





# STUDY ON MANAGEMENT INFORMATION SYSTEM FOR POWER PLANT SAFETY

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**A DISSERTATION REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR**

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# Declaration by the Guide

This is to certify that **Mr. WILLIAM GEORGE.S**, a student of Executive MBA **(POWER MANAGEMENT), Roll No 500024361** of UPES has successfully completed this dissertation report on **"STUDY ON MANAGEMENT INFORMATION SYSTEM FOR POWER PLANT SAFETY"** under my supervision.

Further, I certify that the work is based on the investigation made, data collected and analyzed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfillment for the award of degree of Executive MBA.

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**Abbreviations.**

| | |
|---|---|
| MIS | Management Information System |
| SMS | Safety Management System |
| OHS | Occupational health and safety |
| MSDS | Material Safety Data Sheets |
| PPE | Personal Protective Equipment |
| PSM | Process Safety Management |
| PTW | Permit to Work Systems |
| LOTO | Lock Out / Tag Out |
| HSE | Health, Safety & Environment |
| PSM | Process Safety Management |

# Dissertation Synopsis

**Dissertation Topic**

**STUDY ON MANAGEMENT INFORMATION SYSTEM FOR POWER PLANT SAFETY**

**Abstract**

To minimize or reduce the accidents in the power industry by implementing or improving the safety systems by using the Management information system; Due to lack of knowledge in safety system and not fully aware of the Contingency & Emergency action plans lot of accidents are happened, due to this men, materials like equipment's are damaged, Productions also affected because of these kind of accidents. Due to these the equipment's are not available for power production. The downtime of the equipment's to be minimized by reducing the accidents and to improve the efficiency of the power plants is the main aim of the dissertation.

## 1. Introduction

The power generation industry requires specialized attention when it comes to safety; in power industry safety is the most important one. But how to improve the safety system and how our employees are aware of the system and their responsibilities, the contract workers role & Handling of chemicals and Hazardous materials handling and how to use the PPE during the work; The availability and how to improve the safety system & plant efficiency all are to be discussed in this topic.

## 2. Problem Domain

The lack of safety system, PTW systems, Fatalities, injuries, near misses are not recorded properly, and the employees are not fully aware of the safety system. Safety rules and signs are not properly assigned. Use of WebBFS systems for PTWs, Emergency action plans, Contingency plans & fire drills are not yet followed properly. These may lead to accidents.

## 3. Solution Domain

Innovation in the training methodologies to achieve higher effectiveness of training among to the employees to improve their skills, Developing and implementing Behavior Based Safety Program to improve orientation of work force towards safety in work. Implementation of innovative engineering measures to strengthen the safety requirements at design stages to achieve safe working environment. Conducting Tool box talks, SMARTER objectives, Incident reports and Occurrence reports will help in future how to avoid accidents and actions to be performed during the occurrence. Management Information System for power Industrial Safety contains in-depth discussions on MIS aspects with respect to safety management activities including Hazard and Risk Management, Safety Education and Training, Work-environment Monitoring, Safety Performance Monitoring and Reporting, Gap Analysis and Continual Improvement.

## 4. System Domain

Usage of Microsoft excel and MS project office tools and WebBFS software's SAP systems for issuing the PTWs.

## 5. Application Domain

The work is applicable to all Power plants and industries. Even small or large industries whatever it may be safety is the first and most important one. So this project will help to improve the safety system and programs in power industry. The philosophy of **"each one teaches one"** will go a long way in strengthening our objective of achieving safety and desired safety culture.

## 6. Feasibility Study

6.1 Introduction to feasibility study: This project is feasible and improves the safety system, if successfully implemented after the studies.

6.2 Purpose: We can reduce the number of accidents that affect health, safety and the environment when we understand their cause.

6.3 Economic Feasibility: The project is economically feasible as it involves minimum investment. Every money spent on an Injury and Illness Prevention Program, an employer can expect up to six times a return on its investment.

6.4 Technical feasibility: MIS would have to be designed to be practical and 'user friendly', such that it will promote a 'Safety Culture' in an efficient and effective manner.

6.5 Behavioral feasibility: Studies have shown that a direct correlation exists between a company's performance in safety and its subsequent performance in productivity and financial results.

6.6 Time Feasibility: The project is time consuming and is a subject of ever evolving and can be studied further as the change of time progress.

6.7 Resource feasibility: Studies have shown that a direct correlation exists between a company's performance in safety and its subsequent performance in productivity and financial results. Injury and Illness Prevention Programs will help businesses remain competitive in a global market.

## 7. Expected outcome

The outcome of the project is to increase the efficiency of power plant with the help of efficient operating & monitoring of the safety system. Reducing the accidents and minimize the down time of the equipment & optimizing the man power by the efficient management system.

# Chapter-1

## INTRODUCTION

The project work is on the safety system of the power plant. To minimize or reduce the accident in the power industry by implementing or improving the safety system in a systematic way like Management Information System (MIS). Reducing the accidents and to improve the efficiency of the power plants is the main aim of the dissertation.

The power generation industry requires specialized attention when it comes to safety; in power industry safety is the most important one. Due to lack of knowledge in safety system and not fully aware of the Contingency & Emergency action plans lot of accidents are happened, due to this men, materials like equipment's are damaged, Productions also affected because of these kind of accidents. Due to these the equipment's are not available for power production. But how to improve the safety system and how our employees are aware of the PTW system and their responsibilities and the contract workers role & Handling of chemicals and Hazardous materials and how to use the PPE during the work all are to be improved.

Companies with poor accident records may run the risk of losing favor with investors and of finding it hard to raise funds, Lower injury rates lead to higher profit margins to achieve this the reliability of the plant & personnel safety is important. The availability and the downtime of the equipment's to be minimized by reducing the accidents and how to improve the safety system & plant efficiency all are to be discussed in this topic.

# Chapter-2

## LITERATURE REVIEW

PacificLight Power Pte Ltd ("PLP") is 800MW Combined Cycle Gas Turbine ("CCGT") power plant located on Jurong Island, the first in Singapore to be completely fuelled by liquefied natural gas ("LNG"). The plant is the largest LNG consumer in Singapore and features the latest F-class gas turbines from Siemens, making it one of the most efficient power plants operating in the region. Its choice of fuel is aligned with the Singapore government's objective of diversifying fuel sources for domestic electricity providers.

Construction of the $1.2 billion power plant began in 2011 under an Engineering, Procurement and Construction contract awarded to a consortium consisting of Siemens AG, Siemens Pte Ltd and Samsung C&T.

PLP is majority-owned (70%) by FPM Power Holdings Ltd ("FPM Power") with the remaining stake held by PETRONAS Power Sdn Bhd. FPM Power is a 60:40 joint venture between First Pacific Company Ltd and MERALCO PowerGen Corporation respectively

### Values & Beliefs

- **Accountability**

  We take ownership for our decisions and actions

- **Integrity**

  We embrace strong ethical and corporate governance standards

- **Teamwork**

- We trust, motivate and support one another to achieve common goals

- **Customer Centric**

  We deliver on our promise

- **Social Responsibility**

  We act responsibly in the environment we operate in

## Safety First:

*At PacificLight, we value the safety of our employees above all. Safer best practices mean minimal or zero disruptions to your energy supply. Since the commencement of the project, we have achieved 6.38 million safe man hours. In recognition of this safety record, our contractor received an award in 2014 from the Singapore Workplace Safety & Health Council for their Health, Safety and Environment (HSE) policies.*

## Health, Safety & Environment (HSE) Policy

We will diligently operate our plant in an environmentally-responsible manner and create a safe and healthy environment for our staffs, customers and the community.

**We will realise our HSE policy through:**

- Believing that all incidents related to the health, safety and the environment are preventable.
- We will systematically evaluate the design, operations and maintenance of the power plant and equipment and ensure the health and safety of our staffs, contractors and the community;
- Continuous efforts to maximise plant efficiency and implement resource conservation projects to reduce wastage, control emission levels and minimise discharge into the environment
- Company-wide programmes to implement continual improvements to PLP's operations;
- Respecting our neighbours where we operate; Always be responsible for the safety of yourself and others
- PLP will integrate HSE principles and culture into our business planning and decision-making processes.
- Everyone is an active participant in making their work environment a safe and healthy one.

