

## JOB SAFETY & ENVIRONMENTAL ANALYSIS - JSEA

Activity/Task: \_\_\_\_\_ Procedure / SOI: \_\_\_\_\_ Date: \_\_\_\_\_ Revision: \_\_\_\_\_  
 JSEA Prepared by: \_\_\_\_\_ JSEA Approved by: \_\_\_\_\_ Position: \_\_\_\_\_  
 Client: \_\_\_\_\_ Project: \_\_\_\_\_ Permit No.s: \_\_\_\_\_

\* To be reviewed/finalized/completed on site; in consultation and signed off by ITCS team prior to commencement of work or when the work environment changes. \*

### Hazard Identification – Tick all that apply, write additional hazards identified

HAZARD	YES	HAZARD	YES	HAZARD	YES	HAZARD	YES	WORKPLACE	YES	ENVIRONMENTAL	YES
Confined Space		Engulfment		Suspended loads		Line of fire		Noise - plant & equipment		Air emissions - dust, fumes	
Difficult Entry/exit		Radiation		Falling objects		Pressurized fluids		Lighting		General waste	
O <sub>2</sub> Deficiency/excess		Electrical Hazards - LV/HV		Working near crane & crane runways		Pressurized air/gas		Remote area		Hazardous waste	
Poisonous Fume/gas		Multiple electrical feeds		Live rails-gantry cranes		Traffic Management		Temperature extremes		Hydrocarbon/chem. Spill	
Explosive gas		Working at heights		Trip hazards		Machinery - mobile plant		Weather extremes		Soil disturbance/erosion	
Flammable materials		Ladders		Slippery surfaces		Moving parts		Reduced visibility		Habitat disruption (If any)	
Combustible materials		Elevated work platforms		Manual handling		Unauthorized persons		Communication - personal		High pressure water	
Hazardous substances		Potential for difficult rescue		Sharp materials		Dangerous transport		Communication - means of radio, hand signals		Vacuum	



PEOPLE CONTROLS	EQUIPMENT CONTROLS	ENVIRONMENTAL CONTROLS	PERMITS ATTACHED
Safety watch person	Lockout & tag systems	Ventilation	Excavation
Barriers	Group Isolation	Lighting	Working at heights
Warning Signs	Fire Extinguishers	Ground Protection	Electrical
	Scaffolding for access		Confined Space
			Hot Work

#### ADDITIONAL SAFETY EQUIPMENT OR CONTROLS

Standard PPE for the unit (FRC's, hard hat, hearing protection, safety glasses, steel toe shoes)  
 FRC clothing is required to be worn under all outer garments  
 All outer garments including tyvek must be FR material.

**RISK MATRIX**

Use risk matrix to assign a risk rating to each step of the JSEA on the following pages. Refer to Risk Management Procedure HSEQT.PRO.1.4 Risk Management

RISK LEVELS	5	4	3	2	1
	Extreme	V High	High	Moderate	Low

  

