1. Procedure summary

This procedure describes the process of transferring culture between inoculation ponds and from inoculation ponds to production ponds.

1.1. Related Procedures

Lock Out Tag Out Policy	
Pond Access	CB-03-006-001

1.2. Procedure impacts and concerns

Safety	Required PPE: Standard PPE. Pressurized systems are hazardous. Use caution when operating plumbing system.
Quality	Incorrect valve positions could result in culture movement to incorrect pond. Verify source and destination ponds with Team Lead or Director of Cultivation prior to culture transfers. Incorrect valve positions could result in a pressurized system that will result in equipment damage and possible safety hazards.
Delivery	
Environmental	Loss of containment and/or pond overfills will result in reportable incidents.
Cost	
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	Julio Chavez
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 the process of moving culture between inoculation ponds and inoculation pond culture to production ponds through gravity transfer and or using pump. Refer to Piping Diagram (See Appendix A)

2.2. Process diagram: Work Instruction

Complete Checklist. See below process diagram picture for proper valve openings and closings.

NOTE:ALWAYS PRINT SOP IN COLORED INK

2.3. Process steps

NOTE: DO NOT PROCEED WITHOUT CHECKLIST

NOTE: Obtain Checklist From Columbus Drive/Field Operations/Cultivation Checklists/Culture Transfers/Culture Transfer In INOC Ponds

MAKE SURE CHECK LIST IS CORRECT BEFORE STARTING

2.3.1 Verify Valve Positions

2.3.1.1 Verify that freshwater flush valve WU-V111 is CLOSED. Record position on checklist.

2.3.1.2 Verify that valves IN-V101 and IN-V102 are CLOSED to prevent culture from flowing into 02-R-1202 and 02-R-1204. Record valve position on checklist.

2.3.1.3 Verify that ALL slide gates (IN-V0001, IN-V0002, IN-V0003, and IN-V0004) are CLOSED. Record position on checklist.

NOTE: It is very important to make sure everything is in the closed position before starting to prevent pressurizing the lines or slide gates or sending culture to the wrong place.

*NOTE: If destination pond is empty make sure that the full proper procedure for dry commissioning is complete before beginning transferring.

2.3.**2 Culture Transfer Between Inoculation Pond via slide gate**

2.3.2.1 Record initial depth of destination pond and source pond on checklist. Open the slide gate(s) in the destination pond(s). Record time of slide gate opening on checklist. (IN-V0001, IN-V0002, IN-V0003, and/or IN-V0004. Necessary slide gates highlighted on checklist).

NOTE: If the freshwater flush valve is left ON, the slide gates will be pressurized and leak.

2.3.2.2 Record initial depth of source pond on checklist. Open the slide gate(s) in the culture source pond(s). Record time of slide gate opening. (IN-V0001, IN-V0002, IN-V0003, and/or IN-V0004. Necessary slide gates highlighted on checklist).

NOTE: Open the slide gate of destination pond before opening the source pond slide gate to prevent pressurizing the system.

*NOTE: You will notice bubbles of culture coming in through slide gate in destination pond. See Figure 1.

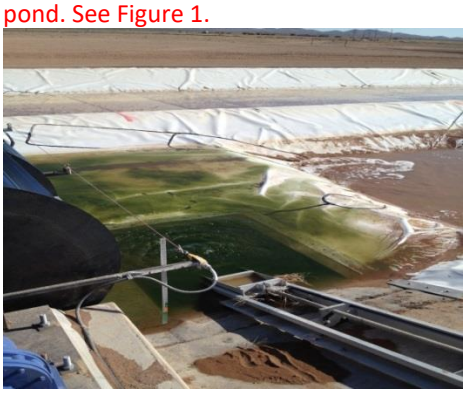

Figure 1.

NOTE: Close source slide gates before closing destination slide gates to prevent pressurizing the system.

*NOTE: Leave paddle wheel on in source pond unless advised otherwise by QAQC to make sure the proper amount of culture gets distributed to pond(s) and algae does not settle in source pond during transfer.

2.3.2.3 Monitor depth in source and destination ponds by turning paddlewheel on/off (refer to paddlewheel operations SOP) to check the depth during small periods of time to ensure that desired culture volume is transferred.

2.3.2.4 Close slide gate(s) in source pond(s) when desired depth/volume is reached. Record final depth in source pond on checklist. Record time of slide gate closing on checklist.