## Power System Operation (PSO):

The Power System Operator (PSO) is a Division of the EMA and is responsible for the secure supply of electricity to consumers and operation of the transmission system.

The Division operates from the Power System Control Centre (PSCC) which is the nerve centre of the electricity generation and transmission system in Singapore. The PSO performs its functions round the clock, monitoring and operating the electricity transmission system and generation dispatch to maintain system security.

The PSO also carries out power system analysis and studies, which includes impact assessment of new generating plants as well as the electricity and gas transmission network expansion plans.

## Vision & Mission

To achieve our vision & mission, we must recognize that all our business activities are under the umbrella of safety. We will achieve excellence when we look at our business from safety point of view for our plant and personnel.

In our power station yearly accident rates are Zero, but still we have to maintain our accidents to 0% level in future. It is possible by improving our safety system and improving awareness to our employees we can able to achive our goal.

# Chapter-3

## 3.1. Management Information System

Management Information System (MIS) is an integral part of modern day safety management functions and requires the same degree of thought and attention as the other management aspects. The system must be dynamic, evolving and continually improving, which can be made possible through effective monitoring of Safety Management System (SMS) by auditing and inspection.

Workplace Safety Management aims at identifying, evaluating and controlling risks related to the health and safety of an organization's workers and others (including the public) that may be affected by its activities. It includes: - Safety audits, studies, assessment and consulting - Fire / Life safety - Behavior based safety - Ergonomics assessment.

MIS would have to be designed to be practical and 'user friendly', such that it will promote a 'Safety Culture' in an efficient and effective manner. Management Information System for power Industrial Safety contains in-depth discussions on MIS aspects with respect to safety management activities including

- ✓ Hazard and Risk Management
- ✓ Safety Education and Training
- ✓ Work-environment Monitoring
- ✓ Safety Performance Monitoring and Reporting
- ✓ Gap Analysis and Continual Improvement

The subject would also encourage using dynamic as well as modern Management Information System in the field of Safety Management. Document control and continuous improvement strategies have been deliberated following the ISO standards on Health & Safety (OHSAS-18001).

## 3.2. Safety Management System (SMS)

A Safety Management System (SMS) is a documented, comprehensive integrated system for managing safety at a workplace. It is a valuable tool for managing safety in our business and reducing our exposure to risk.

Effective risk management will help us to protect people, property and the environment from the hazards of the chemicals that we are use in our business.

Benefits to our business include reduction of incidents and accidents with their resultant disruption and costs, decreased insurance premiums and a more confident and productive workforce.

In an audit of our premises, a SMS can help us to demonstrate the efforts we are making to minimize risks to safety at our workplace.

Typically, our SMS will consist of policies, procedures, organizational responsibilities, planning mechanisms and training programs, established within a framework of ongoing monitoring and review.

The SMS must be documented and contain details of:

Its safety objectives;

The systems and procedures by which the objectives are to be achieved;

The performance criteria that are to be met; and

The way in which adherence to the criteria is to be maintained.

## 3.3. SMS Framework

Safe functioning of a facility depends on the overall management of the operation. To maintain an acceptable level of risk, the following basic elements are needed:

The right plant (equipment and facilities);

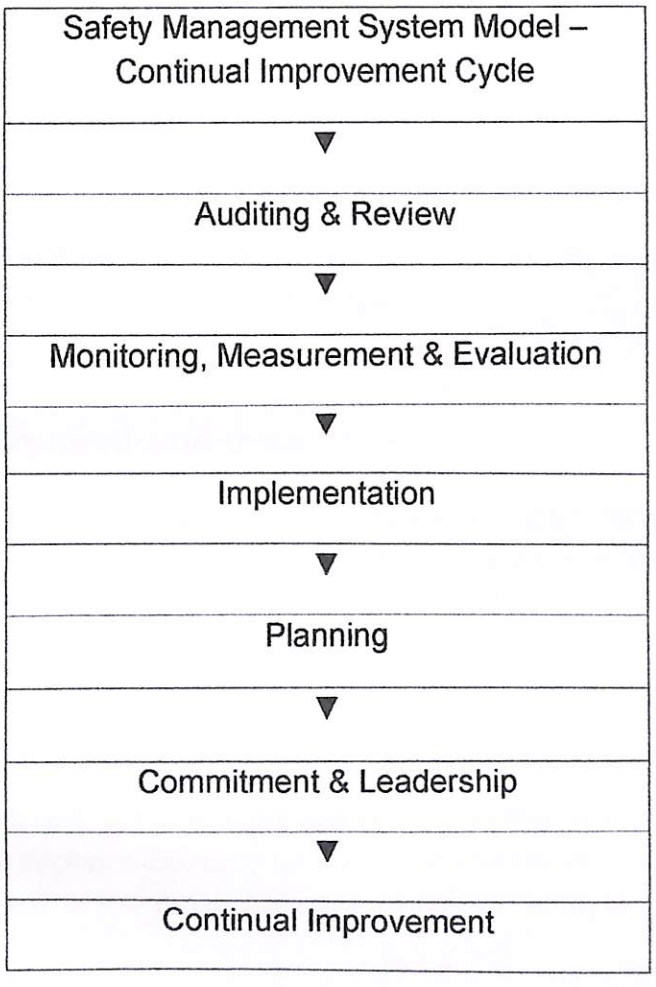
The right procedures (instructions and practices); and

The right people (skills, culture, and behaviors).

All accidents, incidents or losses can be attributed to a breakdown of one or more of these elements. To achieve desired safety objectives it is vital that management provides

appropriate support through commitment and leadership, and fosters the right safety culture.

The SMS framework illustrated in this paper, like all effective management systems, involves the setting of objectives, the establishment of plans to meet those objectives, implementation of the plans, monitoring the outcomes of the plans and the planning and taking of corrective actions to improve performance.



## Auditing and Review

Regular management review of the safety management system is required to provide assurance of the effectiveness of arrangements in managing risk and in meeting the facility's safety policy and objectives. These reviews provide an opportunity for promoting, supporting and sustaining continual improvement in safety performance.

These periodic audits should be conducted as a normal part of the business activities. Auditing processes and schedules should be defined. The frequency and comprehensiveness of the scheduled audits should be based on factors such as:

Risk associated with particular activities as identified through the hazard identification and risk assessment process;

Organizational requirements based on corporate or facility policy; and

Reports of non-compliance from incident reporting and investigation process;

Sufficiently independent people, with the appropriate skills and training to conduct the audit effectively, should carry out audits.

## Monitoring, measurement and evaluation

Regular monitoring, measurement and evaluation of the facility, plant, equipment, process, systems and procedures will ensure deficiencies are identified so that actions can be taken for rectification.

## Implementation & Planning

Plans give results only when actions are taken and the plans are implemented. Continual improvement depends not only on the implementation of new actions, but also on the continual maintenance of practices that underpin the existing level of performance.

## Review and Improvement

The management review process should evaluate of the effectiveness of the SMS in fulfilling your safety policy and objectives, with consideration of the following factors:

Performance against established performance criteria;

Results of audits conducted;

Review of hazard studies and risk assessments;

Completion of safety plans and progress against longer term plans;

Organizational, regulatory and community expectations – present and future;

Resource and technology changes; and

Recent incidents and accidents

## A Process Safety Management (PSM) system

It is a proactive systematic identification, evaluation, prediction, prevention, control and mitigation of chemical disaster that could occur as a result of systems failure.

## PSM contain

Process safety information

Employee involvement

Process hazard analysis

Operating procedures

Training

Compliance audits

Pre –startup safety review

Mechanical / Process integrity

Hot work

Incident investigation

Emergency planning and response

Management of change

## 3.4. Steps to a successful safety program

### Step 1 – Determine the Need

The identification of why a safety program is needed acts as the first step in the process. If more than one need is identified, it is important to consider if these needs can be met by a single program or if there are conflicts. An estimate of the costs of the problem should also be established.

