

# QwikLite 200

BIOSENSOR SYSTEM

## User Guide Version 1.5



**Assure Controls, Inc.**  
2440 Grand Avenue, Suite A  
Vista, CA 92081

760-505-3000  
[www.assurecontrols.com](http://www.assurecontrols.com)  
[info@assurecontrols.com](mailto:info@assurecontrols.com)

## Table of Contents

Serial/Model Numbers .....	1
Important Electrical Safety Instructions .....	2
Bioluminescence .....	3
<i>Pyrocystis lunula</i> .....	4
Installation and Diagnostics.....	5
Options Menu – Set Date and Time, Reformat Files, and Touchscreen Calibration .....	7
Overview of Water Quality Testing Modes .....	9
Rapid Toxicity Assessment (screening test mode).....	10
Reviewing History Files of Prior Tests.....	17
Exporting History Files to Another Computer .....	18
Care and Maintenance .....	19
Handling of the Live Test Organisms .....	20

© 2011 Assure Controls, Inc. All rights reserved. All rights reserved. QwikLite and the QwikLite logo are registered trademarks of the U.S. Government and exclusively licensed to Assure Controls, Inc. U.S. Patents 5,840,572; 5,565,360; 7,704,731; 7,838,212; and 7,964,391. Made in the U.S.A.

**Congratulations on your new purchase. Please review this manual carefully.**

## **Serial/Model Numbers**

### **Read and Save These Instructions**

This User's Guide provides specific operating instructions for your model. Use your QwikLite Biosensor as instructed in this guide. These instructions are not meant to cover every possible condition and situation that may occur. Common sense and caution must be practiced when installing, operating and maintaining any electronic equipment.

### **Record Your Model and Serial Numbers**

Record the model and serial numbers in the space provided below. The serial plate is located on the back of the Biosensor.

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Installed Date: \_\_\_\_\_

(shipped to you on this date)

### **Record Your System Configuration**

After initial Installation (see below), record the values for your System configuration, as seen in the Options Menu (see page 6). These values should generally not be adjusted by the user, as they have been specifically calibrated to your instrument.

Collect Time: \_\_\_\_\_

Dark Count Time: \_\_\_\_\_

Home Offset (Steps): \_\_\_\_\_

## Important Electrical Safety Instructions

Read all instructions before using this instrument.

### Electrical Information

These guidelines must be followed to ensure that safety mechanisms in the design of this instrument will operate properly.

- Refer to the serial plate for correct electrical rating. The power cord must be plugged directly into a proper receptacle. The receptacle must be installed in accordance with local codes and ordinances. Consult a qualified electrician if necessary.
- If voltage varies by 10% or more, the instrument's performance may be affected. Operating the instrument with insufficient power can damage the motor. Such damage is not covered under the warranty. If you suspect your facility voltage is high or low, consult your power company for testing.
- Do not pinch, knot, or bend the cord in any manner.

## **Bioluminescence**

Bioluminescence is the production and emission of light by a living organism as the result of a chemical reaction during which chemical energy is converted to light energy. Its name is a Hybrid word, originating from the Greek bios for "living" and the Latin lumen "light". It is generated by an enzyme-catalyzed chemoluminescence reaction, wherein the pigment luciferin is oxidized by the enzyme luciferase.

### **How QwikLite Utilizes Bioluminescence**

Bioluminescence is the total light emitted from the marine plankton (called dinoflagellates) and compared to a standard or control sample in each test.

During the stimulation process, the optical and electrical components measure bioluminescence of all the test samples, capturing emitted light at specific wavelengths. Toxicity is determined by measuring the light reduction from the bioluminescent marine dinoflagellates after they have been exposed to possible toxicants. The light emitted is inversely related to toxic stress and decreases rapidly when the sensitive, thin walled organisms are in water with contaminants (usually within 24 hours).

Biological testing with marine plankton can detect toxicity in the environment since natural bioluminescent light reduction is directly related to the toxicity of the tested sample. The greater the level of toxin-- the lower the level of light emitted. This is a direct measure that the organism has been severely stressed or has a toxic response from the exposure.

## ***Pyrocystis lunula***

*Pyrocystis lunula* is a crescent or half-moon shaped dinoflagellate species that belongs to the oceanic plankton of tropical and subtropical seas. It is a single-celled alga (round nucleus) and reproduces asexually. This species is non-toxic, easily available, hardy, and grows well at room temperature.

