

SAFETY IN COAL HANDLING PLANT

A K KESHRI
GM-FM/FT (Retd)
NTPC Ltd.

INTRODUCTION

- ▶ CHP in any coal based power house has a reputation of most hazardous workplace.
 - ▶ Workers faces many safety risks due to nature of job.
- ▶ Our Aim is to reduce the work related accidents at CHP

INTRODUCTION

- ▶ The work environment of CHP is often Dusty, Noisy, some places are hot, consists of several major equipment and operations involved.
- ▶ There is an always present risk for falling, crushing injuries, electrical shocks, fire, coming in contact of CO, CO₂ etc.

INTRODUCTION

- ▶ Due to the risky workplaces that Coal Handling Plants constitutes, the companies need to assure safe working conditions through systematic and regular Hazard Identification and Risk Assessment.
- ▶ Many business enterprises have proven that good safety management leads to increased productivity and the same hold good for Power Plants.

INTRODUCTION

- ▶ By having a good safety management program, not only minor injuries can be avoided, but also other incidents that are costly, time consuming, stressful and inconvenient can be prevented.
- ▶ OHSAS 18001 (Occupational Health and Safety Assessment Series) suggests that a safety procedure is must to ensure the identification of Hazard, Assessment of Risk, and its determination to eliminate, reduce or control the possibility for any accident to occur.

INTRODUCTION

- ▶ The most effective tool to reduce such accidents is - HIRARC (Hazard identification, Risk Assessment and Risk Control).

HIRARC

- ▶ Hazard Identification, Risk Assessment and Risk Control have become fundamental to the practice of planning, management and the operation of a business as a risk management.
- ▶ HIRA - Processes used to identify and evaluate both existing and potential hazards on a worksite and the methods used to control or eliminate the hazards identified.

RISK ASSEMENT AND MITIGATION

- ▶ The organizations that have carried out Risk Assessment at the work place have noted numerous changes in their working practice.
- ▶ Those who have already carried out risk assessment in their work have reported positive changes in their working practice.
- ▶ They recognized substandard act and working condition as they develop and take necessary corrective action.
- ▶ The risk assessment process should be continuous and should not be regarded as a one-off exercise.

HAZARD IDENTIFICATION

- ▶ Hazard is defined as anything (e.g. condition, situation, practice, behaviour, etc.) that has the potential to cause harm, including injury, disease, deaths, environmental, property & equipment damage.
- ▶ This is the process of examining each work area and work task for the purpose of identifying all the hazards which are inherent in the job.

RISK ASSESSMENT

- ▶ Hazard is closed relationship with the risk.
- ▶ Risk is a measurement to analyze and evaluate the hazard.
- ▶ The measurement is made by identification on how sever and when likely of the hazard will happen.
- ▶ Risk can be calculated using the following formula
Risk (R) = Likelihood (L) x Severity (S)

RISK ASSESMNT MATRIX

LIKELIHOOD OF HAZARDS	SEVERITY OF HAZARDS				
	INSIGNIFICANT (1)	MINOR (2)	MODERATE (3)	MAJOR (4)	FATAL (5)
RARE (1)	1	2	3	4	5
UNLIKELY (2)	2	4	6	8	10
POSSIBLE (3)	3	6	9	12	15
LIKELY (4)	4	8	12	16	20
ALMOST CERTAIN (5)	5	10	15	20	25

INDICATION OF RISK LEVEL

RISK LEVEL	
1 to 2	LOW
3 to 6	MEDIUM
7 to 12	HIGH
More than 12	EXTREME

PURPOSE OF HIRA

- ▶ The purpose of Hazard Identification and Risk assessment is to highlight the critical operations of tasks that poses significant risk to the health and safety of employees as well as highlighting those hazards pertaining to certain equipment due to energy sources, working conditions or activities performed
- ▶ Risk level is assigned to each hazard for identifying required corrective action to minimize the risk or eliminate the hazard.

RISK CONTROL

- ▶ Risk control is the elimination or inactivation of hazard in a manner such that the hazard does not pose a risk to workers.
- ▶ Hazard should be controlled at their sources where the problem is created.

ACTIONS TO PREVENT UNSAFE CONDITION

Hazard is defined as anything condition, situation, practice, behaviour etc.

- ▶ House Keeping
- ▶ Use of PPEs
- ▶ Awareness (Proper Training)
- ▶ Proper protection (Coupling guard/ pulley guard/ Toe guard etc).
- ▶ Fire Detection & Protection
- ▶ Good Operation Practices.
- ▶ Proper and timely maintenance.

