

**STANDARD OPERATING PROCEDURES**  
**DIVISION OF COMPARATIVE MEDICINE**  
**UNIVERSITY OF SOUTH FLORIDA**

SOP#: 1139.4

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| <b>TITLE:</b>          | <b>Charm Sciences novaLUM® Luminometer</b>                                                                           |
| <b>SCOPE:</b>          | Animal Care Personnel                                                                                                |
| <b>RESPONSIBILITY:</b> | Facility Manager and Technical Staff                                                                                 |
| <b>PURPOSE:</b>        | To Outline the Proper Procedures for the Operation and Maintenance of the Charm Sciences <b>novaLUM®</b> Luminometer |

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**I. PURPOSE**

1. This procedure outlines the use and maintenance of the Charm Sciences novaLUM® luminometer used to assess adequacy of sanitation for the Microbiological Monitoring Program.

**II. RESPONSIBILITY**

1. Facility Managers are responsible for ensuring that sampling is performed properly. Managers should maintain an adequate supply of PocketSwab Plus® and ATP positive control tablets under proper storage conditions. PocketSwab Plus® are stored at room temperature and ATP tablets are stored in the freezer at or below 5°F. Managers may designate a staff member to perform testing.
2. Managers are responsible for the maintenance and security of the novaLUM™ luminometer in their facility.

**III. EQUIPMENT APPLICATION**

1. The novaLUM® luminometer detects the presence of adenosine triphosphate (ATP) a chemical present in all living organisms. ATP may be present on any surface from any organic source.
2. The novaLUM™ uses a process called bioluminescence to detect the ATP. When ATP is mixed with the enzymes luciferin/luciferinase in the PocketSwab Plus® light is emitted. Luciferin/luciferinase are the same enzymes that allow fireflies to light up. The luminometer measures the light emitted as Relative Light Units (RLU).
3. ATP detection measures total hygiene by detecting the presence or absence of organic matter (e.g., biofilms, food residue, human or animal contact, and living or dead microorganisms) on a surface. Microbiological monitoring techniques such as RODAC plates, only detect the presence or absence of live microorganisms.

**IV. EQUIPMENT USE**

1. Sample Identification:

- a. Samples are identified by selecting the appropriate location listed in the testing plan of the novaLUM® prior to inserting a PocketSwab Plus® Sample.
- b. Label each swab with the sample identification and time.

2. Calibration:

- a. Prior to quarterly testing of samples, the calibration of the novaLUM® analyzer must be verified.
- b. The calibration checks consist of three steps. Refer to the manufacturer's instruction sheet, "**PocketSwab Plus® Calibration Check**" for additional instructions.
- c. The "**Instrument Blank**" consists of pressing enter without a swab in the sample chamber. The result should be zero RLU.
- d. The **Negative Control** check consists of performing the PocketSwab Plus® activation procedure after swirling the swab in the reagent water (provided with the test kits) for five seconds. Avoid touching the foam tip to the lip of the bottle. The result should be zero RLU.
- e. The **Positive ATP Control** check consists of several steps that are described in the instruction, sheet including the use of the Poly-Pipette. Briefly:
  1. add 1 ml of reagent water to a clean microtube
  2. add 1 ATP control tablet, cap and shake vigorously for 10 seconds
  3. let sit for 10 minutes and shake again for 10 seconds
  4. open PocketSwab Plus® and gently shake off excess liquid from tip
  5. Holding the swab horizontally slowly add 20 ul of the solution to the tip being careful that it does not drip off.
  6. Insert and read the sample swab using the novaLUM® "**LUM CAL**" plan.
  7. The result should be between 10,000 to 40,000 RLU.
- f. The novaLUM® has been programmed with three locations on channel "**LUM**", plan "**LUM CAL**". Location 001 is "**BLANK**", location 002 is "**NEG CONTROL**", and location 003 is "**POS CONTROL**". Use channel "**LUM**" and these locations to perform the calibration checks described in the instruction sheet.
- g. Notify the Microbiological Monitoring Program Manager (MMPM) if calibration of the novaLUM® analyzer cannot be verified by the use of positive and negative controls.
- h. The reagent water should be stored in the refrigerator at 35-42° F.
- i. The ATP Positive Control Tablets should be stored in the freezer at or below 5° F.

3. Sampling Procedure:

- a. PocketSwab Plus® swabs are stored at room temperature. Discard unused swabs after the expiration date on the package.
- b. Grasp the Pocket Swab Plus® by the black body. **Do not** touch the clear microtube at the bottom. Carefully separate the top and bottom of the Pocket Swab Plus® by twisting and pulling. **Do not** touch the white swab.
- c. **Swab a four-inch by four-inch area (10 cm X 10 cm) for 5 seconds. Twirl the swab as you collect.**
- d. **Hold Pocket Swab Plus upright** with the microtube pointing down for the remainder of the test.
- e. Reinsert the swab into the body of the PocketSwab Plus® and gently push and twist the handle to engage the threads.

**Note: To hold for counting at a later time, do not twist down or puncture the microtube seal. The swab is stable at room temperature in this position for up to six hours.**

4. To Activate Swab:
  - a. Twist handle down completely to puncture microtube seal.
  - b. Gently shake side-to-side 3 times to mix reagents. Note: Liquid should appear in bottom of vial. If not, unscrew swab handle until swab is just above microtube, and twist handle down again. Shake side-to-side 3 times.
  - c. Sampling is now complete.
  
