Fire Protection System Analysis in Automobile Manufacturing Industry

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***Abstract*: The goal of this research is to quantify the advantages of existing fire protection systems and how they affect loss reduction initiatives. The attendees will gain first-hand knowledge of the principles and procedures for maintaining, testing, and troubleshooting fire protection and detection equipment, including sprinkler systems (wet pipe, dry pipe, pre-action, and deluge), alarm systems, and water distribution systems for fire protection. The workshop is intended to address the attendees' unique fire prevention concerns, including system troubleshooting. The attending personnel will have the chance to watch sprinkler systems in action. Inspection, testing, troubleshooting, and maintenance of systems created expressly for hands-on instruction will be demonstrated in the field.**

***Index Terms:* Fire Protection, Basic Components, Inspection and Maintenance, Hydrostatic test, Emergency Action Plan, Fire Prevention, Equipment Test**

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1. OVERVIEW

Objective of this document

Although they are not generally expected to be firemen, the operating and maintenance staff who work near a power plant, a pumping plant, or another Reclamation site may occasionally be required to put out fires as part of their jobs. The goal of this book is to familiarise students with the operation, maintenance, and testing of firefighting equipment as well as to provide them with basic information that may be helpful in such an event.

The standard safety procedures for preventing fires and maintaining general safety around electrical equipment are presumed to be known by operation and maintenance employees. This book aims to advance similar work in some way.

The information in this volume is meant to be used in conjunction with Subpart L, Fire Protection, part 1910 of Title 29 of the Code of Federal Regulations, the Department of Labor, OSHA (Occupational Safety and Health Administration), and Occupational Safety and Health Standards, as well as to serve as a quick reference for solutions to the majority of firefighting issues.

II.THE PRINCIPLES OF FIRE

Chlorine of fire

1. Combustion mechanics
2. Flash Point
3. The need for oxygen in combustion
4. Temperature of ignition
5. Triangle fire

Confirmation of the fire

Class A includes common combustible materials including rubber and plastic as well as items made of wood, fabric, and paper.
Class B includes some rubber and plastic products as well as flammable liquids, gases, and greases.
Electrical machinery in **Class C** is live.
Combustible metals in **Class D** include lithium, magnesium, titanium, sodium, and potassium.

III.Types of PORTABLE FIRE EXTINGUISHERS and Their Use.-

All portable extinguishers serve as "first-aid" tools for putting out fires when they are still small, and their efficacy cannot be relied upon once a fire has expanded to involve a significant volume of combustible material. All extinguishers work by either cooling the burning material below its ignition temperature, cutting off the air supply (blanketing out the oxygen), or by combining these two techniques. Additionally, some varieties have a tendency to chemically prevent oxidation.

Class A fire extinguishers. Multipurpose dry chemical
Extinguishers for foam
stream extinguishers that are loaded
Class C fire extinguishers. Multipurpose dry chemical Halon 1301, carbon dioxide, and bromotrifluoromethane (CO2)
inert chemicals
Class D fire extinguishers.
For class D fires, extinguishers or extinguishing agents must be of a type that has been approved for use with the particular combustible metal.

IV.OPERATION

This book does not attempt to explain how each fire extinguisher functions individually because each piece of equipment comes with instructions for use. Everyone who might need to use an extinguisher should carefully read and follow the manufacturer's instructions that are written on the extinguisher.

All staff authorised to use fire extinguishers will get training in their use upon initial assignment and at least once a year after that. Every year at least, all other staff will receive training on the fundamentals of using fire extinguishers and the dangers of early-stage firefighting.

V.MAINTENANCE

Maintenance is a "thorough examination" of the extinguisher that is meant to provide the highest level of assurance that the extinguisher will function properly and safely. It involves a comprehensive analysis and any required repairs or replacements. Maintenance must be carried out on schedule, no more than once every year, or as particularly required by an inspection. Extinguishers that are taken out of the building to be recharged must be replaced while they are gone by backup extinguishers. As soon as an extinguisher is used, refill it.

Every six years, stored pressure-dry chemical extinguishers that need a 12-year hydrostatic test must be emptied and put through the necessary maintenance processes. Exempt from this rule are dry chemical extinguishers with non-refillable, single-use containers.

Extinguisher type	interval(years)
Storage-pressure water and/or antifreeze.	5
Wetting agent.	5
Foam.	5
Loaded stream.	5
Dry chemical extinguishers with stainless steel shells, or soldered-brass shells.	5
Dry chemical, stored pressure, with mild steel shells, brazed-brass shells, or aluminum shells.	12
Dry chemical, cartridge operated with mild steel shells.	12
Bromotrifluoromethane Halon 1301.	12
Bromochlorodifluoromethane Halon 1211.	12
Dry power, cartridge operated, with mild steel shells.	12

VI.APPLICATION OF WATER EXTINGUISHING SYSTEMS AND FIREFIGHTING EQUIPMENT

(Portable and fixed).

Water is still one of the best all-around weapons because it was man's first weapon against fire. Water, on the other hand, can be harmful to switchboard wire and shielded conductors and windings, like those used in motors and generators. The damage from water may be equal to or greater than the damage caused by the fire itself, and the damage to the insulation from soaking may require costly drying out or rewiring procedures.

Because of this, water should only be applied to a fire of this kind as a last resort. Water may also be harmful because it is occasionally challenging to deactivate all circuits with which it might come into contact. When laying the hoses to get the water on the fire, the firefighting force must work as a well-organized team because the effectiveness of water depends on how quickly it is applied to the fire after it is first identified.