Dinoflagellates can be characterized as microscopic organisms or marine phytoplankton that reside at the surface of the ocean (commonly regarded as “algae”). Neither plant nor animal, many dinoflagellates are unicellular (single cell) and exhibit a great diversity of form including the following characteristics:

- **They are planktonic.** 90% of all dinoflagellates are marine plankton, which passively float, drift or aggregate in a body of water, primarily comprising microscopic algae and protozoa.
- **They are small.** Although many of them are microscopic and range from 15 to 40 microns in size, the largest, *Noctiluca*, may be as large as 2 mm in diameter.
- **They are motile.** Many dinoflagellates swim by means of flagella, movable strands that propel the cell through water (*P lunula* does not).
- **Many are photosynthetic.** They manufacture their own food using the energy from sunlight, and provide a food source for other organisms.



Some dinoflagellates are bioluminescent, capable of producing their own visible light. This light is emitted when they are agitated or disturbed. Dinoflagellates are the most common sources of bioluminescence at the surface of the ocean.

**This User's Guide provides specific operating instructions for your model. Use the instrument, accessories, and disposable test kits as instructed in this User's Guide. Before turning on the power to the instrument, follow these important first steps.**

## **Installation and Diagnostics**

1. Choose a location near an electrical outlet.
2. Attach the appropriate connector on the power supply for your electricity requirements. Your power supply is auto switching and operates from 110-240 V AC.



3. Plug the opposite end of the cord into the instrument.

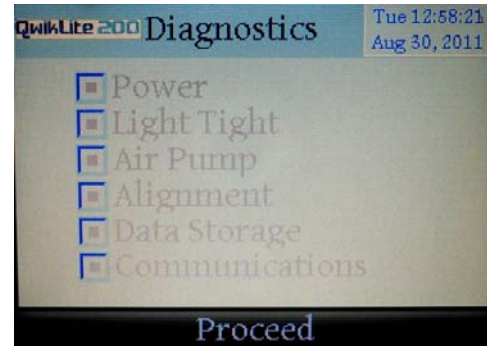
4. Plug the instrument into a corresponding electrical outlet.



5. Switch ON the power button, located on the right-hand side of the instrument case.



6. The first screen indicates the Diagnostic test on the internal components has been performed. Press “Proceed” to continue. You can use your fingertip or a stylus to operate the touchscreen menu.

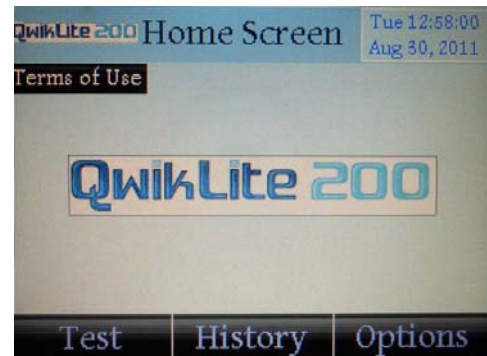


7. This is the Home Screen. There are three menu items presented:

“Test”- press this to run a test

“History” - allows a review of files stored from previous tests

“Options” – proceeds to screens where settings such as date/time and screen calibration are done





## Options Menu – Set Date and Time, Reformat Files, and Touchscreen Calibration

NOTE: Within the “Options” menu, the values for “Collect Time”, “Dark Count Time”, and “Home Offset” should not routinely be adjusted from their factory preset values. Refer to your original QwikLite documentation if these values have been changed (noted on page 1 of this Guide).

NOTE: “Reformat Files” will erase all data on the instrument (see below). The screens will warn you of this situation. If unsure, do NOT proceed unless you have removed all the files in the “History”

The “Options” menu should be selected if you wish to set the date and time, or to calibrate touchscreen, etc.

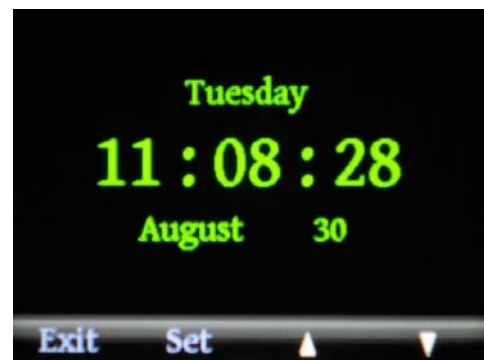


Select one of the desired adjustments on the “Options” menu.



