# PETROCHEMICAL SHARED SERVICES (PSS) PROCEDURE

# JOB SAFETY ANALYSIS

**Procedure Number: PR-PSS-127**

| | | | |
|---|---|---|---|
| Approved by | Name | Dr. Mohammed Yousef Al Mulla | |
| | Position | MD & CEO | |
| | Date | 26/8/2019 | |

| Rev. | Date | Prepared by | Reviewed by | | | | | |
|---|---|---|---|---|---|---|---|---|
| 01 | 03/07/2019 | | | | | Chief HSSE Officer | | Chief Operations Officer |
| | | | | | | 01.09.2019 | | |
| | | Safety Engineer | HSSE Support Manager | HSSE Group Manager | Corporate Planning Group Manager | MGM (SC/PE) & (Vinyl) | Engineering Group Manager | Technical Group Manager |

| **Prepared by** | Safety Engineer | **Reviewed by** | HSSESM | HSSEGM | MGM (SC/PE) & Vinyl | TGM | EGM | CHSSEO | COO | **Approved by** | MD & CEO |
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**Revision / Modification History:**

| Rev # | Date | Section No. | Reason for revision / modification |
|---|---|---|---|
| 00 | 23.06.2016 | All | • Aligned and revised as per new organization and BT-4 documents<br>• New Procedure Number changed from PR-251-SFF-38 to PR-QSS-127. |
| 01 | 03/07/2019 | All | • Updated definition of Scope<br>• Added definition of JSA Team Leader, execution supervisor, MGM<br>• Added execution supervisor in RASCI summary<br>• Updated HSE staff responsibility<br>• Removed execution work crew section removed from the procedure<br>• Removed table from procedure method and added simple steps.<br>• Changed vessel entry name to confined space<br>• Removed specific hazards from the section of identifying the hazards and added open ended question.<br>• Changed JSA approval from head of section to Respective HOD/Production Engineer/Principle engineer.<br>• Added “if there is any change in approved JSA then re-approval from approving authority will be required” in JSA communication section.<br>• Added JSA revalidation section in JSA form.<br>• Updated JSA need identification criteria.<br>• Updated JSA record.<br>• Added JSA process flow diagram (Appendix-5).<br>• Added Activities require Mandatory JSA. |

# Contents

## 1. OBJECTIVE

The objective of this procedure is to provide a process to prevent incident/accidents by identifying & controlling hazards, improving employee skills and awareness through an organized process.

## 2. SCOPE

This procedure is applicable to all QAPCO premises and QAPCO operated companies and to be used in conjunction with other safety systems and procedures such as SOP's, PTW, non-routine operational activities, and other safety standards to identify the hazards and manage risks.

## 3. PROCEDURE SUMMARY

Job Safety Analysis (JSA) process involves breaking down a particular job into a series of simple steps. In each of these steps, hazards are identified and documented. After hazard identification, controls against each hazard is defined for the prevention of accidents in the analysis. Finally, the results of this analysis are shared with affected workforce and their supervisors.

## 4. ABBREVIATIONS / DEFINITIONS

| # | Abbreviation / Key word | Definition summary |
|---|---|---|
| 1 | Job Safety Analysis (JSA) | One of the risk assessment tools to ensure all hazards associated with a job are proactively identified before starting it and suitable controls are identified to mitigate the risk to as low as reasonably practicable (ALARP). |
| 2 | Lead Executor | Is a person who is trained and qualified for QAPCO work permit system and responsible to ensure that all conditions of the permit, agreed to with the Permit Issuer, are being fulfilled at all times throughout the job. He can be a QAPCO staff or a contractor employee |
| 3 | Permit Issuer / Issuing Authority | QAPCO authorized person appointed as Permit issuer and responsible for the asset/area under his control. |
| 4 | JSA Team leader | A person for a specific task, who is trained in the JSA and has the competency to lead a team to perform the JSA for a specific task |
| 5 | Job Owner | The department who is going to perform the job (QAPCO Execution Party). |
| 6 | Management | People (a person or group of people) with authority and responsibility for the conduct and control of a unit/ department/an organization. |
| ~~9~~ | Method Statement | A method statement is a document prepared for each task that gives specific instructions on how to safely perform a work, or operate a piece of plant or equipment. |
| 10 | Critical lift | 1. A lift shall be designated critical if the Gross load is greater than 25 tons<br>2. Lifting of personnel (e.g. Man Riding operations)<br>3. Any of the following conditions are met:<br>• Any lift that requires the use of multiple cranes.<br>• Any lift that exceeds 75% of the crane's rated capacity within the lift configuration of the crane.<br>• The item, greater than 5 ton, requires exceptional care in handling because it is being lifted above a critical item (e.g. live pipelines). If dropping, upset or collision could cause or result in any one of the following:<br>▪ Significant release of radioactive or other hazardous material to the environment or creation of an undesirable condition. |

