Post Beta Test Lab - VA011079

Calculated Sample Results

Click the field name for more information.

Status	Pending Release
Sample ID (optional)	
PWS ID	VT0005005
PWS Name	STARKEBORO VILLAGE WATER COOP
PWS Facility ID	VTTest Fac 1
PWS Facility Name	Test Facility 1
Sample Collection Point ID	12
Sample Collection Point Name	Name 1
Sample Collection Date	01/01/2006
Analytical Method Number	SM 9223 (Colilert)
Source Water Type	river/stream
Analytical Result - Value	2,300
Analytical Result - Unit of Measure	E. coli/100 mL
Contaminant/parameter	E. coli
Turbidity Result (NTU)	
Flags	A,E*
Resample	No
Original Sample Collection Date	
Resample Explanation	

*A flag is associated with your sample for non-compliance to LT2 rule requirements. Please contact your PWS regarding recollection of the sample.

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date
E	An associated Cryptosporidium sample has not been submitted

[Deliver Sample to PWS](#) ✓

[Edit Sample](#) ✎

[Enter New Sample](#) ⚙

[Logout](#) 🚪

Figure 3-8. Calculated *E. coli* 15-tube MPN Method Sample Results Ready for Submission

To help you identify the sample, several previously entered fields will be redisplayed at the top of the screen, including:

- Sample ID
- PWS
- PWS facility
- Sample collection point
- Sample collection date
- Analytical method number
- Source water type
- Resample
- Original Sample Collection Date
- Resample Explanation

The LT2 DCTS-calculated "Analytical Result - Value" is automatically populated. The analytical result is measured in *E. coli* /100 mL and uses the following procedure described.

The data entry screens for both 15-tube methods require the user to input the number of positive 10.0, 1.0, 0.1, 0.01, and 0.001 mL tubes as appropriate.

The guidance and examples for determining *E. coli* concentrations using multiple-tube methods are based on the revision of Standard Methods 9221C included in the 2001 Supplement to the 20th Edition of Standard Methods, approved by the Standard Methods Committee in 1999.

Note: The Analytical Result can be automatically calculated using the LT2 DCTS.

For each sample volume (e.g., 10, 1, 0.1, and 0.01 mL or additional sample volumes as necessary), determine the number of positive tubes out of five.

A dilution refers to the volume of original sample that was inoculated into each series of tubes. Only three of the dilution series will be used to estimate the MPN. The three selected dilutions are called significant dilutions and are selected according to the following criteria. Examples of significant dilution selections are provided in Table 3-2, MPN Value Table.

Choose the highest dilution (the most dilute, with the least amount of sample) giving positive results in all five tubes inoculated, and the two succeeding higher (more dilute) dilutions (Table 3-2, Example A).

If the lowest dilution (least dilute) tested has less than five tubes with positive results, select it and the two next succeeding higher dilutions (Table 3-2, Examples B and C).

When a positive result occurs in a dilution higher (more dilute) than the three significant dilutions selected according to the rules above, change the selection to the lowest dilution (least dilute) that has less than five positive results and the next two higher dilutions (more dilute) (Table 3-2, Example D).

When the selection rules (above) have left unselected any higher dilutions (more dilute) with positive results, add those higher-dilution positive results to the results for the highest selected dilution (Table 3-2, Example E).

If there were not enough higher dilutions tested to select three dilutions, select the next lower dilution (Table 3-2, Example F).

MPN values need to be adjusted, based on the significant dilutions series selected above. Since the MPN/100 mL values in the table are based on the 10 mL, 1 mL, and 0.1 mL dilution series, per method requirements, the MPN value must be adjusted if these are not the significant dilution series selected. Use the following calculation to adjust the MPN when the 10 mL, 1 mL, and 0.1 mL dilution series are not the significant dilution series selected:

$$\text{Analytical Result} = \frac{\text{MPN value}}{\text{\# of mL in middle dilution}} = E. coli \text{ MPN/100 mL}$$

Table 3-2. MPN Value Table

Example	Least dilute (lowest)			Most dilute (highest)			Combination of Positives	MPN Index No./100 mL
	10 mL	1 mL	0.1 mL	0.01 mL	0.001 mL	0.0001 mL		
A	5	5	1	0	0	0	5-1-0	330
B	4	5	1	0	0	0	4-5-1	48
C	0	0	1	0	0	0	0-0-1	1.8
D	5	4	4	1	0	0	4-4-1	400
E	5	4	4	0	1	0	4-4-1	400
F	5	5	5	5	2	0	5-5-2	54,000

Example A: The significant dilution series for the 5-1-0 combination of positives includes the 1 mL, 0.1 mL, and 0.01 mL dilutions. Since the 10 mL, 1 mL, and 0.1 mL dilutions were not selected, an adjustment is necessary to account for the dilutions selected:

$$\text{Analytical Result} = \frac{33}{0.1} = 330 E. coli \text{ MPN/100 mL}$$

Example B: Since the 10 mL, 1 mL, and 0.1 mL dilutions are the significant dilutions, no adjustment is necessary and the result is 48 *E. coli* /100 mL.

Example C: Since the 10 mL, 1 mL, and 0.1 mL dilutions are the significant dilutions, no adjustment is necessary and the result is 1.8 *E. coli* /100 mL.

Examples D and E: The significant dilution series for the 4-4-1 combination of positives includes the 1 mL, 0.1 mL, and 0.01 mL dilutions. Since the 10 mL, 1 mL, and 0.1 mL dilutions were not selected, an adjustment is necessary to account for the dilutions selected:

$$\text{Analytical Result} = \frac{40}{0.1} = 400 E. coli \text{ MPN/100 mL}$$

Example F: The significant dilution series for the 5-5-2 combination of positives includes the 0.1 mL, 0.01 mL and .001 mL dilutions. Since the 10 mL, 1 mL, and 0.1 mL dilutions were not selected, an adjustment is necessary to account for the dilutions selected:

$$\text{Analytical Result} = \frac{540}{0.01} = 54,000 \text{ } E. \text{ coli MPN/100 mL}$$

The remaining three fields in the “Calculated *E. coli* 15-tube MPN Method Sample Results Ready for Submission” screen include auto-populated fields to help define the sample specifications. The Sample Analytical Result unit of measure is auto-populated by the LT2 DCTS as “*E. coli*/100 mL,” and the contaminant/parameter field is automatically populated by the LT2 DCTS as “*E. coli*.”

The final component of the DCTS calculations is assignment of a data qualifier flag. This flag is placed at the bottom of the screen. If data is not compliant with LT2 Rule monitoring requirements, it will automatically be flagged in the DCTS, and the flag key identifying the noncompliant monitoring requirement will be displayed in the flag row of the sample results information. Table 3-3 displays the *E. coli* Data Qualifier Flags, as well as the condition that triggers the flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

Table 3-3. *E. coli* Data Qualifier Flags

KEY	FLAG	TRIGGER
A	Sample schedule not met.	The sample collection date is not within +/- 2 days of the predetermined sampling date.
E	An associated <i>Cryptosporidium</i> sample has not been submitted.	A <i>Cryptosporidium</i> sample has not been submitted for the same PWS, facility, sampling point, and sample collection date.

3.4.3 *E. coli* 15-tube MPN Method Data Review

The LT2 DCTS allows the Principal Analyst at the laboratory to review and approve *E. coli* sample 15-tube MPN results for submission to the PWS. Principal Analysts are identified as Lab Approver Users in the LT2 DCTS. If you have been designated as the Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS. Rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the LT2 DCTS calculations page displayed in Figure 3-8 to approve data. As a Lab Approver User, you will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the "EDIT SAMPLES" link in the bottom right corner. If you would like to approve the sample, click the "DELIVER SAMPLE TO PWS" link in the bottom right corner.

