1. Procedure summary

This procedure describes how to top off ponds for evaporation make up and/or harvested culture at the IABR in Columbus, NM.

1.1. Related Procedures

Pond Access	CB-03-006-001
Culture Sampling	CB-01-001-001
Gravity transfer	CB-03-004-001

1.2. Procedure impacts and concerns

Safety	Standard PPE, nitrile gloves
Quality	Inaccurate concentrations of nutrient addition could lead to toxicities or deficiencies that will result in changes in culture health.
Delivery	NA
Environmental	NA
Cost	NA
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. 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	Chris Lopez
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

Pond health and productivity can be affected by fluctuations in concentrations of essential nutrients. Nutrient Replenishment is necessary to maintain target nutrient concentrations that are depleted as the culture grows and consumes these nutrients. This procedure describes the process of adding top off water for evaporation make up and/or harvested culture.

2.2. Process steps

2.3.1. Top Off Procedures for 1.1 acre ponds via HRP

2.3.1.1. Make checklist based off Daily Instructions or instructions given by QAQC. Obtain checklist from Columbus drive\Field Operations\Cultivation Check Lists\Topping off\Top off source and column.

*When making checklist always good to double check with an other team member.

2.3.1.2 Wait for QA/QC to give OK before beginning to top off ponds. This may be done by radio or email.

2.3.1.3 Check starting depth with Daily Data Collection from morning sampling. If topping off ponds the same day as harvest, check target depths from pond drop check list.

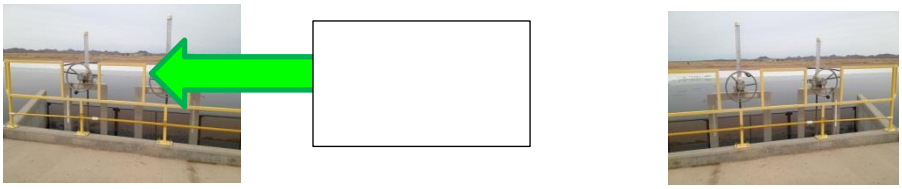
2.3.1.4 Follow checklist for proper valve opening and closings.

2.3.1.5. Time may vary when it reaches pond dependent on volume in HRP and pond location.

2.3.1.6. Add water to pond to reach target depth. Color of water entering pond will most likely be a light green. Notify QAQC or Supervisor if water color is different immediately via radio or email.

*ALWAYS open your destination pond before opening your source pond to NOT over pressurize pipes in the ground or your pond.

*Record and report any flock at the HRP or entering the destination pond.



2.3.2.1.2 As one pond is filling open the next top off pond a little bit so that water is coming out so that line doesn't pressurize and valve is not so hard to open.

2.3.2.1.3 Check depth frequently so that the pond doesn't overfill. When checking depth to pond, make sure that you turn paddlewheel off at power box panel and red lever at pond right below PLC box, is down. Use proper lock out tag out procedure when entering pond. See figure 1 below. Always double check your depths. Make any notes when checking depth if weather is windy, rainy, dusty, etc.

*Make sure that when starting to fill a pond that the paddle wheel\CO2 is off for more accurate depth readings.

Figure 1.

2.3.4.3 After pond is filled to target depth turn paddle wheel and CO2 back on.

2.3.4.3.1 When topping off last pond depending on what column you are topping off, will have to estimate when to close the HRP so that you do not overfill a pond. If pond has reached target depth and there is still water coming out of AHR line advise supervisor if you may open the AHR and AH line at bottom of the column to let line drain completely into the channel or leave line packed.

2.3.4.3.2. When top off is completed make sure that checklist is completed and turn into team lead or supervisor.

*For better communication and productivity, advise the team lead\manager\HMI Operator of ponds in progress or complete so that operator may send out notifications via email.

Top off Procedure for 1.1 acre ponds via Well 4747 and 4746

2.3.5. Follow steps 2.3.1.1-2.3.1.4.

2.3.5.1. Make sure that all valves are in the proper position before turning on well. If valves are not in proper position and line is pressurized the well will turn itself off. This will lead to production time and field operator will then have to go back and recheck all valves to find issue/error.

NOTE: Make sure that flow meter is taken before turning on well.

Top off Procedure for 2.2 acre ponds

2.3.4.3.2 For 2.2 acre ponds top off with water from desired media source example (HRP, well, etc.). Refer to top off procedures from 1.1 acre ponds. Some of the valve settings will change. Retrieve the valve check list at Columbus Drive L:\ Field Operations\ Cultivation Check List\ Topping Off. Depending on your source pond choose the list that matches your assigned job. (ie. If you are going to top off Via HRP you would choose "filling 600 Column via HRP (Master) and so on.)

This is the 600 valve at the HRP.

*Use BIG red key handle to open\close valves in the ground for 2.2 acre ponds.

Top off Procedures for Inoculation Ponds

2.3.4.3.3 For inoculation ponds, top off with well water. Refer to top off checklists for appropriate valve opening and closing. Obtain checklists from Columbus Drive/Field Operations\Cultivation check lists\ Topping Off**.**

2.3.4.4 Record final depth of destination pond and desired media source pond or flow meter if using either well.

3. Required documents

3.1. Input documents

Daily Data Sheet	Columbus Drive L:\Field Operations\Daily Data
Top Off Checklists	Columbus Drive L:\Field Operations\Cultivation Check Lists\ Topping Off

3.2. Output documents

Replenishment Sheet	Columbus Drive L:\Field Operations\Log Sheets

4. Document control

4.1. Revision history

R0 – Initial Release – Andy Randall (Rob McBride)	02-16-2012
R1 – Adriana Rascon	07-05-2012
R2- Leo Willis	09-30-2014
R3-Chris Lopez	01-14-2016

4.2. Document approval

4.3. Document reviewers

5. Risk analysis