**LIKELIHOOD**

SEVERITY	6	5	4	3	2	1
	6	30	24	18	12	6
5	25	20	15	10	5	
4	20	16	12	8	4	
3	15	12	9	6	3	
2	10	8	6	3	2	
1	5	4	3	2	1	

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1.	General Concerns	<ul style="list-style-type: none"> <li>Simultaneous operations on going within the immediate area.</li> <li>Unaware of the location and type of access and escape routes and Safety Shower/Eye Wash Stations and Wind Socks. This will be communicated by Operations to Authorized Employee accepting the Safe Work.</li> <li>General alarm sounds</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Make personnel aware of the various simultaneous operations occurring on &amp; around the area.</li> <li>Highlight the access and escape routes.</li> <li>When the general alarm sounds, the work place is to be made safe. Then proceed to the muster point as quickly as possible. The alternative muster point is to be highlighted.</li> </ul>	Risk rating will be made in the field by team
2.	Obtain Permit for setup	<ul style="list-style-type: none"> <li>Working without permit or not according to permit</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Walk Job and review permit with permit writer and crew prior to execution. Attach person locks on box, sign Attachment A, walk the system down to verify and try the energy isolation points. Ensure the Maintenance PIC walks down the Job Scope with ITCS.</li> </ul>	Risk rating will be made in the field by team
3.	Staging, Setting up, and Positioning equipment	<ul style="list-style-type: none"> <li>Unauthorized entry to area</li> <li>Back, soft tissue injuries due to incorrect lifting techniques.</li> <li>Sharp edges of materials can cause cuts to arms, hands and fingers.</li> <li>Tripping hazards from materials, tools, etc. in area.</li> <li>Barricaded area.</li> <li>Blocking escape and emergency services routes.</li> <li>Being in unauthorized areas.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>ITCS barricading to be erected, ITCS personnel to police the area. Information tags to be on attached to barricading.</li> <li>Use of mechanical aides, team lifting techniques and correct body posture. Awareness of Crane operations within the immediate area.</li> <li>Use leather palm gloves while material handling.</li> <li>ITCS will be responsible for esetting the barricade zone, deploying tape and attaching a completed gag Site review Nd awareness of the work area and surrounds.</li> <li>Barricade Tape off area directly around work area to restrict access. Keep walkways clear.</li> </ul>	Risk rating will be made in the field by team

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3.	Staging, Setting up, and Positioning equipment		Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>• Insure area is barricaded off, and communicate to workers in area about work being performed.</li> <li>• Obtain general work permit from Operations for set up. Position equipment, in cooperation with designated customer representative.</li> <li>• Ensure ITCS Personnel are aware of unauthorized areas established by operations</li> </ul>	Risk rating will be made in the field by team
4.	Crane Operations	<ul style="list-style-type: none"> <li>• Damage by Crane / third parties.</li> <li>• Injury to third parties. Damage to equipment.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>• Barricade off the area (In compliance with Client Site Procedures). Use approved hand signals and/or radio communication to position the Crane. Always use a spotter and escort while moving the Crane.</li> <li>• Use Certified Crane operator</li> </ul>	Risk rating will be made in the field by team
5.	Working on elevated work platforms and Scaffold	<ul style="list-style-type: none"> <li>• Personal injury: Tripping.</li> <li>• Personal Injury: Falling.</li> <li>• Catalyst Exposure</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>• Tidy all platforms before beginning work (bolts etc.). Rig up equipment as tidy as possible. Maintain Good Housekeeping Procedures.</li> <li>• Wear Full body Harness and maintain 100% tie-off while on elevated work platforms or scaffold.</li> <li>• Maintain good hygiene and wear Chemical Resistant Fire Retardent Tyvek suits and Full Face Supplied Air on while in the Hot Zone when vacuuming catalyst. Support personnel on the deck but not in the "Hot Zone" will only wear FRC Coveralls.</li> </ul>	Risk rating will be made in the field by team

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6.	Working on scaffold. (If applicable)	<ul style="list-style-type: none"> <li>Personal injury: Falling.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Use OSHA approved scaffolding with proper handrails. Ensure Scaffold has (Client tag - If any) signature and (OSCA Green or Yellow) competent person inspection. Use tool lanyards, decking, etc. to workers below and prevent falling objects by using orange fencing.</li> </ul>	Risk rating will be made in the field by team
7.	Maneuvering with forklift: Stage super sacks and catalyst for waste disposal in pre determined location per Client	<ul style="list-style-type: none"> <li>Injury to personnel and or damage to equipment</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Barricade off the area. Use certified forklift driver.</li> <li>Use spotter while operating forklift</li> </ul>	Risk rating will be made in the field by team
8.	Crane Operations	<ul style="list-style-type: none"> <li>Damage by crane / third parties</li> <li>Injury to third parties. Damage to equipment.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Hang the hoses up vertically if possible. Mark hoses with Caution Tape if necessary. Make certain safety pins are in place at all hose connections.</li> <li>Use spotter</li> <li>Barricade off the area (In compliance with Client Site Procedures). Use approved hand signals and/or radio communication to position the crane.</li> </ul>	Risk rating will be made in the field by team
9.	Obtain Permit for Mechanical work and Vacuuming	<ul style="list-style-type: none"> <li>Working without permit or not according to permit</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Walk Job and review permit with permit writer and crew prior to execution. Attach person locks on box, sign Attachment A, walk the system down to verify and try the energy isolation points. Ensure the Maintenance PIC walks down the Job Scope with ITCS.</li> </ul>	Risk rating will be made in the field by team

