1. Procedure summary

This procedure describes how to obtain daily data measurements in a cultivation pond.

1.1. Related Procedures

Paddle Wheel Operation	CB-04-004-002
Safe Traffic Flow	CB-03-006-001
Culture Sampling	CB-01-001-001
PLC Calibration and Set Points	CB-01-002-014

1.2. Procedure impacts and concerns

Safety	Caution when operating near ponds and paddle wheel. PPE Required: Standard PPE & Nitrile Gloves, LOTO.
Quality	Inaccurate measurements can be detrimental to culture health and interrupt productivity.
Delivery	Daily Data Collection must be complete by 8:00am and a copy submitted to QAQC with samples. Daily Data entry into PI must be complete by end of the day.
Environmental	Loss of containment must be reported to EH&S.
Cost	N/A
Compliance	Compliance with OSHA's Hazardous Waste Operations and Response, and Hazardous Communication Standard in addition to the Sapphire Energy, Inc. Chemical Hygiene Plan is required where applicable. See 29 CFR 1910.120 and 1200. An AUL list, MSDSs and label information will be available for easy reference in a binder in the administration building.

1.3. Responsibilities and owners

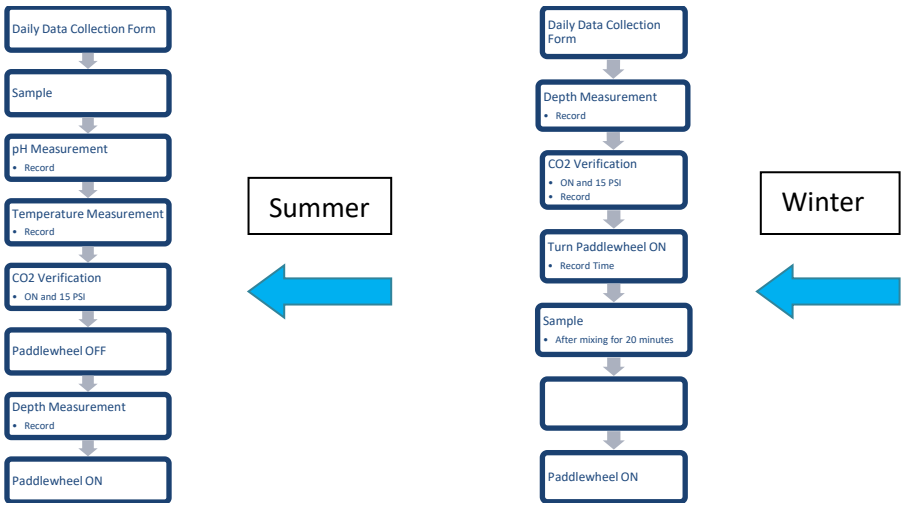
Document Owner	Manage content and distribution	Magdalena Pacheco
Process Owner	Responsible for content and process validation	Dhawal Dhonde
Site Manager	Responsible for implementation and conformance	Dhawal Dhonde

2. Process

2.1. Process description

This procedure describes how to obtain depth, pH, Co2 and temperature measurements. Each measurement must be collected in a uniform manner to ensure the accurate representation of the depth, pH, Co2 and temperature in each pond. Order of operations is dependent on seasonal conditions.

2.2. Process diagram: Work Instruction



2.3. Process steps

2.3.1 Daily Data Collection Form

2.3.1.1 Obtain Data Collection form located in Columbus Drive L:\Field Operations\Daily Data/Daily Data Sheets.

2.3.2 Sample

2.3.2.1. Collect sample from pond with paddlewheel ON. (Refer to Culture Sampling Procedure).

2.3.3 pH Measurement

2.3.3.1. Submerge handheld pH probe in culture in sample bottle immediately after obtaining sample. See Figure 1.

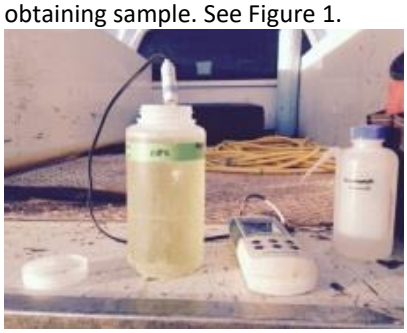


Figure 1.