Costs should include direct and indirect costs e.g.

Accident and injury costs;

Lost time costs;

Investigation costs;

Equipment damage and repair costs;

Productivity losses;

Possible costs to reputation.

### Step 2 – Identify the main driver

Program drivers assist in shaping a program's goals and objectives and are important in providing both intrinsic and extrinsic motivation for program success. These drivers may change throughout the life of the program depending on the nature of the program e.g. a management introduced program being "owned" by workers. If such changes to drivers are anticipated, they need to be clearly identified at the introduction of the program.

### Step 3 – Goals and objectives

The goals and objectives of the safety program need to be defined and reflect the identified program needs before the program is developed. The outcomes of the program need to reflect the goals and objectives.

The strategies to achieve the objectives need clarification as to whether they are based on:

Knowledge, attitude or behavioral change; Environmental change; Technical/equipment change these objectives need to be achievable and, where possible, measurable. The stakeholders and target audience for the program also needs to be clearly defined at this stage.

**Step 4 - Implementation of Program**

Timeframe

The timeframe of the project should be defined as part of the initial process. .

Identification and Allocation of Resources, The allocation of resources needs careful consideration if the goals and objectives are to be met. Resources need to be appropriate and adequate.

Resources fall under the following categories

- ✓ Physical resources e.g. equipment, training materials;
- ✓ Human resources e.g. trainers, co-operation of supervisors and - management;
- ✓ Financial resources e.g. cost of time of program, effect on productivity.
- ✓ Costs estimates
- ✓ Estimating the costs of the program allows a comparison of the cost of the problem with the cost of the solution and fills a need for objective evidence to support claims of program cost effectiveness.
- ✓ The programs costs need to include:
- ✓ Development costs;
- ✓ Implementation costs;
- ✓ On-going costs.

The intent of the project was to assess the economic outcomes in terms of the following formula.

Cost problem Vs Cost of solution

Cost of solution = Cost safety program x 100/% effectiveness

These formulas suggest that the cost of a safety program must be less than the cost of the problem it is intended to address taking into account the program effectiveness. No program is 100% effective and it is generally recognized that different types of programs have different levels of effectiveness. This could allow an analysis of the allocation of

resources and return on investment in terms of seriousness of the problem and effectiveness of solutions.

**Step 5 Evaluation**

An evaluation of a safety program should consider the outputs and the outcomes of the program.

## 3.5. Hazard identification and risk assessment process

Hazard identification and risk assessment is the key process in the prevention of accidents through the identification and consideration of events that could lead to such accidents. It should also be the basis for the establishment and continued development of your SMS. Hazard identification and risk assessment for dangerous goods should be directed toward analyzing the potential causes of explosions, fires and releases of hazardous materials. It should focus on equipment, processes, materials, human actions and external factors that impact on your

The outcomes of the process and indeed involvement in the process itself will assist you and your employees in the development and implementation of safety improvements that can reduce the likelihood or the consequence of accidents.

### 3.5.1. Hazard and Risk Management

A hazard is any biological, chemical, mechanical, environmental or physical agent that is reasonably likely to cause harm or damage to humans, other organisms, or the environment in the absence of its control. This can include, but is not limited to: asbestos, electricity, microbial pathogens, motor vehicles, nuclear power plants, pesticides, vaccines, and X-rays. Identification of hazards is the first step in performing a risk assessment and in some cases risk assessment may not even be necessary.

Risk can be defined as the likelihood or probability of a given hazard of a given level causing a particular level of loss of damage.

Risk assessment is the process where you identify hazards, Analyze or evaluate the risk associated with that hazard, and Determine appropriate ways to eliminate or control the hazard.

The OSH Answers Risk Assessment has details on how to conduct an assessment and establish priorities.

Safety assurance

Our SMS should have processes in place which provide a level of assurance that the facility is a 'safe place of work' during normal and emergency conditions and at all phases of operation. Facilities, plant and equipment must be designed, constructed and maintained to an acceptable standard.

Process operations must be controlled to remain within safe limits. This can require attention to design and specification of control systems, management of critical alarms and interlocks, monitoring performance of critical equipment items, and assessment of human factors.

Maintenance should be approached on a risk-based 'planned' basis rather than solely as a reactive 'breakdown' activity. Arrangements should include the regular review of hazards and the routine inspection of equipment to ensure it is at all times 'fit for purpose'. The selection and implementation of safety assurance measures must have its basis in the identified hazards and risks.

# Chapter-4

Safety objectives are specific components emanating out of the policy, which must be met. The establishment of safety objectives and targets should be based on the management of identified risks.

Objectives should be measurable and capable of being verified. It is often useful to set medium term objectives that represent an improvement on current performance.

Safety targets are often used to assess progress towards the achievement of the objectives. For long-term objectives, it may be useful to achieve targets.

In establishing safety objectives and targets, the following factors should be considered:

The hazards and risks identified for our premises;

Specific legislative and corporate requirements;

The specific interests of significant of employees; and

Availability of technology and resources;

To achieve this we need to focus on the following aspects,

- ✓ Innovation in the training methodologies to achieve higher effectiveness of training among the contractor employees.
- ✓ Developing and implementing Behavior Based Safety Program to improve orientation of work force towards safety in work.
- ✓ Implementation of innovative engineering measures to strengthen the safety requirements at design stages to achieve safe working environment

A well designed safety organization for contractors, sub-contractors and interface with department is are very essential. Implementation of Safety is a line management function; therefore its ownership lies with them. These line managers are to be backed up by competent persons in Industrial safety that provides expertise and supervision of work environment and equipments.

## 4.1. Systems of work

Procedures should be established for the control of risks to people, property and the environment arising from activities conducted at all stages of the life of the facility. These procedures, as well as detailing the activities to be undertaken, should also specify control measures to be adopted such as Personal Protective Equipment (PPE) to be worn or specific safe practices to follow.

## 4.2. Emergency Plans

Emergency plans which will be required to assure the public safety and environmental protection on and off the site in the event of a natural disaster or other major incident relating to or affecting the Project and further, will identify the specific responsibilities.

On-site emergency plans will be prepared to protect the public health, safety and environment on and off the Project site in the case of a major natural disaster or industrial accident relating to or affecting the Project. The Applicant shall prepare the plans and be responsible for implementing the plan with its operations team in coordination with the local emergency response support functions. The plans will describe the emergency response procedures to be implemented during various emergency situations that may affect the Project or the surrounding community or environment.

The emergency plans cover a number of events that may occur at or near the Project site by natural causes, equipment failure or by human mistake. The following is a list of potential events that will be covered by the emergency plans.

- ✓ Personnel injury;
- ✓ Project evacuation;
- ✓ Fire or explosion;
- ✓ Floods;
- ✓ Extreme Weather Abnormalities;
- ✓ Earthquakes;
- ✓ Facility Blackout.

The Project operating and maintenance (O&M) group and third party contractors will receive regular emergency response and safety training to assure that effective and safe action will be taken to reduce and limit the impact of an emergency at the Project site.

All potential emergency situations should be identified and emergency plans and procedures documented for managing an incident and mitigating its impacts. Copies of Contingency plans and procedures must be prepared and available in Control room.

## 4.3. Emergency response and review

If a hazardous materials emergency does occur at our premises, it is essential that it be dealt with immediately and that steps are taken to determine the cause of the emergency and to identify and implement measures to prevent it from occurring again.

Records

Records of information are important to ensure that our SMS is being implemented and to enable this to be demonstrated under internal or external audit.

Incident reporting and investigation

Procedures should be established and maintained to ensure that incidents resulting in deviation, near miss, injury or accident are reported and properly investigated, and corrective actions put in place to minimize risk of re-occurrence

## 4.4. Use of Near Misses and experience feed-backs

As could be seen from the various accident dominos, before a serious or fatal accident occurs, we get number of opportunities to correct the unsafe conditions or unsafe practices from the minor accidents or near misses, which occur as a precursor. These need to be recorded, reported and analyzed as this provides immense experience feed backs for improvement.