| | | |
|---|---|---|
| | | ▪ Damage that would result in serious economic consequences.<br>▪ Damage that would result in unacceptable delay to schedule.<br>Undetectable damage that would jeopardize future operations or safety of a facility. |
| 11 | Zone 1 | Part of hazardous area in which a flammable atmosphere is likely to occur in normal operation. |
| 12 | HSSE | Health, Safety, Security & Environment |
| **13** | QAPCO | QAPCO operated companies: Qatofin and QVC. |
| **14** | HSSESM | Health, Safety, Security and Environment Support Manager |
| **15** | HSSEGM | Health, Safety, Security and Environment Group Manager |
| **16** | CPGM | Corporate Planning Group Manager |
| **17** | MGM(SC/PE) | Manufacturing Group Manager (SC/PE) |
| **18** | TGM | Technical Group Manager |
| **19** | EGM | Engineering Group Manager |
| **20** | CHSSEO | Chief HSSE Officer |
| **21** | COO | Chief Operations Officer |
| **22** | MD&CEO | MD & Chief Executive Officer |

## 5. DOCUMENT REFERENCES

| # | Document ID | Document name | Summary of dependency or use |
|---|---|---|---|
| 1 | PR-PSS-114 | Permit to work Procedure | Risk Assessment |
| 2 | M-250-HSE-01 | HSE Integrated Management System | QAPCO HSE Management System |
| 3 | PR-253-RC-01 | HSE Risk Assessment Procedure | Risk Registers |

## 6. IT SYSTEM REQUIREMENTS

| # | IT system module name | Summary of IT system module use |
|---|---|---|
| 1 | MS Office | Word, Excel for JSA worksheet, checklist |

## 7. RASCI SUMMARY

| # | Procedure chapter | Execution Supervisor | Lead Executor | JSA Team Leader | JSA Team Members | Principle / Production Engineer / HOD | HSE Staff | Area Owner(Issuing authority) | Execution Team |
|---|---|---|---|---|---|---|---|---|---|
| 1 | JSA Need identification | R | I | - | - | C | S | A | - |
| 2 | Performing JSA | S | S | A | R | S | S | S | I |
| 3 | Identifying the Hazards | C | S | A | R | C | S | S | S/I |
| 4 | Defining Controls to each Hazard | S | S | A | R | C | S | S | S/I |
| 5 | Implementation | A | R | S | S | S | S | R | R |
| 6 | JSA Communication | A | S | R | S | I | S | R | R |
| 7 | Continuous Improvement | R | S | S | S | S | S | A | S |
| 8 | Training | R | I | I | I | R | S | I | I |

**Legend:**

R = Responsible (the class of people who are ultimately responsible for getting the work done)

A = Accountable (the position that is accountable to oversee that the work gets done)

S = Support (the person who supports by providing information and suggest any deviations from the Procedure)

C = Consulted (the person who can advise when needed)

I = Informed (concerned persons who are required to be informed or communicate to)

## Detailed Responsibilities

### Area Owner/Operations

- Identify JSA need during planning stage in coordination with Execution Supervisor and Safety
- Actively participate in JSA
- Ensure Operations related hazards are identified and appropriate control measures are defined
- Ensure pre-execution Operational controls are communicated to workforce and implemented

### Execution supervisor

- Ensuring JSA need is evaluated at the job planning stage in coordination with Area Owner and Safety
- Ensure the method of statement is available for the JSA Study
- To identify the JSA Team Leader & Members in coordination with Area Owner and Safety.
- Ensure that JSA is approved and all identified resources are arranged
- Ensuring that identified control measures are implemented before commencement of job in coordination with Lead Executor
- Reviewing and revising JSA as required

