1. Procedure summary

This procedure describes the process to operate the trace metal and iron stock solution mixing station at the IABR in Columbus, NM.

1. Related Procedures

Pond Access	CB-03-006-001
Appendix A PPE Requirements	CB-01-002-008
Nurse Trailer Operation	CB-01-002-009

1. Procedure impacts and concerns

Safety	Standard PPE required plus nitrile gloves, and N95-respirator (dust mask); refer to MSDS for specific chemical handling safety and PPE requirements.
Quality	
Delivery	
Environmental	
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. See 29 CFR 1910.120 and 1200. An authorized users list, MSDSs and label information will be available for easy reference in a binder in the administration building.

1. Responsibilities and owners

Document Owner	Manage content and distribution	Jose Perez
Process Owner	Responsible for content and process validation	Rebecca White
Site Manager	Responsible for implementation and conformance	Rebecca White

2. Process

2. Process description

Trace metals and iron are necessary components of culture media. This procedure describes the process by which stock solutions of trace metals and iron are made, dispensed and stored. The mixing station is located in the Harvest area adjacent to Polymer Building. A media recipe is required for proper constituent proportions and the volume being made. Refer to individual MSDS and Appendix A PPE requirements.

2. Process diagram: Work Instruction

2. Process steps

**Ensure mixing tanks are empty and washed out prior to beginning this procedure.

2.3.1 Obtain Media Recipe Sheet

2.3.1.1. Obtain a media recipe for Iron and/or Trace stock solution. L:\Columbus\Field Operations\Media\Trace and Iron recipe/Current. Adjust volume of recipe according to desire amount being made. Figure 1. below shows where to adjust volume of solution being made.

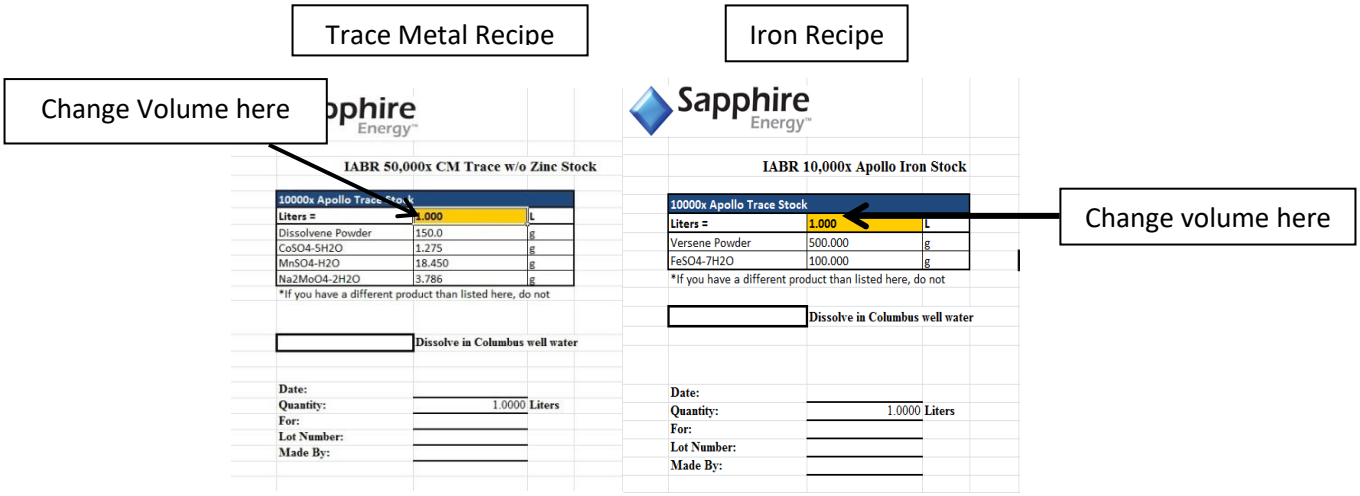

Figure 1.

2.3.2 Water Source

2.3.2.1. Fill the mixing tank with water to 50% of the total volume of solution to be made. This is done to avoid overfilling due to displacement from constituents. See figure 2. below.

Figure 2.

2.3.3 Turn on Mixing Propeller

2.3.3.1 Connect ONLY the motorized propeller being used to power source.

2.3.3.2 Flip switch to ON position to initiate propeller. See figure 3. below.**NOTE: Be cautious of uncovered rotating parts**

Mixing Propeller ON/OFF Switch

Figure 3.