## 4.5. Use of Safety Provisions and Personal Protective Equipment (PPE)

Power industries have many types of hazards due to complexity of the work environment. Even after the implementation of the safety requirements through engineering means during design, there would be always residual risk to worker. Thus, as a good safety culture, all workers should be ensured to use the required PPE. At times some workers may feel some inconvenience in using the PPE, but we should scrupulously enforce the

use of PPE right from day one and each worker should be made to consider these as last defense in depth to save his life. Broadly these are Safety helmets, Safety belts, Safety shoes, hand gloves, goggles, fall arrester etc. Personal protective equipment should be made available near the work spot for ease of use by workers.

Conducting the Safety Meetings

- ✓ Daily interaction between Contractors' Safety Officer and departmental Safety in charge.
- ✓ Monthly Safety meetings by each Works Manager of the contractor along with his Safety Officer with departmental Safety Group.
- ✓ Sectional Safety meetings for the departmental and contractor employees.
- ✓ Quarterly Project level Apex Safety Committee meeting.
- ✓ Regular experience feedback among various agencies.
- ✓ Conducting Risk assessments and tool box talks to the workers before staring the work.

## 4.6. Safety enforcement by line managers

In order to achieve practical solutions and active involvement in accident prevention safety has to be integrated with the line function. Accordingly, the line mangers should supervise and enforce safety requirements in the works. It is the line functionaries who know a hazard as soon as it is created. He has the power and resources to take an immediate corrective action. Safety personnel should act as a catalyst to enable the line managers to timely remove these hazards and any deficiency in a pro active manner.

We can reduce the number of incidents that affect health, safety and the environment when we understand their cause. This is particularly true of incidents that result from human error or from a failure to take adequate precautions against risks. Creating a safer and a less environmentally harmful workplace is, therefore, a learning experience that involves:

- ✓ Finding out more about the risks associated with activities
- ✓ Understanding better why accidents happen or environmental incidents occur
- ✓ Reducing or eliminating the factors that contribute to risk.

## 4.7. Safety Education and Training

Employers must have an overall safety program including relative site specific safety information where applicable. The safety training program should cover topics such as:

- ✓ Accident prevention and safety promotion
- ✓ Safety compliance
- ✓ Accident and emergency response
- ✓ Personal protective equipment
- ✓ Safety practices
- ✓ Equipment and machinery
- ✓ Chemical and hazardous materials safety
- ✓ Workplace hazards
- ✓ Employee involvement

An effective training program can reduce the number of injuries and deaths, property damage, legal liability, illnesses, workers' compensation claims, and missed time from work. An effective safety training program can also help a trainer keep the required OSHA-mandated safety training courses organized and up-to-date.

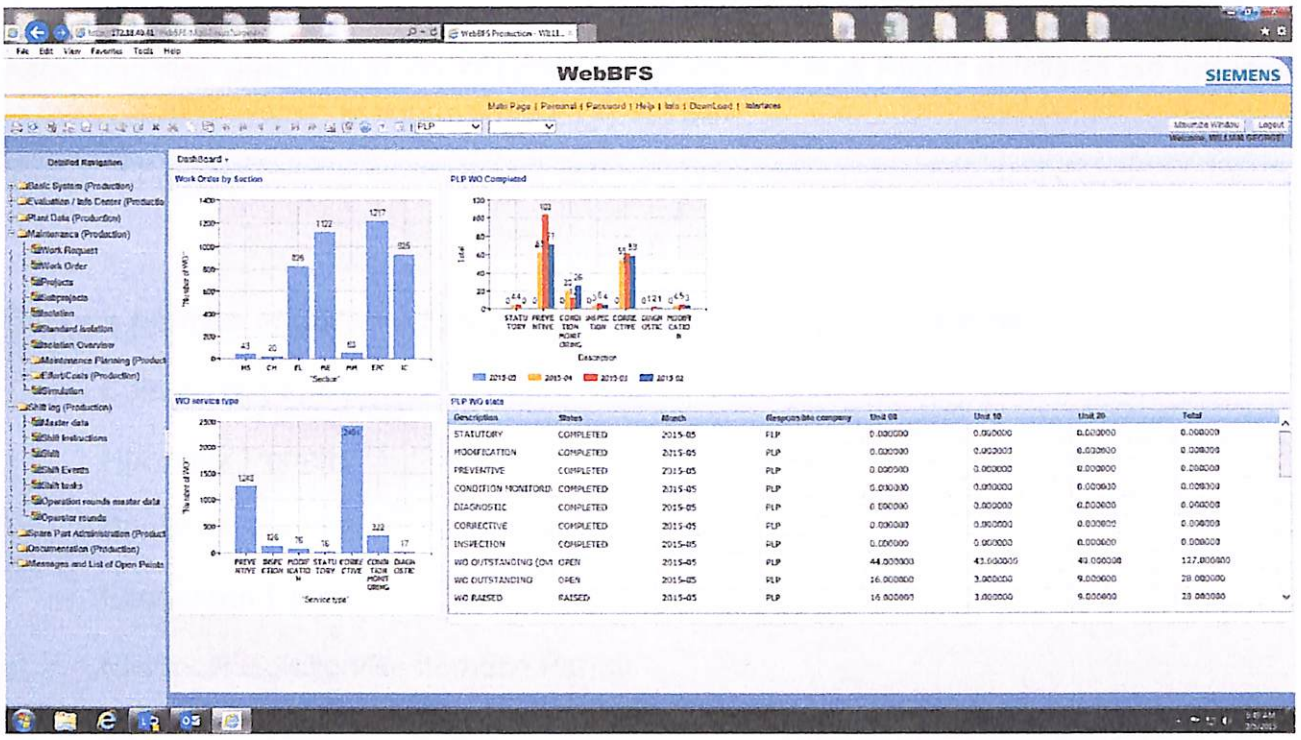
Safety training classes help establish a safety culture in which employees themselves help promote proper safety procedures while on the job. It is important that new employees be properly trained and embraces the importance of workplace safety as it is easy for seasoned workers to negatively influence the new hires. That negative influence however, can be purged with the establishment of new, hands-on, innovative effective safety training which will ultimately lead to an effective safety culture.

