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"Aim to prevent Accident, Protect Environment & Minimises Losses during disaster"



About us: Institution of Safety Engineers (India) is Non - Profitable organization set up in year 2012 under ZJEW Trust, Govt. Reg. No. 5240 and working with objective to prevent accident, protect environment & minimize losses during disaster. Institution of safety engineers (India) imparting safety, health, environment & quality related training to needy & provide similar services to industries, organization, institution to achieve zero harm.



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This Issue Journal Include:

- IJISEI-V3-I4 ¹ Hazardous Energy Isolation Procedures in Industries
- IJISEI-V3-I4 ² Portable Hand Tools Safety
- IJISEI-V3-I4 ³ Effective Safety Audit & Report writing Procedure
- ⁴Wordwide Corona Case Update

International Journal of Institution of Safety Engineers (India)





Email id: shahnawaz.rampuri2@gmail.com

Abstract: Energy is major parameter to operate equipments and run process facility. Energy is very helpful and profitable for human life as well as industries. Energy sources will be harmful, if not follow the effective and safe procedure to perform maintenance or servicing activity of any equipments, system at workplace and it can results orgnisation loss in term of personnel injury, damage to equipment or any harm. Such organisation loss occurs due to sudden release of energy and expose to personnel or equipments. Energy sudden release or machinery started and results accident due to ineffective method used to isolate energy or working on any equipments or system without isolating to energy sources. This Paper is very helpful to know about energized equipments and safe method to work on energized equipments or System. It will help to prevent accident that occurs due to sudden release of energy or startup machinery. In this paper energy is categorized and effective isolation method is identified to complete maintenance or service like activity safely.

Keyword: Energy Isolation, Type of Energy, Risk from sudden energy release, Risk mitigation, Lock out-Tag Out (LOTO) Procedure, Key error

Objective:

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- Isolating energy sources to make equipment safe for maintenance or servicing like activity.
- To prevent unexpected startup of the machines or equipment, or release of stored energy that have potential to cause harm.
- To ensure effective & safe method for energy isolation.
- Ensuring effective compliance of implementation of lockout & Tag out System.
- To Prevent Accident that occur due to hazardous energy source.
- Increasing organization reputation and safety performance.

1. Introduction

In Industries, Every year several accidents occur due to unexpected startup of the machines or equipment, or release of stored energy. Majority of such accident occurs during maintenance or servicing activity. Electricity, pressure, Steam, chemical are few sources of energy that can harm to personnel or organization in case of sudden release or unexpected start up

machine/equipments/systems. To avoid similar accident, need to ensure compliance of Lock out/ Tag out (LOTO) system. Effective implementation of LOTO help to control risk from such energy

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News & Journal Published by ZJEWT in association with Institution of Safety Engineers (India), Govt. Reg. No. 5240 Available online at www.ijournal.iseindia.in sources that have potential to cause harm due to sudden release or start up equipment or machine. LOTO procedure Locked, isolate to energy sources and prevent accident. Pan Prevent Protect Energy sources may be hazardous or non-hazardous. Hazardous energy sources have potential to requipments or environment. Non-hazardous hazardous energy sources to avoid any potential future accidents. Energy sources may be Process fluids, Hydraulic, Pneumatic, Thermal, Electrical, Chemical, Mechanical systems, Radiation. Pumps, Switchboard, pressure vessel, tanks, pipelines like similar source need isolation. To save people of life during

maintenance or servicing activity, this is require to follow LOTO system



Fig. 1, LOTO

2. Terms & Definition

Hazardous Energy: Energy that have potential to cause harm to people or equipments or environment or combination of these.

Energy Isolation: Disconnect to energy sources completely to perform maintenance or servicing like activity for preventing accident.

LOTO: Lock out-Tag out is a effective procedure use to ensure safety of personnel and equipments during working on machine or equipments. It ensure that dangerous machines is shut off completely and not be started prior the completion of maintenance or servicing activity De-Energisation: Process that is used to disconnect energy source and isolate to system for preventing sudden release of energy or start up machine Energisation: Process to remove Isolation and connect to energy sources. In simple, this is defined as supply of energy in system to equipment or system.

3. Hazardous Energy sources classification and associated potential Risk

Hazardous energy sources can be classify on based on their nature and Following are few energy sources and their associated potential risk

3.1 Electrical Energy: Associated potential risk may be Electric shock, Electrical burn, Electrical fires or Fall of person. Fall can occur whenever person sustain electrical shock

3.2 Mechanical Energy: Crushing, Shearing, drawing-in or trapping hazard, cutting or severing hazard, impact hazard, entanglement hazard, stabbing or puncture hazard, friction or abrasion hazard are few hazard related to mechanical energy sources

3.3 Pressure Energy: Damage to body parts partially or fully, damage to other equipment or system of nearby area due to sudden release of extreme pressure.