2.3.2.5 Close slide gate(s) in destination pond(s). Record final depth in destination pond on checklist. Record time of slide gate closing on checklist.

****ADVISE TEAM LEAD/QAQC WHEN TRASFER IS COMPLETE VIA E-MAIL OR RADIO AND SUBMIT CHECK LIST TO TEAM LEAD WHEN TASK IS COMPLETE.**

2.3.3 **Culture Transfer Between Inoculation Ponds via Wagner Pump**

NOTE: Refer to WAGNER PUMP OPERATION SOP.

2.3.3.1 Follow steps 2.3.1.1.1-2.3.1.3 for verifying valve positions.

2.3.3.2 Stage Wagner Pump and hoses in between both ponds, inserting suction end of hose in source pond in sump and dispensing hose in sump of destination pond. Make sure to secure the dispensing end of hose with sand bags in top of it to prevent it from moving side to side or dispensing algae out of pond.

2.3.3.3 Record initial depth of destination pond and source pond on checklist.

2.3.3.4 When turning on Wagner Pump always start RPM's slow and turn up as needed.

*NOTE: Max RPM's for Wagner Pump is 1800 RPM's depending on pump.

2.3.3.5 Leaving paddlewheel on in both ponds and monitor depths in source and destination ponds by turning paddlewheel on/off to check the depth during small periods of time to ensure that desired culture volume is transferred.

2.3.3.6 When ponds have hit their target depths, start turning RPMS down then turn off pump to avoid hose from coming out of pond and causing spills or liner damage after pump is off. Record final depth/ time of source and destination pond on checklist.

2.3.3.7 If culture was over pumped stop procedures immediately. Notify team lead or QAQC via radio or e-mail and they will advise procedure to do next.

2.3.3.8 Advise team lead/QAQC when transfer is complete via e-mail radio and turn in check list to front office.

NOTE: If ends of hoses have camlock fittings it is very important to tape up the ends to avoid liner damage with duct tape. See figure 4-5. Below.

NOTE: Let Wagner Pump warm up for a little before turning up RPM's to avoid damage to pump.

NOTE: Transfer pump dependent on algae strain.

NOTE: Make sure to remove all hoses from ponds after transfer is completed.

Wagner pump gauges

Wagner pump fuel gauge

Wagner Pump

2.3.4 **Culture Transfer from Inoculation Pond to 1.1 acre Production Ponds**

2.3.4.1 Follow valve position verification steps 2.3.1.1-2.3.1.3.

2.3.4.2 Verify that downstream valves and slide gates (AHR-V1202, AH-V1202, AHR-V1204, AH-V1204) are CLOSED. Record valve and slide gate positions on checklist.

NOTE: Make sure checklist is correct before going out into field and starting procedure/task.

2.3.4.3 Culture transfer to 02-R-1202 Row

2.3.4.4 Open IN-V102 valve. Record valve position on checklist. Record time of valve opening on checklist.

2.3.4.5 Record initial depth of source/destination pond(s) on checklist. Open slide gate(s) in source inoculation pond(s). Record time of slide gate opening on checklist. (IN-V0001, IN-V0002, IN-V0003, and/or I N-V0004. Necessary slide gates highlighted on checklist).You will see culture flowing into 1.1 acre pond once source pond slide gate is open. See figure 2. Below.

NOTE:MAKE SURE IT ALWAYS HAS DEISEL BEFORE RUNNING IT.

NOTE: There is also a pipe at pond 1204 just like figure 2 shown above that you will see culture flowing out.

NOTE: LEAVE POND PADDLE WHEEL OFF TO MAKE SURE WHAT THE DEPTH IS IN THE DESTINATION POND


Figure 2. (Pond 1202)

2.3.4.6 Monitor depth in source and destination ponds to ensure that desired culture volume is transferred.
2.3.4.7 Record final depth of source pond on checklist. After closing slide gate(s) in source inoculation pond(s). Record time of slide gate closing on checklist. (IN-V0001, IN-V0002, IN-V0003, and/or IN-V0004. Necessary slide gates highlighted on checklist).
2.3.4.8 CLOSE IN-V102 valve. Record time of valve closing on checklist.
2.3.4.9 Record final depth of destination pond.