Setting Date and Time:

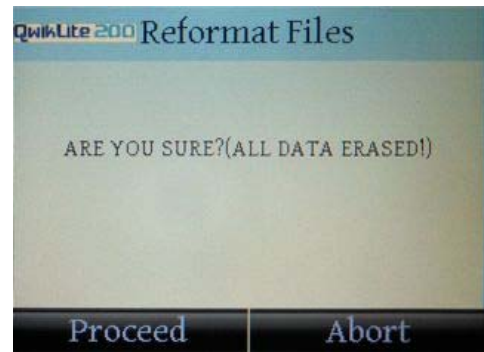
Click the “Set” button to advance through date and time settings. Use up and down arrows to adjust date and time. Select “Exit” when complete.



Reformat Files:

**Note: This command will reformat all memory on the instrument, therefore erasing all data.**

Confirm by clicking “Proceed” to reformat and erase all data, or “Abort” in order to cancel and maintain all data.



Recalibrate Touchscreen:

This command will lead you through a series of screens designed to calibrate the touchscreen. Simply tap the screen multiple times exactly at the positions shown by the arrows.

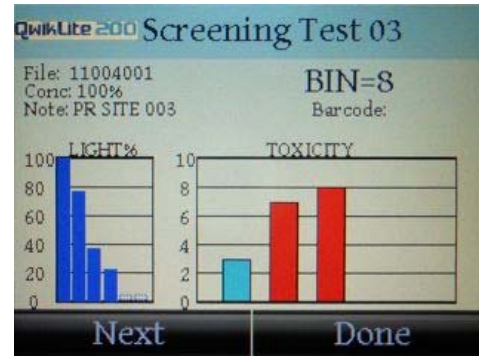


## Overview of Water Quality Testing Modes

The QwikLite 200 Biosensor System allows you to select between two types of testing. Both provide a quantified and easy to understand result.

### **Rapid Toxicity Assessment:**

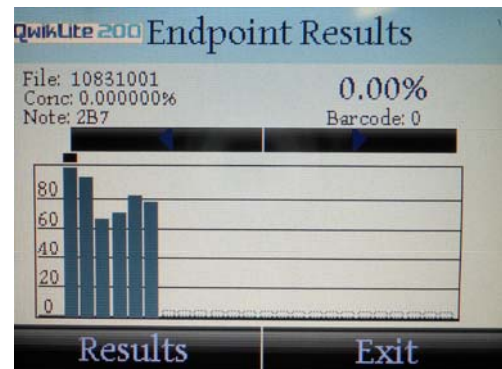
This is a “screening” test which compares a CONTROL (undosed sample or “negative control”) to dosed samples. This type of test is typically useful in routine monitoring of water quality changes, or for fast determination of potentially toxic conditions. The numerical result of a Screening Test is a “Biological Index Number” which is a numerical expression of both the presence and severity of the toxicity in a sample.



### **Inhibition Concentration (IC) Endpoint Test:**

The Endpoint Test requires a predetermined experimental design and prepared concentrations to be evaluated. Samples with varying amounts (concentrations) of a water sample or reference chemical are used to establish a toxicity response range versus a CONTROL.

For example, a test of water effluent might have sample dilutions of 100%, 50%, 25%, 12.5% and 6.25%. The result of the Endpoint Test is a series of data showing inhibition of light correlated to concentration of sample. For bioluminescence (as measured in the instrument), the measurement is calculated as an “Inhibition Concentration” 50 (often expressed as “IC50”). This is defined as the concentration of a given sample or contaminant that causes 50% of the light from the biological test organism (*Pyrocystis lunula*) to be inhibited or suppressed in response to the presence of harmful contaminants.