### JSA Team Leader

- Lead the team in performing the JSA.
- Ensure the assessment includes a site visit (whenever required, JSA team leader to decide)
- Ensure that team understands the assessment process and what it has to achieve.
- Take responsibility for the quality of the JSA.
- Ensure the assessment team has the necessary knowledge and competence to ensure a suitable and sufficient assessment.
- Ensure all associated documents are referred for hazard identification (for e.g. method of statement, MSDS, P&ID etc.)
- Communicate the identified hazards and control measures to the affected parties

### JSA Team Members

- Actively participate in JSA.
- Provide technical support to identify hazards and control measures
- Assist in the identification of any improvements and deficiencies in the work process.
- Ensure that all hazards are identified and appropriate control measures are defined.

**Lead Executer**

- To ensure all identified control measures are implemented at site
- To ensure JSA is discussed amongst working crews before starts of the job in every shift during TBT and communication is recorded
- To ensure that if there is any abnormal change in conditions during execution of the job is highlighted and JSA is revised and approved accordingly.
- Stop work at any time they are concerned about safety

**Safety Staff**

- Actively participate in JSA need identification process
- Actively participate in performing JSA
- Conducting regular audit for compliance of JSA
- Reporting effectiveness of the JSA process to management.

**Note:** *In case of any confusion/conflict that a job requires JSA or not please consult Safety Department.*

## 8. PROCEDURE METHOD

### JOB SAFETY ANALYSIS (JSA)

JSA procedure requires that jobs with a potential safety hazards are systematically identified and the risk from these jobs are analyzed in such a way that potential injury or equipment damage instances are identified and necessary protections are put in place to eliminate chances of injury or major equipment damage.

### INPUTS SUMMARY

A JSA is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. After identifying uncontrolled hazards, appropriate steps are taken to eliminate or reduce them to an ALARP level.

### JOB SAFETY ANALYSIS

| ID | Activity | **Risk**[1] | Risk register reference | Supporting IT system module | Document reference | Responsible org. position |
|---|---|---|---|---|---|---|
| 8.1 | JSA Need identification | NA | NIL | N/A | Appendix 2 | Area owner, Execution supervisor, Safety Representative |
| 8.2 | Team Formation | NA | NIL | N/A | JSA Worksheet | Execution Supervisor, Area Owner |
| 8.3 | Perform the JSA | NA | NIL | N/A | Appendix 3 | JSA Team Leader |
| 8.4 | Identify the Hazards/Environmental Impacts | NA | NIL | N/A | Appendix 4 | JSA Team |
| 8.5 | Control the Hazards (Follow hierarchy of controls) | NA | NIL | N/A | Checklist for the JSA | JSA Team |
| 8.6 | Approval of JSA | NA | NIL | N/A | JSA Worksheet | Principal Engineer, Production Engineer, HOD |
| 8.7 | Implementation | NA | NIL | N/A | JSA Worksheet | Lead Executer |
| 8.8 | JSA Communication | NA | NIL | N/A | LMRA- Last minute risk assessment, Toolbox talk | Lead Executer |
| 8.9 | Review of JSA | NA | NIL | N/A | PR-PSS-127 | JSA Team Leader |

| ID | Activity | Risk[1] | Risk register reference | Supporting IT system module | Document reference | Responsible org. position |
|---|---|---|---|---|---|---|
| 8.10 | Continuous improvement | NA | NIL | N/A | PR-PSS-127 | JSA Team Leader |
| 8.11 | Training | NA | NIL | N/A | PR-PSS-127 | JSA Team Leader |

## PROCEDURE COMMENTARY

### 8.1 JSA NEED IDENTIFICATION

The JSA need identification is performed during the job planning phase.
For activities mentioned in Appendix-6 JSA is mandatory.
In all other cases the need for a JSA need to be identified by Area owner, Execution Supervisor and Safety representative taking into account the criticality/risk of the job (Team can refer to JSA need identification form, Refer Appendix-2).
For any conflict/confusion Safety Team can be consulted.

### 8.2 JSA TEAM FORMATION

JSA meeting shall be initiated by the Execution Supervisor or Area Owner/Operations.
The team shall consist of at least three members (Execution representative, area owner and Safety representative) however, subject specialists such as Shift Supervisor, Process Engineer, Industrial Hygienist, Environmental Experts, Contractor Representative or any other required personnel can be included. The JSA (Team Leader) must have been trained on JSA and will facilitate the process.

