

**FIRST BREAK PROCEDURE
STAN MAYFIELD BIOREFINERY PILOT PLANT**

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A. Scope

This document describes the procedure to prevent any physical injury to employees due to the release of stored energy or hazardous materials that may be present when a break is necessary in the lines and equipment in order to service them and assure the physical safety of the workers in the area. Any hazard will be eliminated by flushing/purging in all cases where practical.

B. Definitions

PPE: Personal Protective Equipment.

SWP: Safe Work Permit.

Purge: Decontamination of a system by a purging media or water by pressure or vacuum.

C. Safety and Training Requirements

Refer to UF Biosafety guidelines and the NIH Guidelines for Research Involving Recombinant DNA Molecules whenever biological cultures/genetically modified organisms are handled or present in the equipment.

Review the location of fire extinguishers, fire blankets, safety showers, eye wash stations, first aid equipment, spill cleanup equipment, and protective gear before beginning any process work.

Prior to work beginning, the responsible person for the work effort will obtain a SWP and follow all appropriate SWP procedures.

When performing any work above 6 feet from the ground, make sure to properly use a harness to prevent injury in case of a fall.

During operations in the plant, the following safety gear will be utilized at all times and at all line breaking jobs:

- Safety Goggles
- Protective Gloves
- Hard Hat

Refer to the tables of Purged and Not Purged lines in the Appendices G1 and G2 for detailed minimum first break PPE.

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D. Related Documents and SOPs

1. Lock-out/Tag-out (LO/TO) Procedure
2. Safe Work Permit (SWP)

E. Preparation/Materials/Equipment

1. Appropriate PPE (see PPE Requirements at the Appendix)
2. General safety training

F. Detailed Procedure

1. Make sure the LO/TO procedure for the equipment/line to be serviced has been completed according to the SWP. Pumps, upstream vessels and other equipment which could cause personal injury due to the release of material will be locked and tagged properly.
2. Whenever possible make sure the line is cleaned and purged with the appropriate purging media before attempting the break. If the line contains genetically modified microorganisms, the line has to be sterilized prior to the break. In the case of using a purging media, workers will be familiar with the characteristics of the purging media and any risks associated with it.
 - a. Whenever possible, opening a high point vent and drain should be the first option for pressure release.
 - b. The purge should be done by introducing water or purging media into the line and draining it at the other end of the line. Run water or purging media continuously for at least five minutes (or until clean water comes out at the other end) to ensure most of the material has been cleared from the line.
 - c. Stop the supply of water or purging media to the line and leave the water or purging media supply and drain open as you break the line.
 - d. When purging a tank, visually confirm that the line to be open is clear and that the tank is empty.
 - e. When wearing a chemical suit, the pants and arm sleeves must be oriented where the product won't go into the boot or into glove/down the sleeve.
 - f. Procedures will provide that if the line cannot be completely purged or decontaminated precautions will be taken to prevent exposure to the content of the line.
3. When the line or system purge is not possible or cannot be completely done, then the PPE according to Appendix G1 will be used. If the purge and drain can be completely performed, then the PPE according to Appendix G2 will be worn.
4. Always perform the first break in the presence of an additional person that will be responsible to call for help in the event of an injury. If the person can be exposed to a hazard, he/she must wear equivalent PPE to that being worn by the person breaking the line.

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5. Whenever possible, start the line break by loosening the flange bolt furthest away from you.

CAUTION: Loosen the bolts slowly to control the release of unexpected pressure.

6. Flange bolts on lines containing flammables will not be burned off or cut with spark producing methods such as grinders. Flange bolt nuts will be broken by mechanical or hydraulic nut crackers.

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G. Appendix

G.1 Personal Protective Equipment (PPE) required for lines/equipment NOT PURGED

Material	Face Shield	Rain suit	Chemical resistant suit	Fire Resistant Clothing	Welding Jacket	Rubber boots	Full face respirator	Chemical-resistant gloves	Heat-resistant gloves	Leather gloves
Antifoam	X									X
Aqueous ammonia	X		X			X	X	X		
Biomass (<120 °F)	X									X
Biomass (>120 °F)	X								X	
C5 hydrolysate	X	X								X
Ethanol	X			X				X		
Fermentation slurry	X	X						X		
Lime slurry	X	X								X
Liquefaction slurry	X	X								X
Magnesium sulfate solution	X	X								X
Phosphoric acid	X		X			X		X		
Potassium hydroxide	X		X			X		X		
Pretreated biomass	X	X							X	
Process water (<120 °F)	X									X
Process water (>120 °F)	X	X							X	
Process liquid waste (from decanter)	X	X								X
Seed broth	X	X						X		
Sodium hydroxide (caustic) (<120 °F)	X		X			X		X		
Sodium hydroxide (caustic) (>120 °F)	X		X			X		X		
Sodium hypochlorite (bleach)	X	X						X		
Steam	X				X				X	
Stripper column bottoms (<120 °F)	X									X
Stripper column bottoms (>120 °F)	X	X							X	
Trace metals solution	X	X								X
Waste water (<120 °F)	X									X
Waste water (>120 °F)	X	X							X	

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G.2 Personal Protective Equipment (PPE) required for lines/equipment PURGED

Material	Face Shield	Rain suit	Chemical resistant suit	Chemical-resistant gloves	Heat-resistant gloves	Leather gloves
Antifoam	X					X
Aqueous ammonia	X		X	X		
Biomass (<120 °F)	X					X
Biomass (>120 °F)	X				X	
C5 hydrolysate	X					X
Ethanol	X	X		X		
Fermentation slurry	X					X
Lime slurry	X					X
Liquefaction slurry	X					X
Magnesium sulfate solution	X					X
Phosphoric acid	X		X	X		
Potassium hydroxide	X		X	X		
Pretreated biomass	X					X
Process water (<120 °F)	X					X
Process water (>120 °F)	X					X
Process liquid waste (from decanter)	X					X
Seed broth	X					X
Sodium hydroxide (caustic) (<120 °F)	X		X	X		
Sodium hydroxide (caustic) (>120 °F)	X		X	X		
Sodium hypochlorite (bleach)	X			X		
Steam	X					X
Stripper column bottoms (<120 °F)	X					X
Stripper column bottoms (>120 °F)	X					X
Trace metals solution	X					X
Waste water (<120 °F)	X					X
Waste water (>120 °F)	X					X