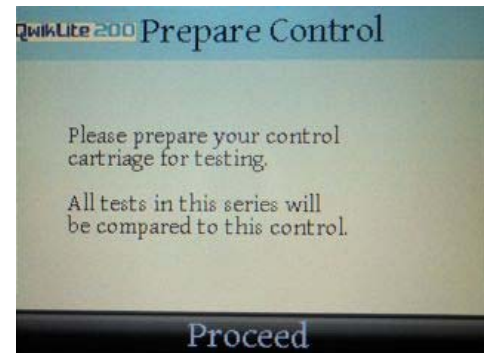
## Rapid Toxicity Assessment (screening test mode)

1. To conduct a Rapid Toxicity Assessment, begin by selecting “Test” on the Home menu.

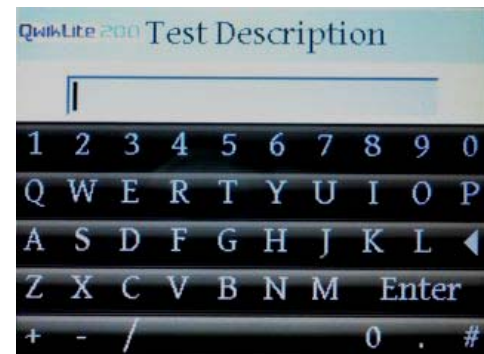


2. The software application will prompt you to prepare your CONTROL cartridge for testing. Open the lid and place the CONTROL cartridge on to the spindle. Close lid and click “Proceed.”

**NOTE: Always ensure that cartridges are seated firmly on the spindle before closing the lid. There is a slot in the spindle that matches up with slots on the underside of the cartridge. The cartridge “drops into place” on the spindle.**



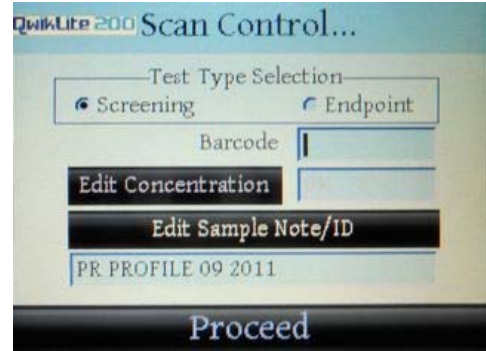
3. Enter a name for the “Test Description” and select “Enter.” This is the overall name for this series of testing, and will be saved in the “History” files.



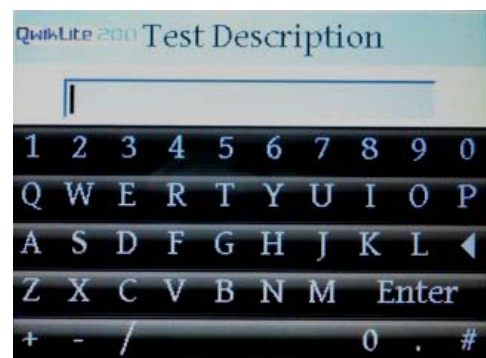
4. By default, the Test Type Selection will be set on “Screening.” (the button is filled in with a black dot). This is the selection for Rapid Toxicity Assessment.

Click the middle bar labeled “Edit Sample Note/ID”, this will allow you to label the CONTROL cartridge with a specific name.

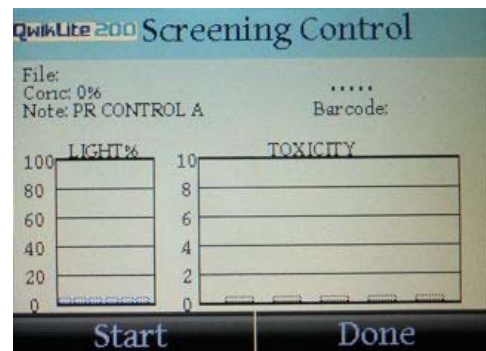
Note: if you have a barcode scanner installed, when scanned in the front of the instrument, this screen will fill in the space for the barcode as well.



5. Enter a name for the CONTROL Cartridge. This will be the unique name for that cartridge, and saved within the History files with that name.

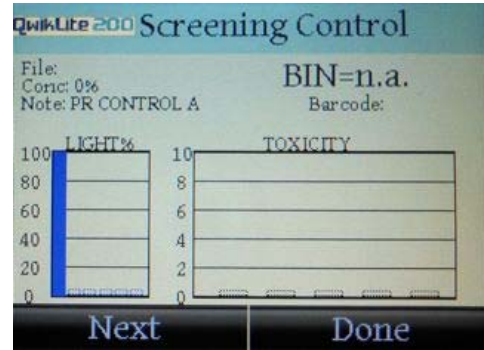


6. The next screen presented is to begin the test of the CONTROL for this “screening” test. Click the “Start” button. You will hear a slight sound from the internal motor. All six cuvettes will undergo testing and measurements taken. This takes about 2 to 3 minutes to complete, and the light output will register on a bar graph in the display. The “Start” button will change to “Next,” moving you to the next cartridge you have prepared for testing.