3.3.1 Hydraulic energy: Hydraulic energy can create Cut, Bruises, entanglement like injury.

3.3.2 Steam Energy: Such energy can results burns, damage to skin or any body parts or damage to nearby equipments.

3.3.3 Pneumatic energy: Such energy may cause of eye injury due to sudden release of pressure or blown debris, skin abrasion, unexpected start of machine or machine components due to pneumatic pressure results lacerations, crushing, pinching, or amputation

3.4 Water: Risk associated with water can be person drowning, fall of person or damage to equipment.

3.5 Chemicals: Chemical can results fire, harm to personnel Health, harm to Environment.

3.6 Radiation: Effect of radiation depend upon their types, exposure duration and radiation capacity. Non-ionization radiation is less danger than ionizing. Radiation effect may be acute or chronic. Radiation can damage to blood cell, blood vessel, effect to skin, damage to tissue, risk of cancer, risk of genetic defect etc.





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>	Plan Prevent Protect Types of Energy Sources	Equipment	Plan Prevent Protect Identification/ symbols			
	Electrical	Circuit breakers, Switches, Motors, Pumps, Compressors				
	Chemical or coolant	Pipelines, Pumps, Vessels, Tanks, Confined Spaces				
	Mechanical	Motors, Pumps, Compressors				
	Hydraulic	Pumps, Pipelines				
	Pneumatic	Compressors				
	Steam	Valves, Vessels, Tanks, Pipelines				
	water	Pipelines, Tank, Vessels	\bigcirc			
	Radiation	Medical X-rays machines, Consumer products, Medical equipment				

5. Purpose of Lock out-Tag out (LOTO)

Purpose to use Lock out-Tag out (LOTO) system is to prevent accident that occur from sudden release of hazardous energy or startup machinery. LOTO protects to personnel and equipment from hazardous energy that release during maintenance or servicing equipment or system. Ineffective or no use of LOTO procedures can results organizational harm in term of fatality, injury or equipment damage or environment damage. In Industries, Time to time require to conduct maintenance or servicing activity of electrical equipment, Compressor, pipeline, mechanical equipment and these equipments have potential to release sudden energy which can be lead to cause of accident. So

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LOTO system implement to control risk from such energy sources that is associated with equipment and system and their hazardous nature. In simple this can be say that To save people life und from sudden energy release or start up machinery, this is require to follow LOTO system Plan Prevent Protect

6. Procedure of Lock out-Tag out (LOTO)

Effective LOTO procedure always help to control risk associated with hazardous energy sources and prevent accident during maintenance or servicing like activity. Below is step-by-step procedure for Effective LOTO implementation

Identify Types of Energy: Firstly need to identify types of used energy, their potential risk and available control devices.

Personnel competency: Ensure that engage personnel in job has knowledge of LOTO apply

Notify to Employees: All affected employees must be notify proactively. Here effected employees means those are associated with this equipments or working nearby or will perform task and area owner.

Turn-off all operating controls: Turn off to all Operating Control panel.

Locate all energy sources: Locate to all energy sources.

Isolate to energy Sources: Isolate to all energy sources through blocking, bleeding and through valve or other means.

Remove stored energy: Check and remove to residual energy from equipment or system where work is planned.

Locking: Lock-to all switches and energy control panel in OFF and Safe Position

Test: Test to equipment or system and ensure that no one can hurt or no one can activate to energy supply

Tag: Display Tag on isolation points.

Task: Start the work.

Before starting work, work permit compliance must be ensure, Take work permit from respective area in-charge or authorized personnel, check employees knowledge, their skill about to LOTO and respective work safety that is to be started. Whenever work finish, Notify to all effected employees before removing lock. Each Lock-out device must be removed by the person who put it on Before re-starting to equipment check all applicable safety requirements and re-start to machinery or equipment after getting final confirmation from respective department or personnel. Few below

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given important factor must be remember and ensure their effectiveness for LOTO performance to Unp sessol

control hazardous energy

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- Plan Prevent Protect Each person is afforded individual protection.
 - Hold Tag properly filled and attached to all locks
 - Each lock is numbered & keyed uniquely (No key duplicates)
 - Locks must be color coded; Red, Blue, Yellow and Black.
 - Ensure that equipment cannot be moved to "on" or open position.
 - All lock out Boxes shall be numbered.
 - Work Permit System.
 - Isolation, Lockout and Use of Hold Tags.



Fig. 2, LOTO Procedure

7. How to Prevent Key error to avoid Accident

Key error may be results accident. There may be several causes of key errors during LOTO procedure implementation and if any key error presence then it may results accident. Before Accident starting on equipment or system, Personnel adopt short cut or start work without LOTO can lead to cause of accident. If equipment is not locked, then other personnel can start to equipments. Similarly if power sources disconnected, equipment locked and residual energy not remove then in

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this stored residual energy can also results accident. Below are few methods to avoid key error during hazardous energy isolation and complete work safely. Plan Prevent Protect

Acciden vent

Plan Prevent Protect Stop to equipment: The main purpose of LOTO is remove hazardous energy sources to stop to equipment, there is planned to work on. So ensure equipment is completely stop or not.

