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"EVALUATION OF SAFETY ON AN ONGOING PROJECT OF THERMAL POWER PLANT (1X660MW)"

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ABSTRACT: This Paper is concerned about the evaluation of a safety measures inside the thermal power plant Deepnagar Bhusawal. It also presents all the valuable information about areas of particular power plants, at which the safety is strengthened, areas of weakness and where the more corrective safety actions are required to enhance the safety.

In this report we also focused on the occupational health of all the employees, labor's, workers inside the power plant & at the same time we also get to know that how the power plant employees be trained to follow all the safety precautions. The safe/Proper working operation of a thermal power plant needs to find the hazards, assess to the associated risks and bring the risks at tolerable level on a continuous basis. There are several unsafe conditions, process and equipment's of the thermal power plant which leads to a number of accidents and which can cause a loss and injury to the human lives, damages to property, interrupt production etc. Hence, safety analysis is an important step in the Protection of the plant from such conditions. It helps us to focus on the safety that really have the potential to cause the harm.

1.1. INTRODUCTION:

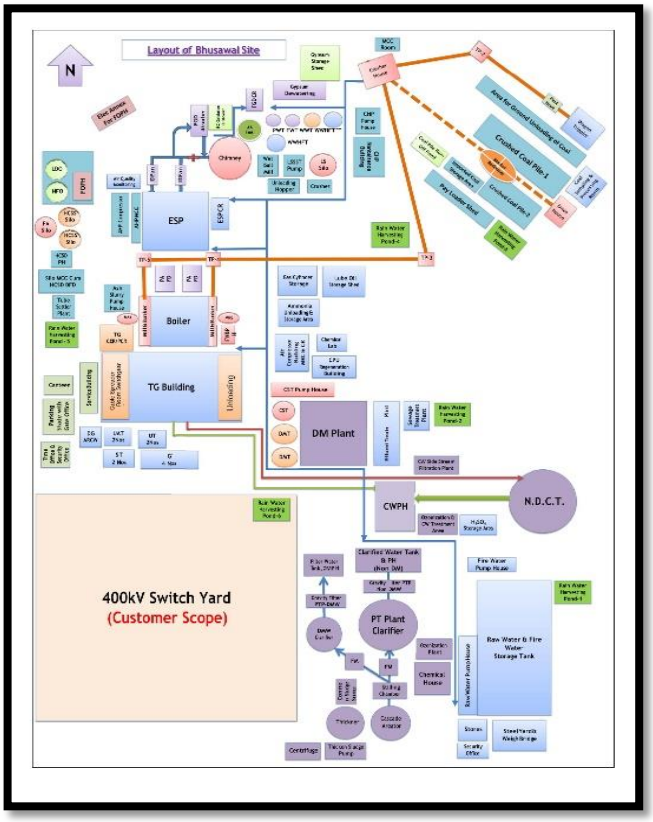
Safety is always associated with the frequency of a failure and consequence effect. Predicting such situations and evaluating all the risk is essential to take the appropriate preventive measures.

Power plant's safety has two sides. One is associated with the safety of power plants outside, such as the protection of the environment against building up of greenhouse gases resulting from the burning fossils fuels. The second side is related with the subject to this project, which is associated with the safety inside the power plant, namely safety of power plants employees and the power plant itself. The Thermal electrical power plants is considered in this study include plants that have different structures including steam and gas turbines.

Thermal power plant is an electricity generation plant, which converts the stored energy to the electrical energy by means of Steam generated by burning of fossils fuels (Coal). The thermal power generation (1 x 660 MW), Deepnagar involves the generation of electricity by burning coal in a large capacity in the furnace. In the coal-fired station, the coal is pulverized and blown into the furnace where it burns, like a gas Flame, to heat the water and to generate the steam, which moves turbine at a high speed.

Safety identification is the process of defining and describing the safety, including its Physical characteristics, magnitude severity, probability frequency, causative factors, and locations or areas affected. There are the few basic methods of a safety identification that may be employee to identify safety:

- Data from all the previous accidents including case studies or operating the experience
- Scenario of the development and the judgment of a knowledgeable individuals
- Generic hazard checklists
- Formal hazard and analysis techniques
- Design data and all drawings.



1.1.1 Objective

Operating instructions are the one that deals primarily with the protection of the equipment. Rules and devices for all the personnel protection are essential, regardless of the type of boiler design or fuel.

Programs on safety trainings as well as on written safety procedures must be an integral for the safe operation of all plant equipment's.

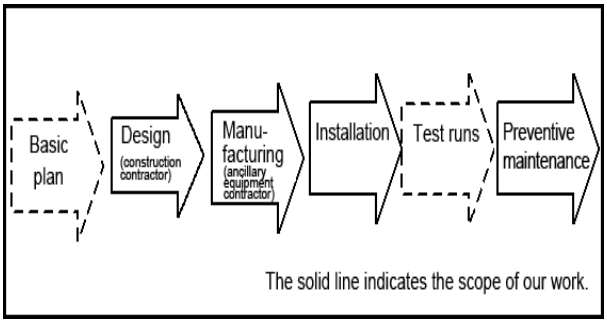
While not exhaustive, the item listed below are based on an actual operating experience and here are the points on some typical personnel safety precautions.

- To study the rules and regulation of safety administration for construction of thermal power plant.
- To identify the factors that are affecting the improper safety management on the site.
- To monitor or identify the current practices of a safety management by the construction companies.
- To neglect the factors that are responsible of affecting the safety on the site by nearby people employees or labor's.

The Objective of a thermal power plant is to provide sources of energy with eco- friendly technologies. Its main objective is to provide major power corporation in India with respect to safety.

1.1.2 Scope

The scope of our work includes construction (design, manufacturing, and installation) and preventive maintenance (modification of construction, update construction, and maintenance) with respect to the safety of persons working there which includes labors, engineers, employees, and other persons working or living nearby the area without cause any damage and with respect to safety in mind.



Operating instructions are usually deal with primarily protection of all equipment's. Rules and the devices for personnel protection are also necessary, regardless to the type of a boiler design or fuel. The Safety training programs with written safety procedures are integral part for the safe operation of all the plants equipment. While not comprehensive, here are the items listed which are based on an actual operating experience and points on some typical Personnel safety precautions.

- Do not stand directly in front of any of open ports or doors, especially when they are being opened.
- When viewing any type of flames or furnace conditions, always wear (tinted) goggles or a shield to protect the eyes from all harmful light intensities and from flying ash too or from slag particles too.
- Do not use any open-ended pipes for rodding observation ports/slag on a furnace walls. Hot gases can be discharged from through the open-ended pipes directly onto its handler.
- The pipe can also become excessively hot.
- Never enter in a vessel, especially in a boiler drum, until all the steam and water valves, including the drain and blowdown valves, have been closed/locked or tagged.
- It is possible that steam and hot water can back up through the drain and blow down piping,

especially when more than one boilers/vessels where connected to the same drain or a Blow down tank.

2.1. OVERVIEW ON LITERATURE REVIEW

The large Industrial Facilities such as Electric power generating plants that is thermal Power plant has experienced the legal treatment at state level since, by 1970's.

However, the Industrial Zoning at local level with its roots in control of inconvenience at common law was inscribed by the supreme court as a legal Exercise of Police power during the year 1926, when the supreme court justifies the validation of legal scheme of Zoning districts. Recently Industrial uses have been adjusted in accordance with the Performance Standards through Special review activities and Environmental controls have appeared as an essential dimension of the development planning. Design and the location of Nuclear power plants have been subjected to the federal control since 1954. But the huge Electric Power Supply facilities were not widely considered as a place of conflict between Economic development and Environmental quality until the Early 1960.If safety performance can be enhanced, the companies would benefit through in the best or improved perform way. Humans error or safety is one of the major underlying cause in any of the construction site or industrial accidents and that are perhaps at the core component with respect to the safety.

3.1. METHODOLGY

The assessment of the conceptual design is conducted for the purpose of recognizing and examining the Safety related to the feed stock materials and major process components, such as utilities and supported systems, environmental factors, proposed operations, facilities, and safe guards too. The qualitative risk of assessment methods and Hazard of analysis have been using, besides the quantitative risk or safety assessment, which is done by a fire dynamic tools.