2.3.3.4 Culture transfer to 02-R-1204 Row
2.3.3.4.1 Open IN-V101 valve. Record position on checklist. Record time of valve opening on checklist.
2.3.3.4.2 Record initial depth of source pond on checklist. Open slide gate(s) in source inoculation pond(s) Record time of slide gate opening on checklist. (IN-V0001, IN-V0002, IN-V0003, and/or IN-V0004. Necessary slide gates highlighted on checklist)
2.3.3.4.3 Monitor depth in source and destination ponds to ensure that desired culture volume is transferred.
2.3.3.4.4 Record final depth of source pond on checklist, after slide gate(s) in source inoculation pond(s) are closed. Record time of slide gate closing on checklist. (IN-V0001, IN-V0002, IN-V0003, and/or IN-V0004. Necessary slide gates highlighted on checklist)
2.3.3.4.5 CLOSE IN-V101 valve. Record time of valve closing on checklist.

2.3.3.4.6 Record final depth of destination pond on checklist.

2.3.5 **CULTURE TRASFER FROM INOC PONDS TO 1.1 ACRE PONDS OTHER THAN 1204/1202 VIA SLIDE GATE AND WAGNER PUMP**

**MAKE SURE THERE IS A CHECK LIST FOR THIS PROCEDURE BEFORE BEGINNING TASK.

2.3.5.1 Its possible to transfer from the outlet pipe in pond 1204 or

1202 with a Wagner pump by connecting a tiger flex hose to outlet pipe with cam lock shown in figure 3. Below.

2.3.5.2 Connect tiger flex hose to inlet side on Wagner pump. NOTE: Make sure all hoses have a gasket in them to prevent leaks.

2.3.5.3 Connect lay flat hoses to destination pond and make sure the pond you're going into is properly commissioned (wet/dry) and slide gate is closed and ready to receive culture.

2.3.5.4 Make sure to secure the dispensing end of hose with sand bags on top of it to prevent it from moving side to side, liner damage or spill.

NOTE: IF YOU DON'T KNOW HOW TO USE A WAGNER PUMP. REFER TO WAGNER PUMP OPERATIONS SOP.

2.3.5.5 To turn on pump follow steps 2.3.3.4 or refer to Wagner Pump Operations SOP.

2.3.5.6 Monitor depth in source and destination ponds by turning paddlewheel on/off (refer to paddlewheel operations SOP) to check the depth during small periods of time to ensure that desired culture volume is transferred.

NOTE: Make sure to remove all hoses from ponds after transfer is completed.

2.3.5.7 Advice team lead/QAQC when transfer is complete via e-mail radio and turn in check list to front office

Figure 3. Outlet pipe from inoc ponds to pond 1204.

NOTE: If ends of hoses have camlock fittings it is very important to tape up the ends to avoid liner damage

Figure 4. Tiger flex hose female end without duct tape

Figure 5. Tiger flex hose female end with duct tape.

3. Required documents

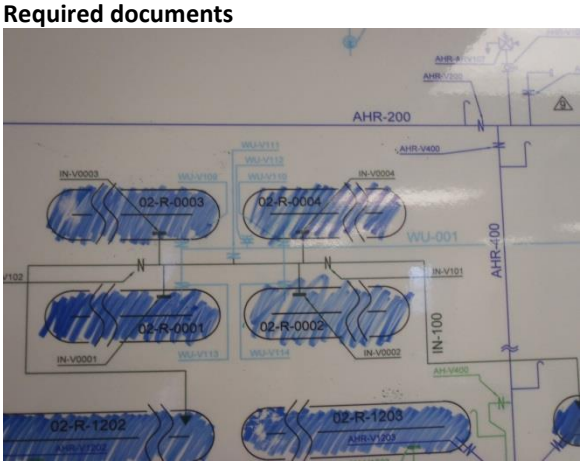

Figure 6. Shows a map with valve numbers of INOC PONDS

3.1. Input documents

Piping Diagram

IABR 02-Ponds and Cultivation Water Process Piping Valve and Equipment Tags

3.2. Output documents

Culture Transfer Checklist

4. Document control

4.1. Revision history

R0 – Initial Release – Adriana Rascon	04/19/2012
R1-Adriana Rascon	09/05/2013
R2 – Rafael Lopez	12/3/2013
R3-Magdalena Pacheco	01/08/2015

4.2. Document approval

4.3. Document reviewers

5. Risk analysis