Before the sample can be approved, you must agree to the following statement: "By approving these *E. coli* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all method and LT2 Rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample to the lab-approved status, thereby making it available for PWS review. If "CANCEL" is clicked, the sample will not be approved. Criteria for valid MPN *E. coli* samples are provided in Appendix C.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *E. coli* sample was successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.5 *E. coli* ONPG-MUG, 51-well Method Samples

The following section details data entry and data review for *E. coli* ONPG-MUG, 51-well method samples.

3.5.1 *E. coli* ONPG-MUG 51-well Method Data Entry

Laboratories certified to analyze *E. coli* using the ONPG-MUG, 51-well method format can use the LT2 DCTS to enter valid *E. coli* sample data. If you analyzed the *E. coli* sample using a different method, click the "CREATE NEW SAMPLE" icon on the toolbar and select the appropriate *E. coli* method type from the drop-down menu. The ONPG-MUG, 51-well analytical method numbers approved for LT2 *E. coli* analyses include the following:

- Colilert™ (Standard Methods 9223)
- Colilert-18™ (Standard Methods 9223)

Refer to the LT2 Rule at: <http://www.epa.gov/safewater/disinfection/lt2/index.html> for additional information on the approved analytical methods for *E. coli* detection. Guidance on the use of these methods under the LT2 Rule is provided in the *Microbial Laboratory Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule* [EPA-815-R-06-006]. Figure 3-9 displays the LT2 DCTS screen used by an approved *E. coli* laboratory to enter *E. coli* sample data generated using the ONPG-MUG, 51-well method.

E. coli ONPG-MUG, 51-well - Anytown Lab - VA1234567

Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering E. coli sample data into the LT2 Data Collection System: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met; and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.

Enter data for the New Sample. [Save](#)  [Delete](#)  [Clear Form](#) 

FIELDS COMMON TO ALL SAMPLES	
Sample Status	New Sample
Resample	No <input type="button" value="v"/>
Sample ID (optional)	<input type="text"/>
PWS ID	- Please Select - <input type="button" value="v"/>
PWS Name	<input type="text"/>
PWS Facility ID	- Please Select - <input type="button" value="v"/>
PWS Facility Name	<input type="text"/>
Sample Collection Point ID	- Please Select - <input type="button" value="v"/>
Sample Collection Point Name	<input type="text"/>
Sample Collection Date	<input type="text"/> 
Analytical Method Number	- Please Select - <input type="button" value="v"/>
Source Water Type	- Please Select - <input type="button" value="v"/>
Turbidity Result (NTU)	<input type="text"/>
Lab Comments	<input type="text"/>
PWS Comments	<input type="text"/>
ENTER YOUR CALCULATED E. coli/100 mL RESULT HERE OR HAVE THE SYSTEM CALCULATE IT FOR YOU USING THE SAMPLE RESULT CALCULATOR BELOW	
E. coli/100 mL	<input type="text"/>
SAMPLE RESULT CALCULATOR (ENTER PRIMARY DATA AND CLICK SAVE, BELOW, TO AUTOMATICALLY CALCULATE THE SAMPLE RESULT)	
Volume analyzed (mL)	<input type="text"/>
Number of positive wells	<input type="text"/>
RESAMPLE INFORMATION (REQUIRED IF THE SAMPLE IS A RESAMPLE)	
Original Sample Collection Date	<input type="text"/> 
Resample Explanation	<input type="text"/>

Click save to continue. [Save](#)  [Delete](#)  [Clear Form](#) 

Figure 3-9. E. coli ONPG-MUG, 51-well Method Data Entry Screen

Only one sample may be entered at a time. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of the data entry column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Fields Common to All Samples

The following fields are required in the top section of the screen labelled "Fields Common To All Samples:"

Sample Status - The Sample Status indicates the status of the sample in the sample review process. The default setting is "New Sample" for sample data entry. Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The Resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

PWS ID - The PWS ID is the public water system ID, which is comprised of a two-letter state code followed by a seven-digit number. If your laboratory is a PWS laboratory, the PWS ID for your utility will be displayed in the drop-down menu that appears when you click the arrow next to the field. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *E. coli* laboratory will be displayed in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *E. coli* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the public water system associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. If your laboratory is a PWS laboratory, confirm that the name in this field is your PWS name and verify that the PWS ID you selected is correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the PWS name supplied on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate PWS Facility ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS Facility ID for the sample is provided on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will be displayed in the drop-down menu.

PWS Facility Name - The PWS Facility Name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated, based on the PWS Facility ID entered. If your laboratory is a PWS laboratory, confirm that the name in this field is your PWS Facility Name and PWS Facility ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, verify

that the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and the PWS ID you entered are correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate Sample Collection Point ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Point ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the sampling points associated with the selected facility will be displayed in the drop-down menu.

Sample Collection Point Name - The Sample Collection Point Name is the name of the sample collection point associated with the Sample Collection Point ID selected. This field is auto-populated, based on the Sample Collection Point ID entered. If your laboratory is a PWS laboratory, confirm that the Sample Collection Point Name and the Sample Collection Point ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - The date that the sample was collected by the facility. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 DCTS. If your laboratory is a PWS laboratory, enter the date the sample was collected by the facility. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a Sample Collection Date was not supplied with the sample, contact the PWS to obtain the correct date.

Analytical Method Number - This is the method number used to designate the analytical method used for analysis, as listed at the beginning of Section 3.5.1. Only approved analytical methods for the given method format (in this example, ONPG-MUG, 51-well) will be displayed in the drop-down menu.

Source Water Type - This is the type of water body used as the source for the drinking water facility from which the sample was collected, and is needed to evaluate the potential relationship between *Cryptosporidium* and *E. coli* concentrations. Select "Flowing Stream," "Lake/Reservoir," "Both FS and L/R" (for both Flowing Stream and Lake/Reservoir), "GWUDI-FS" (Ground Water Under the Direct Influence of Flowing Stream), or "GWUDI-LR" (Ground Water Under the Direct Influence of Lake/Reservoir).

Turbidity Result (NTU) (required only for filtered systems with a population greater than 10,000) - This is the measured turbidity reported as NTU. Turbidity should be measured by the facility at the time of sample collection. If your laboratory is a PWS laboratory, the turbidity should be reported with the sample when sent to your laboratory for analysis. If your laboratory is analyzing *E. coli* samples for a PWS client, the turbidity result is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If no turbidity result was supplied by the PWS with the sample, contact the PWS to obtain the turbidity result.

Lab Comments (optional) - As a Lab User, you can incorporate comments concerning the sample into the information sent to the PWS by entering comments into the Lab Comments field.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the lab.

Enter Your Calculated *E. coli*/100 mL... Fields

After entering the required fields, you may choose to enter the final calculated concentration of *E. coli* in the sample reported as *E. coli* /100 mL calculated in your laboratory, or have the LT2 DCTS calculate your results based on primary measurements. If you do not want the LT2 DCTS to automatically calculate your result using your primary measurements, complete the *E. coli* result – value field. This value may be reported to the nearest tenth. *Note:* Do not complete the bottom section if you complete this field - any data entered will be ignored.

***E. coli* /100 mL** - The final calculated result of *E. coli* per 100 mL.

Sample Result Calculator... Fields

To enter primary measurements from the sample and have the LT2 DCTS automatically calculate the final result, complete the bottom section of the screen. *Note:* Do not enter a value for “*E. coli* /100 mL” in the middle section. If a value is entered for this field any additional primary measurements entered will be ignored by the LT2 DCTS. Additional fields required to calculate results for the *E. coli* ONPG-MUG, 51-well method may include the following primary measurements:

Volume analyzed (mL) - This is the mL of sample added to the tray for analysis. This value may be reported to four decimal places.

Number of positive wells - This is the number of total coliform positive wells with UV fluorescence. This value must be reported as a whole number between 0 and 51.

Resample Information... Fields

If the sample is a resample, additional data must be provided for the following fields:

Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason for why this resample is required.