Note: During this testing of 2 to 3 minutes, pressing the “Abort” command will cease the testing process. This is not recommended, as some of the cuvettes will have been agitated. The command is there in case the wrong cartridge was inserted by mistake.

7. The instrument has now established the CONTROL as the reference for the test. This measurement is used as the “expected” or normal response, and is therefore graphed at 100% bioluminescence for this set of tests. Select “Next” and you will advance to testing your first sample. All samples are then compared to this CONTROL.



For each sample in this series, repeat steps 4-7. When a cartridge has been tested, there is an audible “beep”.

8. When all cartridges in the series have been done (the CONTROL, plus a maximum of five other cartridges with dosed samples), select “Done”, and the entire test will be saved in the History files.

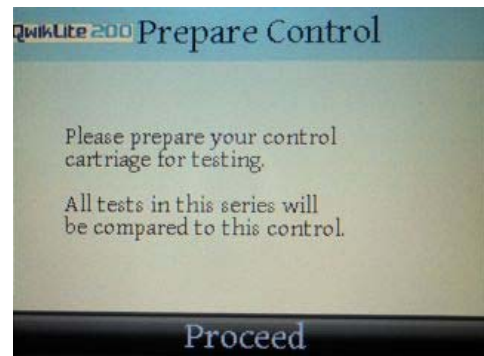
## Inhibition Concentration (IC) (endpoint test mode)

1. To conduct an Inhibition Concentration (IC) Endpoint Test, begin by selecting “Test” on the Home menu.

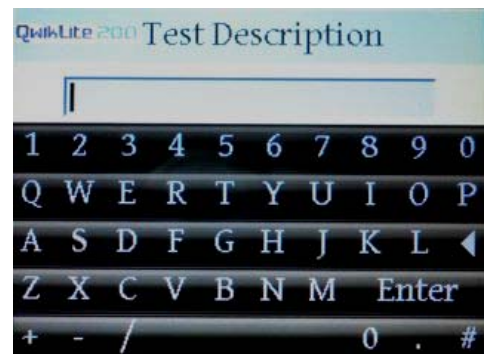


2. The software application will prompt you to prepare your CONTROL cartridge for testing. Open the lid and place the CONTROL cartridge on to the spindle. Close lid and click “Proceed.”

**NOTE: Always ensure that cartridges are seated firmly on the spindle before closing the lid. There is a slot in the spindle that matches up with slots on the underside of the cartridge. The cartridge “drops into place” on the spindle.**



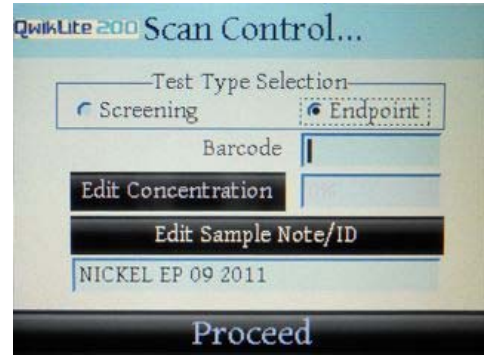
3. Enter a name for the “Test Description” and select “Enter.” This is the overall name for this series of testing, and will be saved within the History files.



4. By default, the Test Type Selection will be set on “Screening.” (The button is filled in with a black dot).

Select “Endpoint” in order to perform Inhibition Concentration (IC) and switch to the endpoint test mode.

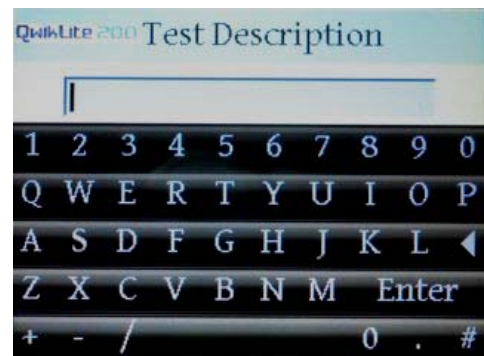
Next, select “Edit Sample Note/ID” in order to name the CONTROL cartridge.