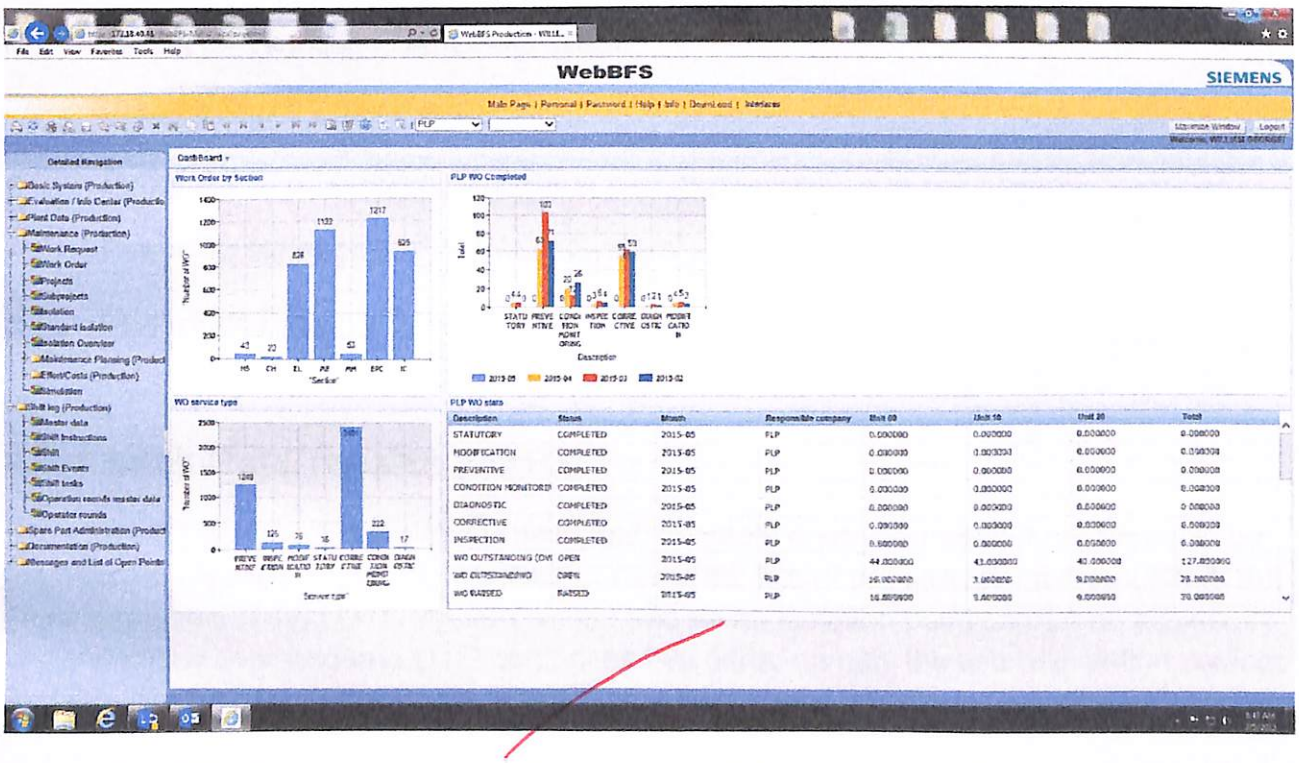
Safety education and training for personnel at a facility should be an integral part of operational safety and operational training. The workers who demonstrate good safety behavior and practices should be motivated by way of rewards. Enhanced field visit by the line managers and interacting with the workers with the philosophy of **"each one teach one"** will go a long way in strengthening our objective of achieving safety and desired safety culture.

## 4.8. Permit to Work

The PTW process ensures the positive and effective isolation of energy sources. It aims to ensure that work occurs with the appropriate level of safety to reduce exposure to risk in a systematic, planned and approved manner by providing a mechanism for employees, contractors and/or other relevant third parties to identify, schedule, evaluate and review works before proceeding with the activity. All employees will be trained in the PTW process during the induction process and additional training is provided on an ongoing basis.






The PTW Process must be followed under all circumstances. All control measures, isolations and subsidiary work permits under the PTW must be implemented before work commences. PTW system by using WebBFS software used for issuing the Line clearance.

Equipment testing permit & Caution tags are to be used, Work order & LC issuing person's name and their designation, no. of persons working; hot work Permit details all are included in the WebBFS system to improve the PTW system.

Types of Permits:

**Various permits applicable in a power installations are listed below:**

- Cold Work Permit
- Hot Work Permit
- Confined Space Entry/Work Permit
- Excavation Permit
- Electrical Isolation/Restoration Permit
- Permit for Closure of Roads
- Permit for using a Radioactive Source
- Permit for Working Over/Under Water
- Vehicle/Crane Entry Permit
- Permit for Photography
- Permit for Isolation of Fire Water System
- Mine/Rock Blasting Operations

### 4.8.1. Lock Out / Tag Out (LOTO)

A LOTO system is expressly designed to isolate energized equipment that is to be maintained, cleaned, repaired, replaced or removed. It is of the utmost importance that the implementation of the LOTO system when used on an isolation point cannot be accidently or deliberately over-ridden. LOTO comprises two parts, namely the use of isolation devices and the tagging of these devices with suitable information.

Lock out devices can include

- ✓ Guards or covers that are placed over gate valves to prevent them being rotated.
- ✓ Trapped key systems.
- ✓ Lockable hasps.

Tag out system should include

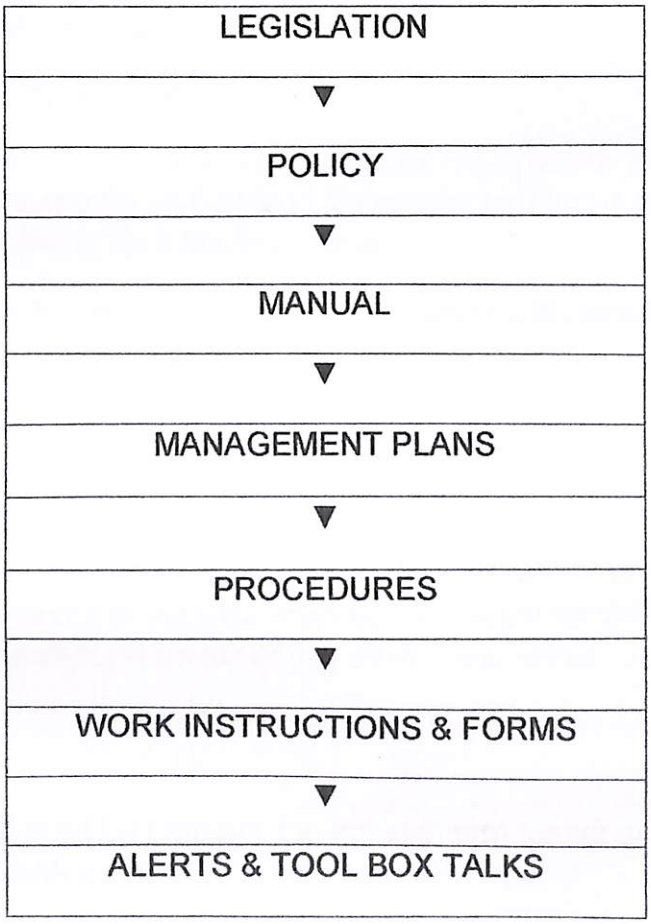
- ✓ Identification of the plant or equipment that is isolated.
- ✓ Reason for the isolation.
- ✓ Name of responsible person.
- ✓ Time and date of isolation.
- ✓ LOTO register number.




A LOTO system is often used in conjunction with a permit to work system where the permitted task requires equipment to be safety isolated. For example, for hot work in a silo, it may be necessary to isolate valves to prevent the flow of product into the silo which could kill or injure a person carrying out the hot work.

## 4.9. Emergency Response Plan

An emergency response plan shall be developed and implemented to ensure that potential and actual emergency incidents are managed in a way that ensures the immediate safety of all those potentially endangered by the event, including ensuring the safety of emergency responders. The plan shall also provide details for the initial on-site response to be managed in a systematic and professional manner and include appropriate communication to all authorities.



## Toolbox Talks

Toolbox Talks are formal meetings held to communicate health, safety, environmental and operational matters and to reinforce the importance of being safe.

The aim of these meetings is to communicate a clear and consistent message about business initiatives, changes to process and any other proactive matter that impacts on health and safety to enhance each person's understanding of their work and ensure a consistent and safe approach to undertake work.

The manager, superintendent, supervisor or officer in charge shall lead the meeting and encourage open discussion between all attendees.

These meetings are to be held at a frequency of at least:

Once per week for operational sites; and

Once per month for the Brisbane Office

Each attendee shall sign on to an attendance register for record of attendance. The records shall be held with the site Health and Safety Coordinator and included in the monthly health and safety statistical reporting for a leading indicator.

Site managers have a responsibility to ensure information is disseminated to personnel across their site.

## 4.10. Safety Alerts

Safety Alerts shall be prepared and distributed to all sites in response to events to enable personnel to be aware of potential risks being present because of varying plant integrity, process and procedural issues or any other issue presenting abnormal risk.

Risk mitigation measures shall be provided in the alert and action by the responsible person.

Each safety Alert shall be presented in the standard format and approved by the Manager, Corporate Health and Safety prior to issue.