### 8.3 PERFORMING THE JSA

JSA has three main stages-

- Breaking the job in to steps
- Hazards identification
- Hazard mitigation/control.

The aim of the process is to minimize the likelihood or consequence of a particular risk to a level that is as low as reasonably practicable and accepted.
Before carrying out a new JSA, information on the job should be gathered. This could consist of existing Risk Assessment, Method of Statements, MSDS, procedures, joint ( asset owner & Execution) site inspection, incident investigation report etc.
Any previously prepared JSA can be used for similar job but the contents shall be verified and validated for the specific job on hand by ensuring all hazards associated with the job is identified and controlled.

JSA should be performed by using the JSA worksheet (Refer to Appendix-3).
Job shall not start unless all the controls/ precautions specified within the JSA are in place.
Approved JSA copy shall be available with the lead executer and attached with PTW in the field during the job activity

### 8.4 IDENTIFYING THE HAZARDS / ENVIRONMENTAL IMPACTS

The team must brainstorm on each identified job steps asking questions such as "what could go wrong?" or "what might be harmed" to identify the associated hazards. Each step should be examined carefully to identify hazards- the action, condition and possibilities that could lead to an incident (Refer to Hazard identification checklists as a guidelines, Appendix-4)
Job site can be visited by the JSA team to look into location specific conditions such as access & egress, escape routes, high noise, surrounding equipment, and structures etc.
Hazards associated with the job steps (Physical, chemical, biological, ergonomic, psychological) are identified and recorded in the "Hazards or Potential Incidents" column of the JSA worksheet.
To ensure a thorough analysis the following questions should be answered for each step of the job task;

- **Where** it is happening (environment),
- **What** it is happening to (exposure),
- **What** can actuate the hazard (trigger),
- The **outcome** that would occur should it happen (consequence),
- **How** to prevent from actuation (Controls)
- **What** response is required if triggers (Response plan)
- Any other contributing factors.

Human factor will increase the probability of failure. Human error situation shall be identified and necessary actions to be implemented to lower down the probability of human error

### 8.5 CONTROLLING THE HAZARDS

This should explain "what" and "how" things need to be done to eliminate or minimize the hazards.
The JSA team should examine each of the job steps and associated hazards and provide solutions to control the hazards in order to minimize the risk to ALARP.
When identifying the control measures to minimize risk, all aspects of risk (Health, safety & environment) should be considered and following hierarchy of controls to be followed:

a) **Eliminate**: Complete removal of hazard, e.g. use flanged fittings instead of welded, thereby removing hot work.
b) **Reduce / Substitute**: Using a less hazardous material or work method in order to reduce risk, or reducing the frequency of the activity or task. E.g. using brush painting instead of spray painting.

c) **Isolate / segregate:** Activities undertaken to isolate a hazard from impacting on people or the environment (e.g. lock-out / tag-out procedures, blinding of lines etc.).
d) **Procedures / Administration**: Working methods used to mitigate risk. E.g.; minimize exposure by rotating workers.
e) **PPE:** This is the last defense in the risk reduction hierarchy. E.g. appropriate PPE for hazards anticipated.
f) Requirements for PPE other than minimum required PPE for unit entry must be noted explicitly / precisely (e.g. breathing respirator, leather gloves) on the JSA worksheet.

Each control measure or precaution shall be specific and general statements such as "work carefully" shall be avoided

- Be specific; say exactly what needs to be done to address the hazard.
- Avoid general statements. Give a recommended action or procedure for every hazard.
- The control measures shall be doable and work crew should know and understand and shall be able to do it.

### 8.6 APPROVAL OF JSA

Approval of JSA to be done by "Principle Engineer / Production Engineer / HOD".

**Note:** *Approving authority / responsibility can be delegated (in case of his absence).*

### 8.7 IMPLEMENTATION

Job must not start unless all the controls / precautions specified within the JSA are in place.

