

**QATAR STEEL COMPANY
(QPSC)**

Procedure	2.32.2.1.03.01
Established	28-Mar-1994
Effective Date	09-Sep-2021
Revision	1.00



PROCEDURE

Hazard Identification, Risk Assessment and Risk Management

**Hazard Identification, Risk Assessment
and Risk Management**

Page 1 of 40

Prepared by:
HSE Department

Issued by:
HSE Department

QATAR STEEL COMPANY (QPSC)

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REVISION HISTORY

Revision No.	Issue Date	Amendment Description	Date Effective	Date to be Revalidated
00	28-Mar-2004	First Issue.	28-Mar-2004	30-Dec-2007
01	30-Dec-2007	Revised (introduced new logo and name).	30-Dec-2007	30-Dec-2010
	30-Dec-2010	Checked and found OK.	30-Dec-2010	26-May-2013
02	26-May-2013	As per OSHA procedure name changed from 'Evaluation and Control of Safety and Occupational Health Risks' to 'Hazard Identification, Risk Assessment and Determining Controls'.	26-May-2013	25-May-2016
03	12-Jun-2016	Complete review. Hazard identification, control measures according to hierarchy/types of hazard, revised HIRA register with document number, revision number, next revision date, area in charge having emergency preparedness.	12-Jun-2016	11-Jun-2019
04	16-Feb-2018	Extensive review to produce an integrated Hazard Identification, Risk Assessment and Risk Management procedure including HIRA, MMI and JSA.	16-Jan-2018	10-Mar-2020
05	08-Mar-2020	Template updated. Extensive review. JSA format updated.	08-Mar-2020	07-Mar-2023
1.00	01-Sep-2021	MMI Section Removed. HIRA process flow updated. More detailed explanation on the HIRA methodology was included. Instruction for HIRA/JSA worksheet template completion was provided.	09-Sep-2021	08-Sep-2024

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1. INTERNAL CONTROLS

1.1 REVIEW of PROCEDURES

To assure Managements, Shareholders and External agencies confidence in the company's policies & practices, QATAR STEEL Internal Audit may verify compliance with this procedure. [Department Owner] shall review this procedure every three years to ensure that it continues to serve the purpose intended.

1.2 EMPLOYEE RESPONSIBILITIES

All employees of the company are required to observe and abide with this procedure.

1.3 APPROVAL

This procedure and any amendments made thereto; require the following approvals.

AUTHORITY



Approved By:
Abdulrahman Ali Al-Abdulla
Managing Director & Chief Executive Officer (MD&CEO)


DATE

13/09/2021



Checked By:
Alexander Stramrood
Manager – HSE Department

05-Sept-2021



Drafted by:
Ali Jaber H. K. Al-Athba
Manager – Steel Making
Risk Management Functional Committee Chairman

02-sept-2021

This document has been reviewed by Document Controller. It complies with the requirements of policy 1.12.0.1.01.01 and it is considered ready for issue.

Signed by  Date 02-Sept-2021

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2 PURPOSE

The purpose of this procedure is to:

1. Ensure that risk management is embedded in Qatar Steel Company's culture and practices;
2. Ensure a systematic approach to risk management;
3. Ensure that hazards are identified, risks are evaluated and appropriate control measures are implemented and monitored; and
4. Describe specific risk assessment methodologies which can be applied and against which compliance can be measured.

3 SCOPE

This procedure shall apply to all workplace hazards and risks, and all activities undertaken by Qatar Steel and include:

1. The routine , and non-routine, activities of all persons having access to the workplace;
2. Hazards associated with plant, machinery and equipment;
3. Hazards associated with substances and materials in the workplace;
4. Hazards originating outside of the workplace that could adversely affect the work environment;
5. Hazards associated with inclement weather or emergency situations; and
6. The complete lifecycle of facilities from specification through to decommissioning and disposal.

4 PROCEDURE

4.1 ABBREVIATIONS

ALARP:	As Low As Reasonably Practicable
EAM	Enterprise Asset Management
FRA:	Fire Risk Assessment
HAC:	Hazardous Area Classification
HAZOP:	Hazard and Operability Study
HIRA:	Hazard Identification and Risk Assessment
JSA:	Job Safety Analysis
HSE	Health, Safety and Environment
MAWP	Maximum Allowable Working Pressure
MMI:	Man, Machine Interface
MSDS:	Material Safety Data Sheet
OEM:	Original Equipment Manufacturer

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O&M: Operations and Maintenance
 PDF: Portable Document Format
 P&ID: Piping and Instrumentation Diagram
 PFD: Process Flow Diagram
 PPE: Personal Protective Equipment
 RACI: Responsible, Accountable, Consulted, Informed
 SOP: Standard Operating Procedure
 QSC: The Qatar Steel Company

Definitions:

Routine Activity:	Routine work are jobs and tasks done at certain defined intervals, to facilitate the normal operation of the plant.
Non- Routine Activity:	<p>Non-routine work are jobs and tasks that are performed irregularly or being performed for the first time.</p> <p>Since these tasks and jobs are not performed regularly, it can be difficult to understand all of the hazards associated with the job.</p> <p>Non-routine work includes jobs or tasks that are, (But not limited to):</p> <ul style="list-style-type: none"> • Performed infrequently; • Outside of normal duties; • Do not have a documented procedure; • Performed in a different way from documented procedure; • Have never been performed before; and • Routine tasks that carry a high level of risk.
Hazard:	A hazard is any chemical or physical condition that has potential to cause damage to people, assets and/or the environment.
Probability:	Probability is the likelihood or chance of an event occurring
Risk:	Risk is defined as the measure of human injury, environmental damage, or economic loss in terms of both the incident likelihood & the magnitude of the loss or injury.
Residual risk:	Residual risk is the risk remaining, associated with a job or an activity after the precautions are taken.
Severity:	Severity describes the highest level of damage possible when an accident occurs from a particular hazard.
Risk Ranking:	Numerical value given to the level of risk based on risk matrix.
Controls:	Precautions put in place to reduce the risk.

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The risk management process can be divided into five steps:

1. Identify the hazards;
2. Identify who is at risk or what can be damaged and how;
3. Evaluate the risk and identify any additional control measures necessary to reduce the risk to As Low as Reasonably Practicable (ALARP);
4. Implement the control measures in the workplace; and
5. Monitor and review the effectiveness of the control measures.

The aim should be to eliminate the hazard or risk wherever practicable. Where it is not possible to eliminate the risk then a hierarchy of controls can be applied ranging from substitution (i.e. the use of less hazardous substances, materials, equipment or processes), through to the application of engineering or administrative controls, and finally the use of personal protective equipment (PPE).

Qatar Steel employs the use of two interrelated processes for the assessment and control of workplace risks:

1. Hazard Identification and Risk assessment (HIRA);
2. Job Safety Analysis (JSA).

At the highest level in the risk assessment hierarchy is the HIRA. This is used to evaluate the hazards, risks and controls associated with QATAR STEEL facilities and jobs. JSA process shall be used to provide another level of detail.