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10.	Remove top Manway: Regulate flow according to usage, vacuum, Temperature, and Oxygen readings	<ul style="list-style-type: none"> <li>Nitrogen Exposure/Oxygen entering reactor</li> <li>Inaccurate Temperature and Atmospheric Conditions</li> <li>Pint Points/Line of Fire</li> <li>Wrong Body Position/Muscle over Machine/ Back, soft tissue injuries due to incorrect lifting techniques.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Personnel working around reactor to wear Personal O<sub>2</sub> Monitors for nitrogen exposure</li> <li>Personnel within defined "Hot Zone" wear Full-Face Breathing Air</li> <li>Use Fluke 51/52 II Thermocouple Thermometer for measurement of temperature</li> <li>Use MSA Altair 5x or equivalent with Dilution Pump on for Atmospheric readings of O<sub>2</sub> and LEL</li> <li>Be aware of hand position while busting bolts loose while using hammer wrench. Wear full face supplied air while using impact wrench. Wear leather palm gloves while performing mechanical work.</li> <li>Use of mechanical aides, team lifting techniques and correct body posture.</li> </ul>	Risk rating will be made in the field by team
11.	Vacuuming Reactor	<ul style="list-style-type: none"> <li>A change in permitted atmospheric conditions</li> <li>Poor communication between team due to respiratory protection</li> <li>Vacuum technician trips, or entangled by cords, leads and hoses</li> <li>Spent catalyst vapors create respiratory and eye hazards</li> <li>Spent catalyst residue creates skin contact hazards</li> <li>Heat Stress</li> <li>O<sub>2</sub> deficiency</li> <li>Exposure to catalyst while in super sack</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Establish and maintain constant atmospheric monitoring. Check Temperature and Atmospheric conditions with Monitor and Thermocouple Thermometer continuously. Monitor to be Calibrated and bump tested.</li> <li>Team equipped with radio communications, and Team Leader with radio stationed at manway for constant communication capability (If needed). (Ground/Elevated work areas) Maintain good communications with vacuum technician/vacuum operator and Bottle Watch personnel</li> <li>Keep cords, leads and hoses routed out of travel paths, behind ladders and well organized.</li> </ul>	Risk rating will be made in the field by team

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11.	Vacuuming Reactor		Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Personnel working in "Hot Zone" use Full Face Supplied Breathing Air.</li> <li>Attendant will be in same PPE</li> <li>FRC clothing to be worn under outer CRFR tyvek.</li> <li>Wear Nitril inner gloves under outer work gloves</li> <li>Follow ITCS Heat Stress Protocol</li> <li>Perform O<sub>2</sub> monitoring at the boundaries to ensure personnel on standby outside are not in a hazardous atmosphere. Personnel to wear personal O<sub>2</sub> Monitors while in nitrogen barricaded areas to include: Hot Zone at top of reactor, and around Vacuum unit. These areas will be noted as such.</li> <li><b>NOTE:</b> Forklift operator will be entering and exiting the barricaded area, additional personnel within hot zone creates more of a hazard. SPOTTER WILL NOT BE USED in this area. Vacuum operator and Super sack Technician will aid in spotter task.</li> <li><b>NOTE:</b> Follow ITCS Vacuum Procedure</li> <li>Close Super Sacks to prevent exposure</li> </ul>	Risk rating will be made in the field by team
12.	Enter reactor for final removal of catalyst (if needed)	<ul style="list-style-type: none"> <li>Spent catalyst residue creates skin contact hazards</li> <li>Falling into the reactor.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li><b>HOLD POINT:</b> In the unlikely event of needing to enter the reactor, a separate permit will be ascertained and a review of the Entry Procedure could occur with plant personnel. ITCS will have Entry-Equipment available for the entry on-site. Additional JSEA's may need to be written.</li> </ul>	Risk rating will be made in the field by team