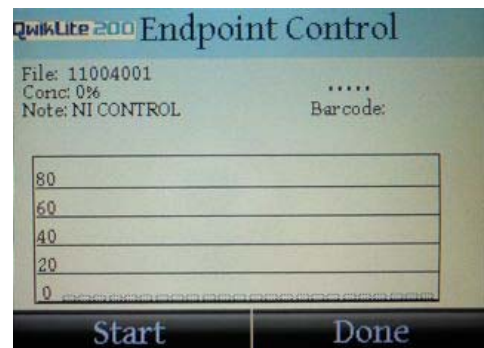
5. Click the middle bar labeled “Edit Sample Note/ID”, this will allow you to label the CONTROL cartridge with a specific name.

Note: if you have a barcode scanner installed, when scanned in the front of the instrument, this screen will fill in the space for the barcode as well.

Enter a name for the CONTROL Cartridge. This will be the unique name for that cartridge, and saved within the History files with that name.



6. The next screen presented is to begin the test of the CONTROL for this “screening” test. Click the “Start” button. You will hear a slight sound from internal motor. All six cuvettes will undergo testing and measurements taken. This takes about 2 to 3 minutes to complete, and the light output will register on a bar graph in the display. The “Start” button will change to “Next”, moving you to the next cartridge you have prepared for testing.

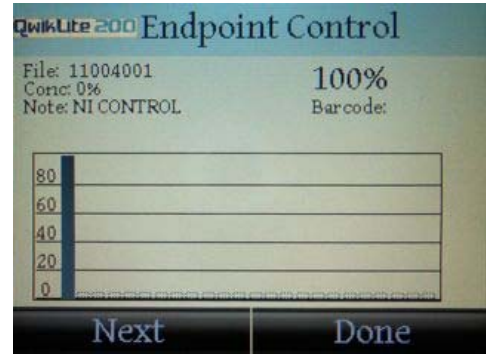


Note: During this testing of 2 to 3 minutes, pressing the “Abort” command will cease the testing process. This is not recommended, as some of the cuvettes will have been agitated. The command is there in case the wrong cartridge was inserted by mistake.



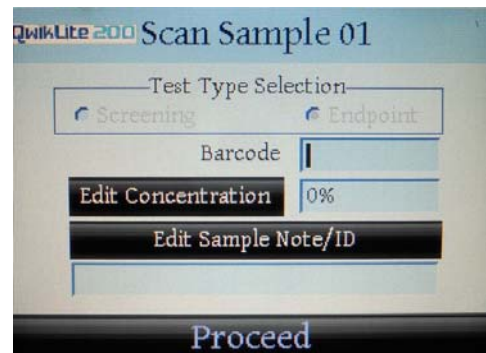
7. The instrument has now established the CONTROL as the reference for the Endpoint test. This measurement is used as the “expected” or normal response, and is therefore graphed at 100% bioluminescence for this set of tests.

Select “Next” and you will advance to testing your first sample. All samples are then compared to this CONTROL.

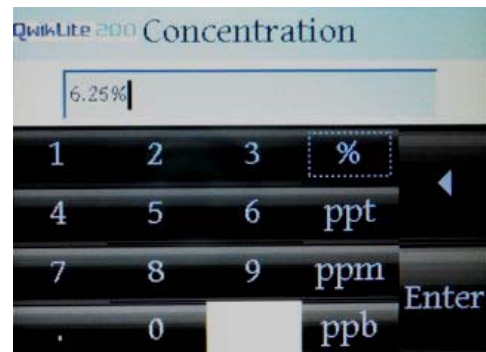


8. The instrument will advance to the “Scan Sample 01” screen. The “Edit Concentration” box will now be activated.

Select “Edit Concentration.”

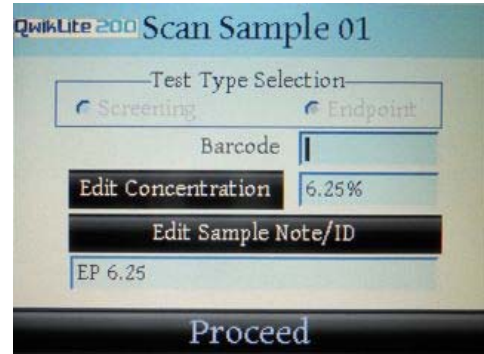


9. Use the keypad to enter the concentration of the first sample to be tested. Make sure to select the appropriate units (% , ppt, ppm, ppb) from the keypad. Then press “Enter.”