Some of the safety alerts & safety slogans are given below

### 4.10.1. Safety Signs



















Ear protection
must be worn


Fire action
Any person discovering a fire
On hearing the fire alarm


First aid
box


COMPRESSED GAS
2



### 4.10.2. Safety slogans

Keeping safety slogans in many places in the plants make awareness to the employees at any time of work, some of the e.g. are given below,

- ✓ Safety does not come instantly, you should implement it consistently.
- ✓ Success will always be with you, as long as you place safety as the first priority.
- ✓ A Safety message could save thousands of life.
- ✓ One minute safety talk can prevent you from injury and death.
- ✓ Safety is endless. Safety is an ongoing process.
- ✓ You're family is waiting for you, work safely.

Industrial Safety Procedure & Responsibilities to be given to all employees and the role of all employees to be clearly mentioned and to be followed, some of the instructions given below before start of the work to avoid the accidents.

Employee Responsibility

Follow the departmental standard operating procedures and safety norms.

Inform all unsafe acts, unsafe conditions, accidents, and dangerous occurrences. And near miss accidents to your seniors;

Ensure use of personal protective equipment as and when required and keep same in good maintained condition.

Maintain good housekeeping in the department.

### 4.11. Important Safety standards & Safety tips

### Electrical Safety

- ✓ Use all electrical wires, cables & materials of proper capacity and proper insulation.
- ✓ Don't overload electrical circuit.

- ✓ Use Molded Case Circuit Breaker of proper capacity to avoid danger of overload or short circuit.
- ✓ Use quality control certified electrical materials and appliances.
- ✓ Use 3 pin plug top instead of open wire in socket.
- ✓ In case of fire due to short circuit, first switch off Main. Don't use water.
- ✓ Use Earth leakage Circuit Breaker to avoid accidents from earth leakage current.
- ✓ Safety shoes & safe tools while working on electrical live lines.
- ✓ Use electrical appliances having provision of ear thing i.e. 3 pin plug.
- ✓ Keep meter room neat, clean and ventilated.
- ✓ Don't use temporary wires.
- ✓ Use insulated wire for neutral & independent wire for ear thing.
- ✓ Use only plug in a socket,
- ✓ Don't use wires and cables having joints.
- ✓ Ensure test remarks before using.
- ✓ Provide copper plate or rod ear thing to electrical installations.

## Hazard & Risk

Hazard: Hazard is defined as source or situation with a potential for harm in terms of human injury or ill health, damage to property , workplace, environment or a combination of these,

Risk: Risk is defined as combination of likelihood and consequence(s) of specified hazardous event occurring.

- ✓ The simple method to recognize hazard is to use the five common senses (sight, hearing, smell, touch , taste).
- ✓ Sight: Some things can be easily seen as dangerous.
- ✓ Heating: An odd noise can mean that something is wrong that could lead to danger.
- ✓ Smell: Unusual smell like that of a chemical can mean there is a leakage that can cause irritation, suffocation or other problems.
- ✓ Touch / Feel: Unusual warmth in an office can mean that the air-conditioner is not functioning properly causing discomfort.

- ✓ Taste: Food that is distasteful could mean that it is a spoilt and may lead to food poisoning.

## Machine Safety

- ✓ Think safety before commencing the activity.
- ✓ Know and understand all the safety features and instructions of the machine before operating the machine.
- ✓ Read all warnings and danger notices.
- ✓ Know where the emergency stop button is located.
- ✓ Switch Off machine completely before changing or adjusting any parts of the machine.
- ✓ Do not attempt any maintenance work on the moving parts of the machines.
- ✓ If any part of the machine is not functioning, inform the same to your departmental engineer immediately. Don't attempt to repair it if you are not trained.
- ✓ Use proper tools to work on machine. Never use bare hands.
- ✓ Don not wears loose clothing when working on machines.
- ✓ Use appropriate personal protective equipment when operating or working on machine.
- ✓ Read and understand the machine instruction manual before operating the machine.

## Material Safety Data Sheet System

- ✓ Material safety data sheet reveals information about potential dangers that could lead to an accident. Names of other hazardous substances I properties of the said chemicals. Safety precaution, its effects on human and environments, ways to fight with dangers and tips on the first Aid requirements.
- ✓ Everyone who works with chemical directly or indirectly must read the MSDS.
- ✓ The MSDS must also be carried when transporting chemicals including waste.
- ✓ The MSDS is available with the user department. The copy of same is available with Emergency Control Center, Health. Safety & Environment Department for reference.

## Hazardous Area Safety

- ✓ API Manufacturing department, solvent yard, Dangerous petroleum store, corrosive material store, switch yard are defined as hazardous areas.
- ✓ Following are the safety instruction for these areas.
- ✓ Switch OFF the mobile phones before entering into the area.
- ✓ During handling of flammable liquids precautions to be taken to eliminate static electricity.
- ✓ Select and use personal protective equipment.
- ✓ Understand properties of chemicals and storage methods. Possibility of hazards due to intermixing (of Non- compatible chemicals)
- ✓ Follow disposal methods and deactivation procedures.
- ✓ Ensure Guarding and use ear thing I bonding.
- ✓ Ensure Fire hazards possibility, type of fire extinguishers available and its use.
- ✓ Follow Safety Permit Systems.
- ✓ Ensure correct label before use.
- ✓ Obey warning and danger signs.
- ✓ All concerned persons must be trained on chemical handling and MSDS.
- ✓ Use eye wash or shower with plenty of water when you come in contact with chemicals (for minimum 20 minutes).
- ✓ No visitors I suppliers I vendors are allowed to enter this area without permission.

## Laboratory Safety

- ✓ Label all chemicals and regent bottles clearly. Store them in appropriate places.
- ✓ Volatile, combustible, flammable chemicals must be stored away from direct flame and other sources of heat.
- ✓ Poisonous material must be kept locked.
- ✓ Fuming cupboard must be used where toxic, irritating and flammable vapors are involved. Exhaust fans I blowers must be kept continuously on to drive out any fumes or vapors if present.

- ✓ While handling toxic and corrosive chemicals, use proper personal protective equipments.
- ✓ Do not throw used solvents into the sink but, collect them in containers for recovery or disposal.
- ✓ There are energy lines and taps in laboratory. Get them inspected periodically and see that leaks are detected and rectified quickly.
- ✓ While pouring solvents which develop static charges from bigger container to smaller container, both of them must be earthed and bonded in order to prevent fire and explosion due to static charge buildup.

## Chemical Safety

- ✓ Know the hazards of the chemical you deal or work with.
- ✓ Make sure you have a copy of the MSDS, read and understand it.
- ✓ Use appropriate personal protective equipments while handling the chemicals.
- ✓ Label all chemical containers and bottles correctly.
- ✓ Store the chemical as per the incompatibility.
- ✓ Obey warning and danger signs.
- ✓ Use eyewash and safety shower with plenty of water when you come in contact with a chemical (for minimum 20 minutes).
- ✓ Try to stop the spillage, if any, and report the same to the shift in-charge and safety department simultaneously through your colleagues earliest possible.

## Gas Cylinders Handling

- ✓ Store the cylinder in well ventilated place / cylinder cage.
- ✓ Ensure the color coding of cylinder as per IS (Indian Standard) specification.
- ✓ Do not drag gas cylinder. Use trolley for transport of cylinder.
- ✓ Always store and use the cylinder in upright position.
- ✓ Always chain the cylinder to prevent accidental knocking out.
- ✓ Always use a pressure reducing regulator free from oil and grease attached to the cylinder valve.

- ✓ Keep the metal cap in place to protect the cylinder valve.
- ✓ Before removing the regular from valve, close the valve and remove the gas by using regulator.
- ✓ Use appropriate personal protective equipment while handling cylinders.
- ✓ Keep the valve of cylinder closed whenever not in use.

## Equipment Safety

- ✓ All new equipments should be procured as per user's safety requirement and designed accordingly.
- ✓ The equipments should be qualified for installation, operation and performance.
- ✓ The Persons working on the equipments should undergo the operation training.