Disconnect to power source: Only Switch off to equipment is not enough, therefore power source must be removed before starting to work. In case of any incident, equipment can be started suddenly

Remove to residual energy: After switching off and disconnecting to energy sources, residual or charged energy remains, so need to check and this must be remove. In Case of not removing to residual energy can results accident.

Test equipment: Test to equipment after de-energized that it cannot be activated or started.

Prevent to unexpected starting: Ensure that no one can be activate to equipment or system during work. Main purpose of Locking under LOTO is to prevent anyone from unexpectedly activating to equipment.

Clear to area before restarting: Before Re-starting to equipment after maintenance or servicing, ensure all personnel are cleared from the area

Follow proper procedure: To complete Job Safely, follow LOTO procedures properly. Don't take short cut and assign job to competent personnel only.

Display Tag: Tag must be display clearly with identification Numbers.

Training: All engage personnel on equipment must be train and they should know the details procedure to apply LOTO

Apart from this, ensure effective implementation of work permit and carry out close supervision through qualified and skill personnel to prevent human error and ensure necessary requirements of LOTO.

8. Lock out-Tag out (LOTO) System Checklist

Checklist help to ensure basis requirement that require for LOTO. Below is check basis

	Check points	Status		Remarks
		Yes	No	ont, prote
+ Aim to	Before Apply LOTO energy identify& Isolation Point identify			er + Aim to
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Have effected employees notify/inform before apply LOTO				(ONITIONE & Re
Do the employees Trained for LOTO procedure, Plan Prevent Protect authorization card available and able to apply?			Plan Preve	nt Protect
Are all existing installed isolation tags and locks are properly recorded in LOTO log register for record and monitoring purposes?				
Does the contractor or respective department personnel has adequate LOCK, Tag, Testing devices and good working condition?			~	
Do the maintenance personnel conducted and attended tool box talks in relation to LOTO procedure and record it?				
Have operations (Isolation Technician) isolated the equipment by placing their lock and tag on first?		<	6	
Has the isolation been checked (tested) to confirm it is correct?	يرف			
Do the tags give information regarding the isolation	50			_
Have all disciplines involved placed their locks and tags on to the isolation				
Has the isolation been completed to the correct standard				
If the answer to the above question is no, has a risk Assessment been completed for this type of isolation				
Does this isolation involve group lockout/tag out?				
Is a multi-hasp or key lock box being used				
If a key box, are the locks applied correctly and operations (Isolation Technician) key locked away safely				
Did the Isolation Technician verify that the equipment was de-energized				
Did the Isolation Technician follow the lockout/tag out process				
Does the lockout/tag out put in place adequately protect workers				
Did the isolation get appropriately reviewed with all personnel involved?			ent Ac	cident, p
Other observation, If any			S Pret Sherry	Corect Em
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Deck out Tag out (LOTO) is effective safety procedures that help to prevent industrial accident. Plan Prevent Protect This is hazardous energy control method used to ensure safety for people or machinery during servicing or maintenance activity. Hazardous energy may be in the form of electrical, hydraulic, pneumatic, kinetic, potential, thermal, chemical, and radiation. During working on energized equipment without follow LOTO procedure, sudden release of energy or startup machinery can results accident. Therefore working on energized equipments or system, need to take adequate precautionary measure to avoid untoward happening. In industries many accident happen due to sudden start up machinery or equipments or release of energy and such methods help to eliminate or reduce risk related to energy. In LOTO power disconnected, lock to system, Tag out, test and then start the work. After completion work, remove the tag, remove the lock through each individual that were engage in job and resume the power source to ensure all require safety measure.

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Conclusion

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²Portable Hand Tools Safety

Annapurna Adiley Email id: reshu.adiley@gmail.com Shahnawaz Rampuri

Email id: shahnawaz.rampuri2@gmail.com

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Abstract: Portable hand Tools is essential mechanism to complete Operation, maintenance & construction related activities of industries. Portable tools use in industries as well as home to complete work easily and safely. Tools may be different types and as per their application tools has been to used. Portable hand tools may be powered manually and powered with the help of energy sources. Tools operated with the help of energy sources have high potential of harm respect to powered manually. In industries several accidents occur regularly due to use of non-standard or defective tool and unsafe method use to operate such tools. Tools related accident results pain, suffering, work delay and several others harm. Study on Portable hand tool related accident has been done to know major cause of hand tool related accident and how to such accident can be prevented. Therefore, this paper is very helpful to evaluate tool related risk and reducing to such risk. A study also conducted to collect data from few industries to know actual cause of accident and how can such accidents can be prevented.