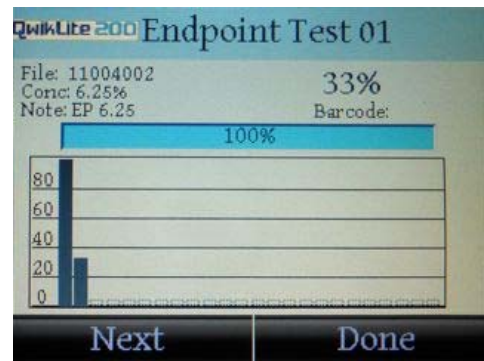


10. The concentration will now show in the “Concentration” box.

Select “Edit Sample Note/ID” and provide a unique name for the first sample cartridge (as you did for the CONTROL cartridge in Step 5). Select “Proceed,” and it will take you to the “Start” menu.



11. When “Start” is selected, the testing begins for that cartridge.



Repeat Steps 6-11 for each sample cartridge in the “Endpoint” test series. When a cartridge has been tested, there is an audible “beep”.

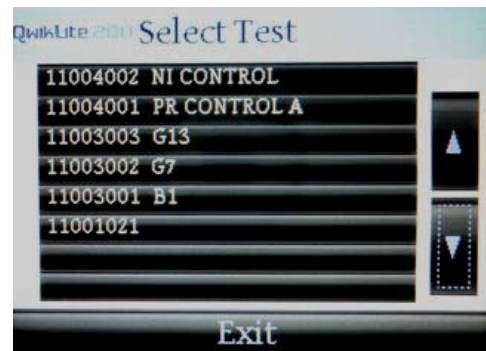
12. When all cartridges in the series have been done (the CONTROL, plus a maximum of five other cartridges with dosed samples), select “Done”, and the entire test will be saved in the History files.

## Reviewing History Files of Prior Tests

1. To review test History files within the QwikLite instrument, select “History” from the Home menu.

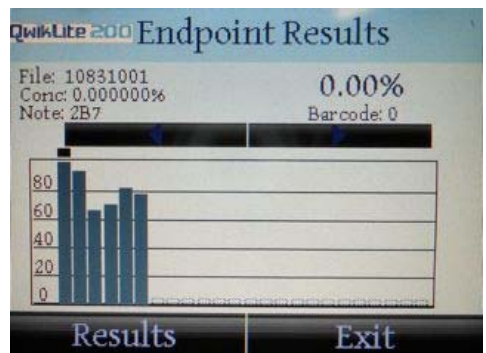


2. Scroll through the “Select Test” menu using the up and down arrows, and select the test.



3. View results.

Note: The individual results of each test can be viewed by selecting the bar on the graph, or use the left and right with the arrow keys to sequentially step through the values for each one.



## Exporting History Files to Another Computer

To transfer prior tests that have been saved in the History file of the instrument to another computer; you must first finish all ongoing tests and return to the Home Screen. Then insert a USB cable or USB storage drive in to either USB slot.

**USB cable:** Connect the USB cord into the USB port on the left side of the QwikLite Biosensor and then to a USB port on your Microsoft Windows based computer system. The QwikLite instrument will appear as an external drive on your computing system. Copy or move the file(s) you wish to import into your application to your computer's hard drive (they are saved and presented as .csv files). While the instrument is plugged into your computer, you may delete any .csv files you would like to eliminate from your History file saved on the instrument.



**USB storage drive:** Insert the drive and the File Transfer screen will automatically appear. Select either "Copy Files To USB Drive" or "Move Files To USB Drive."

The "Copy" command will maintain a copy of all files on the QwikLite instrument.



The "Move" command will delete all files from the QwikLite instrument and move them on to the USB device. The instrument will notify you when all file transfer is complete. You can then remove the USB device. All files will be saved to the device in comma separate value (.csv) file format. This file format can be opened with most standard spreadsheet software programs such as MS Excel and Apple Numbers.

**CAUTION: DO NOT MOVE, DELETE OR CHANGE THE .TXT FILES FROM THE QWIKLITE 200 BIOSENSOR. CHANGES IN THESE FILES COULD HINDER AND PREVENT THE OPERATION OF THE EQUIPMENT.**

The .csv file is organized in the following order:

Date	Time	Control Barcode	Cartridge Barcode	Concentration	Units (% ppt, ppm, ppb)	Total Light Output Measurement	Sample ID/Note
------	------	-----------------	-------------------	---------------	-------------------------------	--------------------------------	----------------

## **Care and Maintenance**

With proper maintenance, the QwikLite 200 Biosensor System will provide years of testing service.