After the first section and either the middle section or bottom section have been completed, click “SAVE” to continue. If you have made errors in data entry and have not yet clicked “SAVE,” you can erase all of the data entered on the screen by clicking “RESET ENTIRE FORM.” You cannot save sample data unless all required fields for the sample have been completed.

3.5.2 Calculations Associated with *E. coli* ONPG-MUG, 51-well Method Data Processing

The LT2 DCTS will help you perform the required method calculation by using the primary data entered by the laboratory to automatically calculate the sample results. After you have entered all of the required and primary measurement fields for an *E. coli* sample, the LT2 DCTS will automatically calculate the sample results and present the “Calculated *E. coli* ONPG-MUG, 51-well Method Sample Results Ready for Submission” screen as shown in Figure 3-10.

E. coli ONPG-MUG, 51-well - VA Post Beta Test Lab - VA011079

Calculated Sample Results

Click the field name for more information.

Status	Pending Release
Sample ID (optional)	
PWS ID	VT0005005
PWS Name	STARKSBORO VILLAGE WATER COOP
PWS Facility ID	VTTest Fac 1
PWS Facility Name	Test Facility 1
Sample Collection Point ID	12
Sample Collection Point Name	Name 1
Sample Collection Date	04/10/2006
Analytical Method Number	SM 9223 (Colilert)
Source Water Type	river/stream
Analytical Result - Value	1
Analytical Result - Unit of Measure	E. coli/100 mL
Contaminant/parameter	<i>E. coli</i>
Turbidity Result (NTU)	1
Flags	A,E*
Resample	No
Original Sample Collection Date	
Resample Explanation	

*A flag is associated with your sample for non-compliance to LT2 rule requirements. Please contact your PWS regarding recollection of the sample.

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date
E	An associated Cryptosporidium sample has not been submitted

[Deliver Sample to PWS](#) ✓
[Edit Sample](#) ✎
[Enter New Sample](#) ➕
[Logout](#) 🚪

Figure 3-10. Calculated *E. coli* ONPG-MUG, 51-well Method Sample Results Ready for Submission

To help you identify the sample, several previously entered fields will be redisplayed at the top of the screen, including the following:

- Sample ID
- PWS
- PWS facility
- Sample collection point
- Sample collection date

- Analytical method number
- Source water type
- Resample
- Original Sample Collection Date
- Resample Explanation

Select appropriate dilution. If multiple dilutions are used, the tray exhibiting 80% positive wells (41 positive wells) should be used to determine MPN value.

Note: The Analytical Result can be automatically calculated using the LT2 DCTS.

Determine MPN. Using the number of positive wells from the appropriate dilution, identify the corresponding MPN/100 mL in the table provided by the vendor. For example, if a 100 mL sample was analyzed, and there were 41 positive wells, the corresponding MPN would be 83.1 MPN/100 mL

Adjust for dilution factor. Because the MPN/100 mL values in the table are based on 100 mL samples, the MPN value should be adjusted if less than 100 mL of sample volume was analyzed. Use the following calculation to adjust the MPN to account for the dilution:

$$\text{MPN value} * \frac{100}{\text{mL sample analyzed}} = E. coli \text{ MPN/100 mL}$$

Example:

Volume analyzed (mL) = 10 mL (in 90 mL of dilution water)

Number of positive wells = 41

MPN = 83.1

The analytical result is calculated as follows:

$$83.1 * \frac{100}{10} = 831 E. coli \text{ MPN/100 mL}$$

On the ONPG-MUG, 51-well data entry screen, the user is asked to input the volume analyzed (mL) and the number of positive wells. The LT2 DCTS uses the answer provided for the number of positive wells, in order to select the corresponding MPN value from the IDEXX® 51-Well Quanti-Tray® MPN Table.

The remaining three fields in the “Calculated *E. coli* ONPG-MUG, 51-well Method Sample Results Ready for Submission” screen include auto-populated fields to help define the sample specifications. The sample analytical result unit of measure is auto-populated by the LT2 DCTS as “*E. coli* /100 mL,” and the contaminant/parameter field is automatically populated by the LT2 DCTS as “*E. coli*.”

The final component of the LT2 DCTS calculations is the assignment of a data qualifier flag. This flag is placed at the bottom of the screen. If data are not compliant with LT2 Rule monitoring requirements, it will automatically be flagged in the LT2 DCTS, and the flag key identifying the noncompliant monitoring requirement will be displayed in the flag row of the sample results information. Table 3-3 displays the *E. coli* Data Qualifier Flags, as well as the condition that triggers the flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

3.5.3 *E. coli* ONPG-MUG, 51-well Method Data Review

The LT2 DCTS allows the Principal Analyst at the laboratory to review and approve *E. coli* sample ONPG-MUG, 51-well procedure results for submission to the PWS. As the Principal Analyst, you are identified as Lab Approver User in the LT2 DCTS. If you have been designated as the Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS. Rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the LT2 DCTS's calculations page displayed in Figure 3-10 to approve data. You will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the "EDIT SAMPLE" link in the bottom right corner. If you would like to approve the sample, click the "DELIVER SAMPLE TO PWS" link in the bottom right corner.

Before the sample can be approved, you must agree to the following statement: "By approving these *E. coli* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all method and LT2 Rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample to the lab-approved status, thereby making it available for PWS review. If "CANCEL" is clicked, the sample will not be approved. Criteria for valid *E. coli* samples are provided in Appendix C.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *E. coli* sample was successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.6 *E. coli* ONPG-MUG, 97-well Method Samples

The following section details data entry and data review for *E. coli* ONPG-MUG, 97-well method samples.

3.6.1 *E. coli* ONPG-MUG, 97-well Method Data Entry

Laboratories certified to analyze *E. coli* using the ONPG-MUG, 97-well method format can use the LT2 DCTS to enter valid *E. coli* sample data. If you analyzed the *E. coli* sample using a different method, click the "CREATE NEW SAMPLE" icon on the toolbar and select the appropriate *E. coli* method from the drop-down menu. The ONPG-MUG, 97-well analytical method type approved for LT2 *E. coli* analyses include the following:

- Colilert™ (Standard Methods 9223)
- Colilert-18™ (Standard Methods 9223)

Refer to the LT2 Rule at: <http://www.epa.gov/safewater/disinfection/lt2/index.html> for additional information on the approved analytical methods for *E. coli* detection. Guidance on the use of these methods under the LT2 Rule is provided in the *Microbial Laboratory Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule* [EPA-815-R-06-006]. Figure 3-11 displays the LT2 DCTS screen used by an approved *E. coli* laboratory to enter *E. coli* sample data generated using the ONPG-MUG, 97-well method.

E. coli ONPG-MUG, 97-well - Anytown Lab - VA1234567

Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering E. coli sample data into the LT2 Data Collection System: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met; and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.

Enter data for the New Sample. [Save](#)  [Delete](#)  [Clear Form](#) 

FIELDS COMMON TO ALL SAMPLES	
Sample Status	New Sample
Resample	No <input type="button" value="v"/>
Sample ID (optional)	<input type="text"/>
PWS ID	- Please Select - <input type="button" value="v"/>
PWS Name	<input type="text"/>
PWS Facility ID	- Please Select - <input type="button" value="v"/>
PWS Facility Name	<input type="text"/>
Sample Collection Point ID	- Please Select - <input type="button" value="v"/>
Sample Collection Point Name	<input type="text"/>
Sample Collection Date	<input type="text"/> 
Analytical Method Number	- Please Select - <input type="button" value="v"/>
Source Water Type	- Please Select - <input type="button" value="v"/>
Turbidity Result (NTU)	<input type="text"/>
Lab Comments	<input type="text"/>
PWS Comments	<input type="text"/>
ENTER YOUR CALCULATED E. coli/100 mL RESULT HERE OR HAVE THE SYSTEM CALCULATE IT FOR YOU USING THE SAMPLE RESULT CALCULATOR BELOW	
E. coli/100 mL	<input type="text"/>
SAMPLE RESULT CALCULATOR (ENTER PRIMARY DATA AND CLICK SAVE, BELOW, TO AUTOMATICALLY CALCULATE THE SAMPLE RESULT)	
Volume analyzed (mL)	<input type="text"/>
Large wells positive	<input type="text"/>
Small wells positive	<input type="text"/>
RESAMPLE INFORMATION (REQUIRED IF THE SAMPLE IS A RESAMPLE)	
Original Sample Collection Date	<input type="text"/> 
Resample Explanation	<input type="text"/>