Key word: Portable hand Tool Safety, Hazard related to Portable hand tool, Potential Risk, Risk control measure.

Objective: Objective to conduct study and publish this paper is control portable hand Tools related Accident for preventing organizational harm, increase organizational reputation, increasing organizational employee's morale and avoid work delay.

1. Introduction

Plan Prevent Protect

In Industries, Portable hand tools have potential sources of harm, if not follow to safety rules during using. Portable hand tools are important Tools that are used regularly in industries. Such Tools are also use in home. Portable hand tools operated manually as well as with the help of energy sources. Wrenches, pliers, cutters, files, striking tools, struck or hammered tools, vises, clamps, screwdrivers, snips, saws, drills, knives are few examples of manual operated tools without aid of Power (Powered manually) and similarly grinding machine, drilling machine, tappers, fastener drivers' machine are few examples of power operated hand tools (Operated with the help of energy sources. Power hand tolls are very helpful to reduce time and complete task easily. Different tools have different application and as per application such tool has been used. To use tool, this is

required to ensure all safety parameter such as tool quality, operating method, potential risk minimization and training for operator to avoid any potential future harm.

Power operated Tools means, such hand tools that are operated with the help of energy sources. Power Operated hand tolls have more potential of accident respect to manually powered. Tools may be categories into Two ways, Tools operated with help of Power (energy sources) is known as power tools & Tools operated manually (Powered manually) without energy sources is known as Non-Power Tools. In simple way we can say that Non- power hand tools, powered manually and power hand tools, Powered with the help of energy source. There may be several types of Power hand tools on based of power/energy sources and power sources may be Pneumatic, Liquid Fuel, Hydraulic and electrical.



Fig. 1 (a), Portable Power Hand Tools



Fig. 1 (b), Portable Hand Tools powered manually

Article published on UKESSAYS website to mention reference of BLS and OSHA, 712 death were occurred in year 2012 due to contact with hand and power tools, 25.5 Non-fatal injuries were occurred in every Ten thousand workers due to using hand and power Tools. Survey was conducted to collect data of from emergency room (EC), survey show that 400,000 visited to EC due to hand and power tools related accident.

As per Bureau of Labor Statistics (BLS), one out of every 10-construction industry employees is injured annually by power tools. Report Published on CDC website on reference of NIOSH, & Percent accident were occurred in mining industries due to using hand Tools in 2011 (Fig.2).





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Fig. 2, Sources, CDC, NIOSH

2. Cause of Accident & Potential injury

There may be several reason of accident during using Portable Power hands tools and major causes may be use of defective or non-standard tools or Tool operated by less experienced personnel (Not or partially trained). Person who using Portable hand tools may be expose to hazard of flying and splashing objects, contact with rotating parts or sharp edges, falling or to harmful mists, dusts, fumes, gases. Exposure to person may be danger parts or energy sources of power operated hand tools. Cause of exposure of potential hazard may be use of defective tools or human error. Human error may be Non-use of appropriate personal protective equipment (PPE's) or over speeding or poor concentration of work or not follow safety rules as per Tool manufacturer recommendation or not follow to Safe operating procedures. Cause of human error may be Poor enforcement of Safety rules, heavy work load, Stress, Tool operated by less experienced personnel, poor supervision, or employee health Issue. Potential hazard lead to cause of accident and accidents results cut injury, abrasion injury, bruises injury, crushed injury, electrical shock, Person fall, injury due to hit by object and injury due to not fulfilling ergonomical factors. In few cases, Portable hand tools related accidents results fatal accident. Portable Power hand Tools can results of Fire and electrocution also Fig. (3)





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Fig. 3, Portable hand tools related accident

3. Study Method

Study is conducted to collect data from seven industries including Construction Industries. Data of accidents are collected only from Portable hand tools related accident. Accidents has been categorized on based on injury (Fig., 5) and cause wise (Fig., 4).Study has been conducted as per below steps

- a) Data collection: Portable hand tools related Accidents data collected from different resources including Safety Professional of respective industries.
- b) Study on accident
- c) Injury classification human body parts wise
- d) Cause wise classification

4. Study of Portable Hand Tools related accident:

A study conducted to collect data of accident related to portable hand tools from seven industries including three EPC project. These data were collected from different sources including respective industries safety professional and found that total 113 hand tools related accident were occurred during 2018-19 (Two year) in which 84 were first aid Nature (resume duty on same day), 17 were Major injury (unable to resume duty within Two day) and 2 was fatal.73 accident were recorded in



Fig. (4), Study by ISEI in year 2018-19 to collect Portable Hand Tools related accident



Safety Measure for Portable hand Tools

Portable hand tools have high potential of risk, if not follow to safety rules. Such risk can result of entrol plan Prevent Protect accident. Following are few safety majors that help to control hand tools related risk Plan Prevent Protect