## Hand Power Tools Safety

- ✓ Use the right tool for the job.
- ✓ Immediately report all faulty equipment to your senior or departmental engineer.
- ✓ Take extra care of your tools. Keep them clean and in good working condition. Replace damaged or worn out tools.
- ✓ Do not carry tools in your pocket. Use a proper tool kit or box.
- ✓ Use appropriate personal protective equiprnents while working or carrying out any repair jobs.
- ✓ Make sure all guards and safety devices are in place and functioning properly before operating any power tools.
- ✓ Electrical power tools must be properly earthed.
- ✓ Do not operate electrical equipment with a wet hands or while standing on a wet ground.
- ✓ Office Safety
- ✓ Step stools should be used to obtain objects from higher shelves.
- ✓ Chairs are meant for sitting; do not use them for other purposes.
- ✓ Drawers must be kept close when not in use to avoid people bumping on it.

- ✓ Do not run electrical or phone cords across the aisles, cubicles or hallways as it becomes tripping hazards.
- ✓ Be sure not to roll chairs or equipments over cords to avoid damaging its insulation and creating shock hazards.
- ✓ Do not read while walking.
- ✓ Slow down and look at blind corners along passageways and hallways.
- ✓ Handle metal filing clips with care to prevent cuts.
- ✓ Never lift anything which you cannot carry and always bend your knees while lifting a load from ground to prevent back injury.
- ✓ Always wash your hands before having your meals.

## Ergonomics

- ✓ Ergonomics is the study of hoe people interact with their work. The Goal of Ergonomic programme is to minimize health hazards and psychological stresses.

## Mechanical Guarding

- ✓ Every moving part or every dangerous part of any machine must be properly guarded to prevent accident.
- ✓ Guarding must be compatible and must be able to restrict the access of any person to any moving or dangerous part.
- ✓ Following types of guards should be provided as applicable.
- ✓ Fixed guard
- ✓ Automatic guard
- ✓ Interlocking guard
- ✓ Trip guard
- ✓ Depending on the machine to be guarded its use / application, operation of the machine, movement of the operator and other persons, above types of guards must be selected.
- ✓ Warning / Caution label must be displayed prominently near the moving or dangerous part of machine and / or guard must be highlighted.

- ✓ Machine should not be operated without guard. If the guard has been detached from the machine then caution / warning label should be displayed prominently on the machine.

## Work Permit Procedure

Following work permit procedures are to be followed while carrying out the respective work.

## Hot Work Permit

For the following activities hot work permit should be taken:

- ✓ Gas Cutting
- ✓ Welding
- ✓ Brazing
- ✓ Drilling
- ✓ Chiseling
- ✓ Buffing Grinding

Any work where open fire is required viz. Tar heating or chances of spark generation hot work permit will be issued to user department after evaluation of the site condition with help of check points mentioned in the hot work permits and clearance will be given by safety person for carrying out the job safely.

### Cold Work Permit

For the engineering jobs or activities, not specified in hot work permit or excavation permit, cold work permit is required except if the vessel entry is done by the production person, for cleaning the vessel.

The user department will issue the permit after evaluating the site conditions where the actual job is to be carried out with the help of check points mentioned in the cold work permit.

## Vessel Entry / Confined Space Entry Permit

For the activities / confined space (Viz. - inside the reactor, vessel, tank) Vessel entry or confined space entry permit should be taken.

The vessel entry / confined space entry permit will be issued to user department after evaluating the site conditions where the actual job is to be carried out, with help check points mentioned in the confined space or vessel entry permit. Electrical isolation wherever required will be done by authorized electrical person. Final clearance will be given by safety Person after evaluation of site conditions viz. Gas in PPM level, explosive level in percentage electrical isolation, isolation of utility valves, etc.

## Work Permit for Excavation

For the excavation, work permit for excavation should be taken. The excavation permit will be issued to user department after evaluation of the site conditions where the actual job is to be carried out by Civil Engineer along with the electrical engineer and user department, with help of check points mentioned in the work permit for excavation. Final clearance will be given by safety person after ensuring the site condition.

## Fire Alarm System Isolation Permit

For the isolation of fire alarm system Fire alarm system isolation permit should be taken. The permit will be issued to user department / Electrical Department after the clearance given by Health, Safety and Environment department person.

## Certis CISCO

Certis CISCO is Singapore's leading security organisation. We offer a comprehensive range of security services from Auxiliary Police to a "one-stop solution" for a full range of physical, IT and data security services. The breadth of services include security manpower – both armed auxiliary police officers, as well as unarmed protection officers, enforcement services, security consulting and training, security technology, defence services, outsourced manpower, and IT security and information management.

## Fire Hydrant System Isolation Permit

For isolation of fire hydrant system, Fire hydrant system isolation permit should be taken. Fire hydrant system isolation permit will be issued by the Engineering department after the clearance from Health Safety and Environment Department. Sam e should be authorized by Unit Head / Engineering Head. This will be informed to all departments. The system will be restored after the completion of the job.

## Electrical Isolation Permit

For the activities specified hereunder the Electrical isolation permit should be taken.

- ✓ Working on High Tension lines
- ✓ Working on transformers
- ✓ Working on main panels.

The permit with be issued after the evaluation of the site conditions where the actual job is to be carried out by electrical engineer along with the department head or other senior electrical engineer, with help of check points mentioned in the electrical isolation permit. Final clearance will be given by Health, Safety and Environment department after ensuring the compliance of the permit conditions. After completion of the work in a given period, per mi t user wilt inform it to Authorized electrical engineer who will restore the isolation after certifying the job.

## Fire Prevention

- ✓ In case of fire, break the glass of the nearest manual call point and try to alert person s in the immediate area of danger and / Of dial emergency phone number and inform other persons about location of f ire and / or use fire bell.
- ✓ Attempt to extinguish the fire using the nearest suitable firefighting equipment, without exposing yourself to undue risk.
- ✓ If you are familiar with plant. Machinery or equipment affected by fire isolate it as necessary for containment and to avoid further spread of the fire.
- ✓ If the fire is from electrical power, do not use water until the main supply is switched off.
- ✓ Send a report of the same for the unit head through HOD safety department
- ✓ Nobody is allowed to get water from hose reel and hydrants except to put off fire.

- ✓ Strictly obey "No Smoking in instructions.
- ✓ A fire drill will be carried out every month. Educate and expertise every person in fire fighting by nominating them in these drills.

## Spillage Handling

- ✓ Special care must be given to prevent spillage of hazardous chemicals especially flammable solvent into the drain and sewage system.
- ✓ Any spillage must be reported to the Health Safety & Environment Department immediately while possible control and containment of the spill is carried out.
- ✓ All departments are provided with spill control kits . Emergency safety cupboards are located at various locations containing personal protective equipment and spill control kit.

## Emergency Handling Procedure

- ✓ Emergency: A situation created by an accidental release, spill of any hazardous gas or chemical.
- ✓ Fire, Explosion, Natural disaster or other situation which poses threat to the safety of employees. The environment or the property. Emergency can be declared by raising walling siren, by announcing on public address system.

## Action to be taken by the person noticing the fire / Explosion

- ✓ By moving to a safer location break the glass of the nearest manual call point and try to alert persons in the immediate area of danger and /or dial emergency phone number and inform other person s about the location of fire and I or use of the bell.
- ✓ Attempt to extinguish the fire using the nearest suitable firefighting equipment without exposing yourself to undue risk. First seek to protect yourself by moving to a safer location.
- ✓ If you are familiar with plant, machinery or equipment affected by fire, isolate as necessary for containment and to avoid further spread of fire.

## Action to be taken by the person noticing chemical / Gas Leakage / Spillage

- ✓ First seek to protect yourself by moving to a safer location.
- ✓ Break the glass of the nearest manual call point and try to alert person s in the immediate area of danger and / or dial emergency phone number and inform other persons about the location of fire and /or use of fire bell.
- ✓ Cover your nose with gas mask or wet cloth & breath though it.
- ✓ All hot work should be stopped.
- ✓ Attempt to stop leakage / spillage without exposing yourself to undue risk.

## Duties of Safety Squad Members & First Aid team members

- ✓ Immediately on receiving the communication to help.
- ✓ Hand over the current job to the colleague and proceed to the emergency control room /site.
- ✓ Report to the incident controller at emergency control room / site.
- ✓ Follow the instructions given by the incident controller.