### **Updating the QwikLite 200 Biosensor System**

Please complete your warranty registration card to be notified of updates to the software operating system of the QwikLite 200 Biosensor. Updates will be available for download through the Assure Controls web site or via USB flashdrive that will be sent to you. A notification will be sent to you via email and/or mail.

### **Water Removal**

Any water remaining in the basin upon completion of a cartridge test should be gently blotted with a soft cloth. Blot any residual droplets from in front of the Optical Window.

### **Door Switch**

A build-up of particles may hinder the lid from sealing. Upon completion of testing, use a soft cloth to wipe any particles away from around the light seal and door microswitch.

### **Barcode Scan Engine (if equipped)**

- Magnetic material may affect the ability of the scanner to operate. Keep any magnetic material a minimum of 12" away from the Biosensor.
- Handle the Biosensor with care. Scratches on the Scan Window may affect the ability of the Scanner to effectively read barcodes.

### **LCD Touchscreen**

- Do not use excessive force when inputting information to the Touchscreen. Excessive force could cause the screen to malfunction.
- Particles and residue may build up on the LCD screen. Periodic cleaning with a soft cotton cloth is required. Please do not use sprays.

### **Nipple**

Nipples may need to be replaced periodically. Replacement nipples are available from Assure Controls.

### **Optical Window**

- Particles and residue may build up on the Optical Window. Periodic cleaning with a soft cotton cloth is recommended. Please do not use sprays of any kind, just clean water.

## **Handling of the Live Test Organisms**

### **Circadian Rhythms**

A circadian rhythm is a roughly-24-hour cycle in the physiological processes of living beings, including plants, animals, fungi and cyanobacteria. Based on its circadian rhythm, the test species used in the QwikLite 200 Biosensor System (*Pyrocystis lunula*) maximizes their natural bioluminescence approximately 2 to 4 hours after dark. Therefore, this is the optimal time for performing the tests.

### **Storage Temperature**

Place the live organisms in an area where the temperature range is between 18°C (65°F) and 29°C (85°F).

For brief periods, this range can be expanded, but temperatures outside these ranges are harmful.

### **Light Cycling**

Immediately Upon Receipt - Open the shipment and expose the cells to indirect light (since they have been in a dark environment during shipment).

Do NOT place the cultures in direct sunlight – expose the plankton cells to moderate indirect and/or artificial light only.

Upon receipt, the new shipment of sensitive plankton need to remain in the light for 4 to 12 hours. This is called a Light cycle. After the initial Light cycle, the cultures need rest and enter the Dark cycle. In general, the Light and the Dark cycles should approximately be 12 hours, but this can vary 1 to 2 hours.

**NOTE: the plankton must complete a full Light/Dark cycle prior to any testing!**

Repeat the Light/Dark Cycle: Throughout the time you have your plankton; from receipt through final testing; it is important to establish a Light/Dark cycle so that the sensitive cells remain healthy and ready to be used in bioluminescence testing.

Best Time to Dose: Typical experimental designs involves a 24 hour exposure cycle of the organism to the water sample. For best bioluminescence, the ideal testing time is 3 hours after start of the Dark cycle, when they are the brightest. So when you consider when to “dose” your samples, it is best to determine when you want to perform your final testing, and then dose 24 hours earlier.

Best Time to Test: Approximately 3 hours after start of the Dark cycle. Bioluminescent response in the test culture is optimized approximately 3 hours after they are in the darkness.

Simply calculate backwards from the time you want to test, and this will determine when you will want the Light/Dark cycle to be established.

**Light/Dark cycling and testing example:**

If you would like to perform a 24 hour exposure test on Friday at 12noon, you need to dose your samples on Thursday at 12noon.

This testing plan would have this appropriate Light/Dark schedule:

Tuesday - Receive a shipment of live cultures at 2 pm, provide light and air immediately

Wednesday 9 am - start Dark cycle (12 hours)

Wednesday 9 pm - start Light cycle (12 hours)

Thursday 9 am - start Dark cycle (12 hours)

Thursday 12 noon – Dose samples and put back into Dark cycle

Thursday 9 pm – start Light cycle (12 hours)

Friday 9 am – start Dark cycle (12 hours)

Friday 12 noon – Test (this is optimum: 3 hours after the Dark cycle has started)