Where the HIRA process identifies risks associated with the operation and maintenance of machinery then risk relevant to man machine interface to be considered. For the purposes of this procedure machinery shall include:

1. Moving equipment (rotating and reciprocating);
2. Pressure vessels with an internal diameter more than 152 mm and a maximum allowable working pressure (MAWP) more than 15 psig; and
3. Static equipment with a surface temperature more than 700°C.

The JSA process shall be applied for non-routine activities which are not covered in HIRA & all contractor activities. This process breaks jobs up into a series of sequential activities and is used to assess the hazards, risks and controls associated with each activity.

An overall, high-level flow diagram for the risk management process is given as **Figure 1**

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4.2 HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA)

The objective of the HIRA process is to provide a systematic basis for the identification of hazards, risks and controls associated with Qatar Steel facilities and activities and to ensure that all risks are maintained at As Low as Reasonably Practicable (ALARP) level. It is intended to be a working document that Qatar Steel personnel can use to help them understand the workplace risks and manage them effectively. The identification, implementation and maintenance of effective controls is key to ensuring that all workplace risks are appropriately managed. Employee and contractor participation, consultation and communication are key to a successful outcome.

4.2.1 Applicability

The HIRA process shall address:

1. Routine, and non-routine, activities;
2. Hazards associated with plant, machinery and equipment;
3. Hazards associated with substances and materials in the workplace;
4. Hazards originating outside of the workplace that could adversely affect the work environment;
5. Hazards associated with inclement weather or emergency situations; and
6. The complete lifecycle of facilities from specification through to decommissioning.

4.2.2 Methodology

A flow diagram for the HIRA process is given as **Figure 2**. The worksheet given in **Appendix 1 - HIRA Worksheet** shall be used to record the results of the analysis. A team member shall be nominated to facilitate the HIRA sessions and another to compile the worksheet as the analysis progresses. The role of the facilitator is to: lead the team; prompt the brainstorming effort; manage the discussion without compromising creativity; identify the key issues; and ensure that the worksheet accurately reflects the points discussed.

The HIRA process can be broken down into the following basic steps:

1. Select the job which is to be considered;
2. Describe the job which is to be carried out;
3. Brainstorm all the potential hazards and risks associated with the job;
4. For each identified hazards, elaborate the worst-case scenario that may occur without considering any safeguards or existing controls;
5. List down the existing controls to prevent and/or minimize impact of the consequence;
6. Evaluate the probability, severity in terms of people, asset, environment, company reputation and assess the level of current risk considering the existing controls are

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in place;

7. Identify any remedial action / additional controls required for further risk reduction mentioning a responsible party, target date and action status. When the target date is passed, the action status has to be changed. If no additional action then the remedial action field should mention "Nil" and residual risk will remain same as current risk;
8. If an engineering control is introduced as remedial action, the severity or probability or both can be reduced more than one order of magnitude (i.e.; 4C to 2C or 3D to 3B). If an administrative control is introduced the severity or probability or both cannot be reduced more than one order of magnitude (i.e.; 4C to 3C or 3D to 3C). This is due to the fact that, administrative controls are easy to breach, requires regular monitoring on the implementation, whereas an engineer control act as an active barrier;
9. Assess the residual risk following implementation of the proposed actions or controls. The credit of risk reduction can only be taken with reduced risk ranking on the residual risk if recommended additional action item has been implemented and there is a "Closed" status of remedial action. After implementing additional control, it should remain in same column irrespective of any HIRA revision with status "Closed" so that the difference can be easily identified between "Current Risk" with existing control & "Residual Risk" with additional control. With "Open" status of remedial action, the residual risk will be same as the current risk; and
10. Select the next area of the plant or the next job and repeat the above mentioned process until the HIRA is complete.

The checklist of potential hazards and controls given in **Appendix 2 - Checklist of Potential Hazards** can be used by HIRA assessment teams. This checklist is only intended to be a prompt and is not a substitute for the effective implementation of the HIRA process by knowledgeable and experienced personnel. The teams should have access to any supporting information or documentation that might add value to the assessment such as details of previous incidents, Process Flow Diagrams (PFDs), Piping and Instrumentation Diagrams (P&IDs), Material Safety Data Sheets (MSDS) plant layouts etc.

The Qatar Steel qualitative risk matrix shown in **Figure 3** shall be used to assess the probability of occurrence and potential severity of the scenarios considered, which will in turn define the level of risk (i.e. no risk, low risk, medium risk or high risk). The risk is assessed based on the potential impact on people, assets, the environment and company reputation. The risk level recorded in the HIRA worksheet is taken to be the highest observed for these four categories. Further guidance on how to assess the severity of the consequences is given in **Appendix 4 -Consequence and Frequency Category Definitions**.

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Where the HIRA process identifies risks associated with the operation and maintenance of machinery then risk relevant to man machine interface to be considered. The JSA process shall be applied for non-routine activities which are not covered in HIRA & all contractor activities.

4.2.3 Risk Acceptance

Based on the risk level, as derived from the Qatar Steel risk matrix (*Figure 3*) and assigned during the HIRA assessment, the following actions shall be taken to ensure effective risk management.

High Risk

If the residual risk is high, then the operation or activity shall be stopped until additional controls can be implemented or an alternative process or activity can be found that will reduce the risk to an acceptable level.

Medium Risk

If the residual risk is medium, then the assessment team needs to be satisfied that the identified controls are implemented and effective and that no additional controls can be identified to further reduce the risk (i.e. the risk is ALARP).

Low Risk

If the residual risk is low, it is still important to make sure that the identified controls are implemented and effective and to be aware of further opportunities for improvement.

4.2.4 The Assessment Team

The selection of the assessment team has a direct effect on the usefulness and quality of the HIRA process. The assessment team shall consist of personnel that are knowledgeable about the plant being considered, its operation and maintenance, the materials used and the activities to be undertaken. The team can be relatively small but it should contain sufficient knowledge and expertise to be able identify all the hazards and the risks associated with the plant and the activities.

The assessment team should include: the plant supervisor/engineer for the plant; operations representatives (supervisor, senior operator) due to familiarity with the operation of the unit/plant; maintenance representatives (supervisor, senior technician) due to having specific knowledge about the control and safeguarding of unit/plant and an HSE representative. The HSE representative shall ensure consistency of approach and provide input on the hazards, risks and the potential severity of the consequences. Operation or maintenance representative will be involved based on the nature of the task whether it is operational and/or maintenance activity. Where specialist knowledge is required to address specific hazards or risks then additional team members can be temporarily included as necessary.

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4.2.5 Roles and Responsibilities

A RACI chart for the HIRA process shown in **Figure 2** is given as **Table 1**. The RACI chart defines who is responsible and accountable for each step in the process and who needs to be consulted or informed.

4.2.6 Timing of Assessments

HIRAs shall be reviewed and updated when:

1. There is a change to the existing plant or new facilities are added;
2. There is a change to the hazards, operational environment or working conditions;
3. There is a change to the activities undertaken or new activities are proposed; and
4. There has been an accident or high potential near-miss.