### 8.8 JSA COMMUNICATION

The JSA shall be communicated to all personnel who are involved in the job. In case of jobs going beyond one shift then the JSA shall be communicated at the start of each shift.
The JSA and any associated documentation is to be summarized at the Toolbox meeting to ensure that all personnel involved in the job understand the hazards and control measures.
Any changes to the approved JSA shall be done after approval from approving authority of JSA and changes shall be communicated to all personnel who are involved in the job.
It is the responsibility of Lead Executer to ensure that all personnel in the work team understand the hazards and control measures identified in JSA and that any new member joining the team is fully briefed.

### 8.9 REVIEW OF JSA

In the following cases the JSA must be reviewed and revalidated by all parties.

- There is a change in job scope.
- New hazards are identified at the job site that require new mitigation measures.
- Method of Statement has changed.
- Working conditions have been changed (e.g. abnormal weather, plant condition change etc.)

### 8.10 CONTINUOUS IMPROVEMENT

Upon completion of the job a briefing needs to be conducted among work team to discuss any learned lesson.
If required the original JSA should be updated to reflect the most recent improvements with respect to hazard identification and hazard control or mitigation techniques learned through the completion of the job.

**Note***: All JSAs kept in record and to be reviewed & revalidated before using again.*

### 8.11 TRAINING

JSA team leader shall be trained on JSA Procedure
Training will cover the following topics;

- When to conduct a JSA
- JSA process
- Hierarchy of risk reduction control measures
- Common workplace hazards
- Individual responsibilities

## 9 RECORDS

Area Owner to record the JSA in their department specific folder in P Drive

| # | Document / Record ID | Document / Record name | Responsible department or section |
|---|---|---|---|
| 1 | JSA | JSA Records | JSA Owner |

# 10 APPENDIX

## 10.1 SERVICE LEVEL DEFINITION

The key services and service levels listed below are required to complete the activities contained within this procedure

| # | Service | Service level | Service provider | Service customer |
|---|---|---|---|---|
| 1 | | NA | | |

## 10.2 APPENDIX 2

JOB SAFETY ANALYSIS NEED IDENTIFICATION FORM

| JSA Need Identification Form | | |
|---|---|---|
| Probability | P | |
| Impact / Consequences | C | |
| Risk Rating | R= P x C | |

- If Risk rating high and extreme, JSA is required for the job.
- If Risk rating is low and medium hazards, JSA is not mandatory, job risks can be assessed with PTW system.

| Consequence | HSSE | INTEGRATED RISK MATRIX | | | | |
|---|---|---|---|---|---|---|
| 5 = Catastrophic | - Multiple fatalities/ Multiple irreversible disabiliities<br>- Explosion or Fire in Multiple units / Tanks.<br>- Toxic gas leak with offsite impact (>IDLH Limit)<br>-Hostage or terrorist attack | M | H | E | E | E |
| 4 = Major | - Single fatality or Permanent disability to multiple persons<br>- Single unit / tank fire<br>- Toxic gas leak (>IDLH) with no offsite impact<br>- Significant flammable gas / liquid leak<br>- Unauthorized access to QAPCO process / sensitive area or forceful access to QAPCO | M | M | H | E | E |
| 3 = Serious | - Lost Time Injury (LTI) to one person or more.<br>- Fire in process area<br>- Small toxic, flammable or gas / liquid leak.<br>-Unauthorized access to QAPCO premises from access point | L | M | M | H | E |
| 2 = Moderate | - Medical Treatment Injury (TRI) (MTC & RWC) to a small number of people or Reversible disability requiring hospitalization<br>- Fire in non-process area<br>-Flammable gas/liquid leaks below PSM Tier-2 levels<br>Petty theft/unauthorized access attempt at QAPCO main enterences | L | L | M | M | H |
| 1 = Minor | - First Aid Injury or Minor illness (no hospitalization)<br>- Minor leak with minimal escalation potential<br>- insignificant security breach | L | L | L | M | M |
| | Probability | 1 =Very Unlikely (Incident not known to occur) | 2 = Unlikely (Incident occurs in last 10 years) | 3 = Possible (Incident occurs in last 5 years) | 4 = Likely (Incident occurs once in last 1 year) | 5 = Very Likely (Incident occurs more than once a year) |

