

# Vessel Passivation Procedure

January 2023

## 1. Purpose

The purpose of this procedure is to safely and effectively passivate vessels following completion of unloading and cleaning.

## 2. Scope

This procedure is a guideline for this specific job task to be completed in a manner that is a safe to the environment, personnel, public and our client's premises. This job is to be completed using IPS★ITCS's equipment, contract equipment and customer equipment that is authorized and inspected for use.

### **NOTE:**

If nitrogen gas is to be supplied as an atmosphere controlling method, all must know that nitrogen is an asphyxiate gas and can cause death if inhaled. NIOSH Life Support Helmets are required when performing this work in or around the presence of nitrogen. The following are the general guidelines to passivate a vessel in an oxygen sensitive atmosphere.

## 3. Safety

### 3.1. Potential Hazard

- Highly pyrophoric (spontaneously combustible)
- Flash fire
- Suffocation (if in a confined space or enclosed area)
- Harmful vapors (SO<sub>2</sub>, Carbonyls, CO, etc.)
- Poor Visibility
- Fall Hazard
- Heat Stress

#### 3.1.1. Steps to Minimize Hazards

- All employees must understand and follow written Job Hazard Analysis (JSEA)
- Obtain Safety Data Sheets (SDS) for Materials(s) to be handled
- All catalyst technicians must have updated training and fit testing.

#### 3.1.2. Special Tools, Equipment and Form

- Passivation trailer
- Vacuum Unit
- Breathing Air cylinders and airlines
- NIOSH Life Support Helmet
- Air Monitor (Altair 5X IR, Eagle II, or equivalent)
- Communications (Radios)
- Life Support Module
- Forklift A/T 6000 lb.

- Nitrogen
- Signs for Confined Space and Inert Work
- Roll of plastic
- Spill containment berms
- Orange Vest/ Horn/
- 120-volt dedicated power source
- ¾" dedicated fire hose w/valve and fire extinguisher
- Light plants & Flashlights
- Fuel truck
- Hand wash rack
- Scaffolding
- Containment containers for waste solution
- Environmental labels/stickers
- Metal Markers
- Chemicals for passivation (plant specific)
- JSEA

#### 3.1.3. Personal Protective Equipment

- Hard Hat
- Nomex or FRC coveralls
- Safety Steel-Toe Rubber Boots
- Full body safety harness W/ double lanyard or (SRL Where required)
- NIOSH Life Support System
- Hearing Protection
- Work gloves Rubber
- Safety Glasses
- Dermashield – Skin Barrier Cream
- H<sub>2</sub>S Monitors (Where required)
- Leather Gloves
- Tyvek chemical resistant
- Full-face air purifying respirator with HEPA Filters

#### 3.1.4. Job Overview and Planning

- Receive and review Pre-Job form with all groups
- Receive confirmation from Customer – P.O.#
- Supply manpower requirements with competent personnel
- Order job specific rental equipment through purchasing
- Safety to perform a job assessment and fill-out a detailed Job Safety and Environmental Analysis (JSEA)
- Schedule date to begin work

#### 4. Passivation of Reactor Head and Dump nozzle flanges

- Plant personal and IPS★ITCS management to ensure proper mixture of chemicals has been done prior to starting vessel work.
- Passivate reactor side flange face of vessel head and piping prior to lowering vessel head to ground.
- Passivate entire head, inlet, outlet, and internal pipe once on the ground and on containment.
- Passivate reactor side flange face of dump caps prior to installing dump shoot.
- Passivate blind flange once lowered to the ground and in containment.

**Warning:**

IPS★ITCS passivation equipment is not cleaning equipment, Plant Representative and IPS★ITCS Management must sign off on vessel unloading and cleaning prior to passivation procedure starting. Passivation equipment is meant for neutralization of reactor parts, internals, and walls only.

1. Passivation equipment to be staged in close proximity to vessel.
2. Plant personal and IPS★ITCS management to ensure proper mixture of chemicals has been complete prior to starting vessel work.
3. Hose to be hung to the top of the vessel allowing enough hose to go down to the bottom of the vessel.
4. Top side Technician to lower hose down through top manway to the in-vessel technician at bottom.
5. Containment must be placed under vessel drains or blind flanges re-installed prior to starting vessel neutralization to ensure no spills occur.
6. Upon approval of IPS★ITCS Management in-vessel technician to start with neutralization of elephant stool, outlet pipe or lower support grid.
7. Once outlet area has been coated in vessel tech to ascend the ladder stopping every 10' utilizing DBI and ladder stands as required to coat the vessel walls.
8. Each tray section and/or dump shoot or nozzle to be soaked individually, video equipment to be utilized as needed to verify tray neutralization has been completed as required.
9. Upon exiting tech to re-spray vessel neck and flange face. Top side Supervisor To notify IPS★ITCS Management that vessel Neutralization is complete
10. IPS★ITCS management to verify with plant personal that neutralization procedure has been completed as required and that N<sub>2</sub> may be turned off to vessel.
11. Outlet blind and/or drains are to be opened at this time and cleared to ensure all solution has been drained from vessel. Plant and IPS★ITCS management to verify vessel outlet points are free of neutralization solution.
12. A sample of drained off solution is to be capture and given to Plant Personnel to determine disposal requirements of waste material.