Any changes in the HIRA shall be circulated to all concerned agencies and all the changes must be documented. Each HIRA shall be subject to review at least every three years from the date of the last revision if there have been no changes.

4.2.7 Deliverables

The deliverable from the HIRA process shall be a fully completed worksheet that has been assessed by the relevant Engineer or Section Head, reviewed by HSE and approved by the Department Manager. A PDF copy of the approved HIRA shall be added to the HIRA database located on the Qatar Steel computer network. The department management should identify a convenient mechanism to verify that employees understand their SOPs, HIRA and other work support documents apart from acknowledgement. Also, any update on the current HIRA to be communicated within the department to ensure employee involvement.

4.2.8 Verification of Controls

After completion of the HIRA it is the responsibility of the line management of the concerned department to:

1. Disseminate the key findings from the HIRA and specifically highlight any medium or high risks and their associated controls; and
2. To check that the identified controls have been implemented and are being complied with in the field.

Checking the effectiveness of controls can be achieved through the inspection of documentation such as SOPs, method statements, work permits, inspection and maintenance records, training records; and through direct observation.

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4.2.9 Audit and Review

Quarterly audits shall be carried out by the HSE department to check that HIRAs are being carried out in accordance with this procedure and that the associated controls are being implemented in the field. Any non-conformances and corrective actions shall be fully documented and brought to the attention of the relevant Department Manager for action and resolution.

4.3 JOB SAFETY ANALYSIS (JSA)

Job Safety Analysis is an important tool that is used to identify hazards and risks before a job is performed and before they can result in injuries or damage. The aim being to eliminate the hazards or put controls in place to minimize them. Jobs are broken down into a series of steps or tasks. The hazards, risks and controls associated with each task are then identified. The JSA is used to during:

1. Work permits (according to applicability mentioned in section 4.4.1);
2. Toolbox talks;
3. Training materials for new employees; and
4. Refresher training for established employees.

4.3.1 Applicability

A JSA shall be carried out:

1. For non-routine jobs which are not covered in HIRA; and
2. For all contractor activities.

4.3.2 Methodology

A flow diagram for the JSA process is given as **Figure 4**. The worksheet given in **Appendix 6 - JSA Worksheet (Qatar Steel)** shall be used to record the results of the analysis. A team member shall be nominated to facilitate the sessions and compile the worksheet as the analysis progresses. The input for developing a JSA will be the approved method statement or operating procedure from the user department/section.

The job is broken down into tasks each with recognizable starting and end points. If a job contains more than 15 tasks then consideration should be given to splitting the job up into discrete phases (e.g. preparation, execution, and close-out).

The tasks are listed in the worksheet and then the analysis proceeds task by task until all the tasks have been considered. Following review and discussion by the team the following information is added to the worksheet for each task:

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1. The potential safety issue, hazard or risk;
2. The potential causes that could lead to realization of the hazard or risk;
3. The potential severity of the consequences as per the Qatar Steel risk matrix;
4. The controls that needs to be implemented; and
5. The party responsible for implementing the controls.

The checklist of list of potential hazards (**Appendix 2 - Checklist of Potential Hazards**) and controls (**Appendix 3 - Hierarchy of Controls**) can be used by JSA assessment teams. This checklist is only intended to be a prompt and is not a substitute for the effective implementation of the JSA process by knowledgeable and experienced personnel. Where there are potential chemical hazards reference should always be made to the relevant MSDS.

4.3.3 The Assessment Team

The JSA team shall include at least four members. The area supervisor, at least one senior operator or technician, depending on the nature of the job, contractor representative (for project activities) and a HSE representative. The HSE representative shall ensure consistency of approach and provide input on the hazards, risks and the potential severity of the consequences. To ensure that the JSA is both realistic and practical, it is essential that those that will be carrying out the work are responsible for its preparation. Where a job requires specialist knowledge then additional team members should be included as appropriate.

4.3.4 Roles and Responsibilities

A RACI chart for the JSA process shown in **Figure 4** is given as **Table 2**. The RACI chart defines who is responsible and accountable for each step in the process and who needs to be consulted or informed.

4.3.5 Timing of Assessments

JSAs shall be carried out as the need arises. A JSA shall be reviewed and updated whenever there is a significant change to the job or if a high potential near-miss or accident occurs related to the execution of the job.

4.3.6 Deliverables

The deliverable from the JSA process shall be a fully completed worksheet shown in **Appendix 6 - JSA Worksheet (Qatar Steel)** that has been reviewed by the relevant Engineer or Section Head. For Contractor the JSA process shall be fully completed worksheet shown in **Appendix 8 - JSA Worksheet (Contractor)** done by the contractor and then be reviewed by the relevant engineer in accordance with **Appendix 7 - JSA Approval Authorization Form** under whom the contractor is working. The final JSA worksheet will be reviewed and approved by HSE within one (1) week of submission.

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4.3.7 Verification of Controls

After completion of the JSA it is the responsibility of the line management of the concerned department to check that the identified controls have been implemented, and are being complied with, in the field. This can be achieved through the inspection of documentation such as SOPs, method statements, work permits, training records; and through direct observation of jobs.

4.3.8 Audit and Review

Quarterly audits shall be carried out by the HSE department to check that JSAs are being carried out in accordance with this procedure and that the associated controls are being implemented in the field. Any non-conformances and corrective actions shall be fully documented and brought to the attention of the relevant Department Manager for action and resolution.

4.4 ASSOCIATED STUDIES

There are a number of associated studies that are outside the scope of this procedure that can nevertheless provide useful input into the identification of risks and controls.

4.4.1 What-if Analysis Study (What-if)

The What-If Analysis technique is a brainstorming approach in which team members familiar with the process ask questions about possible undesired events. This assessment technique asks a number of questions that begin with "What if" to attempt to identify any associated hazards.

4.4.2 Hazard Operability Study (HAZOP)

A HAZOP is a structured and systematic assessment of processes or operations to identify and evaluate problems that may represent risks to personnel or equipment by examining the impact of deviations from normal operations.

4.4.3 Hazardous Area Classification (HAC)

A HAC assessment involves the evaluation of a manufacturing or process facility to identify areas where potentially flammable atmospheres can occur, to enable the selection of equipment that will minimize the chances of ignition.

4.4.4 Fire Risk Assessment (FRA)

A FRA is used to identify what needs to be done to prevent fires and protect personnel. It is a structured process for identifying fire hazards, the personnel at risk and what can be done to eliminate or reduce the risks.

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4.5 COMMUNICATION AND DISSEMINATION

For the risk assessment and management practices described in this procedure to be effective Qatar Steel personnel must be made aware of the workplace risks and the associated controls. The identification, implementation and maintenance of effective controls is key to ensuring that all workplace risks are appropriately managed. Employee participation, consultation and communication are essential to a successful outcome.