## 10.3 APPENDIX 3

## JOB SAFETY ANALYSIS WORKSHEET

| **JOB SAFETY ANALYSIS (JSA)** | | | |
|---|---|---|---|
| **Job Being Analyzed:** | | **Date:** | |
| **Dept./Section doing JSA:** | | **JSA Members:** | |
| **Supervisor Name:** | | | |
| **Main Contractor:** | | | |
| **Work Area / Work Specific Location:** | | | |
|  | | | |
| **Task Over View:** | | **Process Safety Hazards:** | |
| **JSA Performing Team** | **Execution Resp.** | **Production/Area Owner Rep.** | **Safety Resp.** |
| | Department: | Department: | Department: |
| | Name: | Name: | Name: |
| | Signature: | Signature: | Signature: |
| **JSA Approved by** | **Principle Engineer / Production Engineer / HOD** | Department: | Name: |
| | | Date: | Signature: |
| **JSA Revalidated by** | **Principle Engineer / Production Engineer / HOD** | Department: | Name: |
| | | Date: | Signature: |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Prepared by** | Safety Engineer | **Reviewed by** | HSSESM | HSSEGM | CPGM | MGM (SC/PE) & Vinyl | TGM | EGM | CHSSEO | COO | **Approved by** | MD & CEO |

| HAZARD IDENTIFICATION AND RISK MANAGEMENT | | | | |
|---|---|---|---|---|
| **Step No.** | **Task Steps** | **Potential Hazards** | **Controls Measures** | **Action/Responsible Party** |
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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Prepared by** | Safety Engineer | **Reviewed by** | HSSESM | HSSEGM | CPGM | MGM (SC/PE) & Vinyl | TGM | EGM | CHSSEO | COO | **Approved by** | MD & CEO |

## 10.4 APPENDIX 4

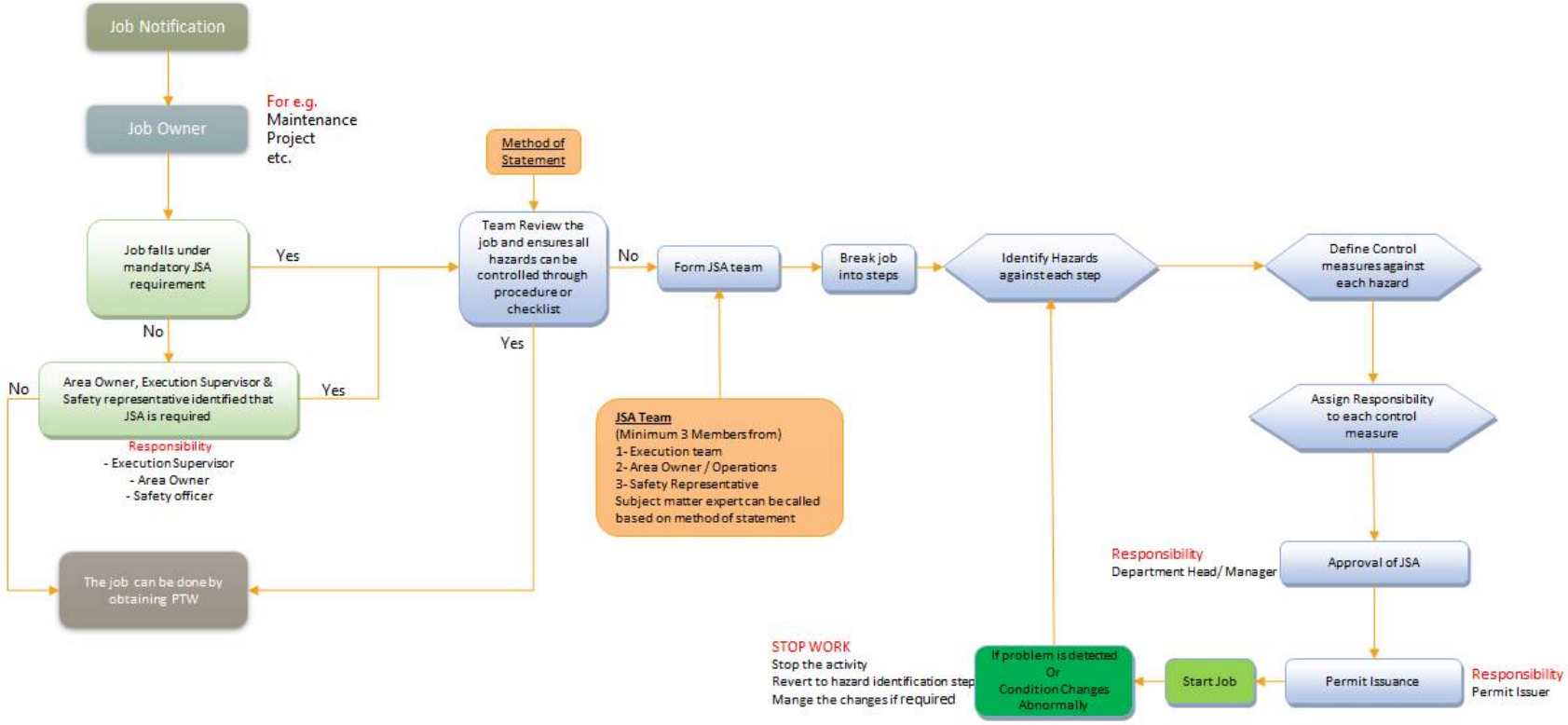
## HAZARD IDENTIFICATION CHECKLIST AS GUIDE