2.3.4 Add Constituents

Trace metal and Iron constituent storage bins located inside polymer building. Each bin is labeled with correct chemical.

Note: If any chemicals are low or are not located in Trace and Iron mixing area, they can be found in chemical building located in harvest area east of Trace and Iron mixing station. See IABR map.

Figure 4.

2.3.4.1 Weigh and add each constituent according to media recipe to its respective tank. See Figure 5. below for scale.

NOTE: Will need to make sure scale is on flat surface before measuring any chemical.

Figure 5.

Must add substances on recipe in order.

2.3.4.1.1 Push on/off button on scale.

2.3.4.1.2. Push mode button until scale is reading in kilograms.

2.3.4.1.3. Put 5 gallon bucket on scale to measure weight and hit mode button again to zero out scale and you are ready to start measuring ingredients.

2.3.4.1.4. Always add Tetra Sodium EDTA Powder first. (Versene or Dissolvine) Add slowly and allow dissolving prior to adding rest of Iron or Trace Metal components. Then proceed with other ingredients. Allow to mix for 5 minutes then proceed to next step.

2.3.5 Turn Propeller Off

2.3.5.1 Turn power switch to mixing propeller to the OFF position.

2.3.6 Add Water

2.3.6.1 Top off mixing tank to desired volume on recipe.

2.3.7 Turn Propeller On

2.3.7.1 Flip the switch to the ON position.

2.3.7.2 Allow to mix for at least 1 hour. No chunks should be visible prior to storage or loading to Trace and Iron trailer.

2.3.7.3 Label each mixing tank with date, and who it was made by(initials).

2.3.8. Stock Solution Dispensing into Trace and Iron trailer.

2.3.8.1 Use the peristaltic pump to transfer solutions from mixing tanks to respective dispensing tanks mounted on trailer. Picture below shows peristaltic pump.

Peristaltic Pump

Figure 6.

Peristaltic Pump Controls

Figure 7.

Lid should be removed and peristaltic hose should be inserted into container.

Figure 8.

2.3.8.2 Solutions should be added to individual containers through top lid. See picture above. Lid is to be taken off then pump hose inserted into container and held by individual while pump is pumping solution.

2.3.8.3 Pump solutions one at a time and ensure peristaltic pump is pumping in correct direction using forward to dispense into the tank and reverse to pump what is left in the line back to the tank if needed.

2.3.8.4 After tank is filled to desired amount of solution. Mount trailer to truck hitch.

Trace and Iron Trailer

Figure 9.

2.3.8.3.1 See Nurse Trailer Operation SOP. Section 2.3.2 .

2.3.8.4 Discard all trash in proper containers.

2.3.8.5Be sure and wash mixing station area with water hose located at mixing station. All water must flow towards drain covered by metals grates. See Picture below for hose location and grate location.

Figure 10.

Figure 11.

2.3.9.1 Ensure that nutrient calculation sheet sent by Director of Cultivation or designee is correct and depths verified on sheet; adjust as needed.
2.3.9.2 Refer to Pond Access Procedure for details on traveling in the vicinity of ponds.
2.3.9.3 When at desired pond location
2.3.9.3.1 Fill appropriate graduated cylinder (Carboy) to dispense proper amount of each solution into desired pond. Note: See nutrient calculation sheet for proper amount according to pond number. See picture below.

Figure 12.

2.3.9.3.2. Open specific valve for trace or iron container on Trace and Iron trailer.

Figure 13.

2.3.9.3.3 Use graduated cylinder to dispense (Carboy) solution near adjacent tanks on liner into pond. Dispense solutions into ponds. Always dose iron first then trace at same location.


Iron


Trace

Figure 14.

2.3.9.3.4 Rinse Liner using water dispensing tank on trailer.

2.3.10. Solution Storage

Solution Storage/Mixing Tanks

Figure 15.

2.3.10.1 Solution is stored in mixing tanks. Each solution has an expiration of 1 week from mixing date.

3. Required documents

3. Input document

JHA for task
Trace and Iron Recipe
Nutrient Calculation Sheet
Replenishment Log

4. Document control

4. Revision history

R0 – Initial Release – Adriana Rascon	07/12/2012
R1 – <Editor name>Jose Perez	03/3/2015

4. Document approval

4. Document reviewers

5. Risk analysis

<Risk name>	<Mitigation plan>	<Owner>	<RPN>