- Never use defective and non-standard tools. Inspect to tools before using.
- Ensure guard on rotating parts of Portable power tools.
- All operating and control switches of tool must be in good working condition.
- Disconnect the power source, when tool is not in use.
- Don't allow to unauthorize person in work area.
- Before using check to tools. Avoid accidental starting.
- Follow to manufacturer recommendation guidelines. Tools must be fulfill to ergonomical factor.
- Remove all damage Portable hand tools.
- Store tools to suitable and safe place. Avoid to keep loose tools at work place.
- Don't carry Tools by cord or hose.
- Avoid to hold work piece material by hand, always use clamps or vise to secure work
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- Always use Tool bag to carry tools at height. Don't keep loose tools in elevated area to avoid fall.
- Avoid to use loose cloth or Jewelry, ring during using Portable power hand tools
- Power routed through adequate rating of ELCB for Portable Power tools.
- Use suitable Personnel Protective equipments (PPE's).
- Tools must be operated by trained personnel.
- Carry out close supervision through competent personnel during work to prevent human error.

5. Risk Control during Tools using

To control Tools related accident, need to control Tools related Risk. To control Tool Related Risk, need to select activity and Tools that will be use and identify the potential sources of harm or situation including human error and based on this, need to control hazard and prevent to human

error to avoid any future accident Fig. (6)



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Fig. 6, Tools related Risk Control

6. Conclusion

As per study, Portable Hand tools related accident occurred due to poor method of tools using or defective tools used. Person used poor method due to poor skill about the job or tool operating, work load or health issue. As per study, Power operated (operated by energy sources) portable hand tools are more dangerous than Powered manually Tools. Power operated hand tools have potential risk to cause of electrocution and fire also. As based on ISEI study, found that majority of accidents occurred due to Fall hazard (fall of Tools or Fall of person) and second cause of accidents were due to contact with hazardous parts of tools including rotating parts, sharp edges. Majority of Injuries were associated with Hand and Foot injury. Apart from this Eye injury, Face and neck injury also occurred during accidents related to Portable hand Tools using.

Portable hand tools related accident can be prevented to use standard tools, avoid to use defective tools, check to tools before using, disconnect to power sources when tools is not in use, avoid to keep tools in elevated area where are potential of tools falling, Tools must be use by Trained personnel. Administrative control measure plays important role to control tools related risk.

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³Effective Safety Audit & Report writing Procedure Shamim Rayani

Plan PrevB:EquMBA, PDIS from RLI, M.Sc (Environment Science), NEBOSH-IGC (U.K), SMISE Corporate Safety, Health & Environment- Water Business Voltas Limited, Patna- Bihar Email id: Shamimrayani@voltas.com

Abstract

Safety Audit is important parameter to ensure effectiveness of organization safety performance. Safety Audit helps to identify occupational health Safety related gaps and look opportunities to remove such gaps or deficiencies from organization to improve safety performance and reduce risk up to tolerable level. To improve organizational Safety performance, need to conduct effective safety Audit time to time, prepare Safety Audit report and share with organisation for needful action. Report should be prepare in effective ways as per based of observation to categories to risk, needful action level priority and positive observation. Organization will get less or no chance to improve Safety performance due to ineffective Safety audit, ineffective Report & Poor interest of Auditee management in field of safety. For Current Scenario, this is need of every organization to conduct effective safety audit for their organization to measure safety performance and improvements. Safety report is prepared by auditor on based on their finding, observation and examination. This study is carried out to ensure effectiveness of safety audit and report writing. This paper is very helpful to identify suitable method to conduct safety audit in any organization and effective safety audit report writing procedure.

Objective

- To Measure effectiveness of organization safety performance and look opportunities for improvements
- To Plan and Conduct Effective Safety Audit in any organisation
- To know effective report writing method and writing report in such manner to prioritize to risk, needful action & Cost factor consideration during writing recommendation
- To prevent Accident or organisational harm
- Identify Non-conformance and ensuring their effective compliance
- To fulfill statutory requirements as per respective state or country rules & Codes

Key Word: Effective Safety Audit report writing, Method to conduct effective Safety Audit, Audit, Audit, Audit, Audit, Audit, Audit, Content of Safety Audit, Safety Audit objective

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In industries several Techniques has been used to identify hazard and control work place risk. Management always work to implement effective Safety management system in industries and this is only possible whenever all applicable (for this organization) safety management related elements will be identified and existing gaps will be known. Job Safety Analysis, Safety inspection, HAZOP study, Hazard identification & Risk assessment, Preliminary hazard analysis like several techniques used to identify potential sources of harm or situation of organization to eliminate or control potential associated risk from such sources. Similarly, Safety Audit is a technique that used to identify potential associated risk with any organization and ensuring their effective control measure to reduce or control risk for preventing organizational harm. Safety Audit is detail examination of organization safety performance and such examinations help to seek gaps where are possibility of improvements. Safety audit help to identify all potential sources of harm and mitigating to such sources of harm. Safety Audit can be conducted through internal organization people or outside people of other company (third party) or government officer.