| HAZARDS OF THE TASK (H) | THE CONTROLS FOR THE TASK HAZARDS (C) | YES? |
|---|---|---|
| Working at Height | 100% tie off, Green tag on scaffold, and secure ladders, awareness of working overhead, Work at Height training. | |
| Slips Trips and Fall Potential | Good Housekeeping, access free from obstructions. | |
| Proximity to electrical switchboards (400V+) | Permit to work for close proximity to electrical equipment | |
| Injury from use of defective or invalid hand tools | Good condition, inspected, proper tools, right tool for the job | |
| Scaffolding | Green tag on scaffold, Work at Height training | |
| Lifting operations | Barricade, Color code on rigging gear, Qualified rigger in work team | |
| Road Transport, Moving equipment and vehicles | Special care, barricades, observers, high visibility vest | |
| Excavation | Excavation Certificate, PTW system | |
| Confined Space | Confined Space Certificate, PTW system, Hole Watch, Gas Test | |
| Poor Lighting / Low Visibility | Artificial lighting, High visibility vest | |
| Falling Objects | PPE, Housekeeping, Tied off tools, awareness of overhead work, safety net on scaffolding | |
| High Ambient temperature / Physical conditions | Proper acclimatize, fluids available, Heat Stroke flag, regular breaks | |
| Fatigue / Physical tiredness | Managed work breaks, look out for your buddy | |
| Dust | Eye protection, dust masks | |
| Hot Work / Fire | Area free of combustible materials, fire-watch, Fire extinguisher / blankets, Water hose | |

| | | |
|---|---|---|
| Grinding / Sandblasting | Correct PPE (Eye protection, face shields, gloves, other) | |
| Manual Handling | Assess manual lift before starting work. | |
| Rotating Equipment | Machinery Guarding, Lock Out Tag Out, Zero Energy | |
| Hot Surfaces | Correct PPE, guarding and signage | |
| Sharp and Jagged Objects | Correct PPE, guarding, re-bar caps in place | |
| Nearby work / employees | Supervisor to co-ordinate access and communicate | |
| Hydro-testing / Drowning | Barricades, Permit, Correct PPE, life vests, | |
| Pressurized systems | Certified equipment, barricades, signage, awareness | |
| Exposed man-holes & incomplete structures | Hard barricades, signage and covers, grating removal permit | |
| Loss of chemical containment / fumes | Correct PPE, material correctly stored, MSDS, spill kits | |
| Vermin, disease | Good housekeeping. Only eat in approved location | |
| Vibrating equipment | Rotating work teams, Correct PPE | |
| Noise | Correct PPE | |
| Oxygen deficient atmosphere & inert gases | Confined space permit. Purging barricades. Awareness of pressurized vessels | |
| Radiation and X-Ray emissions | Barricades, warning signs, NDE permit | |
| Other(s): | | |

## 10.5 APPENDIX 5

### JSA PROCESS FLOW CHART




| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Prepared by** | Safety Engineer | **Reviewed by** | HSSESM | HSSEGM | CPGM | MGM (SC/PE) & Vinyl | TGM | EGM | CHSSEO | COO | **Approved by** | MD & CEO |