Click save to continue. [Save](#)  [Delete](#)  [Clear Form](#) 

Figure 3-11. E. coli ONPG-MUG, 97-well Method Data Entry Screen

Only one sample may be entered at a time. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of the data entry column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Fields Common to All Samples

The following fields are required in the top section of the screen labelled "Fields Common To All Samples:"

Sample Status - The Sample Status indicates the status of the sample in the sample review. The default setting is "New Sample" for sample data entry. Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The Resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

PWS ID - The PWS ID is the public water system ID, which is comprised of a two-letter state code followed by a seven-digit number. If your laboratory is a PWS laboratory, the PWS ID for your utility will be displayed in the drop-down menu that appears when you click the arrow next to the field. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *E. coli* laboratory will be displayed in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *E. coli* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the PWS associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. If your laboratory is a PWS laboratory, confirm that the name in this field is your PWS name and verify that the PWS ID you selected is correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the PWS name supplied on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate PWS Facility ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS Facility ID for the sample is provided on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID

was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will be displayed in the drop-down menu.

PWS Facility Name - The PWS Facility Name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated, based on the PWS Facility ID entered. If your laboratory is a PWS laboratory, confirm that the PWS Facility Name and PWS Facility ID selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, verify the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and the PWS ID you entered are correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate Sample Collection Point ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Point ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the sampling points associated with the selected facility will be displayed in the drop-down menu.

Sample Collection Point Name - The sample collection point name is the name of the sample collection point associated with the Sample Collection Point ID selected. This field is auto-populated, based on the Sample Collection Point ID entered. If your laboratory is a PWS laboratory, confirm that the Sample Collection Point Name and the Sample Collection Point ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - The date that the sample was collected by the facility. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 DCTS. If your laboratory is a PWS laboratory, enter the date the sample was collected by the facility. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a Sample Collection Date was not supplied with the sample, contact the PWS to obtain the correct date.

Analytical Method Number - This is the method number used to designate the analytical method used for analysis, as listed on at the beginning of Section 3.6.1. Only approved analytical methods for the given method format (in this example, ONPG-MUG, 97-well) will be displayed in the drop-down menu.

Source Water Type - This is the type of water body used as the source for the drinking water facility from which the sample was collected, and is needed to evaluate the potential relationship between *Cryptosporidium* and *E. coli* concentrations. Select "Flowing Stream," "Lake/Reservoir," "Both FS and L/R" (for both Flowing Stream and Lake/Reservoir), "GWUDI-FS" (Ground Water Under the Direct Influence of Flowing Stream), or "GWUDI-LR" (Ground Water Under the Direct Influence of Lake/Reservoir).

Turbidity Result (NTU) (required only for filtered systems with a population greater than 10,000) - This is the measured turbidity reported as NTU. Turbidity should be measured by the facility at the time of sample collection. If your laboratory is a PWS laboratory, the turbidity should be reported with the sample when sent to your laboratory for analysis. If your laboratory is analyzing *E. coli* samples for a PWS client, the turbidity result is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If no turbidity result was supplied by the PWS with the sample, contact the PWS to obtain the turbidity result.

Lab Comments (optional) - As a Lab User, you can incorporate comments concerning the sample into the information sent to the PWS by entering comments into the Lab Comments field.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the laboratory.

Enter Your Calculated *E. coli*/100 mL... Fields

After entering the required data, you may choose to enter the final calculated concentration of *E. coli* in the sample reported as *E. coli*/100 mL calculated in your laboratory or have the LT2 DCTS calculate your results based on primary measurements. If you do not want the LT2 DCTS to automatically calculate your result using your primary measurements, complete the *E. coli* result – value field. This value may be reported to the nearest tenth. *Note:* Do not complete the bottom section if you complete this field - any data entered will be ignored.

***E. coli*/100 mL** - The final calculated result of *E. coli* per 100 mL.

Sample Result Calculator... Fields

To enter primary measurements from the sample and have the LT2 DCTS automatically calculate the final result, complete the bottom section of the screen. *Note:* do not enter a value for "*E. coli*/100 mL" in the middle section. If a value is entered for this field any additional primary measurements entered will be ignored by the LT2 DCTS. Additional fields required to calculate results for the *E. coli* ONPG-MUG, 97-well method may include the following primary measurements:

Volume analyzed (mL) - This is the mL of sample added to the tray for analysis. This value may be reported to four decimal places.

Large wells positive - This is the number of total coliform positive large wells with UV fluorescence. This value must be reported as a whole number between 0 and 49.

Small wells positive - This is the number of total coliform positive small wells with UV fluorescence. This value must be reported as a whole number between 0 and 48.

Resample Information... Fields

If the sample is a resample, additional data must be provided for the following fields:

Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason for why this resample is required.

After the first section and either the middle section or bottom section have been completed, click "SAVE" to continue. If you have made errors in data entry, and have not yet clicked "SAVE," you can erase all of the data entered on the screen by clicking "RESET ENTIRE FORM." You cannot save sample data unless all required fields for the sample have been completed.

3.6.2 Calculations Associated with *E. coli* ONPG-MUG, 97-well Method Data Processing

The LT2 DCTS will help you perform the required method calculation by using the data entered by the laboratories to automatically calculate the sample results. After you have entered all of the required and primary measurement fields for an *E. coli* sample, the LT2 DCTS will automatically calculate the sample results and present the “Calculated *E. coli* ONPG-MUG, 97-well Method Sample Results Ready for Submission” screen as shown in Figure 3-12.

E. coli ONPG-MUG, 97-well - VA Post Beta Test Lab - VA011079							
Calculated Sample Results							
Click the field name for more information.							
Status	Pending Release						
Sample ID (optional)							
PWS ID	VT0005005						
PWS Name	STARKEBORO VILLAGE WATER COOP						
PWS Facility ID	VTTest Fac 1						
PWS Facility Name	Test Facility 1						
Sample Collection Point ID	12						
Sample Collection Point Name	Name 1						
Sample Collection Date	06/12/2006						
Analytical Method Number	SM 9223 (Colilert)						
Source Water Type	gwudi-lr						
Analytical Result - Value	200						
Analytical Result - Unit of Measure	E. coli/100 mL						
Contaminant/parameter	E. coli						
Turbidity Result (NTU)	1						
Flags	A,E*						
Resample	No						
Original Sample Collection Date							
Resample Explanation							
*A flag is associated with your sample for non-compliance to LT2 rule requirements. Please contact your PWS regarding recollection of the sample.							
<table border="1"> <thead> <tr> <th colspan="2">Explanation of Flags</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Sample not collected within +/-2 days of scheduled date</td> </tr> <tr> <td>E</td> <td>An associated Cryptosporidium sample has not been submitted</td> </tr> </tbody> </table>		Explanation of Flags		A	Sample not collected within +/-2 days of scheduled date	E	An associated Cryptosporidium sample has not been submitted
Explanation of Flags							
A	Sample not collected within +/-2 days of scheduled date						
E	An associated Cryptosporidium sample has not been submitted						
Deliver Sample to PWS ✓ Edit Sample ✎ Enter New Sample ➕ Logout 🚪							

Figure 3-12. Calculated *E. coli* ONPG-MUG, 97-well Method Sample Results Ready for Submission

To help you identify the sample, several previously entered fields will be redisplayed at the top of the screen, including the following:

- Sample ID
- PWS
- PWS facility
- Sample collection point
- Sample collection date

- Analytical method number
- Source water type
- Resample
- Original Sample Collection Date
- Resample Explanation

In the section below these elements, the LT2 DCTS calculated value is automatically populated. The Analytical Result is measured in *E. coli*/100 mL and uses the equation below.

Select appropriate dilution to yield countable results. If multiple dilutions are used, the tray exhibiting positive wells in the 40% to 80% range (39 to 78 total positive large and small wells) should be used to determine MPN value.

Note: The Analytical Result can be automatically calculated using the LT2 DCTS.

Determine MPN. Using the number of large positive wells and small positive wells from the appropriate dilution, identify the corresponding MPN/100 mL in the table provided by the vendor. Large well values are located in the left column; small well values are located in the top row. For example, if a 100 mL sample was analyzed, and there were 29 large positive wells and 5 small positive wells, the corresponding MPN would be 49.6 MPN/100 mL.

Adjust for dilution factor. Because the MPN/100 mL values in the table are based on 100 mL samples, the MPN value should be adjusted if less than 100 mL of sample volume was analyzed. Use the following calculation to adjust the MPN to account for the dilution:

$$\text{Analytical result} = \text{MPN value} * \frac{100}{\text{mL sample analyzed}}$$

Example:

Volume analyzed = 10 mL of sample (in 90 mL of dilution water)

Large wells positive = 39

Small wells positive = 5

The MPN value calculated based on the intersection of 10 and 2 in the table.

MPN = 81.3

$$\text{Analytical result} = 81.3 * \frac{100}{10} = 813 \text{ } E. coli \text{ MPN/100 mL}$$

On the ONPG-MUG, 97-well data entry screen, you are asked to input the volume analyzed (mL), the number of large wells positive and the number of small wells positive. The LT2 DCTS uses the answers provided for the numbers of large and small wells positive in order to select the corresponding MPN value from the IDEXX Quanti-Tray/2000 MPN Table. On the IDEXX Quanti-Tray/2000 MPN Table, the rows represent the number of large wells positive and the columns represent the number of small wells positive. The MPN is determined based on the intersection of rows and columns.

The remaining three fields in the "Calculated *E. coli* ONPG-MUG, 97-well Method Sample Results Ready for Submission" screen include auto-populated fields to help define the sample specifications. The sample

analytical result unit of measure is auto-populated by the LT2 DCTS as "*E. coli* /100 mL," and the contaminant/parameter field is automatically populated by the LT2 DCTS as "*E. coli*."

The final component of the LT2 DCTS calculation is assignment of a data qualifier flag. This flag is placed at the bottom of the screen. If data are not compliant with LT2 Rule monitoring requirements, it will automatically be flagged in the LT2 DCTS, and the flag key identifying the noncompliant monitoring requirement will be displayed in the flag row of the sample results information. Table 3-3 displays the flags that can apply to *E. coli* data, as well as the condition that triggers the flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

3.6.3 *E. coli* ONPG-MUG, 97-well Method Data Review

The LT2 DCTS allows the Principal Analyst at the laboratory to review and approve *E. coli* sample ONPG-MUG, 97-well procedure results for submission to the PWS. As the Principal Analyst, you are identified as Lab Approver User in the LT2 DCTS. If you have been designated as the Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS. Rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the LT2 DCTS calculations page displayed in Figure 3-12 to approve data. You will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the "EDIT SAMPLE" link in the bottom right corner. If you would like to approve the sample, click the "DELIVER SAMPLES TO PWS" link in the bottom right corner.

Before the sample can be approved, you must agree to the following statement: "By approving these *E. coli* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all method and LT2 Rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample to the lab-approved status, thereby making it viewable for PWS review. If "CANCEL" is clicked, the sample will not be approved. Criteria for valid *E. coli* samples are provided in Appendix C.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *E. coli* sample was successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.7 *E. coli* Membrane Filtration Method Samples

The following section details data entry and data review for *E. coli* Membrane Filtration method samples.

3.7.1 *E. coli* Membrane Filtration Method Data Entry

Laboratories certified to analyze *E. coli* using the membrane filtration method format can use the LT2 DCTS to enter valid *E. coli* membrane filtration data. If you analyzed the *E. coli* sample using a different method, click the "CREATE NEW SAMPLE" icon on the toolbar and select the appropriate *E. coli* analytical method from the drop-down menu. The following membrane filtration procedures are approved for LT2 *E. coli* analyses:

- Standard Methods 9222B/9222G (mEndo orLES-Endo/NA-MUG)
- Standard Methods 9222D/9222G (mFC/NA-MUG)
- Standard Methods 9213D (mTEC)
- Method 1603 (Modified mTEC)
- Method 1604 (MI medium)
- m-ColiBlue24 Broth

Refer to the LT2 Rule at: <http://www.epa.gov/safewater/disinfection/lt2/index.html> for additional information on the approved analytical methods for *E. coli* detection. Guidance on the use of these methods under the LT2 Rule is provided in the *Microbial Laboratory Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule* [EPA-815-R-06-006]. Figure 3-13 displays the LT2 DCTS screen used by an approved *E. coli* laboratory to enter *E. coli* sample data generated using the Membrane Filtration.

E. coli Membrane Filtration - Anytown Lab - VA1234567	
Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering E. coli sample data into the LT2 Data Collection System: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met; and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.	
Enter data for the New Sample. Save  Delete  Clear Form 	
FIELDS COMMON TO ALL SAMPLES	
Sample Status	New Sample
Resample	No <input type="button" value="v"/>
Sample ID (optional)	<input type="text"/>
PWS ID	- Please Select - <input type="button" value="v"/>
PWS Name	<input type="text"/>
PWS Facility ID	- Please Select - <input type="button" value="v"/>
PWS Facility Name	<input type="text"/>
Sample Collection Point ID	- Please Select - <input type="button" value="v"/>
Sample Collection Point Name	<input type="text"/>
Sample Collection Date	<input type="text"/> 
Analytical Method Number	- Please Select - <input type="button" value="v"/>
Source Water Type	- Please Select - <input type="button" value="v"/>
Turbidity Result (NTU)	<input type="text"/>
Lab Comments	<input type="text"/>
PWS Comments	<input type="text"/>
ENTER YOUR CALCULATED E. coli/100 mL RESULT HERE OR HAVE THE SYSTEM CALCULATE IT FOR YOU USING THE SAMPLE RESULT CALCULATOR BELOW	
E. coli/100 mL	<input type="text"/>
SAMPLE RESULT CALCULATOR (ENTER PRIMARY DATA AND CLICK SAVE, BELOW, TO AUTOMATICALLY CALCULATE THE SAMPLE RESULT)	
Filter 1 volume (mL)	<input type="text"/>
CFU on Filter 1	<input type="text"/>
Filter 2 volume (mL)	<input type="text"/>
CFU on Filter 2	<input type="text"/>
Filter 3 volume (mL)	<input type="text"/>
CFU on Filter 3	<input type="text"/>
Filter 4 volume (mL)	<input type="text"/>
CFU on Filter 4	<input type="text"/>
RESAMPLE INFORMATION (REQUIRED IF THE SAMPLE IS A RESAMPLE)	
Original Sample Collection Date	<input type="text"/> 
Resample Explanation	<input type="text"/>
Click save to continue. Save  Delete  Clear Form 	

Figure 3-13 E. coli Membrane Filtration Method Data Entry Screen

Only one sample may be entered at a time. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of the data entry column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Fields Common to All Samples

The following fields are required in the top section of the screen labelled "Fields Common To All Samples."

Sample Status - The Sample Status indicates the status of the sample in the sample review process. The default setting is "New Sample" for sample data entry. Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The Resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

PWS ID - The PWS ID is the public water system ID, which is comprised of a two-letter state code followed by a seven-digit number. If your laboratory is a PWS laboratory, the PWS ID for your utility will be displayed in the drop-down menu that appears when you click the arrow next to the field. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *E. coli* laboratory will be displayed in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *E. coli* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the public water system associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. If your laboratory is a PWS laboratory, confirm that the name in this field is your PWS name and verify that the PWS ID you selected is correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the PWS name supplied on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate PWS Facility ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS facility ID for the sample is provided on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID

was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will be displayed in the drop-down menu.

PWS Facility Name - The PWS Facility name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated, based on the PWS Facility ID entered. If your laboratory is a PWS laboratory, confirm that the PWS Facility Name and PWS Facility ID selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, verify that the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and the PWS ID you entered are correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate Sample Collection Point ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Point ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the sampling points associated with the selected facility will be displayed in the drop-down menu.

Sample Collection Point Name - The sample collection point name is the name of the sample collection point associated with the sample collection point ID selected. This field is auto-populated, based on the Sample Collection Point ID entered. If your laboratory is a PWS laboratory, confirm that the Sample Collection Point Name and the Sample Collection Point ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - The date that the sample was collected by the facility. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 DCTS. If your laboratory is a PWS laboratory, enter the date the sample was collected by the facility. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a Sample Collection Date was not supplied with the sample, contact the PWS to obtain the correct date.

Analytical Method Number - This is the method number used to designate the analytical method used for analysis, as listed at the beginning of Section 3.7.1. Only approved analytical methods for the given method format (in this example, membrane filtration) will be displayed in the drop-down menu.

Source Water Type - This is the type of water body used as the source for the drinking water facility from which the sample was collected, and is needed to evaluate the potential relationship between *Cryptosporidium* and *E. coli* concentrations. Select "Flowing Stream," "Lake/Reservoir," "Both FS and L/R" (for both Flowing Stream and Lake/Reservoir), "GWUDI-FS" (Ground Water Under the Direct Influence of Flowing Stream), or "GWUDI-LR" (Ground Water Under the Direct Influence of Lake/Reservoir).

Turbidity Result (NTU) (required only for filtered systems with a population greater than 10,000) - This is the measured turbidity reported as NTU. Turbidity should be measured by the facility at the time of sample collection. If your laboratory is a PWS laboratory, the turbidity should be reported with the sample when sent to your laboratory for analysis. If your laboratory is analyzing *E. coli* samples for a PWS client, the turbidity result is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If no turbidity result was supplied by the PWS with the sample, contact the PWS to obtain the turbidity result.

Lab Comments (optional) - As a Lab User, you can incorporate comments concerning the sample into the information sent to the PWS by entering comments into the Lab Comments field.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the laboratory.

Enter Your Calculated *E. coli*/100 mL... Fields

After entering the required fields, you may choose to enter the final calculated concentration of *E. coli* in the sample reported as *E. coli*/100 mL calculated in your laboratory, or have the LT2 DCTS calculate your results based on primary measurements. If you do not want the LT2 DCTS to automatically calculate your result using your primary measurements, complete the *E. coli* result – value field. This value may be reported to the nearest tenth. *Note:* Do not complete the bottom section if you complete this field - any data entered will be ignored.

***E. coli*/100 mL** - The final calculated result of *E. coli* per 100 mL.

Sample Result Calculator... Fields

To enter primary measurements from the sample and have the LT2 DCTS automatically calculate the final result, complete the bottom section of the screen. *Note:* Do not enter a value for “*E. coli*/100 mL” in the middle section. If a value is entered for this field any additional primary measurements entered will be ignored by the LT2 DCTS. Additional fields required by the LT2 DCTS to calculate results for the *E. coli* Membrane Filtration method may include the following primary measurements:

Filter 1 volume (mL) - the mL of sample filtered on Filter 1. This value may be reported to four decimal places.

Filter 1 CFU - the number of *E. coli* colony forming units (CFU) observed on Filter 1. This value must be reported as a whole number.

Filter 2 volume (mL) - the mL of sample filtered on Filter 2. This value may be reported to four decimal places.

Filter 2 CFU - the number of *E. coli* colony forming units (CFU) observed on Filter 2. This value must be reported as a whole number.

Filter 3 volume (mL) - the mL of sample filtered on Filter 3. This value may be reported to four decimal places.

Filter 3 CFU - the number of *E. coli* colony forming units (CFU) observed on Filter 3. This value must be reported as a whole number.

Filter 4 volume (mL) - the mL of sample filtered on Filter 4. This value may be reported to four decimal places.

Filter 4 CFU - the number of *E. coli* colony forming units (CFU) observed on Filter 4. This value must be reported as a whole number.

Resample Information... Fields

If the sample is a resample, additional data must be provided for the following fields:

Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason why this resample is required.

After the first section and either the middle section or bottom section have been completed, click "SAVE" to continue. If you have made errors in data entry and have not yet clicked "SAVE," you can erase all of the data entered on the screen by clicking "RESET ENTIRE FORM." You cannot save sample data unless all required fields for the sample have been completed.

3.7.2 Calculations Associated with *E. coli* Membrane Filtration Method Data Processing

The LT2 DCTS will help you perform the required method calculation by using the primary data entered by the laboratory to automatically calculate the sample results. After the user has entered all of the required and primary measurement fields for an *E. coli* sample, the LT2 DCTS will automatically calculate the sample results and present the "Calculated *E. coli* Membrane Filtration Method Sample Results Ready for Submission" screen as shown in Figure 3-14.

E. coli Membrane Filtration - VA Post Beta Test Lab - VA011079

Calculated Sample Results

Click the field name for more information.

Status	Pending Release
Sample ID (optional)	
PWS ID	VT0005005
PWS Name	STARKEBORO VILLAGE WATER COOP
PWS Facility ID	VTTest Fac 1
PWS Facility Name	Test Facility 1
Sample Collection Point ID	12
Sample Collection Point Name	Name 1
Sample Collection Date	09/06/2005
Analytical Method Number	SM 9213D (mTEC)
Source Water Type	river/stream
Analytical Result - Value	152
Analytical Result - Unit of Measure	E. coli/100 mL
Contaminant/parameter	E. coli
Turbidity Result (NTU)	
Flags	A,E*
Resample	No
Original Sample Collection Date	
Resample Explanation	

*A flag is associated with your sample for non-compliance to LT2 rule requirements. Please contact your PWS regarding recollection of the sample.

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date
E	An associated Cryptosporidium sample has not been submitted

[Deliver Sample to PWS](#) ✓
[Edit Sample](#) ✎
[Enter New Sample](#) ➕
[Logout](#) 🚪

Figure 3-14. Calculated *E. coli* Membrane Filtration Method Sample Results Ready for Submission

To help you identify the sample, several previously entered fields will be redisplayed at the top of the screen, including the following:

- Sample ID
- PWS
- PWS facility
- Sample collection point
- Sample collection date
- Analytical method number
- Source water type
- Resample
- Original Sample Collection Date
- Resample Explanation

In the section below these elements, the LT2 DCTS-calculated value is automatically populated. The analytical result value is the final calculated concentration of *E. coli* in the sample, reported as *E. coli* /100 mL. The Analytical Result is measured in *E. coli* /100 mL and uses several steps to reach the final value. On the Membrane Filtration data entry screen, the user is asked to input the volume and CFU value for Filters 1 through 4. These values will be used to determine the CFU/100 mL analytical result value.

E. coli counts should be determined from the volume(s) filtered that yielded 20 to 80 *E. coli* colonies (20-60 for mFC-NA-MUG), and not more than 200 total colonies per plate. (Guidance for samples that do not yield countable plates is provided in Sections E and F of the February 2006 version of the *Microbial Laboratory Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule* [EPA-815-R-06-006] (Reference 4.6.2.2).

Note: The Analytical Result can be automatically calculated using the LT2 DCTS.

If there are greater than 200 colonies per membrane, even for the lowest dilution, the result is recorded as “too numerous to count” (TNTC). These results cannot be reported for LT2 monitoring, as they cannot be used for the required data analyses. During the next sampling event, analyze an additional, lower dilution volume (the highest dilution volume may be omitted) unless conditions were unusual (e.g., heavy rains, flooding, etc.) during the sampling event yielding TNTC for all dilutions.

If colonies are not sufficiently distinct for accurate counting, the result is recorded as “confluent growth” (CNFG). To prevent CNFG from occurring, smaller sample aliquots should be filtered. For example, if sample volumes of 100, 10, 1 and 0.1 mL are analyzed and even the 0.1 mL plate results in CNFG, then potentially 0.01 mL should be analyzed during the next sampling event. For sample volumes less than 1 mL, serial dilutions should be used, and 1 mL volumes of the dilutions should be filtered. The 100 mL volume can be eliminated. *Note:* If growth is due to high levels of total coliforms but low *E. coli*, another method should be chosen for analysis that does not rely on total coliform determination prior to or simultaneously with *E. coli* determination.

Note: Results that are TNTC or CNFG are not appropriate for LT2 microbial data analysis, and cannot be entered into the LT2 DCTS. These results should not be reported.

Using the *E. coli* counts from the appropriate dilution, *E. coli* CFU/100 mL is calculated based on the following equation:

$$E. coli \text{ CFU} * \frac{100}{\text{mL sample filtered}} = E. coli \text{ CFU}/100 \text{ mL}$$

Example 1:

Filter 1 volume = 100 mL	CFU = TNTC
Filter 2 volume = 10 mL	CFU = 40
Filter 3 volume = 1.0 mL	CFU = 9
Filter 4 volume = 0.1 mL	CFU = 0

Using the guidance on countable colonies above, the counts from the 10 mL plate will be used to calculate the *E. coli* concentration for the sample:

$$40 E. coli \text{ CFU} * \frac{100}{10} = 400 E. coli \text{ CFU}/100 \text{ mL}$$

If no *E. coli* colonies are present, the detection limit is calculated as the following:

< largest volume filtered per 100 mL.

$$\text{Detection Limit} = \frac{100 \text{ mL}}{\text{Largest volume filtered}} = E. coli \text{ CFU}/100 \text{ mL}$$

Example 2:

Filter 1 volume (mL) = 100 mL	CFU = 0
Filter 2 volume (mL) = 10 mL	CFU = 0
Filter 3 volume (mL) = 1.0 mL	CFU = 0
Calculation of <i>E. coli</i> /100 mL:	

$$\frac{100 \text{ mL}}{100 \text{ mL}} = <1 E. coli \text{ CFU}/100 \text{ mL}$$

Example 3:

Filter 1 volume (mL) = 100 mL	CFU = Lab incident, no data available
Filter 2 volume (mL) = 10 mL	CFU = 0
Filter 3 volume (mL) = 1.0 mL	CFU = 0
Calculation of <i>E. coli</i> /100 mL:	

$$\frac{100 \text{ mL}}{10 \text{ mL}} = <10 E. coli \text{ CFU}/100 \text{ mL}$$

The remaining three fields in the “Calculated *E. coli* Membrane Filtration Method Sample Results Ready for Submission” screen include auto-populated fields to help define the sample specifications. The sample analytical result unit of measure is auto-populated as “*E. coli*/100 mL,” and the contaminant/parameter field is automatically populated by the LT2 DCTS as “*E. coli*.”

The final component of the LT2 DCTS calculations is assignment of a data qualifier flag. This flag is placed at the bottom of the screen. If data are not compliant with LT2 Rule monitoring requirements, it will automatically be flagged in the LT2 DCTS, and the flag key identifying the noncompliant monitoring requirement will be displayed in the flag row of the sample results information. Table 3-3 displays the flags that can apply to *E. coli* data, as well as the condition that triggers the flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

3.7.3 *E. coli* Membrane Filtration Method Data Review

The LT2 DCTS allows the Principal Analyst at the laboratory to review and approve *E. coli* sample membrane filtration method results for submission to the PWS. If you have been designated as the Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS, rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the LT2 DCTS calculations page displayed in Figure 3-14 to approve data. You will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the “EDIT SAMPLE” link in the bottom right corner. If you would like to approve the sample, click the “DELIVER SAMPLE TO PWS” link in the bottom right corner.

Before the sample can be approved, you must agree to the following statement: “By approving these *E. coli* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all method and LT2 Rule QC requirements. [Ok] [Cancel]”

Clicking “OK” will update the sample to the lab-approved status, thereby making it viewable for PWS review. If “CANCEL” is clicked, the sample will not be approved. Criteria for valid membrane filtration *E. coli* samples are provided in Appendix D.

If “OK” is clicked, you will be directed to a confirmation screen indicating that: “The following *E. coli* sample was successfully submitted to the PWS on [date sent].” To navigate from this confirmation screen, use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for “release” to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.8 View Samples and Search

The LT2 DCTS allows laboratories to search for *Cryptosporidium* or *E. coli* samples already entered by their laboratory. The search screen serves as an access point to view the existing sample data. You can set search specifications for *E. coli* or *Cryptosporidium* data, Sample ID, PWS Inventory Data, Status, Last Update Date, and Sample Collection Date. Figure 3-15 displays an example of the search screen.

Figure 3-15. Laboratory Search Screen

To search for a sample, first select either *Cryptosporidium* or *E. coli* at the top of the table by clicking the appropriate radio button. If *E. coli* is selected, select the appropriate method type from the drop-down menu. You can search for all four *E. coli* method types by selecting "All Methods" from the drop-down menu. After selecting the analyte, select one or more of the search specification displayed in the table by clicking the box next to the criterion. For each criterion selected, enter the value in the field, or pick the desired value from the drop-down menu to the right. After you have selected the analyte and search specifications, click on the "SEARCH SAMPLES" link to display the search results. A listing of relevant samples will appear at the bottom of the screen. Up to 10 samples will be viewed at one time. If more than 10 samples match the search specifications, navigational buttons will be displayed to permit the user to click through the rest of the data. There are buttons to move to the next set of 10 samples (>), last set of 10 samples (>|), previous set of 10 samples (<), and first set of 10 samples (|<). If you chose to search for all *E. coli* methods, the method that was used for the sample will be color-coded in the search results:

- Yellow: 15-tube MPN
- Purple: Membrane Filtration
- Grey: ONPG-MUG, 51-well
- Pink: ONPG-MUG, 97-well

The text at the top of the bottom section of the screen indicates how many samples matched your search specifications. If you would like to modify your search, return to the top of the screen, modify the search information and click on the "SEARCH SAMPLES" link again.

Search results are organized in the table by three “status” categories:

- **Pending release** - samples that have been entered by your laboratory but not approved for release to the PWS.
- **Delivered to the PWS** - samples that have been approved by your laboratory for PWS review, and can no longer be changed by your laboratory.
- **Returned by PWS** - samples that have been submitted by your laboratory to the PWS, but returned to you by the PWS for action.

Once a sample has been either approved or contested by the PWS, it switches to a “PWS Reviewed” status. These samples are not automatically displayed to the user. They must be searched for specifically, by selecting the “PWS Reviewed” status from the drop-down menu in the search specifications.

Under each status, the data are initially sorted by “Last Edit Date.” You may also sort the data by clicking on any of the column headings including Sample ID, PWS, PWS Facility, Sample Collection Point, Last Edit Date, Sample Collection Date, and Last Edit User.

You can view (or edit for samples that are pending release) up to four *Cryptosporidium* samples or one *E. coli* sample at a time by clicking the check boxes to the left of the samples, then clicking on the “EDIT/VIEW SELECTED SAMPLE DATES” link. You can download samples that have been delivered to the PWS by clicking the check boxes to the left of the samples, then clicking on the “DOWNLOAD SELECTED SAMPLES” link. You may also print the search results using the “PRINT SEARCH RESULTS” link. Once the “PRINT SEARCH RESULTS” link is clicked and your printer’s menu appears, set the print layout/orientation to “Landscape” in order to see the entirety of the search results.