Safety Audit report is a type of documents that includes Auditor finding and finding may be Nonconformance (N.C), conformance and recommendation for compliance of found non-conformance. Non-conformance means safety related deficiency that not fulfill to safety standard, rules and regulation. After Audit, Auditor prepare report and share with management representative to include organization safety performance to know existing safety performance is acceptable as per company policy and respective state or country legislation or need any improvements. Nonconformance is categorized in different ways on based of their level of risk to ensure safety control measure as per priority basis or level. Priority level may be low, medium and high and management should focus first on high priority Non-conformance and then median and lastly to low priority items. In few safety audit report, Auditor not prioritize to their observed non-conformance or recommendation to additional improvements and this can results harm to organization due to organization take needful action on low priority risk level items earlier instead of high and medium priority risk level observed Non-conformance.

2. Procedure to conduct effective Safety Audit

Effective Safety Audit help to identify the necessary requirements in organization and measure to available existing system and based on this auditor comparison their finding with actual requirements as per applicable safety audit elements and finally prepare report with recommendation for needful action whenever require. Below Few important parameters to conduct effective Safety Audit

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1. Introduction

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Plan for Audit: Planning is important part of safety Audit. Effective Planning will help to identify require resources and decide the procedure to conduct effective safety Audit. This will also help to require resources and decide the procedure to conduct effective safety Audit. This will also help to require resources and decide the procedure to conduct effective safety Audit. This will also help to require resources and decide the procedure to conduct effective safety Audit. This will also help to require resources and decide the procedure to conduct effective safety Audit. This will also help to require resources and decide the procedure to conduct effective safety Audit. This will also help to require resources and the procedure to conduct effective safety Audit. This will also help to require the procedure to conduct effective safety Audit. This will also help to require to respective organization.

Select to Team and define clear role & responsibility: Select Team to conduct Audit is also major parameters that ensure effectiveness of safety audit. So, Safety auditor should be competent (qualified, experienced & certified), Knowledgeable (Knowledge of Process, Knowledge of Legislation & Codes) and they should have leadership quality. One auditor will be act as lead Auditor and rest member will be Team member (Auditor). Define clear Role and responsibility of safety audit Team member.

Identify to Safety Audit element: Identify elements of Safety Audit that are applicable for organization. It will help to Check and verify the system effectively and to identify non-conformance. Audit element will help to measure organization safety performance to compare with actual requirements with present existing system of organization and look possibility of improvements.

Safety Policy, Safety Budget, safety observation and their compliance, Safety Training record, Tools Tackle record, Safety committee meeting and compliance of minutes of meeting (MOM), Safety Campaign records, Employees safety awareness activity, Accident Investigation & reporting, Personnel Protective equipments (PPE's) are few example of safety audit element and during safety audit, such elements are examined and verified by auditor to check its compliance status.

Conduct opening meeting: Before starting safety audit, need to conduct opening meeting with management representative and respective organizational personnel. In opening meeting Auditor brief introduce to team, procedure and objective to conduct Safety Audit. Management representative also introduce to self and organization.

Conduct Audit: Whenever opening meeting close, Auditor start to audit as per plan schedule. During audit, Auditor Physically visit to site and respective department including Occupational health center to check and examine to existing system. Auditor will make a note of their observation. Whenever Audit finish, All member will seat together and discuss about finding and observation to finalize report.

Closing Meeting: Conduct closing meeting and Share to observed conformance, non-conformance and how to improve organization safety performance summary with organization representative.

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Prepare Report: To ensure effectiveness of Safety Audit report, Auditor should includes their finding, observation, Recommendation and good practices in a positive ways to compare with respective state or country rules, regulation and codes. Include introduction, Executive summary, Objective, Organisation Profile, Observation, Recommendation, Conclusion and other applicable items in effective manner in Report. Auditor should share report to Auditee for needful action and Auditee will take follow up regularly with respective Department or section head to close to finding and improve organization safety performance.

In few Audit, Auditor prepare report before closing meeting and few audit, Auditor prepare report latter because to prepare effective report, need times and report preparing instantly can result any error.

3. How to prepare Effective report

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For Effective Safety Audit Report, need to write actual finding with evidences and supporting documents. Identify to Actual gaps that resulted to human error and created Potential sources of harm or situation. Without finding to actual root cause of N.C, Organisation can not eliminate to human error and potential sources of harm completely and this may results repetition to generate such non-conformance in future. Report should be written in such manners that easily understand by everyone. In Report need to include positive observation i.e good practices with Non-Conformance (N.C). All Non-conformance must be link with respective state or country Safety Rules, regulation and codes. Non-Conformance related risk must be categorise in low, medium, high risk and based on this, need to write recommendation with priority basis such as low, Medium and high priority. Always use positive words during report writing. For Report Writing, See the content Table 1.