2.3.3.2. Record pH measurement on Daily Data Collection Form.

2.3.3.3. Record PLC pH reading on Daily Data Collection Form.

**NOTE: Daily Data Collection located in the Columbus Drive L:/Field Operations/Daily Data/Daily Data Sheets.

2.3.3.4. Verify pH readings from handheld and PLC match. If the difference between the two readings is greater than 0.2 pH points, the PLC probe must be calibrated. (Refer to PLC Calibration and Set Points Procedure).

2.3.3.5. If handheld and PLC both match and pH is out of range. (Strain Specific). See the following.

2.3.3.6. If pH is high verify Co2 is flowing to pond, and CO2 set point at 15 psi, and check to see if CO2 hoses are pinched.

2.3.3.7. If the pH is low. Turn Co2 off and verify the set points are correct and no Co2 is flowing.

2.3.4 Temperature Measurement

2.3.4.1. Submerge temperature probe in culture in sample bottle immediately after obtaining sample.

2.3.4.2. Record temperature measurement on Daily Data Collection Form.

**NOTE: This must be done immediately after sample is taken. Delays in temperature measurements result in inaccurate readings that cannot be re-measured. **

**NOTE: You can also record temperature using pH handheld. See Figure 2.

Figure 2.

2.3.5 Paddlewheel

2.3.6.1. Turn paddlewheel OFF at control panel using ON/OFF switch. Allow culture (liquid) to settle for at least 20 minutes. (Refer to Paddlewheel Operation Procedure)

2.3.6 CO2 Verification

2.3.5.1. Verify that CO2 valve is in the OPEN position. See Figure 3.

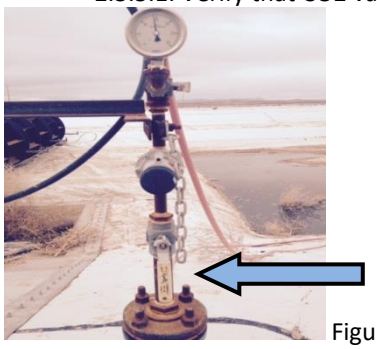


Figure 3.

2.3.5.2. Verify that CO2 pressure gauge reads 15 PSI. See Figure 4.

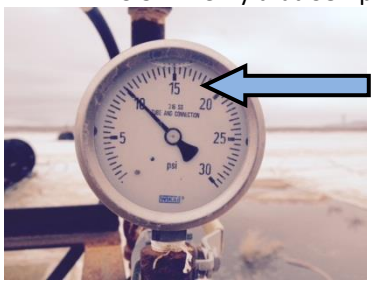


Figure 4.

2.3.5.3. If solenoid is on, watch for Bubbles come out diffusers

2.3.5.4. Record on Daily Data Collection form

Diffuser not working properly

Diffuser working properly

2.3.7 Depth Measurement

2.3.7.1. Measure depth from mounted ruler near paddlewheel with the paddlewheel OFF. See Figure 5.

Figure 5.

2.3.7.2. Record depth measurement in inches on Daily Data Collection Form.

**NOTE: Be aware of paddlewheel operations and proceed with caution. Refer to LOTO, Safe Traffic Flow Procedure for driving instructions around pond area and Paddlewheel Operations Procedure for safety.

2.3.8 Paddlewheel

2.3.8.1. Turn paddlewheel ON. (Refer to paddlewheel operation procedure).

3. Required documents

3.1. Input documents

Columbus Drive L:\Field Operations/Daily Data/Daily Data Sheets

3.2. Output documents

Completed Daily Data Collection Form — Columbus Drive L:\Field Operations/Daily Data/Daily Data Sheets

Production Log — Columbus Drive L:/Field Operations/Daily Data/Production Log

4. Document control

4.1. Revision history

R0 – Initial Release – Adriana Rascon	03-09-2012
R1 – Adriana Rascon	06-27-2012
R2 – Adriana Rascon	11-26-2013
R3-Magdalena Pacheco	12-30-2014

4.2. Document approval

4.3. Document reviewers

5. Risk analysis