13. Outlet nozzles and dump nozzles to be opened and air movers installed to prep for vessel inspection

Typical capacity of IPS★ITCS Passivation Equipment = 500 gallons.

Industry standard amount of chemicals for 500 gallons (2% solution):

- 85-lbs soda ash
- 17-lbs sodium nitrate
- 1/2-gallon degreaser (Dawn dish soap)
- 1-cup anti foam (optional but recommended)
- Demineralized (Demin) Water

# Revision History

Rev	Rev Date	Rev By	Approved By	Description
1.0	1.3.2022	Shayne Torrans	Shayne Torrans	Initial Procedure Document
1.1	12.5.2022	Shayne Torrans	Shayne Torrans	Format Revision

**Approvals:**

Procedure Owner

Print Name

Date

Signature

# Competency Assessment

No.	Questionnaire	C/NYC
Q1		
A1		
Q2		
A2		
Q3		
A3		
Q4		
A4		
Q5		
A5		

Enclosed Attachments	
Risk Assessment	<input checked="" type="checkbox"/>
Environmental Aspect and Impact	<input checked="" type="checkbox"/>
Training and Competency	<input checked="" type="checkbox"/>
Measure and Evaluation Tools	<input checked="" type="checkbox"/>

# Competency Checklist

To be filled out by Trainer and signed by Employee, Assessor and Supervisor before being returned to the HSEQT Manager for recording purposes.

Procedure	Competency	Date	Competent YES / NO	Employee Signature

(Please tick appropriate box)

This employee is competent in performing the job.

This employee has not attained the competency level.


\*

**\*** *If the employee has not attained all competency levels, the General Manager must assess the action to be taken, provide an extension of training or alternative action as listed below.*

Alternate action to be taken: \_\_\_\_\_

Signed By      Employee: \_\_\_\_\_      Date: \_\_\_\_\_



Trainer:

Date:

Assessor:

Date:

Regional Manager:

Date:

# Environmental Aspects and Impacts

## Identified Environmental Aspects and Impacts

The following table is a summary of the likely environmental aspects and impacts that may be identified during site inspections. The significance of each impact needs to be assessed using the Risk Assessment Model.

Activity	Aspect	Impact
<b>Purchasing &amp; Administrative Work</b>	Consumption of goods	Conservation of natural resources
	Consumption of energy (eg. Electrical equipment and facilities)	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of waste (eg. Paper)	Consumption of space for waste disposal; Habitat loss
<b>Climate Control</b>	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of noise	Disturbance to community; Habitat loss
<b>Cleaning of – offices / vehicles</b>	Storage, use and release of chemicals	Contamination of air, water or soil; Risk to human health
<b>Transport (Fleet vehicles / staff travel)</b>	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Loss of habitat at all stages of generation; Light pollution
	Consumption of goods (eg. Oil)	Consumption of natural resources; Generation of waste; Habitat loss; Biodiversity impacts
	Generation of waste (eg. Oil)	Consumption of space for waste disposal; Potential contamination of water or soil; Habitat loss
	Exhaust emission	Release of greenhouse gases and atmospheric pollution
	Use of dangerous goods (eg. Batteries)	Potential contamination of air, water or soil; Risk to human health
	Generation of noise	Disturbance to community; Habitat degradation

Activity	Aspect	Impact
Operations		

# Risk Assessment

Risk Assessment // insert name here

Step No: Logical sequence	Sequence of Basic Job Steps documented in the Procedure, Work Instruction and project plans. Break down Job into steps.  Each step should be logical and accomplish a major task.	Potential Safety & Environmental Hazards/Impacts at the site of the Job  Identify the actual and potential health and safety hazards and the environmental impacts associated with each step of the job.	Risk Rating  Refer to the risk matrix or HSEQT.PRO. Risk Mgt	Recommended Corrective Action or Procedure  <i>Determine the corrective actions necessary to reduce the risk to as low as reasonably practical (ALARP) refer to HSEQ.PRO.Risk Mgt. The risk must be reduced or controlled to ALARP before work commences.</i>  Document who is responsible for implementing the controls to manage each hazard identified.	Risk Rating refer to the risk matrix or HSEQT.PRO.Risk Mgt
1.					
2.					
3.					
4.					
5.					

# Audit

<b>Process:</b> insert// <b>Procedure:</b> Insert //			Date:	Audited by:
			Location of Audit:	Area Mgr/Supervisor:
Item	Question	Evidence Sited	Comments	Conformance Score 0,3,5
1.				
2.				
3.				
4.				
5.				
6.				
7.				
AUDITOR'S SIGNATURE:  SAFETY REP'S SIGNATURE:		CONFORMANCE SCORE:    / 25  CONFORMANCE %:		0 – Non-Conformance 3 – Continuous Improvement Opportunity 5 – Total Conformance