## Evacuation

- ✓ When told to evacuate or after hearing evacuation siren do not get panic.
- ✓ Do not approach the emergency site as a spectator.
- ✓ Do not engage phones unless it is in connection with the emergency.
- ✓ Do not move about unnecessarily.
- ✓ Remain at your work place & be attentive to receive instructions.
- ✓ Non emergency team members should take charge from emergency team members
- ✓ Proceed to Assembly Point in orderly manner as per the emergency evacuation plans displayed in the department.
- ✓ Ensure that all contractors & visitors working in your department are also following the above instructions
- ✓ At the Assembly point follow the instructions given by the department head.

## Health, Safety and Environment Committee

- ✓ Unit head will be the chairman of the committee.
- ✓ Health, Safely and Environment Committee shall meet as often as necessary but at least
- ✓ Once in every month.
- ✓ Employees will be member of the committee.
- ✓ Health, safety and Environment committee shall meet as often as necessary but at least once in every month.
- ✓ Health , Safety and Environment Committee shall have the right to ask for necessary
- ✓ information concerning Health and Safety of the employees 10 any personnel in the unit
- ✓ And seek any relevant information advice concerning Health and Safety of the employees from any expert in the field.
- ✓ Functions and duties of the Health, Safety and Environment Committee shall include :
- ✓ Assisting and co-operating unit management in achieving the aims and objective outlined in Health, Safety and Environment Policy.
- ✓ Dealing with all mailers concerning Health, Safety and environment and to arrive at Practicable solutions to problems encountered.
- ✓ Creating Safety awareness amongst all employees through safety team and Health. Safety & Environment committees.
- ✓ Undertaking educational training and promotional activities for Safety. Health & Environment.
- ✓ Deliberating on reports of Safety. Environmental and Occupational Health Surveys. Emergency plans. Safety and its risk assessment and implementation of recommendations made in the report.
- ✓ Carrying out Health and Safety surveys and identifying causes of accident or likely hazards and / or to appoint a team to carry out the same.
- ✓ Looking into any notice on the probability of an eminent danger to the safely and Health of the employees and to suggest corrective measures.

- ✓ Reviewing the implementation of the recommendations made by it or by the authorities.
- ✓ To discuss out the points rose in departmental Safety Committee Meeting.
- ✓ The minutes of the meeting must be recorded. Minutes must contain all the points discussed in the meeting with the appropriate action to be taken, compliance done on the points discussed in the last meeting and the pending points for which compliance is not done.

## Unsafe act and Condition

- ✓ When you find any unsafe condition. Hazard. Or an unsafe act by anyone in the company premises. Prevent it if you have been adequately trained or immediately report it to your superior or Department. Head to avoid any unplanned incident.
- ✓ Employee operating a machine without authority.
- ✓ Employee using unsafe equipment.
- ✓ Employee bypassing safety procedures.
- ✓ Working without proper PPE.

## Health Safety and Environment Training

- ✓ As a part of regular training program, Job Safety training should be carried out at different levels of the management.
- ✓ As a part of 'Off the job' safety and in order to create awareness for Health, Safety and Environment training on the subjects like Vehicle Safety, road safety etc to be carried out at different levels of management.
- ✓ Emergency handling training is a must for all emergency handling team members.
- ✓ Fire fighting training should be organized in the employee's family.

## First Aid

- ✓ All emergency handling team members will be trained in first aid.
- ✓ First Aid boxes shall be available in all departments.

## Safety Signs and Instructions

To create the Health, Safety and Environment awareness at all levels of management and to communicate the specific risk / hazards, at relevant locations Health, Safety and Environment Signs, Warning Labels, Instruction to be displayed.

## Lighting

Illumination sufficient for maintaining safe working conditions shall be provided where ever personnel is required to work or pass , including in passageways, stairways and landings.

No work area shall have illumination of less than 50 flux or otherwise specified.

## Housekeeping

- ✓ All machinery and equipment should be maintained clean.
- ✓ The working area, pathways. Corridors. Passages, rest rooms. Control rooms, sub stations and wash rooms should be free from rubbish and unwanted material.
- ✓ Materials should be stored and stacked in such a way as not to cause any obstruction at the workplace or which could cause.
- ✓ No materials should in such a way that it obstructs the accessibility to fire extinguishers, first aid boxes, electrical switches, walk paths aisles and roads.
- ✓ No material should not be stored outside the de marked area.

## Noise, Dust and Fumes Control

- ✓ Hearing protection devices shall be provided and used in areas where the noise level exceeds 90 dB (A) and when all other controls have been applied to reduce the level.
- ✓ There should be proper ventilation for fumes and dust to prevent its concentration as it could be hazardous.
- ✓ Noise monitoring as per the legal requirement s will be carried out as per schedule.

## Safety of stacker, Goods lift, Personnel lift

- ✓ Only authorized and trained personnel are allowed to operate stacker.
- ✓ No one is allowed to hitch a ride on these vehicles /machines.
- ✓ Before starting the above stated equipment the driver or user must go through a checklist or water and lubrication oil etc and report fault discovered.
- ✓ Stacker s must have reverse buzzers.
- ✓ All goods hoist and personnel lift must have annual inspection by competent person.

## Emergency Contact Numbers

List of key personnel is available at emergency control center, main gate. Please refer the same in case of emergency.

## Hazardous waste Disposal

- ✓ The hazardous wastes must not be mixed with normal wastes. It must be stored separately.
- ✓ These wastes should be handed over to Health Safety & Environment Dept with details of waste in prescribed format.
- ✓ The waste shall be handed to Authorized party for disposal.

These are all some of the guidelines to be followed to minimize the accident. By using these techniques we can improve the work culture and safety of the equipment's as well as employee's safety.

# Chapter-5

## 5.1. Conclusion

This project was designed to provide a framework for the evaluation of the effectiveness, efficiency and appropriateness of safety programs and initiatives at all levels in the Power industry and to identify the key factors affecting the success of programs.

Through the development and application of our plans and procedures, we will achieve the following goals

- ✓ Provides workers with a safe work environment.
- ✓ Conduct routine/regular workplace inspections and meetings.
- ✓ Provide Personal Protective Equipment.
- ✓ Develop and implement safe work procedures and rules.
- ✓ Provide on-going safety training and Emergency action plans.
- ✓ Enforce safety rules and appropriate discipline.
- ✓ Use of Near Misses and experience feed-backs

A workplace free of occupational injury and illness; a workforce that is fit for Duty;

A consistent approach across the company towards health and safety; Effective risk management with robust planning and prioritization processes; Clarity of roles, responsibilities and accountability for all people in the organization; Understanding and discharging employer obligations set by health and safety legislation; Documentation of the company's ability and commitment to manage health and safety by controlling the risks to all persons affected by the organizations activities; Safety awareness and leadership embedded throughout the business and part of everyday activity, Continuous improvement by identifying leading practice and learning from it, and Engagement of employees, contractors and others through effective communication and consultation.

Companies with nil or less accident records may lead to increase favor with investors and of finding it easy to raise funds and Lower injury rates lead to higher profit margins. On **April 28** The International Labour Organization celebrates **"World Day for Safety and Health"** to raise awareness of safety in the workplace. Occurring annually since 2003, each year it focuses on a specific area and bases a campaign around the theme.

## 5.2. Further scope of the work

The technology is improving day by day and it helps to utilize the technology to improve the reliability & efficiency of the plant. For example in our company to improve the PTW system SAP software system is planned within next one to two years.

Now WebBFS system is used for PTW system, this system is used as an online process of PTW system. Maintenance engineer need to check the stock and spares and he has to process it through WebBFS system. But when it comes in SAP the availability of the spares & Maintenance team member details and their availability all are available. Because of this information's the repair time will reduce and the employee's details when they attended safety training what kind of training they attended & who are all doing the work and how many hours they are completing the work all are to be identified, It will gives the idea to the management to improve the plant safety and the efficiency.

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