Table 1,	Content	of Safety	Audit Repor	·t
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	Cover Letter	
	Contents	
	Acknowledgement	
	Executive Summary	
	1. Introduction	
	1.1 Organization Profile Summary including Achievements (awards, Appreciation	Ana
/	letter, Certification etc)	Profeet
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In this section, Write drown abbreviation

This content of safety audit report is author idea but no limitation. On based on this, Safety Audit report can be prepared. Report can be prepared by different ways and this depends on Auditor and requirements of respective organization.

4. Factor that results to cause of ineffective Safety Audit Report

Poor Planning: Planning is major factors that can effects to safety audit. Poor planning and inadequate resources can results ineffective Safety Audit and report.

Incompetency of Safety Audit Team: Team member selection always effects to Safety Audit. Incompetence Audit team will not be able to find actual gaps in existing system and this can results will ineffective Safety audit report. So, always select to Skilled, experience and certified personnel that are able to conduct effective Safety audit and report writing. Lead Auditor should have ability to handle to team in right manner to fulfill audit objective.

Poor interest of management Representative including organization top management personnel: Management representative plays vital role to support to Auditor during safety audit and effective report writing. Management representative maintain suitable co-ordination with their team, auditor and share correct information to find to actual gaps. Some Time organization hide information and avoid to share correct information with auditor, so auditor not able to find gaps and organization miss to find non-conformance and chances of improvements. Some time Management conduct Safety Audit just for report, management submit such report to their stake holder and this factor also may cause of ineffective safety audit report.

Cost Factor Consideration: During writing recommendation, many auditor not consider cost factor and give any recommendation that management unable to fulfill comply due to huge expenses on recommendation and cost factor can also results ineffective safety audit. So Auditor should check such effective alternate solutions, which have less cost and easily implemented by management. Some time organisation hire to less experience Auditor to save money and this may be also cause of ineffective safety Audit and report.

Risk classification: Classify Risk on based on their nature to link with respective state, country rules, regulations and codes are major parameter to ensure quality report. So during writing Audit report, Auditor not classify to non-conformance on based on their nature and action priority level, So management not taken action on based of priority and latter such factor can results accident and effect to organization safety performance. Therefore not mentioning priority for action to comply N.C can also effect to safety audit report. Therefore, report should be prepared by auditor to mention risk level priority to aware to management for taking needful action accordingly.

Poor Follow up: Poor Follow up to ensure compliance of all observed non-conformance during safety audit can results fail to achieve safety Audit goal and deviate to organization objective.

Apart from this safety related statistics of few year comparison data missing in Audit report, Missing Positive observation such as compliance, good practices like factor also effect to safety audit report. Poor enforcement of Govt. safety rules is also factor that effects to safety audit. Therefore there may be several reasons of ineffective Safety Audit and report writing.

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5. Study & Results

A study conducted to collect 48 Safety Audit report (external) of industries from different sources including construction industries to identify human error and other Non-conformance including availability of potential sources of harm or situation that were found and included in safety audit report. Total 23 Safety Audit report reviewed for year 2018 and 25 Safety Audit Report reviewed for year 2019. In year 2018, Total finding (N.C) included in Report were 307 including 89 were related to human error. In year 2018, Total finding (N.C) included in report were 497 including 156 were related to human error. Causes of human errors are categorized into three parts, error due to resources un-availability, Less experience of working personnel and Poor interest of management in ineffective enforcement of safety rules. Poor interest of management are identified to view report, safe procedure related documents of organization, allocated safety budget and supporting documents of enforcement of Safety rules on based of safety audit report.

In this study, found that Auditor have mentioned to their finding and recommendation but they have not analyses and included to root cause of such N.C in 28% Audit report. This was major parameter to measure effective organization safety performance and seeking actual gaps for improvements. In 17% Safety Audit report, Finding and recommendation were not link with respective state or country rules, codes and standards. In few safety Audit report, found that finding were risk not categories and their recommendation were written simply instead of writing on based on risk level priority. On based on study, author classify to Audit report in three parts, Very effective Safety Audit Report, Effective Safety Audit report & Partially effective safety Audit Report and found that 27% Safety Audit was very effective, 51% were effective and 22% were report were partly effective.