HOUSE KEEPING and 5S

- ▶ ..\..\Image CHP 5 S\industrial-manufacturing-shop-floor-factory.jpg
- ▶ ..\..\Image CHP 5 S\Tools.jpg
- ▶ 5S Rihand.mp4

DIFFERENT SECTIONS OF CHP

- ▶ UNLOADING AREA
- ▶ CRUSHING AREA
- ▶ STACKING / RECLAIMING AREA
- ▶ CONVEYOR BELT
- ▶ BUNKER AREA
- ▶ PUMP HOUSE
- ▶ ELECTRICAL PANEL ROOMS
- ▶ CONTROL ROOM AND CABLE GALLERY

UNLOADING AREA

▶ Wagon Tippler

- ▶ Fugitive dust
- ▶ Man stuck between two wagons
- ▶ Misalignment of cradle and derailment of wagon
- ▶ Falling of bogie due to improper clamping.
- ▶ Overrun during pushing / pulling of coal rake.
- ▶ Roll back of coal rake.
- ▶ Fall due to slippery area

UNLOADING AREA

▶ Apron Feeder

- ▶ Fugitive dust
- ▶ Man stuck in Dribble Conveyor
- ▶ Injury due to rotary part (Due to missing coupling guard)
- ▶ Suffocation due to presence of gas.
- ▶ Presence of CO.
- ▶ Insufficient Lighting

UNLOADING AREA

▶ Track Hopper

- ▶ Fugitive dust
- ▶ Man stuck in Bottom Door opening of BOBR wagon
- ▶ Misalignment of track and derailment of wagon
- ▶ Derailment due to coal heap in Track Hopper.
- ▶ Overrun during pushing / pulling of coal rake.
- ▶ Accident/derailment due to miscommunication between MGR control room and loco driver / unloading supervisor.
- ▶ Injury due to fall in gratings.
- ▶ Fall due to slippery area.
- ▶ Falling in wagon from cross over.
- ▶ Sinking in BOXN wagon coal while pocking from top. (due to hidden fire inside coal)
- ▶ Movement of rake while person still taking coal sample from wagon top.

UNLOADING AREA

▶ Track Hopper

Track Hopper (-) level

- ▶ Fugitive dust.
- ▶ Injury due to falling coal
- ▶ Fall due to slippery area.
- ▶ Electrocution in Sump Pit
- ▶ Accident due to darkness. (Insufficient Lighting)
- ▶ Suffocation due to presence of gas.
- ▶ Presence of CO.

CRUSHING AREA

▶ Crusher Area

- ▶ Very high noise
- ▶ Fugitive Dust.
- ▶ Injury due to rotary part (Due to missing coupling guard)
- ▶ High vibrating area.
- ▶ Fire due to coal dust / oil accumulation on floor.
- ▶ Sudden fall of huge quantity of coal from impact area of chut.
- ▶ Accident due to material kept in pathway.

CRUSHING AREA

- ▶ **Vibro Feeder /Grizzly feeder**
 - ▶ Very high noise
 - ▶ Fugitive Dust.
 - ▶ Injury due to rotary part (Due to missing coupling guard)
 - ▶ High vibrating area.
 - ▶ Fire due to coal dust / oil accumulation on floor.
 - ▶ Sudden fall of huge quantity of coal from impact area of chut.
 - ▶ Accident due to scrap kept in pathway.

STACKER RECLAIMER AREA

- ▶ Fire in yard and fire in Electrical Panel Room (due to ingress of coal dust)
- ▶ Sinking in coal while moving on coal heap. (due to hidden fire inside coal)
- ▶ Fall of coal on track
- ▶ Self Movement of Stacker during heavy storm.
- ▶ Striking of Reclaiming Bucket with Dozer during reclamation.
- ▶ Toppling of Dozer, due to improper movement on coal.
- ▶ Fall due to slippery area near Hydraulic Motor.

CONVEYOR BELT

- ▶ Fall on conveyor belt while crossing over running belt.
- ▶ Loose cloth get entangled in conveyor belt.
- ▶ Accident due to belt snap / belt sway
- ▶ Injury due to tail pulley (due to missing tail pulley guard).
- ▶ Injury due to fall of Take-up (Take-up area not guarded properly)
- ▶ Fire due to coal dust accumulation on Deck Plate / on plate below return conveyor.
- ▶ Accident due to material kept in pathway.

CONVEYOR BELT AT (-) VE LEVEL

- ▶ Insufficient Lighting
- ▶ Water accumulation at tail end.
- ▶ Coal accumulation in tail end and in pathway
- ▶ Fall on conveyor belt while crossing over running belt.
- ▶ Loose cloth get entangled in conveyor belt.
- ▶ Accident due to belt snap / belt sway
- ▶ Injury due to tail pulley (due to missing tail pulley guard).
- ▶ Injury due to fall of Take-up (Take-up area not guarded properly)
- ▶ Fire due to coal dust accumulation on Deck Plate / on plate below return conveyor.
- ▶ Accident due to material kept in pathway.

BUNKER AREA

- ▶ Suffocation due to presence of gas
- ▶ Presence of CO gas.
- ▶ Fugitive Dust.
- ▶ Injury due to rotary part (Due to missing coupling guard)
- ▶ Fire due to coal dust / oil accumulation on floor.
- ▶ Sudden fall of huge quantity of coal from discharge chute of impact area of chut.
- ▶ Accident due to material kept in pathway.