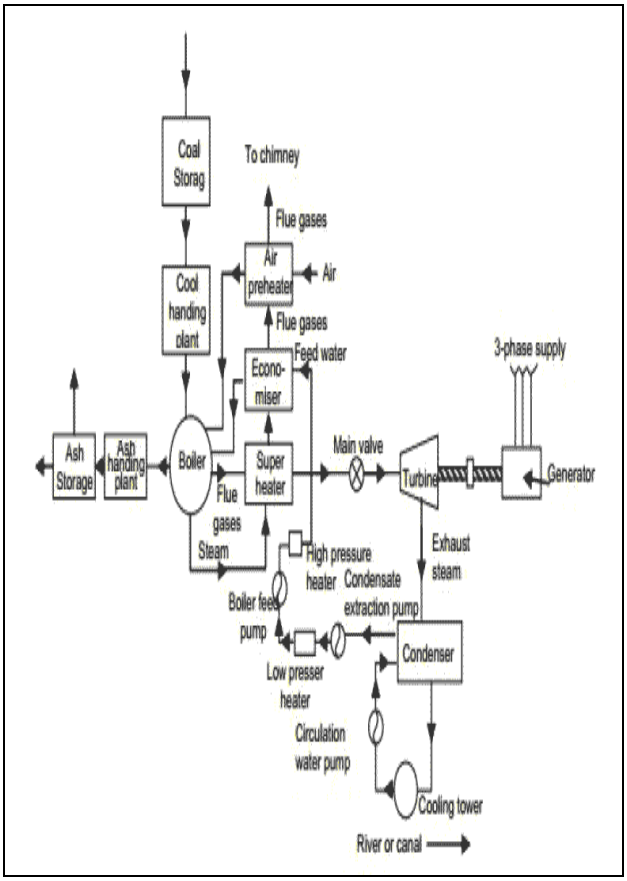
3.1.1 Safety during the Testing and Commissioning-

The planning, Sequence is the from whole to a part. Testing in a sequence is the form of part to a whole, give important to the *two* point in commissioning the thermal power plant. Tests must not be avoided in any circumstance. Putting the equipment into the operation, without testing is a very unsafe practice and serious lapses of a construction management. During the testing and commissioning, each protective zone is tested in-dependently. The general employees at construction site may be exposed to a danger during the working in the plant i.e., during commissioning.

3.1.2 Safety Precautions during the plant Energizing-

Primarily requirement during the energizing of an electric plant or its subsystem is to ensure that unauthorized person do not come to close to proximity of the plant or subsystem. Display of a signboard "**DANGER, WORK IS IN PROGRESS, AND ENRTY IS PROHIBITED".**

Only all the authorized person with the gate pass should be permitted to enter control room and in the equipment zone. Follow all the procedure /protocols for subsystem tests and should be written down in advance and signed by contractor, owner, commissioning manager. Follow step-by-step, part to whole a sequence. The total plant must be subdivided into sub-system and further into the small sections. The small sections must be tested and proved first, and then to the subsystem, and then finally to plant. While energizing the subsystems, all visual observations should stand with an appropriate safety distances from the subsystem for sparks/flash-over /abnormal sounds. They should communicate with the control engineer



3.1.3. Health Problem

Some workforce in the boiler rooms may suffers from a diseases of upper respiratory tract such as bronchitis and from conjunctivitis too these caused by vanadium compounds (dust given off by oil combustion) and SO_2. Far from the Flue cleaners and a cinder, removers may, after some years. Suffers from a disease like chronic bronchitis and rhino pharyngitis as well as pneumosclerosis caused by cinder dust and Sulphur dioxide and trioxide.

4.1 RESULT AND DISCUSSION

It is observed that the Safety assessment is a very helpful in the construction of any structure for finding the hazard conditions in the thermal power plant. Safety analysis and Safety assessment are used to be establish the priorities so, that most of dangerous situations are reduced/addressed first and those least likely to be occur and least likely to cause the major problems and can be considered later. Safeties were identified just to examine the risk or safety at different sections of the thermal power plant sectors. Here are the different activities that were divided in to a high, medium and low depending upon their result and likelihood. The Frequency ranges for the event and has been established by using a format, which includes the time between the occurrences, and a qualitative description of the frequency there ranges and categories at a level of likelihood. A likelihood category can be chosen for the safety assessment as to provide a frequency range for a work.