Non-Conformance inculding Potential sources of harm in organisation





Fig., 2, Human Error causes on based on Safety Audit Report study, 2019







Fig. 3, Safety Audit Report effectiveness based on Study

6. Conclusion

In this Study, this has been found that major Numbers of Safety audit report were prepared in effective manners in which 27% Safety Reports were very effective, 51 % Reports were effective and 22% Safety Reports were partially effective. To prepare conduct and prepare effective safety audit report, there is need to consider many parameters such as Effective planning for audit, Selection of skill, Experience and certified Auditor and Auditee interest related to safety. In several reports found that Auditor missed to find actual gaps of human error and other Non-conformance and such condition may lead to cause of repeat occurrences in future and effect to organization safety performance. In safety audit report, if Auditor not clearly mention to add reference of respective state Safety rules, code and standard for compliance of their finding (N.C), then management may be less or not serious to implement to such recommendation. Rules show mandatory compliance like factor and this create positive thoughts among management employees to take needful action to avoid govt. rules breaches. In Few Reports, only highlighted to nonconformance and not included to positive observation and such factors create negative thought among management employees. So Auditor should identify and include positive observation with non-conformance in report. Auditor should use positive word to make sentence of observation and recommendation.

For effective safety audit, Need to identify applicable Safety Audit elements and based on these safety audit elements, create safety audit checklist and during safety audit, verify to all existing

control measure, implemented safety management system in organization and seek to missing compliance of safety audit elements including possibility of improvement in existing system. Write report in simple and effective ways to understand by organization easily and implement to recommendation on based of priority as per respective state or country rules, codes & standards. In Safety Audit report also add to supporting documents such as Safety statistics, graph, chart, Air quality monitoring report with Annexure to increase report effectiveness.

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- Being new organisation, always seek opportunities and Continual improvements in products, process, Services and Peoples to ensure compliance & standards.

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Date: 03/12/2018



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Table 1, worldwide Corona case update

Total Corona Case		Death	Recovered	
83264353		1816164 59053261		
Active Cases (Current infected Patients)		Closed Cases (Cases which had an outcome)		
In mild condition	Serious or Critical	Recovered/ Discharged	Deaths	
22288393 (99.5%)	106535 (0.5%)	59053261 (97%)	1816164 (3%)	

Table 1, Sources worldometers.info on date 31 Dec. 2020, 15:23 GMT

Corona Case update of Major Five countries



Fig. 1, Sources worldometers.info on date 31 Dec. 2020, 15:23 GMT





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TRAINING CALENDER

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Training Calendar (January-March 2021)						
Training Title/ Course	Duration	Schedule	Location	Remarks		
ISE-SM (Safety Management at work place)	3 day or Min.24 hours Training	04/01/2021 to 06/01/2021	Raipur	E-Learning/ Regular mode		
ISE- ICCOHSEM (International Certificate course in Occupational Health Safety & Env. Mgt.)	Min. 96 hours Training	08/01/2021 to 18/01/2021	Raipur	E-Learning/ Regular mode Exam date 19/01/2021		
Safety Audit in Engineering Industries	2 days	22/01/2021 to 23/01/2021	Raipur	E-Learning/ Regular mode		
Integrated Lead Auditor (ISO 45001:2018, ISO 9001:2015, ISO 14001:2015)	6 days	25/01/2021 to 30/01/2021	Raipur	E-Learning/ Regular mode		
First Aid	1 days	03/02/2021	Raipur	Regular mode		
Lead Auditor ISO 9001:2018	5 day	08/02/2021 to 12/02/2021	Raipur	E-Learning/ Regular mode		
ISE-TQM (Total Quality Mgt.)	3 day or Min.24 hours Training	17/02/2021 to 19/02/2021	Raipur	E-Learning/ Regular mode		
Lead Auditor ISO 45001:2018	5 day	22/02/2021 to 26/02/2021	Raipur	E-Learning/ Regular mode		
ISE-SM (Safety Management at work place)	3 day or Min.24 hours Training	04/03/2021 to 06/03/2021	Raipur	E-Learning/ Regular mode		
ISE- ICCOHSEM (International Certificate course in Occupational Health Safety & Env. Mgt.)	Min. 96 hours Training	10/03/2021 to 19/03/2021	Raipur	E-Learning/ Regular mode Exam date 20/03/2021		
ISE-EM (Environmental Management)	3 day or Min.24 hours Training	22/03/2021 to 24/03/2021	Raipur	E-Learning/ Regular mode		
Lead Auditor ISO 45001:2018	5 day	26/03/2021 to 31/03/2021	Raipur	E-Learning/ Regular mode		
ISE- IDOHSEM (International Diploma in Occupational Health Safety & Env. Mgt.)	One year	Last Date of Registration 30/01/2021	Raipur	E-Learning/ Regular mode Exam Date Dec. 2021 (Proposed)		
Diploma/ Post Diploma in industrial Safety/Fire/Environmental Mgt.	One year	Dec Jan. (2020-21)	Raipur/ Rampur	Regular		

Risk assessment & Control, Behaviour based safety, chemical safety in industries, Safety in construction industries, Scaffolding safety, Petroleum & Gas industries safety, Ergonomics, Mock Drill, HAZOP study, Emergency planning, Disaster Mgt., Fire Safety, Environmental Mgt., EIA

Note: Diploma & ISE-IDOHSEM Courses conducted twice in a year. December-January session known as winter session and June-July session is known as summer session.



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