VII.FIRE HOSE HANDLING

Fire hose handling requires that the hose be unrolled in order to place the male and female ends in the proper alignment for connecting. To prevent leakage and pressure loss, all couplings must be made firmly. The hose needs to be put out or fanned out so that it won't kink or twist as the line is drawn closer to the fire. Without prompt and effective completion of each activity, important time will be lost, possibly making the difference between a fire being promptly put out and spreading out of control. Hose may be run out without tangling or kinking when it is wound as shown in figure 2.

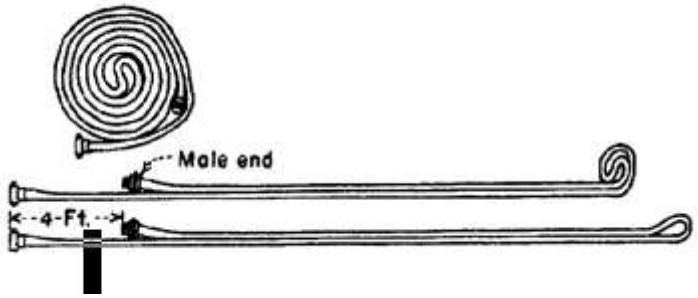

Figure 2

When handling fire hoses, it is necessary to unroll the hose in order to align the male and female ends for joining. All couplings must be made firmly to avoid leakage and pressure loss. So that it won't kink or twist as the line is pulled closer to the fire, the hose

needs to be put out or spread out. Without fast and efficient execution of each task, significant time will be lost, potentially determining whether a fire is put out quickly or spreads out of control. When wound as in figure 2, hose can be run out without tangling or kinking.

The hose is set out straight first, then folded in half, with the male end on top and 1.2 metres (4 feet) away from the female end. The hose is firmly wrapped as slack is picked up while being grasped at the fold. To get an even, compact roll, care must be given. The ends are correctly positioned when coiled in this way, with the male end always on the inside.

One person firmly grasps the male end, while the other threads the female swivel. To align the thread, the swivel is rotated backward by one-half turn. This expedites the coupling process and stops the threads from becoming clogged.

When only one person connects, the male end is held in place with the foot, freeing both hands to turn the swivel. The individual handling the female end should always ensure the rubber gasket is in place before making any couplings. Without it, the connection will leak, causing the loss of pressure.

VIII.ACTION PLAN FOR EMERGENCIES.

The presence of appropriate escape facilities to ensure quick access to safe locations and thorough staff education regarding what to do in an emergency fire situation are the most crucial things to take into account when providing adequate employee safety.
Every company will have a written emergency action plan that details the steps to take to protect employees from fires and other crises.

The plan will at least have the following components:

emergency evacuation plans and designated emergency escape routes;
the steps that employees must take to operate key point activities before they evacuate;
When an emergency evacuation has been completed, procedures to account for all employees;
The preferred method of reporting fires and other emergencies; Rescue and medical responsibilities for those personnel who are to carry them out; Names or regular job titles of people or departments who can be contacted for more information or an explanation of tasks under the plan.

IX.FIRE PREVENTION.

Poor housekeeping is a major cause of fires, both inside the home and in many other ostensibly fireproof buildings. Many building fires can be linked to oily rags and other debris that were either accidentally spilled onto pipes in the heating system or were otherwise discarded and prone to spontaneous ignite.

The vaporisation process is initiated by the pipes' temperature, and as heated vapour trapped in the rag builds up, the temperature rises. Over time, the oil rag's ignition temperature is achieved, and a fire starts.

The most crucial component in fire protection is probably maintaining a high level of cleanliness and order. The need of routinely disposing of wastepaper and other flammable waste is paramount. Metal containers with lids should be used as trash cans. Additionally, given their propensity for spontaneous ignite, greasy mops, dust rags, etc. should be stored in fire-resistant storage enclosures.

Both inside and outside of buildings, good cleanliness is crucial. Waste and trash shouldn't be permitted to build up in areas where they could help a fire spread. Around structures, dry grass or weeds provide a fire risk.

A locker area where men have left painted or oiled clothing is another place where a fire might start. A fire hazard is created when matches are carelessly left lying around, especially in areas where mice or rats are present.

Hot bearings, exposed lightbulbs near flammable materials, sparks from grinding wheels, dust and lint accumulating in ventilation and blower systems, and carelessly discarded cigarettes and matches are other things to be on the lookout for as potential sources of fire.

Static electricity is a common source of gasoline fires or explosions, especially during loading or filling activities near service stations, on tank cars, and on trucks. The friction of the moving liquid produces the electric charge. If the nozzle is not grounded by contact with the tank, static charge is likely to build up and finally discharge to ground through the shortest path. However, if the nozzle is grounded by contact with the tank, the electric charge drains off to the ground.

A spark hot enough to ignite a vapor-oxygen mixture will span the space between the nozzle and the tank because the mouth of the tank is the nearest metal conductor.

X.CONCLUSION

The devices, systems, and methods described in this study are meant to offer a level of property protection and life safety that complies with the relevant standards. The interplay of passive and active Pire Protection elements forms the foundation for this degree of security. In addition to emergency and standby power, communications, and mechanical smoke control, active systems also contain fire suppression and detection systems. Compartmentation with fire-resistive separations, Type IA construction, MOE systems, and Flame-Spread Index (FSI) restrictions are examples of passive characteristics.

Nothing in this paper is meant to imply non-compliance with the codes. The options for the Jamul Indian Village Gaming Project are provided in this report's Fire Protection Planning Guidelines. To comply with the Fire Protection features listed in this document, working drawings and specifications will be coordinated.

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