To return to the first record in your search, click the “RETURN TO TOP OF RESULTS” link on the bottom of the page. To perform a new search, click on the “CHANGE SEARCH OPTIONS” link at the bottom of the screen to go back to the top of the page.

3.9 Sample Dates

Laboratories may view a PWS' established sampling schedule dates by using the left-hand toolbar and clicking on the "Sample Dates" button. This leads to a screen with two search options: by date range or by organization. To view sampling dates, select both a start and end date and click "SUBMIT" to view all scheduled sample dates that match the search specification. To view established sampling schedule dates by organization, select both the PWS name and facility name from the list and click the "SUBMIT" link to view sampling dates associated with the selected PWS and facility. Figure 3-16 displays an example of the "PWS Sampling Schedule" search screen.

Sample Dates

View the PWS established sampling schedule by searching within a particular Date Range or Organization and then click "Submit" to display the results.

<input checked="" type="radio"/>	Date Range	Start	<input type="text" value="8/9/2005"/>	End	<input type="text" value="10/29/2005"/>	Submit
<input type="radio"/>	Organization	PWS	<input type="text" value="--Please select--"/>	Facility	<input type="text" value="--Please select--"/>	

Sampling Schedule:

Date	PWS	Facility
08/22/2005	VA1 PWS	VAD11 fac
09/05/2005	VA1 PWS	VAD11 fac
09/19/2005	VA1 PWS	VAD11 fac
10/03/2005	VA1 PWS	VAD11 fac
10/17/2005	VA1 PWS	VAD11 fac

Figure 3-16. View a PWS Sampling Schedule

3.10 Contacts

The LT2 DCTS allows Lab Users to view the list of contacts for their laboratory. Lab Approver Users may select and/or update the Official Contact for their laboratory by clicking on the "CONTACTS" link in the navigational toolbar. New contacts entered into the LT2 DCTS will automatically be associated with the laboratory you are currently working on and will be visible only to users with permission to access data for the laboratory. Lab Users can also view the contacts for the PWSs for which they are a contracting laboratory. *Note:* Lab Users do not have the ability to modify the PWS contacts. Figure 3-17 displays an example of the "LT2 Contacts" screen.

Contacts for Anytown Lab - VA1234567

LT2 Contacts

Update the official contact by selecting the radio button next to the appropriate contact and click "Update Official Contact." *Note:* Every lab must have one official contact designated as the main contact for all EPA correspondence.

Official Contact	Edit	Delete	Contact Name	Title	Phone Number
<input checked="" type="radio"/>			Kerri Contact	Analyst	(703) 818-0000
<input type="radio"/>			James Smith	Principal	(703) 888-8888

[Update Official Contact](#) [Insert New Contact](#) [Search Official Contacts](#)

Figure 3-17. Laboratory Contact List

Every laboratory must have an Official Contact identified in the LT2 DCTS as the point of reference on all USEPA correspondence. The first contact entered into the LT2 DCTS will automatically be selected as the Official Contact. If more than one contact is listed for a laboratory, the Lab Approver User will have the ability to determine which person should be designated as the Official Contact. After an Official Contact is assigned, that user cannot be deleted until the Lab Approver User has designated a new Official Contact. The Official Contact is the person from your laboratory that USEPA should contact regarding LT2 issues. Select the Official Contact for your laboratory by clicking the appropriate radio button under the "Official Contact" column in the contacts table and clicking the "UPDATE OFFICIAL CONTACT" link.

To delete a contact for your laboratory, click the trash can icon next to the contact name in the "Delete" column of the contacts table. *Note:* Since an Official Contact is required by the LT2 DCTS, the Official Contact cannot be deleted.

The LT2 DCTS also allows Lab Approver Users to update and add new contact information. Lab Users can only view this information. To edit information for a contact, click the pencil icon next to the contact name in the "Edit" column of the LT2 Contacts screen. To add a new contact for your laboratory, click the "INSERT NEW CONTACT" link. Figure 3-18 displays the screen used for updating and adding new contact information.

Contacts 

Please enter/edit information about the contact below. To designate the contact as a LT2 and/or Stage 2 contact, select the appropriate contact type from the associated drop-down. If "Not Applicable" is selected, you are stating that this individual is not a contact for the particular system.

*First Name	<input style="width: 90%;" type="text"/>
*Last Name	<input style="width: 90%;" type="text"/>
NickName	<input style="width: 90%;" type="text"/>
LT2 Contact Type	<input style="width: 90%;" type="text" value="Not Applicable"/>
Stage 2 Contact Type	<input style="width: 90%;" type="text" value="Not Applicable"/>
Department	<input style="width: 90%;" type="text"/>
*Title	<input style="width: 90%;" type="text"/>
*Mailing Address	<input style="width: 90%;" type="text"/>
Mailing Address 2	<input style="width: 90%;" type="text"/>
*City	<input style="width: 90%;" type="text"/>
*State	<input style="width: 90%;" type="text" value="AK"/>
*Zip Code	<input style="width: 90%;" type="text"/>
Phone Number	<input style="width: 45%;" type="text"/> Ext. <input style="width: 45%;" type="text"/>
Fax Number	<input style="width: 90%;" type="text"/>
*Email Address	<input style="width: 90%;" type="text"/>
Comments	<input style="width: 90%;" type="text"/>

[RETURN TO LIST](#) 
[SAVE](#) 

Figure 3-18. Contact Form

If you are editing contact information, the contact form will be populated with the current information stored in the database. You may simply update the field you would like to correct and click the "SAVE" link at the bottom of the screen.

If you are entering a new contact, you must enter values for all required fields marked with an asterisk. You may enter values for optional fields, as appropriate. When complete, click the "SAVE" link at the bottom of the screen.

You may exit the form using the following three methods:

- To return to the laboratory contact list without saving, click the "RETURN TO LIST" list.
- To save the contact information, click the "SAVE" link.
- If you make data entry errors, and would like to delete all information from the form and start over, click the "RETURN TO LIST" link.

3.11 Select Application

The “Select Application” screen is intended for those users who have access to more than one application within the LT2 DCTS. You must select the application you wish to access. Figure 3-19 provides an example of the “Select Application” screen.

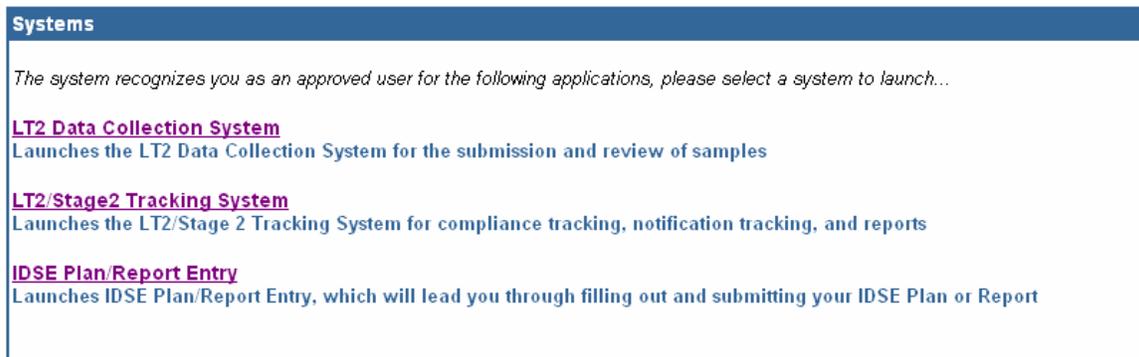


Figure 3-19. Select Application Screen

The LT2 DCTS will display a list of applications, and you will be required to select the application you wish to access. At any given point, you can only access one application. To switch to another application, click the "CHANGE APPLICATION" link that appears in the side navigation toolbar. The “Systems” screen will display, and you may choose to work within a different application.

After selecting an application, you will be directed to the default initial screen for your user role. The navigation toolbar will appear in the side toolbar with the links appropriate to your user role.