PUMP HOUSE

- ▶ Water accumulation in pathway
- ▶ Injury due to rotary part (Due to missing coupling guard)
- ▶ Accident due to material kept in pathway.
- ▶ Fall due to improper layout of suction / discharge pipes

ELECTRICAL PANEL ROOM

- ▶ Injury due to loose chequered plate
- ▶ Fall in pit
- ▶ Flash over due to wrong isolation
- ▶ Wrong panel door opening from back side.
- ▶ Flash over due to coal dust accumulation
- ▶ Accident due to material kept in pathway.

CONTROL ROOM AND CABLE GALLERY

- ▶ Coal Dust accumulation in Cable Gallery
- ▶ Wrong Isolation
- ▶ Miscommunication
- ▶ Improper Record Keeping
- ▶ Improper filling of safety formats

ELECTRICAL SAFETY

- ▶ Wrong Isolation
- ▶ Wrong Identification
- ▶ Insufficient Isolation
- ▶ Miscommunication
- ▶ Over Confidence

HIRARC

HAZARD	LIKELYHOOD OF HAZARDS	SEVERITY OF HAZARDS	Risk (R) = Likelihood (L) x Severity (S)	RISK CONTROL
Fire in coal yard	4	4	16	Regular inspection, water spray, isolation from ignition sources
Respiratory problem due to coal dust.	5	4	20	Use of Mask, Working of Dust Suppression system
Injury during coal handling like slip and trip	4	3	12	Use of PPEs, Proper House Keeping, 5S
Catches on conveyer belt	3	5	10	Safety Guard on moving parts
Injury during maintenance on Crusher	2	4	8	Training, proper supervision, PPEs
Struck by falling object	2	5	10	Use of Helmet, Safety Net etc

PROTECTIONS IN CHP

PROTECTIONS IN CHP

- ▶ PULL CHORD

- ▶ [..\..\Video CHP\Pull Chord.mp4](#) (4.37)

- ▶ Belt Sway Switch (BSS)

- ▶ [..\..\Video CHP\BSS.mp4](#) (2.53)

PROTECTIONS IN CHP

- ▶ Zero Speed Switch (ZSS)

[..\..\Video CHP\ZSS.mp4](#) (3.00)

- ▶ Block Chute

- ▶ [..\..\Video CHP\Block Chute.mp4](#) (3.14)

FIRE

LINEAR HEAT DETECTION SYSTEM (LHDS)

- ▶ Linear Heat Detection System (LHDS)

..\..\Video CHP\LINEAR HEAT DETECTOR_SENSOR IN FDA SYSTEM_LHS_LHD क्या होता है और कैसे काम करता है! In Hindi .mp4. (8.19)

- ▶ ..\..\Video CHP\Linear Heat Detector.mp4 (2.51)

FIRE DETECTION WORKING PRINCIPLE

- Fire Detection Working Principle
- ..\..\Video CHP\Fire Detection Working Principle.mp4 (11:05)

FIRE FIGHTING

- ▶ Deluge Valve Working
- ▶ [..\..\Video CHP\fire fighting Deluge system Working.mp4](#) (10.49)
- ▶ Deluge Valve at site
- ▶ [..\..\Video CHP\Fire Fighting Deluge valve at site.mp4](#) (3.51)

DUST SUPPRESSION

- ▶ Dust Suppression after Apron Feeder

[..\..\Video CHP\Dust Suppression after Apron Feeder.mp4](#) (0:48)

- ▶ Dust Suppression at Wagon Tippler

- ▶ [..\..\Video CHP\Dust Suppression at Wagon Tippler.mp4](#) (1:29)

DUST SUPPRESSION

- ▶ Dust Suppression - Dust Fighter

[..\..\Video CHP\Dust Supression - Dust Fighter.mp4](#) (0.32)

- ▶ Dust Suppression - Dry Fog

▶ [..\..\Video CHP\Dust Supression Dry Fog.mp4](#) (1.04)

CASE STUDY

- ▶ 1) Death of two NTPC employees in Staff Room near Track Hopper during winter season due to Carbon Mono-oxide (Rihand -Yr 2005-06).
- ▶ 2) Fall of a contractor labour while crossing conveyor at tail end (Jhajjar Yr 2011-12) .
- ▶ 3) Fall of NTPC Executive (AGM) due to leg got entangled in scrap material in Crusher House (Korba Yr 2015).
- ▶ 4) Fall of an executive from height, while going upstairs, due to rusting of chequered plate of Landing, (SSTPS Yr 2016).
- ▶ 5) While cleaning chute in rainy season, huge lump fall on the head of labour, while he was trying to inspect the chute putting head inside the chute.

CASE STUDY

- ▶ 6) Fire on coal bunker area while welding small openings in chequered plate of pathway.
- ▶ 7) Head of labour got stuck in between Bottom Opening Door of BOBR wagon (Rihand Yr 2002-03)
- ▶ 8) NTPC Executive got pulled in Dribble Conveyor below apron Feeder (Farakka Yr 2021).
- ▶ [Labour Stuck in belt.mp4](#)
- ▶ [Conveyor Belt accident - man loses his hand.mp4](#)

THANKS

ANY QUESTION

?