4.5.1 QATAR STEEL COMPANY

This latest version of this procedure shall be made available to all Qatar Steel employees through the Qatar Steel computer network. It is a line management responsibility to ensure that the hazards, risks and controls identified through the application of this procedure are effectively communicated to supervisors and shop floor workers. A wide range of mechanisms are available to achieve this goal, including training, coaching and toolbox talks etc.

4.5.2 CONTRACTORS

Qatar Steel has a responsibility to ensure that its contractors are made aware of the hazards, risks and associated controls that can affect them while working for QSC. It is the responsibility of the Qatar Steel contract supervisor to ensure that these are effectively communicated to contractors prior to the starting work on Qatar Steel facilities.

4.6 RELATED PROCEDURES

- 2.32.1.1.06.01 Emergency Plan
- 2.32.1.1.06.02 Emergency Plan for Radiation Exposure
- 2.32.2.1.01.01 HSE Regulations
- 2.32.2.1.02.01 Incident Reporting, Investigation and Handling of Safety Suggestions
- 2.32.2.1.02.01 Personal Protective Equipment
- 2.32.2.1.02.01 Work Permit System
- 2.32.2.1.11.01 Working at Height
- 2.32.2.1.12.01 Excavation Procedure
- 2.32.2.1.13.01 Confined Space Procedure

4.7 SOURCES OF INFORMATION

Relevant sources of information include:

1. Operation and maintenance manuals;
2. PFDs and P&IDs;
3. Plant layouts;
4. Chemical inventories
5. MSDS;

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6. Incident investigation reports;
7. Standard operating procedures;
8. Work permit audit reports; and
9. External party audits and technical reports.

4.8 AUDIT AND REVIEW

Annual second party audits shall be carried out to check that risk assessment and risk management activities are being carried out in accordance with this procedure. Any non-conformances and corrective actions shall be fully documented and recommendations to be suggested for improvement. This procedure shall be subject to review when an opportunity arises to make a significant improvement, or to address a concern, but the review date shall not exceed three years from the date of the last revision.

4.9 MANAGEMENT OF PROCEDURAL UPDATE

No updates shall be made to this procedure without approval from the QATAR STEEL Risk Management Committee. Any suggestions or recommendations for updates or improvements to this procedure should be submitted in writing to the Risk Management Committee. Each submission should give details of the proposed amendment and the reason why it is considered necessary.

The Risk Management Committee will keep a log of all change requests, prioritize them for action and, subject to his approval, schedule them for inclusion in the next relevant update of the document. The latest version of this procedure shall be made available via the Qatar Steel computer network. Earlier versions shall be retained for a minimum of three years in accordance with the Qatar Steel document management system.

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4.10 REFERENCES

Table 1: RACI Chart for the HIRA Process

Process Step	Department Manager	Engineer/Section Head	Assessment Team
Define scope of the assessment	A	R	I
Form the assessment team	A	R	I
Select area, process or job	A		R
Identify the hazards	A		R
Identify the present controls	A		R
Assign probability and severity	A		R
Determine the current risk	A		R
Identify remedial actions/controls	A	C	R
Identify the responsible party	A	C	R
Determine the residual risk	A		R
Review the HIRA for accuracy and completeness	A	R	C
Add HIRA to database	A	I	R
Verify controls are implemented	A	C	R

Legend

R: Responsible for Carrying out the Activity

A: Accountable for the Outcome of the Activity

C: Must be Consulted

I: Must be Informed

Hazard Identification, Risk Assessment
and Risk Management

Prepared by:
HSE Department

Issued by:
HSE Department

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Table 2: RACI Chart for the JSA Process

	Department Manager	Engineer/Section Head	Assessment Team
Process Step			
Select the job to be analyzed	A	R	I
Form the analysis team	A	R	I
List the job steps	A		R
Select a job step	A		R
List the potential hazards, risks and causes	A		R
Identify the controls and actions	A	C	R
Identify the responsible party	A	C	R
Review the JSA for accuracy and completeness	A	R	C
Add JSA to database	A	I	R
Verify controls are implemented	A	C	R

Legend

R: Responsible for Carrying out the Activity

A: Accountable for the Outcome of the Activity

C: Must be Consulted

I: Must be Informed

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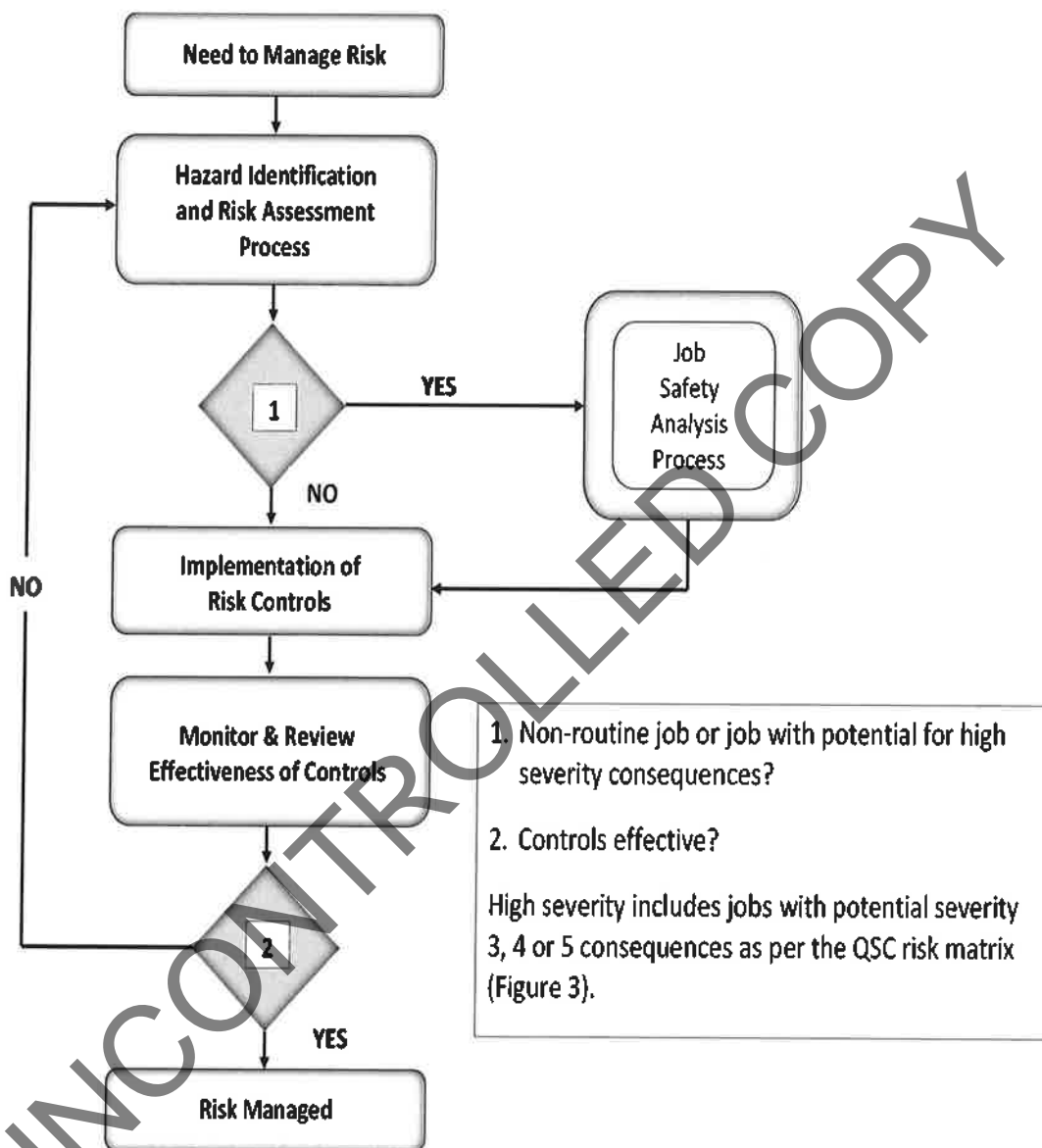
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Figure 1: Overall Risk Management Process



Hazard Identification, Risk Assessment and Risk Management

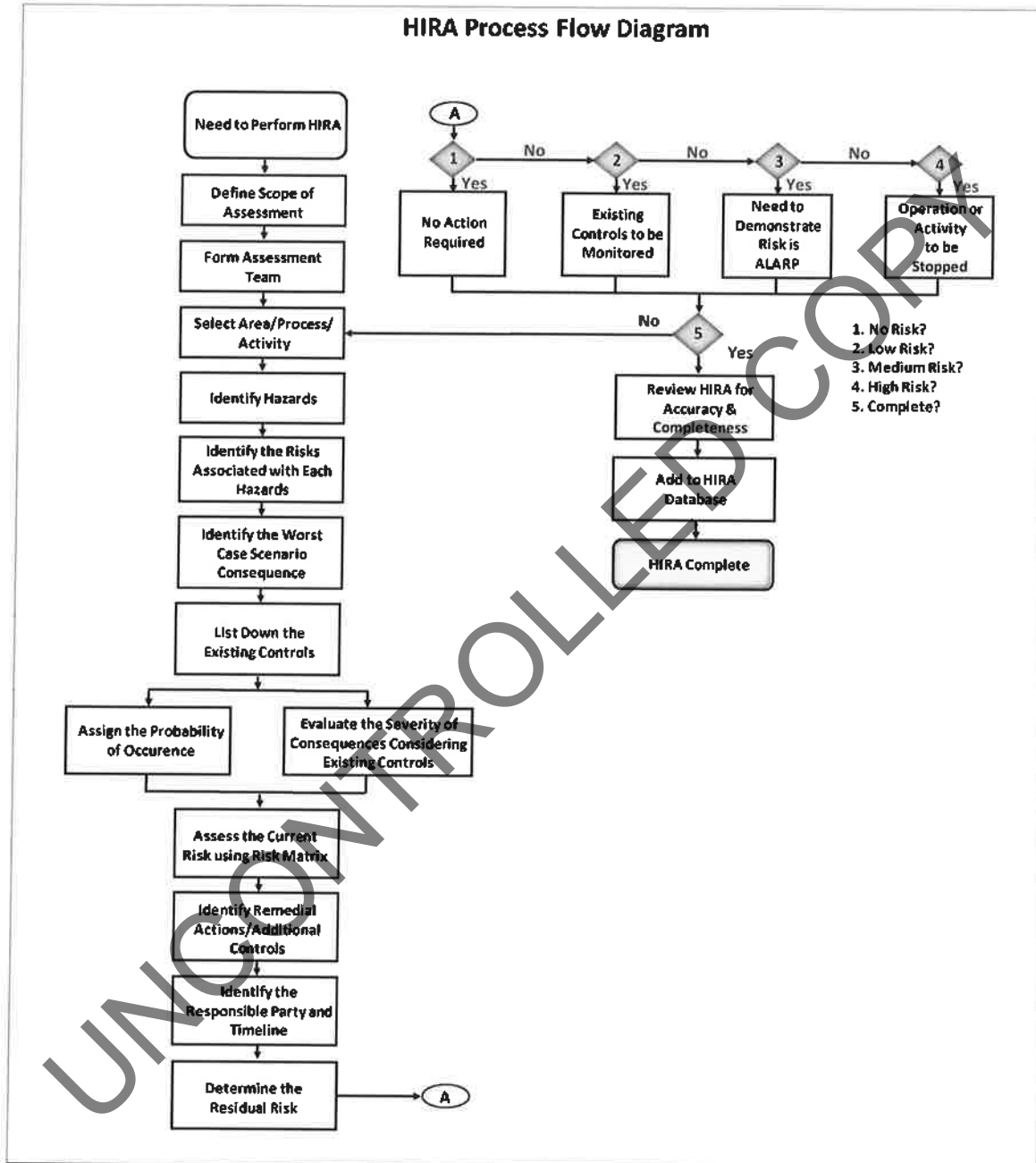
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Figure 2: Flow Diagram for HIRA Process



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Figure 3: Qatar Steel Risk Matrix

Potential Severity	Consequences				Increasing Probability				
	People	Assets and Production	Environment	Reputation	A	B	C	D	E
					Remote Have occurred in the Steel Industry Worldwide but not in Qatar Steel	Unlikely Have occurred in other similar companies but not in Qatar Steel	Occasional Has occurred in Qatar Steel	Likely Occurs several times a year in Qatar Steel	Frequent Occurs several times a year in same location or operation within Qatar Steel
0	No injury	No damage	No effect	No impact	No Risk	Low Risk			
1	Slight injury or health effect	Slight damage, (< QAR 50,000)	Slight effect	Slight impact					
2	Minor injury or health effect	Minor damage (QAR 50,000 to 500,000)	Minor effect	Limited impact		Medium Risk			
3	Major injury or health effect	Local damage (QAR 0.5M to 5,000,000)	Local effect	National impact					
4	Single Fatality or permanent total disability	Major damage (QAR 5M to 25,000,000)	Major effect	Regional impact		High Risk			
5	Multiple fatalities	Extensive damage (>QAR 25,000,000)	Massive effect	International impact					

Hazard Identification, Risk Assessment and Risk Management

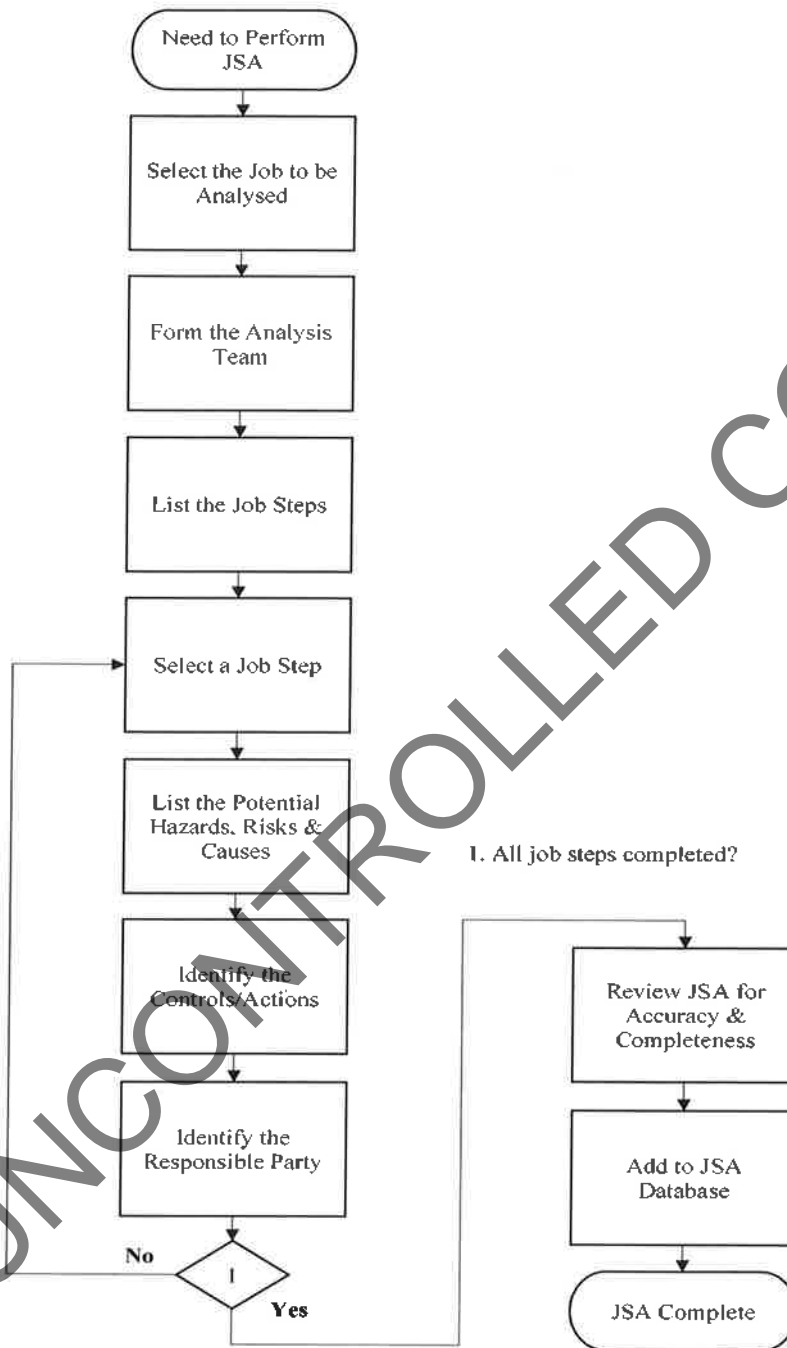
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Figure 4: Flow Diagram for JSA Process



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Appendix 1 - HIRA Worksheet

Department:	HIRA Conducted by:
Area:	List the name of participants who conducted the HIRA as a part of the HIRA team
HIRA Reference:	QSC/Department/Section/Function/Revision No Ex: QSC/DR & Lime/DR-J/DRO-I/Rev1
Date of Issue:	Supervisor: Section Head: Department Manager:

Provide HIRA reference number according to the nomenclature protocol

#	Area or Activity	Hazard What has the potential to cause harm to people, assets or the environment?	Risk What could go wrong and what might happen as a result? Consider worst scenario while evaluating	Consequences Consider worst scenario while evaluating without taking credit of existing controls. Define based on the Risk Matrix in Procedure	Existing Controls What are the existing controls & Countermeasures to reduce the Risk/Hazard	Current Risk (Consider existing controls during current risk evaluation)							Residual Risk (Consider additional controls during residual risk evaluation)							Comments Any additional information to be noted																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
						Probability	People	Assets	Environment	Reputation	Evaluated Risk	Risk Ranking	Remedial Actions Define the additional actions to be implemented to reduce the risk (if required or specify as NIL)	Responsible Party Assign responsibility to ensure that actions are implemented	Target Date Assign target date to ensure that actions are not overdue	Status	Severity						Risk Ranking																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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1	Checking and cleaning control panels and electrical junction boxes for any leaks and defects	Electrical systems	Contact with electricity (static discharge, battery terminal, capacitor discharge) during maintenance activities.	Electrocution, electrical fire, burns leading to personal injury or possible fatality.	1. Earthing and bonding in place; 2. Equipment design e.g. guards/insulation as per standards; 3. SOP requires trained maintenance personnel to conduct work on equipment having hazardous energy sources; 4. Strictly follow the "Permit to work" & Isolation and Lock/ Tag out procedure of QS; 5. QSC approved mandatory PPE must be used during doing this job.	B	4	1	0	2	4B	M	Nil																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

If > additional action is required mention "NIL"

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#	Area or Activity	Hazard What has the potential to cause harm to people, assets or the environment?	Risk What could go wrong and what might happen as a result? Consider the worst scenario while evaluating	Consequences Consider worst scenario while evaluating without taking credit of existing controls to reduce the Risk/Hazard based on the Risk Matrix in Procedure	Existing Controls What are the existing controls & Countermeasures to reduce the Risk/Hazard?	Current Risk (Consider existing controls during current risk evaluation)							Remedial Actions Define the additional actions to be implemented to reduce the risk (if required or specify as NIL)	Responsible Party Assign responsibility to ensure that actions are implemented	Target Date Assign target date to ensure that actions are not overdue	Status	Residual Risk (Consider additional controls during residual risk evaluation)					Comments Any additional information to be noted		
						Probability	People	Assets	Environment	Reputation	Evaluated Risk	Risk Ranking												
Severity																								
2	Cleaning Activity of overflowed slag from Slag pit	Hot Molten Slag	1. Fire due to oil leakage from equipment 2. Fire in wheel loader due to molten slag comes under the tire while cleaning 3. Fire in tires of SPC due to hot piece of slag and floor 4. Burning of electrical components of SPC due to radiating heat 5. Damage to property (wall, heat protection panel of roof or structure) 6. Personnel burn injury	1. Minor burn injury and health effect 2. Local damage to property/asset and loss of production	1. Chain mounted wheel loaders are only assign to work in hot slag handling activities; 2. Heat resistant tires are utilized in SPC; 3. Established communication channel with EF operation and vice versa (SCL & SMD) to inform immediately regarding uncontrolled activity; 4. Routine inspection of wheel loader and chain; 5. Third party certified wheel loader and operator with valid Qatar driving license; 6. Periodic maintenance schedule of equipment in place.	C	2	3	0	1	3C	M	1. Engineering Control: Modification in signal light logic to be conducted after seven minutes of green signal light, it start blinking and once blinking of green signal start means only two minutes are left to turn ON the red light. 2. Engineering Control: Camera installation to be completed in slag pit to monitor the slag pit activities from EF Control room. Recording and playback facility for last 50 days are available. 3. Administrative Control: Do not proceed to work inside the slag pit without getting permission over telephone or TMR from EF operation, if signal light is not working 4. Administrative Control: Visual inspection of tire's chain on daily	SCL & SMD	Aug 2020	Closed	C	1	1	0	0	IC	F	Risk reduction achieved by implementing additional remedial action. Risk reduction achieved for more than one orders of magnitude (to IC) since both "Engineering Controls" and "Administrative Controls" are implemented as additional action. Risk reduction would have been achieved for one magnitude if only "Administrative Controls" were implemented as additional action.

Implementing additional engineering and administrative controls. It is indicated by the "closed" status and completion date "Aug 2020". If implementation was not completed, the credit of these additional safeguards cannot be taken and residual risk remains same as current risk.

Implementing additional control. It should remain in same column (including HIRA revision) with status "closed" so that the difference can be easily identified between current risk with existing controls & residual Risk" with additional control.

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Drafted By (Concerned Department) : **Assessed By (Concerned Department) :** **Reviewed by (HSE Representative) :** **Approved By (Department Manager) :**

If MIM related hazards & risks are identified for any job, the consequences, safeguards/effective control shall be clearly documented against each activities in the HIRA worksheet shown above."

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Appendix 2 - Checklist of Potential Hazards

Safety Hazards	<ul style="list-style-type: none"> Slipping and tripping hazards (e.g. poorly maintained floors) Moving parts of machinery (e.g. belts, flywheels, pinch points) Working at height (e.g. on roofs, from elevated platforms) Pressurized systems (e.g. piping, vessels, boilers) Vehicles (e.g. forklifts, loaders, trailers, cranes) Electricity (e.g. poor wiring, worn cords) Suspended loads Inadequate lighting Confined spaces
Occupational Health Hazards	<ul style="list-style-type: none"> Noise Exposure (e.g. hand-held tools, compressors, engines) Respiratory Exposure (e.g. dusts, fumes, mists, vapors) Ergonomics (e.g. repetition, forceful exertions, awkward postures, vibration, lifting and handling loads) Ionizing radiation (e.g. x-rays, radioactive materials) Extreme temperatures Biological Exposure (e.g. molds, bodily fluids, bacteria, viruses)
Chemical Hazards	<ul style="list-style-type: none"> Inhalation Skin Contact Absorption Injection Ingestion
Fire Hazards	<ul style="list-style-type: none"> Fire/Explosion Hot Work (e.g. grinding, cutting, welding, brazing)
Weather Hazards	<ul style="list-style-type: none"> Heat Flood Wind

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Appendix 3 - Hierarchy of Controls

Elimination	<ul style="list-style-type: none"> Task elimination Hazard elimination
Substitution	<ul style="list-style-type: none"> Safer substances Safer equipment Safer work processes
Engineering Controls	<ul style="list-style-type: none"> Guards Barricades Interlocks Isolation Automation Redesign
Administrative Controls	<ul style="list-style-type: none"> Standard operating procedures Safe working practices Training Supervision Warning signs and signals Job rotation
PPE	<ul style="list-style-type: none"> Safety glasses, goggles, visors Gloves Hard hats Safety shoes, boots Aluminized Jackets Dust masks Respirators Ear protection Safety harnesses
Emergency Response	<ul style="list-style-type: none"> Escape routes Rescue equipment Firefighting equipment Medical support Emergency communications

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Appendix 4 -Consequence and Frequency Category Definitions

Potential Severity	People	Description
0	No injury	No injury or health effect.
1	Slight injury or health effect	First Aid cases or minor discomfort cases e.g. Headache, dust / fumes / gases having irritation in the nose when inhaled - a person can return back to work after a rest.
2	Minor injury or health effect	Reversible injuries or illnesses requiring Medical Treatment (MTC) or Restricted Workday Cases (RWC) for 5 days or but not LTI's. E.g. loss of consciousness from medical reasons only (e.g. diabetes, epilepsy, narcolepsy etc.), needle stick injuries and cuts from sharp objects.
3	Major injury or health effect	Reversible injuries or illnesses resulting in RWCs for more than 5 days or LTIs e.g. Punctured ear drums, fractured ribs or toes, chronic back injuries, loss of consciousness from work-related activities e.g. blow to the head, heat induced.
4	Single Fatality or permanent total disability	Single fatality, permanent disability or irreversible illness such as corrosive burns, amputation.
5	Multiple fatalities	Multiple fatalities or multiple irreversible illnesses. A near miss with potential for multiple fatalities.

Potential Severity	Assets and Production	Description
0	No damage	No financial impact.
1	Slight damage, (< QAR 50,000)	No disruption to operation, estimated cost less than QAR 50,000.
2	Minor damage (QAR 50,000 to 500,000)	Brief disruption to operation, estimated cost of QAR 50,000 to 500,000
3	Local damage (QAR 0.5M to 5,000,000)	Partial shutdown of operation, estimated cost of QAR 500,000 to 5,000,000.
4	Major damage (QAR 5M to 25,000,000)	Partial loss of operation; estimated cost between QAR 5M to 25,000,000.
5	Extensive damage (>QAR 25,000,000)	Substantial or total loss of operation with estimated cost in excess of QAR 25,000,000.

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Potential Severity	Environmental	Description
0	No effect	No impact to the environment.
1	Slight effect	No lasting effect. Low-level impacts on biological or physical environment, local environmental risk within the fence and within the system. Clean up within days.
2	Minor effect	Minor short-medium term damage to small area of limited significance. Single exceeding of statutory or prescribed limits; single complaint; no permanent effect on the environment. Clean up within weeks.
3	Local effect	Moderate short-medium term widespread impacts, repeated exceeding of statutory or prescribed limits and beyond fence or neighborhood. Clean up within months.
4	Major effect	Severe environmental damage; Qatar Steel is required to take extensive measures to restore the contaminated environment to its original state; extended exceeding of statutory or prescribed limits. Clean up within months – years.
5	Massive effect	Persistent severe environmental damage or severe nuisance extending over a large area; in terms of commercial or recreational use or nature conservancy, a major economic loss for Qatar Steel; constant high exceeding of statutory or prescribed limits. Long term clean up required.

Potential Severity	Reputation	Description
0	No impact	No reputational impact.
1	Slight impact	Public awareness may exist but there is no public concern.
2	Limited impact	Some local public concern; some local media or local political attention with potentially adverse aspects for Qatar Steel operations.
3	National impact	National public concern; extensive adverse attention in the national media. Significant difficulties in gaining approvals.
4	Regional impact	Extensive adverse attention in the regional media; regional public and political concern. May lose consent to operate or not gain approval. Management credentials are significantly tarnished.
5	International impact	Extensive adverse attention in international media; international public attention. Consent to operate threatened. Reputation severely tarnished.

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Potential Probability	Qualitative Definition	Description
A	Remote	Have occurred in the Steel Industry Worldwide but not in Qatar Steel. Almost inconceivable that event will happen in Qatar Steel.
B	Unlikely	Have occurred in other similar companies but not in Qatar Steel. Not likely to happen (but could) in Qatar Steel.
C	Occasional	Has occurred in Qatar Steel. An activity or event occurs infrequently or irregularly.
D	Likely	Occurs several times a year in Qatar Steel. The event is repeatable and occurs often if events follow normal patterns.
E	Frequent	Occurs several times a year in same location or operation within Qatar Steel. Will be continuously experienced unless action is taken to change events

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Appendix 5 – Guidelines to check for Potential Hazards for MMI

Physical Hazards

Hazard Type	Potential Consequences
Mechanical	
1. Acceleration/deceleration	Being thrown
2. Kinetic energy	Crushing
3. Angular parts	Cutting or severing
4. Approach of a moving element to a fixed part	Drawing-in or trapping
5. Cutting parts	Entanglement
6. Elastic elements	Friction or abrasion
7. Falling objects	Impact
8. Gravity	Injection
9. Stored energy	Shearing
10. Height from the ground	Slipping, tripping or falling
11. High pressure	Stabbing or puncturing
12. Machinery mobility	Suffocation
13. Moving elements	Being run over
14. Rotating elements	
15. Surface finish (rough or slippery)	
16. Sharp edges	
17. Instability	
18. Vacuum	
Electrical	
1. Arc	Chemical effects
2. Electromagnetic phenomena	Effects on medical implants
3. Electrostatic phenomena	Electrocution
4. Live parts	Falling or being thrown
5. Insufficient distance from live parts under high voltage	Fire
6. Overload	Projection of molten particles
7. Parts becoming live under fault conditions	Shock
8. Short-circuit	Burn
9. Thermal radiation	
Thermal	
1. Explosion	Burn
2. Flame	Dehydration
3. Objects or materials with a high or low temperature	Discomfort

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4. Radiation from heat sources	Frostbite
	Injuries from radiated heat
	Scald
Noise	
1. Cavitation phenomena	Discomfort
2. Exhaust system	Loss of awareness
3. High-speed gas leak	Loss of balance
4. Manufacturing process (e.g. stamping, pressing, grinding)	Permanent hearing loss
5. Moving parts	Stress
6. Scraping surfaces	Tinnitus
7. Unbalanced rotating parts	Tiredness
8. Whistling pneumatics	
9. Worn parts	
Vibration	
1. Cavitation phenomena	Discomfort
2. Misalignment of moving parts	Low-back disease
3. Mobile equipment	Neurological disorder
4. Scraping surfaces	Osteoarticular disorder
5. Unbalanced rotating parts	Trauma of the spine
6. Vibrating equipment	Vascular disorder
7. Worn parts	
Radiation	
1. Ionizing radiation source	Burn
2. Low-frequency electromagnetic radiation	Damage to eyes and skin
3. Optical radiation (IR, visible, UV), including laser	Effects on reproductive capability
4. Radio frequency electromagnetic radiation	Genetic mutation
	Headache, insomnia, etc.
Materials/Substances	
1. Aerosol	Breathing difficulties, suffocation
2. Biological and microbiological (viral or bacterial) agent	Cancer
3. Combustible	Corrosion
4. Dust	Effects on reproductive capability
5. Explosive	Explosion
6. Fiber	Fire
7. Flammable	Infection
8. Fluid	Mutation

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9. Fume	Poisoning
10. Gas	Sensitization
11. Mist	
12. Oxidizer	

Hazardous Tasks

Transport
1. Lifting
2. Loading
3. Packing
4. Transportation
5. Unloading
6. Unpacking
Assembly, Installation and Commissioning
1. Preparations for installation (e.g. foundations, vibration isolators)
2. Assembly of the machine
3. Fixing, anchoring
4. Connection to energy supplies (e.g. electricity, compressed air)
5. Connecting to disposal system (e.g. for exhaust gases, waste water)
6. Adjustment of the machine and its components
7. Fencing
8. Feeding, filling, loading of ancillary fluids (e.g. lubricants, adhesives)
9. Testing
10. Running the machine without load
11. Trials with load or maximum load
12. Demonstration
Setting, Teaching, Programming and/or Process Changeover
1. Mounting or changing tools, tool-setting
2. Adjustment and setting of protective devices and other components
3. Adjustment and setting functional parameters (e.g. speed, pressure, force, travel limits)
4. Clamping/fastening the work piece
5. Feeding, filling, loading of raw material
6. Program verification
7. Functional test, trials
8. Verification of the final product
Operation
1. Clamping/fastening the work piece

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2. Feeding, filling, loading of raw material
3. Manual loading/unloading
4. Operating manual controls
5. Driving the machine
6. Minor adjustments and setting of functional parameters (e.g. speed, pressure, force, travel limits)
7. Minor interventions during operation (e.g. removing waste material, eliminating jams)
8. Restarting the machine after stopping/interruption
9. Unclamping/unfastening the work piece
10. Control/inspection
11. Supervision
12. Verification of the final product

Cleaning and maintenance

1. Adjustments
2. Cleaning, disinfection
3. Dismantling/removal of parts, components, devices of the machine
4. Housekeeping
5. Isolation and energy dissipation
6. Lubrication
7. Replacement of tools
8. Replacement of worn or damaged parts
9. Resetting
10. Removal and disposal of spent fluids
11. Restoring fluid levels
12. Verification of parts, components, devices of the machine

Fault-finding/trouble-shooting

1. Adjustments
2. Dismantling/removal of parts, components, devices of the machine
3. Fault-finding
4. Isolation and energy dissipation
5. Recovering from control and protective devices failure
6. Recovering from jam
7. Repairing
8. Replacement of parts, components, devices of the machine
9. Rescue of trapped persons
10. Resetting
11. Verification of parts, components, devices of the machine

Dismantling and disabling

1. Disconnection and energy dissipation

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Revision	1.00

2. Dismantling	
3. Removal and disposal of spent fluids	
4. Lifting	
5. Loading	
6. Packing	
7. Transportation	
8. Unloading	
Ergonomic	
1. Access	Discomfort
2. Design or location of indicators and visual display units	Fatigue
3. Design, location or identification of control devices	Musculoskeletal disorder
4. Effort	Stress
5. Flicker, dazzling, shadow, stroboscopic effect	
6. Local lighting	
7. Mental overload or underload	
8. Posture	
9. Repetitive activity	
10. Visibility	
Environmental	
1. Dust and fog	Burn
2. Electromagnetic disturbance	Slight disease
3. Lighting	Slipping or falling
4. Moisture	Suffocation
5. Pollution	
6. Snow	
7. Temperature	
8. Water	
9. Wind	
10. Lack of oxygen	

Hazardous Events

Shape or Finishing of Accessible Machine Parts	
1. Contact with rough surfaces	
2. Contact with sharp edges and corners, protruding parts	
Moving Machine Parts	
1. Contact with moving parts	
2. Contact with rotating open ends	

Hazard Identification, Risk Assessment and Risk Management

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