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12.	Enter reactor for final removal of catalyst (if needed)		Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>• <b>HOLD POINT:</b> <i>In the unlikely event of needing to enter the reactor, a separate permit will be ascertained and a review of the Entry Procedure could occur with plant personnel. ITCS will have Entry-Equipment available for the entry on-site. Additional JSEA's may need to be written.</i></li> <li>• Obtain the Confined Space Entry Permit. Place N<sub>2</sub> atmosphere warning signs.</li> <li>• Check N<sub>2</sub> level, no entry if &gt;3% O<sub>2</sub> and LEL explosion level &gt; 10%.</li> <li>• Maintain open and precise communication. Maintain good internal lighting. Follow ITCS Confined Space Entry Operations Procedure. Ensure the Rescue Plan is understood and in Place. Review JSEA and MSDS Sheets with crew. Locate Emergency Shower/Eye-Wash Stations, Fire Extinguishers, and Escape Routes and Assembly Points. Isolate area from 3rd party personnel and post appropriate signs.</li> <li>• FRC clothing to be worn under outer CRFR tyvek.</li> <li>• Wear Nitril inner gloves under outer work gloves</li> <li>• Install ridged aluminum reactor ladders, use Tri-Pod with 3-in-1 fall arrestor for entry.</li> <li>• <b>NOTE:</b> <i>Follow ITCS Confined Space Entry Operations Procedure</i></li> <li>• <b>NOTE:</b> <i>Follow ITCS Rescue Procedure Outline</i></li> </ul>	Risk rating will be made in the field by team

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13.	Final Video inspection of empty reactor	<ul style="list-style-type: none"> <li>Poor video quality for retention</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li><b>HOLD POINT: Cleanliness</b></li> <li>Have operations and investigation team review video prior to exiting the work area</li> </ul>	Risk rating will be made in the field by team
14.	Sock Load Reactor	<ul style="list-style-type: none"> <li>Pinch Points/Line of Fire</li> <li>Wrong Body Position/Muscle over Machine/ Back, soft tissue injuries due to incorrect lifting techniques.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Be aware of hand position while loading. Wear leather palm gloves while cutting sock and loading.</li> <li><b>NOTE: Some tightening of nuts and bolts may require a bare hand due to position and needed finger dexterity.</b></li> <li>Use of mechanical aides, team lifting techniques and correct body posture.</li> </ul>	Risk rating will be made in the field by team
15.	Exit working area	<ul style="list-style-type: none"> <li>Non-Authorized personnel at the work platform.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Clear all areas around the reactor.</li> </ul>	Risk rating will be made in the field by team
16.	Completion of job	<ul style="list-style-type: none"> <li>Leaving equipment behind.</li> </ul>	Risk rating will be made in the field by team	<ul style="list-style-type: none"> <li>Sign off all permits. Remove Locks. Check job site. Certificate of completion.</li> </ul>	Risk rating will be made in the field by team



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### Consultation and Sign-off

I confirm by my signature below, that I have attended a briefing on the requirements of the attached Job Safety & Environment Analysis and agree to perform the work in the manner detailed on it. I confirm that copies of the relevant Permits, MSDS's, Isolation Plans etc. have been reviewed and are attached.

**Activity or Task:**

**Name (Please Print)**

**Signature**

**Date**