5. Assay Procedure:
  - a. **Optimal results are obtained when swabs are read within one minute.**
  - b. Turn on the novaLUM® by pressing the red **"ON/OFF"** key. You should hear an audible beep.
  - c. When powered up, the novaLUM® defaults to **"MAIN MENU"** screen. Scroll down to Item #2, **"PROGRAMMED PLANS"** and press **"OK"** to open the **"CHANNEL MENU"**. (Note: Pressing the **"ESC"** key always returns you to the previous menu).
  - d. From the **"CHANNEL MENU"** select Item #1 **"LUM"** and press **"OK"** to open the **"PLAN MENU"**.
  - e. From the **"PLAN MENU"** scroll down to the desired plan and press **"OK"** to select. Plans are facility specific
    1. **LUM CAL** – use when performing calibration of the novaLUM® (e.g., Blank, Negative Control, and Positive Control).
    2. **CAGEWASH** – use when testing the efficacy of cagewash sanitation and includes a list of primary enclosures and equipment routinely sanitized utilizing the cage/rack or tunnel washer (e.g., rodent cage, NHP cage, water bottle etc).
    3. **PROCEDURAL AREA** – used to test efficacy of sanitation of procedural areas. Room numbers are listed consecutively with separate location for each surface that has the potential to come in contact with animals (e.g., COM 1302 Xenogen, COM 1302 Laser Doppler, COM Scanning Microscope, etc.)
    4. **H<sub>2</sub>O TEST** – used for monitoring animal drinking water quality. Room numbers with sources of animal drinking water are listed consecutively and list the source(s) of drinking water within the room (e.g., COM 1312 Sink, COM 1319 Lixit, etc).
    5. **ROOM DECON** – plan used for testing efficacy of sanitation subsequent to room decontamination. Room numbers are listed consecutively.
  - f. **Once the appropriate "PLAN", and surface location within the plan, is selected** insert the PocketSwab Plus® into the novaLUM® chamber on the top of the device (remove chamber cap first). The novaLUM® should be in the upright position, not tilted or on its side. Press **"OK"** to start the count and after five seconds the result (Pass or Fail) will appear on the screen.
  - g. Press **"OK"** to advance to the next location after each test. Use the **"PREV"** key to return to the previous location read multiple samples from the same location. After all tests are read on one channel, press **"ESC"** once and select another channel to read if necessary.
  - h. All results are automatically stored in the novaLUM® memory.

- i. Used swabs may be disposed of in the regular trash.

6. Download Data:

- a. Make sure the novaLUM® is OFF before proceeding.
- b. Using either the USB port or Serial Comport, connect the novaLUM® to the computer.
- c. Turn on novaLUM® and allow it to go through its internal diagnostics to reach the main menu.
- d. A “novaLINK™” icon has been added to your desktop computer. Double click the icon to open novaLINK™ program.
- e. SelSelect “**CONNECT and SYNCHRONIZE TRANSFER**” from the menu bar in the center of the screen.
- f. When the connection is established the **Instrument Parameters and Instrument Status** will appear on the screen and the attached novaLUM® will display a message that it is under remote control.
- g. Select “**DOWNLOAD**” and wait until completed.
- h. Save the test when prompted.
- i. Reports:
  - 1. Select the “**REPORTS**” button
  - 2. Select the “**ALL**” for the Sample, Location and Surface boxes (the left-hand columns)
  - 3. Leave the date/time and report selections alone (middle column)
  - 4. Select “**RUN REPORT**”
  - 5. The next screen will be a pop-up – select the “**ENABLE AUTO REFRESH**”
  - 6. Print the report by selecting the print option (this gives you the Charm software header on the report)
  - 7. Highlight cells, copy/paste into another excel spreadsheet, and send report to the MMPM at [mbaldwin@usf.edu](mailto:mbaldwin@usf.edu)
  - 8. Do not send reports until all failed test results have been addressed
  - 9. Unresolved failed tests will be documented as to the corrective action taken and evidence of a successful retest.

## V. MAINTENANCE

1. Maintenance:

- a. An internal rechargeable battery pack or the novaLUM® battery charger powers the novaLUM®. The unit may be operated as it is being recharged, but it may extend charge time. Charging a fully depleted battery takes between two and four hours. To charge the unit plug the adaptor into a suitable outlet and plug the other end of the cord into the novaLUM®.
- b. A battery charge indicator is displayed in the upper right-hand corner of the novaLUM® screen, showing how much power is left in the battery. As the battery power decreases the level of the charge goes down. The indicator is visible on all screens except when a test is in progress. When the indicator is completely filled-in the battery is fully charged. When the indicator is completely clear the battery charge is low. When the indicator is clear the battery is depleted and must be charged immediately.
- c. When the novaLUM® is charging a LED light on the charger will begin to blink. The unit is completely charged when the light is steady. Disconnect the novaLUM® from the power cord when full charge is indicated. Full charge is

completed in 2 to 4 hours. A charged battery will power the novaLUM® for up to 8-10 full hours of operation.

- d. For optimum battery performance and life, recharge the battery only when the novaLUM® displays "battery low recharge soon."
- e. Unit may be cleaned occasionally with a damp cloth but do not use any harsh cleaners.
- f. Avoid exposure to direct sunlight, water and other liquids.

## VI. TROUBLE SHOOTING

1. Refer to the manufacturer's operation and maintenance manual.

## VII. REFERENCES

1. Refer to the manufacturer's manual for additional information.
2. Manufacturer's instruction sheet "**PocketSwab Plus® Calibration Check**".

Approved:

Date: