Assessment Task 3-Case Study Risk Management Plan

Executive summary

Risk management plan is one of the effective plans in the chemical manufacturing industry. It is capable of providing a comprehensive management mechanism for handling risk and uncertainty in organizations. The diversity of risk management plan has so variation that not only a product process or project, the entire organization can be assessed with the features of risk management plan. The plan is developed to entertain the problems in the identified case of chemical manufacturing industry; it will assess the ongoing situation and flaws to encounter the risk .In addition, a number of standards will be followed for designing an effective and efficient risk management plan, the standards include; Work Health and Safety Regulation 2017 (NSW), IEC/ISO 31010:2009, AS/NZS ISO 31000, and Work Health and Safety Act 2011 No 10 (NSW).

A misfortune happened on 15th November 2014 when 24000 pounds of toxic gas got released from chemical facility in Texas. It resulted in casualty of one supervisor, three workers and damaged the chemical manufacturing plan. Accident analysis had revealed that it was flawed engineering to be held primarily responsible for the chemical accident in the industry . In addition to that, the ventilation system was poor, safety and health conditions at workplace were not effective and management had poor core values or vision incorporated in their work culture against hazards of chemical manufacturing industrial process. The project boundaries are quite versatile in nature because of project scope. Foremost stage of project implementation would begin from WHS manager's recruitment in the chemical manufacturing factory. An effective training based on workplace health and safety for duration of three month would be held for staff at chemical manufacturing plant. After getting occupational safety and health training, the staff would start working for identification and replacement of flawed engineering design as it would

be safe working at the plant. Overall stakeholder's involvement would increase as well that eventually increases productivity and profitability of chemical manufacturing plant. The identification of risks for the chemical manufacturing industry can be effectively examined and analysed on the basis of the standards provided by AS/NZS ISO 31000:2009. The standards are designed for identifying and assessing risks along with their impact on the process and procedures. In addition, the risk assessment process will follow the criteria of IEC/ISO 31010:2009 and analysis process of Failure Mode and Effect Analysis (FMEA) for hazard assessment

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1. Introduction

Risk management plan is one of the effective plans in the chemical manufacturing industry. It is capable of providing a comprehensive management mechanism for handling risk and uncertainty in organizations. The diversity of risk management plan has so variation that not only a product process or project, the entire organization can be assessed with the features of risk management plan (Mogos, Fredriksson, & Alfnes, 2019). A critical glance at the risk management plan has revealed that, with the inclusion of RMP, it becomes far time easier to highlight errors in the project. The waywardness in the results or outcomes of the project gets low as possible. Decision making is empowered by risk management plan for taking critical decision on diverse and complex situations (Uhl, & Gollenia, 2016). An efficient communication plan is extended to the whole human resource of the manufacturing industry about organizational values, vision, targets and objectives. There are three essential stages of risk management plan implementation. Input stage contains project scope, planning, cost management, enterprise, and environmental and organizational process assets (Rust, Flood, & McCaffery, 2016). Tools and techniques such as meetings and analysis are applied on input determinants to produce output in the forms of risk management plan. The plan is developed to entertain the problems in the identified case of chemical manufacturing industry; it will assess the ongoing situation and flaws to encounter the risk (Alanen, & Salminen, 2016). In addition, a number of standards will be followed for designing an effective and efficient risk management plan, the standards include; Work Health and Safety Regulation 2017 (NSW), IEC/ISO 31010:2009, AS/NZS ISO 31000, and Work Health and Safety Act 2011 No 10 (NSW).

1.1. Project Information

A misfortune happened on 15th November 2014 when 24000 pounds of toxic gas got released from chemical facility in Texas. It resulted in casualty of one supervisor, three workers and damaged the chemical manufacturing plan. Accident analysis had revealed that it was flawed engineering to be held primarily responsible for the chemical accident in the industry (Alston, 2017). In addition to that, the ventilation system was poor, safety and health conditions at workplace were not effective and management had poor core values or vision incorporated in their work culture against hazards of chemical manufacturing industrial process (Kockmann, et.al. 2017). After summing up the entire given case, a risk management plan would be presented to rectify all the potential risks present in the chemical manufacturing industry. The salient features of risk management plan would be implemented in the form of project to eradicate flawed engineering design, poor ventilation, and weak workplace safety and weak management system at the chemical manufacturing industry (Kiani Mavi, Goh, & Kiani Mavi, 2016).

1.2. Project Scope & Boundaries

The scope of project is as follows;

- Identification and replacement of flawed engineering design in chemical manufacturing plant.
- Installation of efficient ventilation system at plant.
- Effective management system for good administration & monitoring of staff, process and products.
- Inclusion workplace health & safety program for staff working at chemical manufacturing plant.

The project boundaries are quite versatile in nature because of project scope. Foremost stage of project implementation would begin from WHS manager's recruitment in the chemical manufacturing factory. An effective training based on workplace health and safety for duration of three month would be held for staff at chemical manufacturing plant (Gardetti, & Torres, 2017). After getting occupational safety and health training, the staff would start working for identification and replacement of flawed engineering design as it would be safe working at the plant (Villa, et.al. 2016). The quality enhancement and evaluation & monitoring team of engineers would be formed for installation of effective ventilation system and testing of new engineering design installed in place of flawed engineering design at the plant. A team of senior managers and engineers would be brought under direct governance of CEO of the manufacturing to ensure efficient management system. The entire financial budget for this project scope & boundaries are 100000$, for each project scope 25000 $ would be given. The other resources of industry would be left at disposal of project in charge to comprehensively complete the proposed risk management plan.

1.3. Project Objectives

Project objectives for the given risk management plan are as follows;

- To incorporate the values of chemical manufacturing industry in risk analysis case and development of risk management plan.
- To identify stakeholders, boundaries and uncertainties in chemical engineering project & system.
- To assess, evaluate, priority and treat risks in chemical engineering projects & systems lifecycle.

- To develop risk management plan for the selected case in corresponding to IEC/ISO 31010:2009 and AS/NZS ISO 31000 risk management standards.

1.4. Risk Management Process

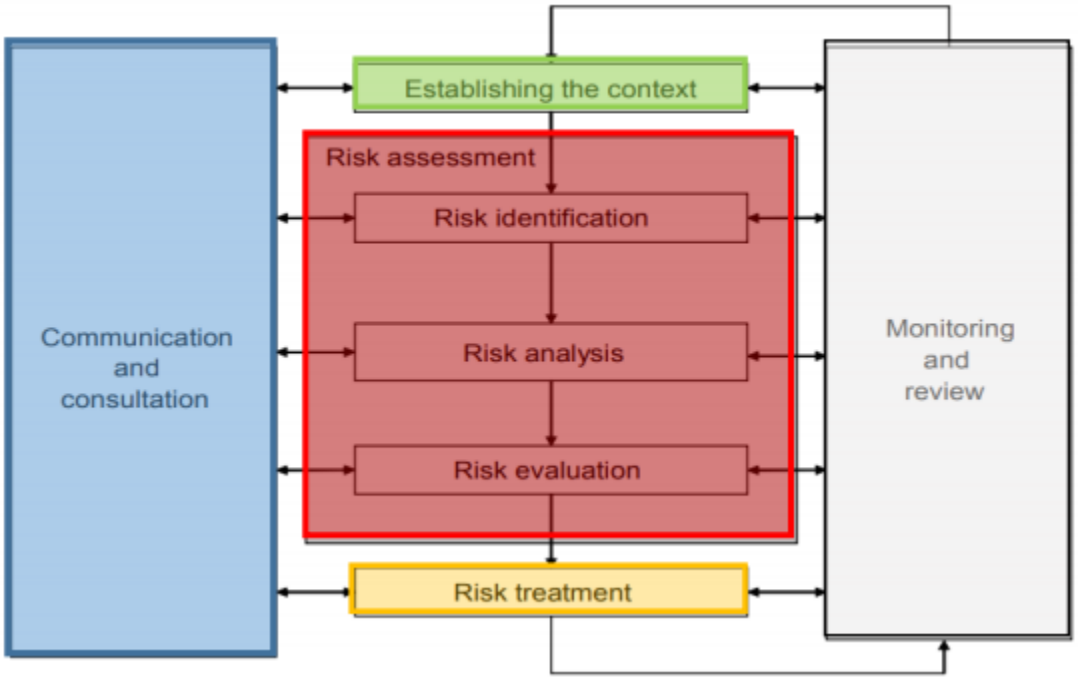


Figure 1 Risk Management Process (RMP)

It can be seen from the above figure that the first and foremost step of the RMP plan is to establish the context of risk. In the given case, the context of risk was associated with the poor conditions of chemical manufacturing plant. There are total four risks in numbers that have been identified and would undergo risk analysis and evaluation for best of the best risk treatment (Brindley, 2017). The entire risk assessment would be strongly monitored and reviewed for feedback, continuous improvement, and whistle blowing and for strategic management. In addition to that, entire risk management plan would be communicated to all layers of management from manager to staff in all departments (Clark, et.al. 2016). This would create an

employee ownership of the risk management plan and employee engagement would also increase at the chemical manufacturing plant. Ultimately, it would deliver strong management functional units that are capable of achieving desired risk management plan objectives.

2. Consultation & Communication Strategies

In the light of risk management plan for established context, the consultation and communication strategy would be comprised of both internal and external communication factors. The unfortunate incident that happened in the chemical plant was devastating news for every stakeholder of the chemical manufacturing industry (McDonald, et.al. 2018). Therefore, all stakeholders need to play their true role by contributing positively in the risk management plan through advice, action and appropriate measures. Overall stakeholder's involvement would increase as well that eventually increases productivity and profitability of chemical manufacturing plant.

2.1. Internal Communications

The table below is presenting information about the elements of internal communication process;

Table 1 - Internal Communications

Involvement	***Process***	***Time***	***Explaining strategy***
Senior Engineer	Installation & Maintenance	Weekly	The chemical plant would be assessed from each and every aspect to identify all flawed designs. These designs would be replaced by new ones after complete testing and producing results. Weekly progress of

			design installation would be reported to CEO.
Work health & safety manager	Workplace safety	Weekly	A certification program for staff on WHS would be created. It would be conducted inside the factory at the chemical plant. This training would comprise of lectures, videos, guest speaker lectures, manuals and workshops. Only after passing the WHS internal exam, the staff would be allowed to work in the plant. There would be only two chances for passing the exam otherwise the staff would be transferred to general management department. Weekly progress of training would be reported to CEO.
General manager	Effective management	Weekly	The management system would now be based on employee engagement. New remuneration packages and perks & privileges would be introduced for employees working at the plant. The performance would of employees would be monitored on weekly basis and it would be reported to CEO as well.
Ventilation team	Good ventilation	Weekly	An entire new ventilation design would be installed for plant to obtain better and maximum ventilation for the chemical plant against engineering processes.
Q&E engineer	Monitoring & Evaluation	Monthly	All the four identified risks mentioned in the project scope section would be under continuous monitoring and evaluation of Q & E team. The achieved results of all departments would be validated and verified. Critical analysis results report would presented to CEO

			only.
Staff	Daily tasks	Weekly	Performance of daily tasks given by line managers

2.2. External Communications

The table below is presenting information related to external communication process designed for the project;

Table 2 - External Communications

Involvement	***Process***	***Time required***	***Explaining strategy***
Vendors	Provision of major engineering parts & equipment	Quarterly	All the engineering parts, components and equipment would be provided to the chemical plant for limiting the flawed designs, poor ventilation system. Vendor would share its demand and expectations from new RMP as well. In a similar fashion the technical staff would work closely with vendors to secure precise and accurate engineering designs for the new chemical plant site.
Suppliers	Supplying general items	Quarterly	The reporting materials for taking daily, weekly and monthly logs from the entire department to measure

			their performance. The gap of demand and supply between management and supplier reduces. Communication among supplier and manager gets more frequent and effective to ensure uniformity of management functions.
Government	Legal Compliance	Bi-yearly	Strong health and safety program for workplace would be designed and it would be share with government officials to ensure workers are provided with neat, clean and hygienic workplace to stay safe and prevented from industrial accidents.
Environmental inspectors	Environmental Compliance	Monthly	The environment conditions have to be checked properly that any engineering manufacturing process is causing land, water, air or sound pollution in the environment. The adverse effects on environment would lead to the heavy taxes, fines and even sanctions on chemical plant by government.

3. Establishing Context

The stakeholders for this risk management plan are comprised of technical and non-technical human resource of the staff, CEO, vendors & supplier and corporate governance (for legal and environment assessment) of the chemical faculty (Tarasov, & Popov, 2018). Human resource team is comprised of engineers, managers, labour and many more; they would be main driving force for a successful implementation of risk management plan. However, there would be some constraints from this relevant stakeholder in the implementation of risk management plan. The staff would show resistance in learning workplace health safety training program (Hristozov, et.al. 2016). They would reveal their unwillingness to obtain this skill or failed to appreciate the need and importance of workplace health and safety training program. CEO of the chemical manufacturing industry would have to play the role of a leader in the given complex situation (Yan, & Hino, 2016). The CEO needs to create massive awareness from management to staff level in recognizing the need of workplace safety and health training program. Oral communication skills, analytical and sharp observation skills of CEO would play a pivotal role in convincing its HR staff on accepting and ownership of risk management plan.

The vendors and supplier are also major stakeholders in this complex situation. They need to be taken in full confidence that high standard and good quality of engineering parts, designs, and equipment and management resources for bringing security, safety, quality output and efficiency of the chemical manufacturing plant (Reim, Parida, & Sjödin, 2016). Vendors and suppliers would be made member of a consultation and advisory board to work closely on meeting the aims and objectives of risk management plan. Constraint from vendor and supplier end would be slow process of their payments, delay in file processing and improper specifications of things given to them (Tuptuk, & Hailes, 2018). The CEO has to come forward in this regard again

would be key to establishing strong working relationship between vendors & supplier and with the company managers. In this way quick payments and fast file processing along with proper specification of things would be handed over to the vendor and supplier. This constraint would be easily getting rid of.

In addition to that, corporate governance is also an important stakeholder in the implementation of risk management plan. The environmental engineer and work health and safety manager would hold important meetings with government officials to obtain satisfactory certificates of workplace safety and environmental assessment (Aqlan, & Lam, 2016). Only constraint in this stakeholder function is failure in meeting environmental and workplace safety compliance prescribed by the government. It is therefore, it would be the prime duty of company environmental engineer and workplace safety manager to ensure environmental friendly industrial operation and clean safer and secure workplace for health hygiene for all the employees working at the chemical manufacturing plant (Stoessel, 2020).

3.1. Risk Management Context

The risk management context is a combination of external and internal context. In the external context of the chemical manufacturing plant, the company would operate in a pollutant free industrial environment and safe workplace for its employees (Bakand, & Hayes, 2016). It would facilitate the risk management plan to accomplish its one and major objective of providing safe workplace training programs for employees. Politically the company would be working for generating revenue for contributing in national economy (Sholl, & Lively, 2016). Socially the company would invest in social programs for betterment of community in terms of donations, charity function, funds for increasing education and improving health services in the country

moreover, by starting green environment programs through reforestations and forestation. Legally, the law of the land would be observed in full obedience and compliance, there would be no breach of law on legal grounds (Scheibe, & Blackhurst, 2018).

The second part or entity of risk management context combination is internal context. There are following consideration that would be made in internal risk management context.

- Focus on risk objectives with risk managing strategies to prevent chemical explosions in future at the chemical plant.
- Good governance through effective management for strong company structure, defined roles for staff and accountability in case of risk management failure.
- Promoting employee engagement by investing on employees through workplace safety and health training programs.
- Changing the engineering design flaws and installation of good ventilation system to meet engineering compliance obligations.
- Appreciating risk tolerance by including it in business mission & vision of the company (Clomburg, Crumbley, & Gonzalez, 2017).

3.2. Risk Criteria

Risk criteria are a type of criteria that enables chemical manufacturing company in taking decision or making judgement on the implications of risk under assessment. It would be based on internal and external risk management context and are constantly under review for continuous improvement and strategic plan. In the given context of the risk management plan for chemical manufacturing plant, the below mentioned tables provides the risk criteria.

Table 3. Risk assessment criteria at chemical manufacturing plant

Impact Score	Descriptor	Definition
1	Negligible	Minimum injury or least intervention needed at chemical manufacturing plant
2	Minor	Minor injury, need three days off , 3 days stay in hospital
3	Moderate	Moderate injury, 4-10 days off, same duration of stay in hospital , reportable incident
4	Major	Major injury causing long term disability, need holidays more than 15 days, same duration of stay in hospital
5	Catastrophic	Injury causing death to large number of staff working at the plant

Table 4. A risk matrix for risk managers at chemical manufacturing plan

Impact Score	Descriptor	Frequency
1	Rare	Never happen, least probability
2	Unlikely	It may happen lesser possibility
3	Possibly	Might happen less probability
4	Likely	It will happen but not due to persisting issue: high probability
5	Almost Certain	Highest probability, definitely happen

Table 5. Risk Assessment criteria

Impact Score	Descriptor	Action Needed	Review
1-7	Low	Accept Risk	Bi yearly through engineers, work safety managers, ventilation monitoring team

8-15	Medium	Management role	Monthly by general managers at meeting with CEO
16-25	High	CEO decision	Immediet , directly reported to CEO and the matter is formally discussed with final implementing deicison in the ligh of risk management plan to counter the potential threats.

3.3. Stakeholder Analysis

For the given risk management plan, stakeholder analysis has identified all the involved employees before the beginning of the project. After identification, the employees according to their expertise, experience and skills are grouped to seek their participation, interest and influence according to the need of the project. It has become easy to communicate with stakeholders (Clomburg, Crumbley, & Gonzalez, 2017).

Table 6 - Stakeholders analysis

CEO	Head of Project
Ventilation designers	Vendors
Engineers	Supplier
Quality enhancement & inspection engineers	Consultant
WHS training manager	Financer
	Corporate Governance

Table 7 - Stakeholders analysis

	Involvement needed	**Explaining strategy**
Internal	*CEO*	Lead the entire risk management plan and would monitor it. Takes reports from managers and performs

		evaluation.
	Ventilation designer	To design good quality ventilation for chemical plant
	WHS manager	To train management on occupational safety and health at workplace for securing them against chemical accidents at the plant.
	Engineers	To produce flawless engineering designs of chemical plant to prevent any sort of chemical explosions.
External	*Vendors*	To supply desired items for chemical manufacturing plant.
	Suppliers	To supply desired items for chemical manufacturing plant.
	Consultant	To test and validate the risk management plan designed for chemical manufacturing plant.
	Financer	To provide capital for the risk management plan
	Government and regulation makers	To ensure the chemical manufacturing plant is meeting the legal and environmental compliance.

3.4. Project Rules

The rules and regulations of chemical manufacturing plant can be seen in appendix. Guidelines have been taken into account of risk management plan as it is playing a great role in prevention of chemical manufacturing plant hazards.

3.5. Project Roles and Responsibilities

Following employees have specific roles and responsibilities in this risk management plan.

Table 8- Project roles and responsibilities

Concerned authorities	**Project roles**
Engineering department	Identifying hazards of engineering design flaws
Workers	Recording events of health and safety of conveyer use. .
Warehouse team	Recording hazards associated with dispatching using brackets for throat
Quality enhancement & evaluation team	Performance evaluation and examining fulfilment of regulations.
Manufacturing department	Staffing to warehouse ventilator team for measuring consequences.
Workplace health and safety department	Evaluating safety precautions at workplace.

3.6. Processors

3.6.1. Site Inductions

All the work force staff, guests or the subcontractors must attempt a site acceptance so as to complete the development and contraction work regarding to the time (Meyer, & Reniers, 2016). The procedure of induction varies upon three stages:

1. Visual investigation of the hurricane line General Safety Induction Card
2. Site conference directed by a designer

Marking onto the applicable SWMS for the fundamental subcontractor or the organization before beginning or commencing the construction or development of work (Clomburg, Crumbley, & Gonzalez, 2017).

3.6.2. Safe Work Method Statements (SWMS)

The statement of Safe Work Method forms a vital proportion of the hazard that board inside a development venture (Scheibe, & Blackhurst, 2018). SWMS will be produced for each development action. It must incorporate all the accompanying:

- Actions of contractors.
- Evaluation of possible damages and risk before and after every task.
- Mitigation procedures to reduce probability of the hazard (Sholl, & Lively, 2016).

4. Risk Assessment Process

The identification of risks for the chemical manufacturing industry can be effectively examined and analysed on the basis of the standards provided by AS/NZS ISO 31000:2009. The standards are designed for identifying and assessing risks along with their impact on the process and procedures. In addition, the risk assessment process will follow the criteria of IEC/ISO 31010:2009 and analysis process of Failure Mode and Effect Analysis (FMEA) for hazard assessment (Bakand, & Hayes, 2016).

4.1. Risk Identification

The purpose of the project is to emphasize on the ventilation structure of chemical manufacturing plant to work on the safety hazards, assessment of the risks would be made through evaluating and monitoring the activities of management, staff and factors involved in generating risk. It would allow to identify and handle the monitored risks by means of the most effective and suitable methods (Stoessel, 2020).

4.1.1. Identification Method

Risk identification method will be designed on the fulfilment of IEC/ISO 31010:2009 suggested standards. The activities of chemical manufacturing industry will be corresponding to the assistive techniques suggested in the document. A risk register will be made for recording the analysed risks and their consequences (Aqlan, & Lam, 2016).

4.1.2. Risk Register

Documentation of the risk register will be made through distinguishing the dangers and causes of blast in the manufacturing industry. This would help to work on the identified causes i.e. ventilation issues, management lack of responsibility and staff unawareness about the dangers. In this way, the risk surrounded to the manufacturing industry would be entertained with potential. The project report will be used as a sample for dealing with the risks to the plant (Tuptuk, & Hailes, 2018).

4.2. Risk Analysis

Analysis of the risks are demanding contraction to all the issues including health and physical concerns to every individual working in the chemical manufacturing plant. However, to design the mitigation strategy it is essential to evaluate the working activities and methods of improvisation the norms of working within the plant (Hristozov, et.al. 2016). The causes and process of risk evaluation to state the causes interlinked with the activities are presented in Appendix A. the measures to control the evaluated method are listed in terms of the methods provided in appendix.

4.2.1. Analysis Method

It is stated that for identifying and applying appropriate strategy to mitigate and eliminate risk it is essential to have appropriate and in-depth information. In this way, plot to overcome the risk is designed and different perspectives to manage the needs of risk are gathered with creative ideologies by means of enough and demanded knowledge (McDonald, et.al. 2018). Observation of the performance in terms of various field activities will be made to inspect the performance and risk to individual. Probability rating is made on the basis of FMEA assumptions for the consequences associated with every risk (Tarasov, & Popov, 2018).

4.3. Risk Evaluation

4.3.1. Hierarchy of Control (HOC)

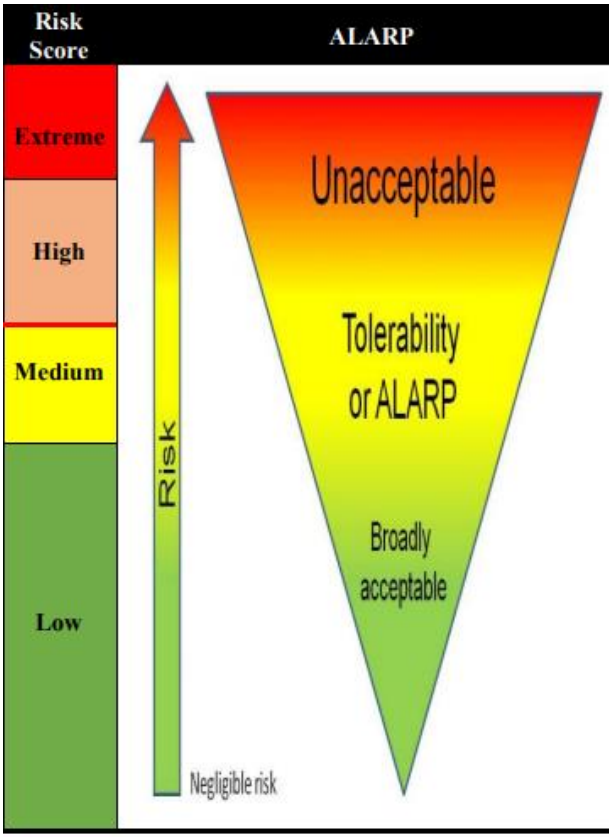
Risk evaluation process for the designed project is following measures of hierarchy of control, however, the impacts and severity of risk is stated in terms of stages given in the table below.

Table 9 - HOC

Stages	Evaluation
Elimination	Removing hazard
Substitution	Identifying the cause of hazard and replacing it appropriate option
Isolation	Enclosing hazard
Engineering	Evaluation based redesigning
Administration	Controlling the procedures and eliminating hazard
Personal protective consideration	Applying barriers

4.3.2. Risk Acceptance Criteria

The criteria of risk acceptance states the methods and procedures for overcoming the identified risks, the needs of the chemical manufacturing industry are evaluated for developing this criteria. The risk acceptance criteria is assuming all the issues, harms and consequences to individual, engineers and management (McDonald, et.al. 2018). The treatment needs and factors integrated to the activities are assumed for handling improper events, areas of management, acceptance level for the risk and products or chemicals that are manufactured in the plant. Practically, the criteria is designed for making the tasks risk free and as low as possible for the chemical manufacturing plant (Brindley, 2017). The level of acceptance suggested by the standards of IEC/ISO 31010:2009 and accepted for the project are presented in the figure below;



Risk Score	ALARP	RPN Range	Acceptance Level	Further Action Required
Extreme		100+	Unacceptable	Yes – Activity cannot proceed. Project Manager involvement and re-design of engineering activity.
High		75-100	Unacceptable	Yes – Project Manager Reviewal and discretion to approve risk activity. Revision of Engineering controls to be discussed and implemented.
Medium		40-75	Acceptable	Not Required – Regular Controls Implemented
Low		0-40	Acceptable	Not Required – Regular Controls Implemented

Figure 2 Acceptance for risk or Risk tolerance

5. Risk Treatment

The process of risk treatment is managed and formalised on the basis of most effective available options for treating the probability of risk. However, the mechanism of risk treatment is explained in the headings below;

5.1. Probable Treatment Options

The possible chances of reducing the causes of risk must be identified and treated with mandatory actions. Meanwhile, consideration must be given to the personal involvement in the activities of identified risks for stating and preventing the causes of risk occurrence (Villa, et.al. 2016)

(Villa, et.al. 2016). The possible chances for improving the activities in the chemical manufacturing industry are; competency checks, training to the staff, rules and policies for administration of activities, and appropriate use of the chemical equipment. Basic consideration for treating the risks of chemical industry are presented in the figure below, these considerations are focused for eliminating, mitigating and overcoming the risks (Gardetti, & Torres, 2017).

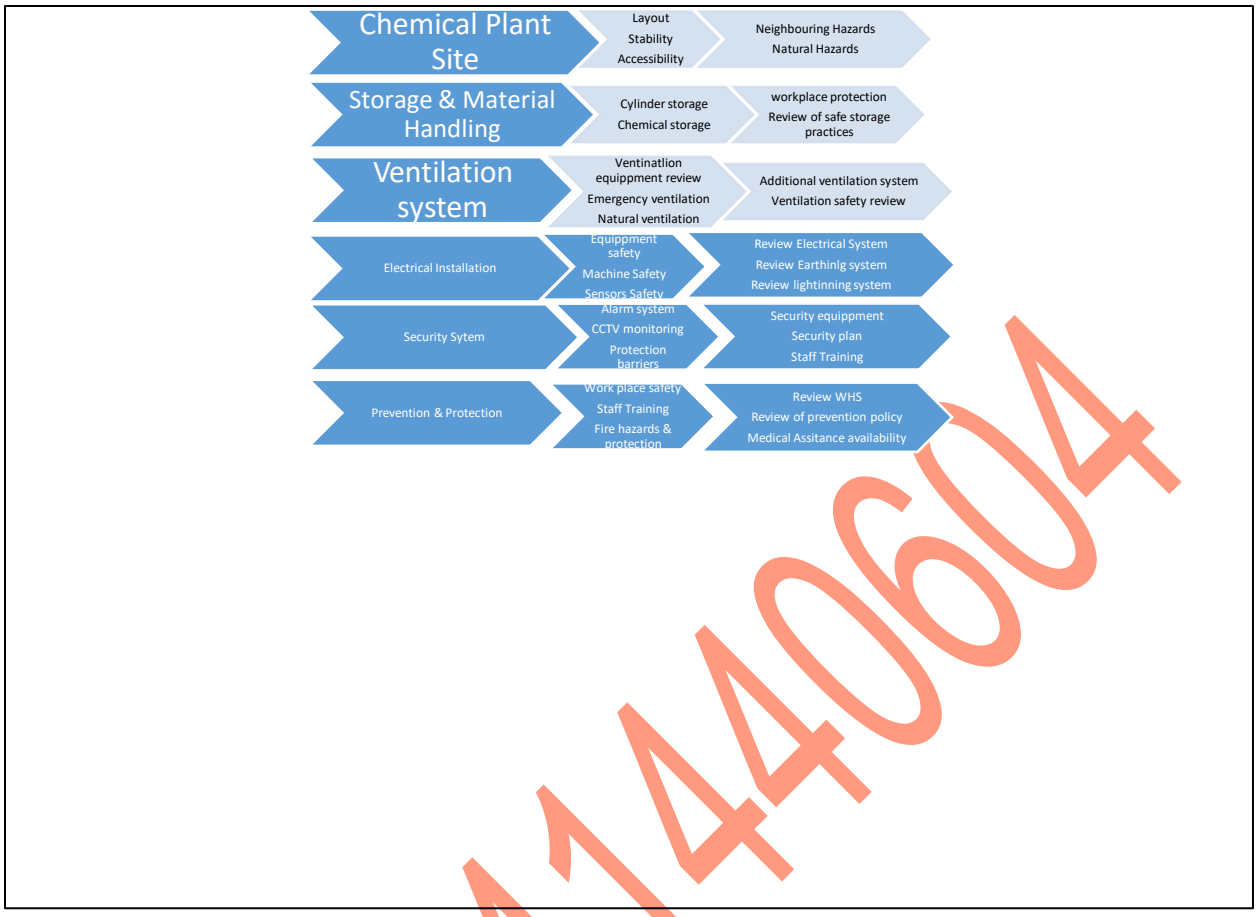


Figure 3 Treatment options

5.2. Effective Treatment Options

The evaluation and management of addressed risks is made on the basis of chemical manufacturing industry's case context. It is mandatory for the plant to link all the available options and mechanism for the risk addressed. Furthermore, the potential of risk occurrence can be minimised through determining the impact of risk on individual and to the overall plant (Rust, Flood, & McCaffery, 2016). The treatment options would allow to state the strengths, weaknesses, costs, changes and monitoring aspects for playing role and responsibilities in the plant. It is stated that the investigation and examination process mused be appropriately managed

by means of stating the likelihood of risk (Mogos, Fredriksson, & Alfnes, 2019). Therefore, on the basis of blast danger its impact on the overall plant and individual is measured. It is decided in the formation of risk management plant to consider avoidance of risk, mitigating risk, transferring and retention of risk as priority (Uhl, & Gollenia, 2016). In future, avoidance of risk will help to analyse all the possibilities of risk by means of analysing the risk. In addition, causes and consequences would get eliminated effectively to mitigate the possibilities of risk occurrence. In this way, effective decision making from the end of management will be shown and risk will have no impact on the decision making process (Alanen, & Salminen, 2016).

6. Risk Monitoring & Review

6.1. Processes

Project implementation is interconnected by means of reviewing and monitoring mechanism. Below table is explaining all about the process of reviewing and monitoring.

Table 10 - Process

Involved authorities	**Process**	**Time required**	**Management of activity**
Department of manufacturing and packaging	*This process involves the checking of required information*	**On daily basis**	This required the staffing and guiding which helps to improve the contribution of the individuals.
Department of manufacturing	*Staffing of chemical manufacturing plants*	**On monthly basis**	Evaluating procedures and reducing chances of physical hazards through using machinery.

It involves the ware house team	*Dispatching and making if box*	**On daily basis**	This process required the activity of examining all the cases regarding to allergies and asthma
Department of manufacturing	*Hazards of recording and accessing*	**On weekly basis**	This involves the workers conduction in altered undertakings or activities. Furthermore, the activity involves the equipment performance.
Designers for equipment's	*Equipment's and machines for the purpose of evaluation*	**On weekly Basis**	Review of SWMS
Department of manufacturing	*Concerns regarding to the end item or product*	**After the completion of product**	This process involves the evaluation of product quality and capacity.
Department of manufacturing and packaging	*Process of performance evaluation for each and everyone*	**On annually basis**	Examining and evaluation of performance for the regulations.

7. Discussion

7.1. Lessons Learnt

Risk management is defined as the process which helps both the individuals and company to learn about the impacts regarding to risks. The development plan helps to reduce the probabilities of engaging and occurrence of individual which highlight the strength and mission of the organization (Kockmann, et.al. 2017). The mission of the organization involves the hazard

free and safe workplace. The risk potential gather the knowledge about the FMEA and HOC application considering the law of nation. It is individual responsibility to recognize the roles and subjective abilities to safe individual from harm. Physical safety measures can be fulfilled and attained by paying concern towards the safety needs (Kiani Mavi, Goh, & Kiani Mavi, 2016).

7.2. Evaluation of RPN & Criticality

Risk impacts were highly connected with the usage of machine and equipment's at chemical manufacturing plant. It is found that due to moving the machines individuals can also get injuries. It is very necessary to carry machinery and equipment's that provide supports rather than creating troubles and difficulties in the process. All the impacts and effects of risks can be vanished by means of proper manning and identifying the risk effectively (Gardetti, & Torres, 2017).

Conclusion

To develop risk management plan for the selected case in corresponding to IEC/ISO 31010:2009 and AS/NZS ISO 31000 risk management standards. Project Objectives Project objectives for the given risk management plan are as follows; To incorporate the values of chemical manufacturing industry in risk analysis case and development of risk management plan. The risk management context is a combination of external and internal context. It is decided in the formation of risk management plant to consider avoidance of risk, mitigating risk, transferring and retention of risk as priority. It can be seen from the above figure that the first and foremost step of the RMP plan is to establish the context of risk. Ultimately, it would deliver strong management functional units that are capable of achieving desired risk management plan objectives. Risk management plan is one of the effective plans in the chemical manufacturing industry. Tools and techniques such as meetings and analysis are applied on input determinants to produce output in the forms of risk management plan. In addition to that, entire risk management plan would be communicated to all layers of management from manager to staff in all departments. In the given context of the risk management plan for chemical manufacturing plant, the below mentioned tables provides the risk criteria. Therefore, all stakeholders need to play their true role by contributing positively in the risk management plan through advice, action and appropriate measures. In addition to that, corporate governance is also an important stakeholder in the implementation of risk management plan. However, there would be some constraints from this relevant stakeholder in the implementation of risk management plan. It would facilitate the risk management plan to accomplish its one and major objective of providing safe workplace training programs for employees.

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9. Appendix

Risk analysis method

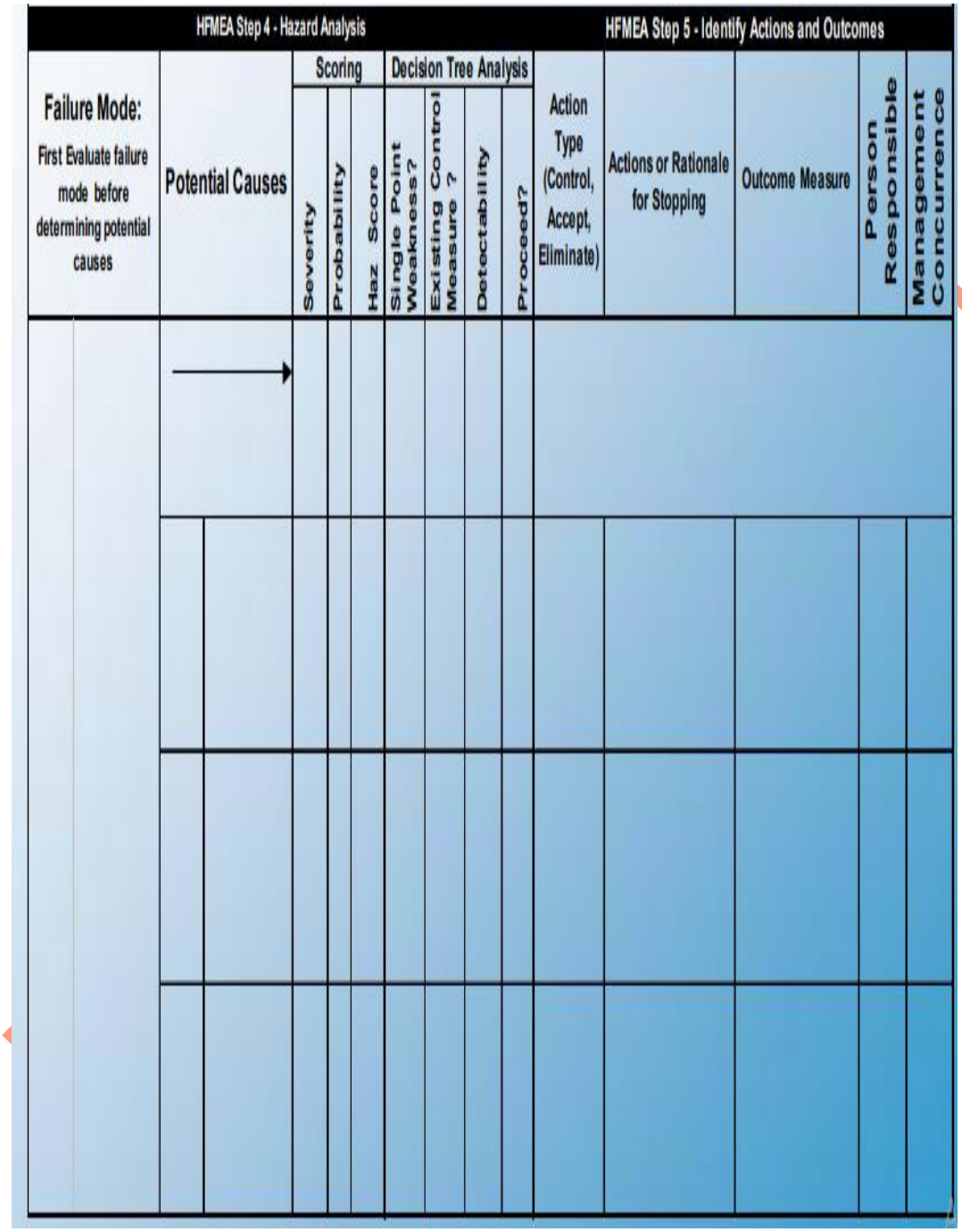

Figure 4 4.2 Risk analysis method

Process of evaluation

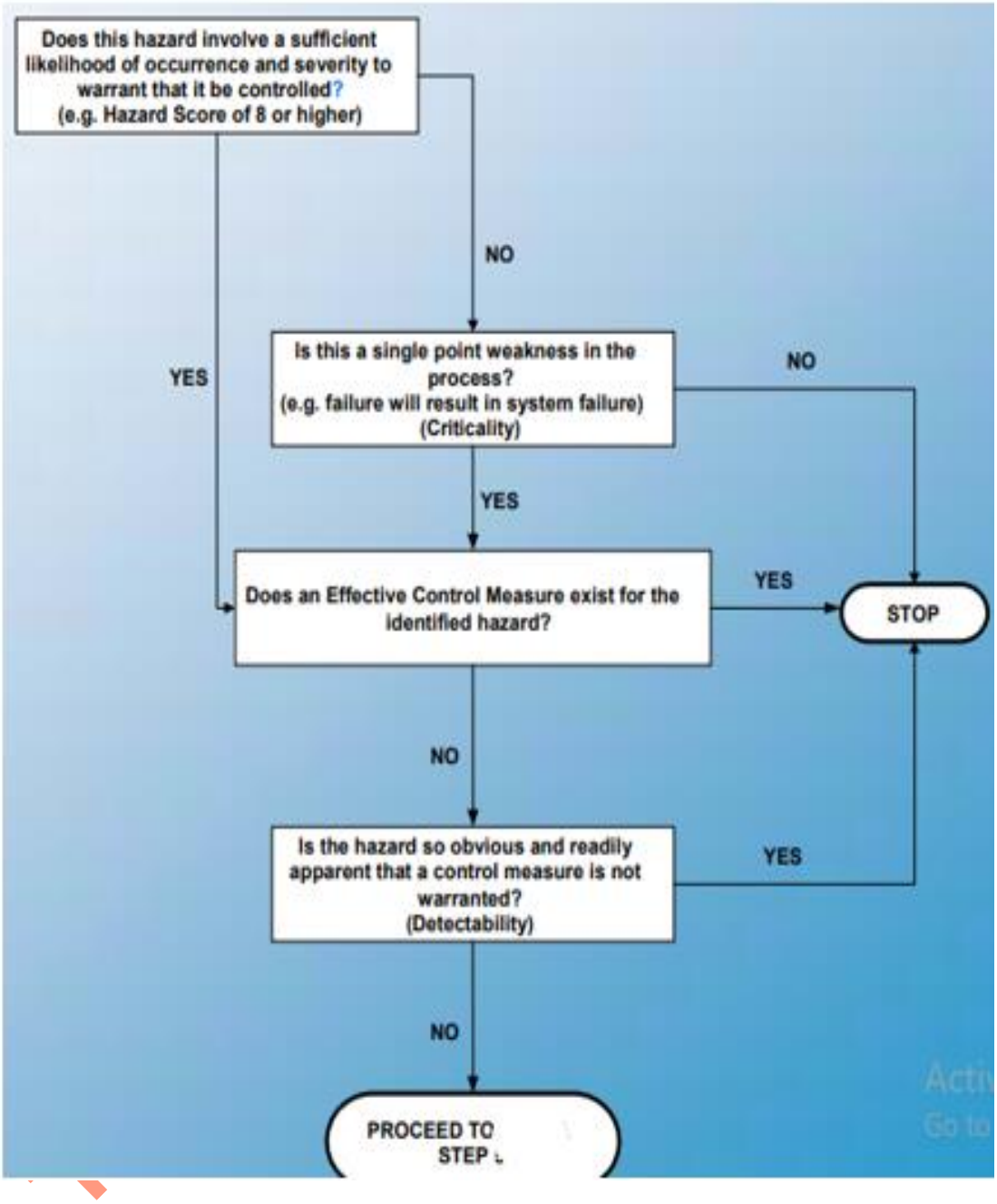

Figure 5 Process of evaluation

Process to step

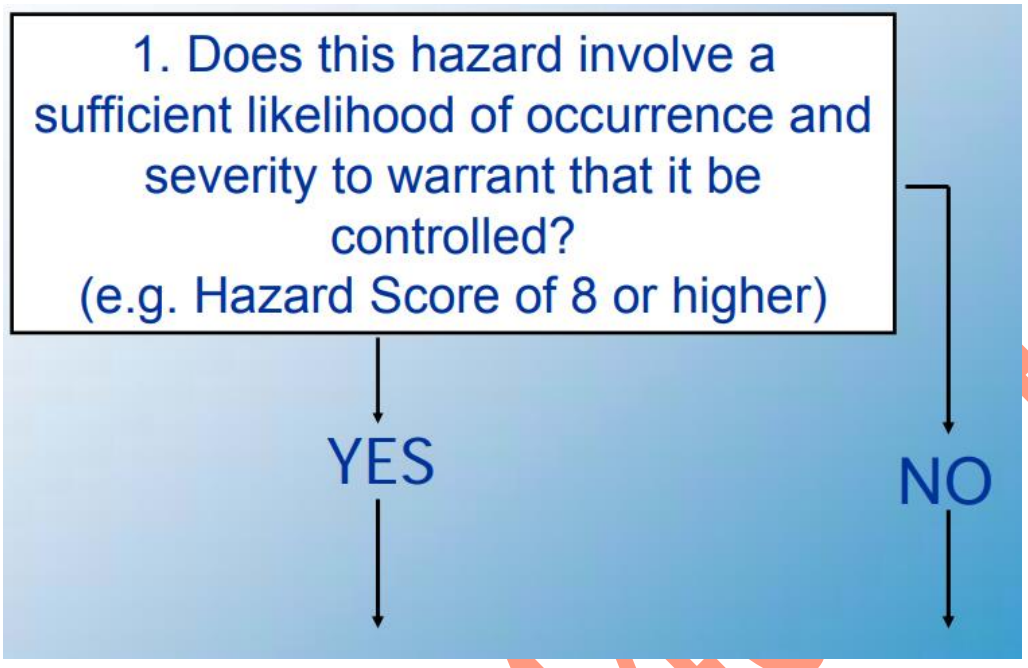

Figure 6 step 1

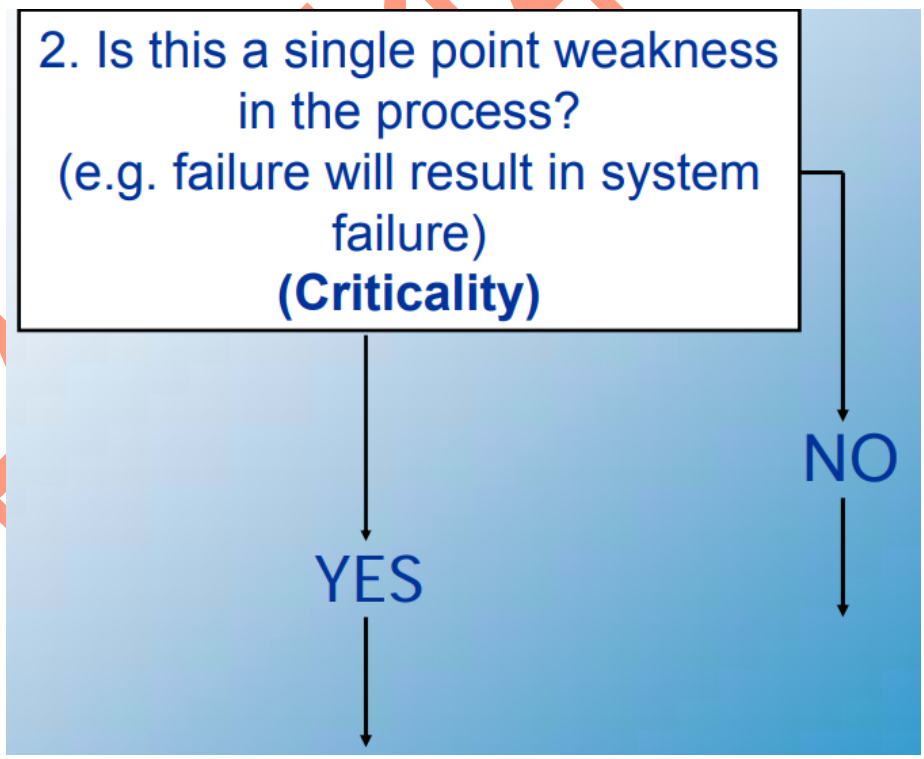

Figure 7step 2

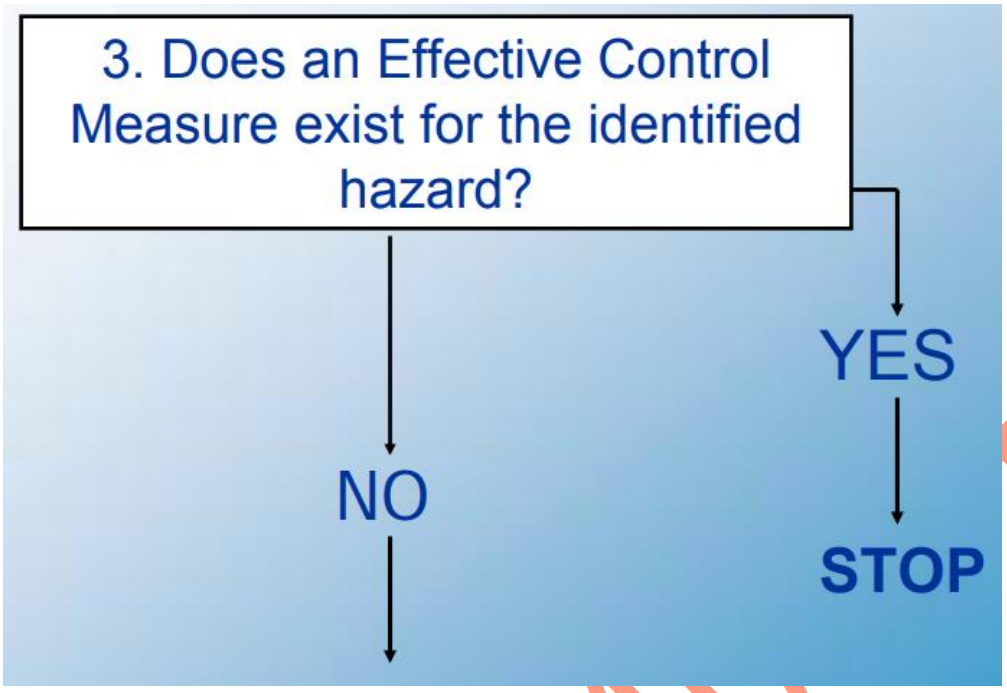

Figure 8 step 3

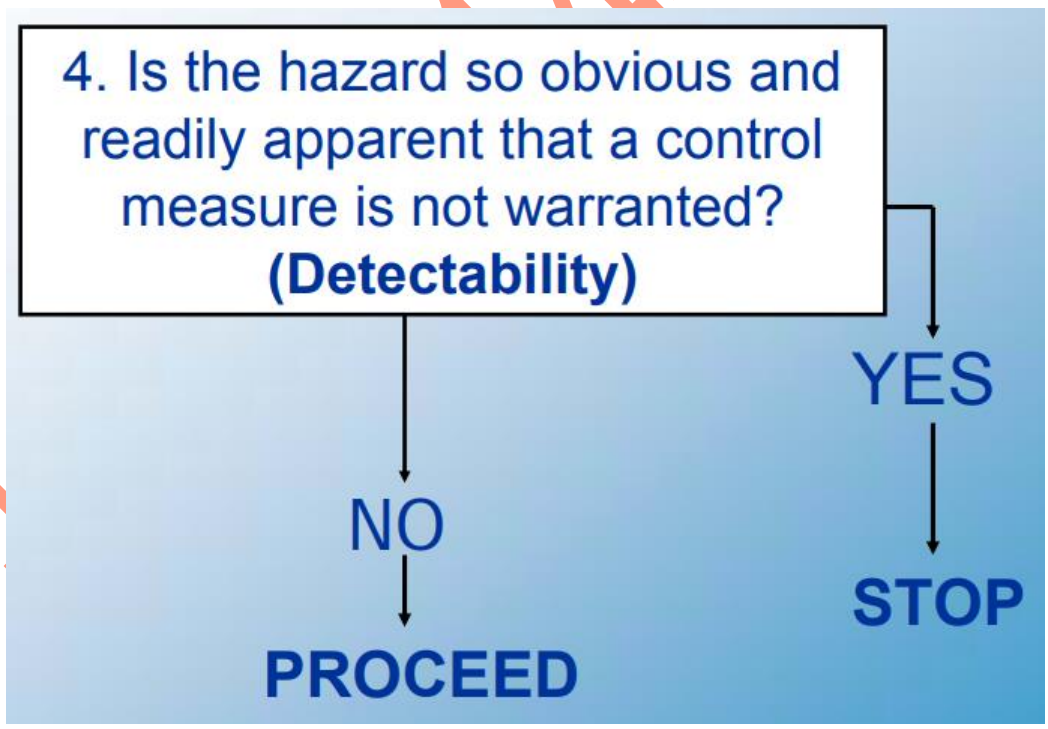

Figure 9 Step 4

Catastrophic Event *(Traditional FMEA Rating of 10 - Failure could cause death or injury)*	Major Event *(Traditional FMEA Rating of 7 – Failure causes a high degree of customer dissatisfaction.)*
Outcome: Death or major permanent loss of function (sensory, motor, physiologic, or intellectual), suicide, rape, hemolytic transfusion reaction, Surgery/procedure on the wrong patient or wrong body part, infant abduction or infant discharge to the wrong family **Outcome:** Death; **or** hospitalization of 3 or more. **Outcome:** * A death or hospitalization of 3 or more staff **Equipment or facility:** **Damage equal to or more than $250,000 **Fire**: Any fire that grows larger than an incipient	**Outcome:** Permanent lessening of bodily functioning (sensory, motor, physiologic, or intellectual), disfigurement, surgical intervention required, increased length of stay for 3 or more patients, increased level of care for 3 or more patients **Outcome:** Hospitalization of 1 or 2 visitors **Outcome:** Hospitalization of 1 or 2 staff **or** 3 or more staff experiencing lost time or restricted duty injuries or illnesses **Equipment or facility:** **Damage equal to or more than $100,000 **Fire:** Not Applicable – See Moderate and Catastrophic

Figure 10 Failure causes

PROBABILITY RATING:

Frequent - Likely to occur immediately or within a short period (may happen several times in one year)

Occasional - Probably will occur (may happen several times in 1 to 2 years)

Uncommon - Possible to occur (may happen sometime in 2 to 5 years)

Remote - Unlikely to occur (may happen sometime in 5 to 30 years)

Probability	Severity			
	Catastrophic	Major	Moderate	Minor
Frequent	16	12	8	4
Occasional	12	9	6	3
Uncommon	8	6	4	2
Remote	4	3	2	1

Re-evaluation

Potential
Failure Mode and Effects Analysis
(Design FMEA)

System:	Name/number of system			FMEA Number	Insert FMEA#
Subsystem:	Name/number of subsystem	Design		Page	1 of 1
Component:	Name/number of component	Responsibility:	Name	Prepared by:	who
Model:	model years/programs	Key Date:	7/15/2018	FMEA Date:	7/15/2008
Core Team:	Team members				

Item/Function Requirements	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s) / Mechanism(s) of Failure	Occurrence	Current Design Controls Prevention	Current Design Controls Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results: Actions Taken & Completion Date	Severity	Occurrence	Detection	RPN