4.1.1 Establishing the event consequences and category range

The consequences are related to the potential expected damage to the property, people's life safety etc. The following table's gives the consequence rage related to qualitative losses data first on the base of life safety consequences and the other properties damage consequences too.

	Consequences Level	***Description***
01.	*Low*	*First Aid.*
02.	*Moderate*	*Single Person injury requires hospital treatment.*
03.	*Heavy*	*Multiple Person injury requires hospital treatment.*
04.	*High*	*Life threatening injuries / death on site.*
05.	*Very High*	*Life threatening injuries / death on site.*

Table 1: Life Safety Consequences Categories

	Consequences Level	***Range (Damage Factor %)***	***Description***
01.	*Slight*	*0-1*	*Limited localized minor damage not requires repair.*
02.	*Light*	*1-10*	*Significant local damage of some of components (Not requires major repair).*
03.	*Moderate*	*1-25*	*Significant local damage of some of components (Warranty repairs).*
04.	*Heavy*	*25-60*	*Extensive Process of equipment damages (requires major repairs).*
05.	*Major*	*60-100*	*Major wide spread damage that may result in the facility major structural damage and release of*

			contaminated (Combustion products OFF SITE).

Table 2: Property damage categories

Frequency is a range of event that can be established by using a format, which includes time between the occurrences, and a qualitative description of all the frequency that are in the range and categories/level of likelihood. A likelihood category is chosen for the risk of assessment to provide a frequency range to work when for example a likelihood category in a table relates to a frequency range at midpoint.

Sr No.	***Likelihood Category***	***General Definition***
01.	*Very Low*	*Very remote possibility of an occurrence (0.000001>p) .So, likely or unlikely ,it can be assumed that the occurrence may not be experienced, with the probability but the occurrence is less than in that life .Unlikely to occur , or may be possible to occur.*
02.	*Low*	*Possibly occurs at once over 2-3 times in the useful life of the process (0.0001>P>0.000001) Unlikely but it is possible to occur in the life of an item, with a probability of occurrences less tan or greater than in that life. Unlikely to occur or may be possible to occur.*
03.	*Moderate*	*Possible to occur in once over the lifetime of the process (0.001>P>0.0001) Likely to occur sometime in the life of an item, with a probability of process (0.001>P>0.0001) Likely to occur sometime in the life of an item, with a probability of occurrence or less than but greater than in that life and it will occur several times.*
04.	*High*	*Possible to occur once per average process of a life cycle (0.01>P>0.001) which will occur several times in the life of an item, with a probability of occurrence less than or will occurs frequently.*
05.	*Very High*	*Possible to occur occasionally (P>0.1) likely to occur in the life of an item with a possibility of occurrences greater than that in life.*

Table 3: Initiating event likelihood categories

4.1.2 Safety Measures Following at site

- Psychological and psychological aspects of accident prevention, Accident investigation and analysis.
- Safety administration for construction industry with Personal protective equipment and Fire protection in construction
- Safe work permit system such as Safety in excavation, trenching and shoring, Safety in welding, cutting and bracing, Safety in road works and Working at height, access and scaffold safety.
- Safety in the use of hand and power tools, working around concrete safely.
- Safety in the use of cranes and lifting equipment, Safe rigging practices and mechanical equipment with respect to motor transportation.
- Safety in pressure testing such as material handling with respect to the use of electricity with the use of ionizing radiation and chemicals too.
- Occupational health and hazards Emergency Organization planning and preparedness.

5.1. CONCLUSION

In this paper, we have observed a present scenario of all the existing safety Measures and there efficiency too. Construction of a thermal power station deals with many challenges in the safety field the implementation of safety and overcoming the entire difficultly in executing the project as per plan with workforce and minimum loss of a life and injuries. The risk of rating of the present and Possible hazard/safety is evaluated which can be divide then into Acceptable, tolerable and unacceptable risk levels. The risks, which are in unacceptable level there will be possible corrective actions taken and also recommended to improve safety measure and analysis too. The Results of this analysis will be a valuable to find out the Consequence of the emergency situation that may occur on the site. With this Knowledge, the level of preparedness can be assessed and Measures to be taken to enhance the capabilities through trainings and Preparation of more effective response to such an occurrences.

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