Name, Part Number, or Class Function	Manner in which part could fail: cracked, loosened, deformed, leaking, oxidized, etc.	Consequences on other systems, parts, or people: noise, unstable, inoperative, impaired, etc.			List every potential cause and/or failure mechanism: incorrect material, improper maintenance, fatigue, wear, etc.		List prevention activities to assure design adequacy and prevent or reduce occurrence.	List detection activities to assure design adequacy and prevent or reduce occurrence.		0	Design actions to reduce severity, occurrence and detection ratings. Severity of 9 or 10 requires special attention.	Name of organization or individual and target completion date	Actions and actual completion date				0
										0							0
										0							0
										0							0
										0							0
										0							0

Probability	Severity			
	Catastrophic	Major	Moderate	Minor
Frequent	16	12	8	4
Occasional	12	9	6	3
Uncommon	8	6	4	2
Remote	4	3	2	1

Step 4 - Hazard Analysis										Step 5 - Identify Actions and Outcomes				
Failure Mode: First Evaluate failure mode before determining potential causes		Potential Causes	Scoring			Decision Tree Analysis				Action Type (Control, Accept, Eliminate)	Actions or Rationale for Stopping	Outcome Measure	Person Responsible	Management Concurrence
			Severity	Probability	Haz Score	Single Point Weakness?	Existing Control Measure ?	Detectability	Proceed?					
1A(1)	Turn off alarm	→	major	occasional	9	→	N	N	Y					
		1A(1)a Missed snooze button	major	occasional	9	→	N	N	Y	Eliminate	Purchase new clock	Purchase by certain date xx/xx/xx	YOU	Yes