Emergency Preparedness: Is the Workplace Truly Prepared for Emergencies?

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Abstract

Every year, thousands of employees are exposed to various types of emergencies. Many can be avoided and are due to plant accidents and natural-occurring situations. In any event, a plant must be prepared for any adverse situation that has a high-level of probability of happening and spontaneous incidents that occur without warning. Although injuries, both minor and major along with loss of life can happen depending on the severity of the emergency, these circumstances can be minimized with proper emergency preparedness planning, organization, communication, implementation, and training. Information contained within this article is a culmination of designs in different plant facilities through the years. It will provide action plans that have been successfully implemented in the aforementioned manufacturing plants and that can be replicated or added to enhance a current plan within a facility. The final part concerns an important, but yet often neglected part of Emergency Preparedness which includes shift changeover and how that may affect an Emergency Action Plan since the plant might have double the people at a time where the plant needs to be evacuated or employees sent to in in-house disaster shelter. This is an important concern that most organizations do not take into consideration but can be critical in an emergency situation. The article includes a compilation of workable concepts and designs in worksheet format. It also provides a plethora of descriptions, explanations, and classifications to further help in the planning process. Finally, it includes identifiers and a check-sheet of ideas, knowledge, and data gained from action-oriented implementation strategies that will be helpful in designing a proper Emergency Preparedness Plan strategy that can be extremely beneficial but, more importantly, minimize major personal injury or loss of life.

Emergency Preparedness Plan

An Emergency Preparedness Plan is usually identified as a plan to maximize employee safety before, during, and after an emergency, either natural or man-made, occurs hence, the main objectives of the Emergency Preparedness Plan are to keep employees safe by reducing any injury that may happen, preserve plant/building integrity, minimize any impact to people in the community and to the immediate surroundings, and to minimize all-around damage to people, property, and place (Auf der Heide, 1996). The emergency plan should identify all possible emergencies within the immediate location, the potential consequences should any one emergency occur, what is required to minimize the impact of the situation including written policies and procedures, the availability of all resources, local, state and federal, depending on the extent of the emergency, and an updated list of all responders that include contact numbers, current and alternative, and each one's role and responsibility for the particular emergency including a back-up responder in case of absence.

Workplace Emergency Action Team (WPEAT)

In implementing several WPEAT groups, this team should be one of the first teams developed within a manufacturing environment. This team will take an active leadership role so it is critical to identify and train these individuals to take the lead for assessing the overall emergency, implementing the established emergency response procedures, coordinating with external responders and providing much-needed leadership and information to employees.

In the initial stages, this team needs to conduct begin a preliminary plan that includes the types of emergencies that may be associated with this facility. Then, begin to identify what inhouse resources are available to respond to an emergency including personnel, equipment, systems, etc., are available for assistance.

This group should also begin early-stage development for response procedures including an up-to-date evacuation plan (see Appendix). Once the evacuation plan is designed, all team members need to be trained on how to properly and efficiently evacuate the building or where emergency shelter areas are within the building in case of severe weather or activeshooter/violence occurs inside the facility. Drills should be used to reinforce the critical nature of the emergency, but not too frequent that it loses its effectiveness.

Employees need to know the differences for evacuation, in-house shelter, and lockdown. Evacuation is where all employees are relocated to a designated area outside the facility and where roll is taken to ensure that all employees are accounted for and is usually associated with fire, gas leaks, bomb threats, etc. This is where the evacuation plan is crucial, and a clear chain of command and designation of the person authorized to order an evacuation has been established.

In-house shelter is used usually during weather-related issues like tornadoes or, in some cases an external chemical spill. It is also critical that all employees know exactly where these in-house shelters are so they can be in a safe place during the situation

A lockdown may be needed in the case of an active shooter, and on-site threat of violence, or a threat of violence in the immediate vicinity. The lockdown is where an employee stops, looks, and listens to determine whether it is safe to barricade in the immediate vicinity or move to a safer place and lock doors with proper barricade.

Types of Emergencies

Once the WPEAT is in place, then, depending on the location of the plant (city, state, region) and the production being conducted, the types of emergencies need to be identified which can vary from situation to situation. For instance, a chemical plant has a much higher probability of a chemical disaster than a plant the produces computer parts. A plant located in a classified tornado-ally location has a much higher probability of a natural disaster that a plant located in the extreme northern part of the country. Regardless, there are many examples of different types of emergencies, but it appears that the most commonly occurring emergencies include:

- natural disasters including, hurricanes, tornadoes, earthquakes, floods, fire, etc., and
- man-made disasters including chemical spills, construction failures, fire, hazard material exposure, explosions, transportations accidents, active shooter situations, etc. (Noji, 1991; Leonard & Teitelman, 1991).

These are the best recognized types of emergencies that need to be identified along with the probability of occurrence of one or more happening at any given time.

Level of Emergencies

Once the different types of emergencies are identified by the WPEAT, the next step in properly developing an active and functional Emergency Preparedness Plan should be to determine what level of emergencies can occur. The three levels are:

- 1) **likely to happen:** high probability of occurring or frequency of occurrence and needs high-level attention and planning,
- 2) **marginable or can occur:** a lower probability of occurrence but still needs to be highly considered and well planned for, and
- 3) **unlikely to happen:** very low probability of occurrence in the area) but still needs to be considered in case of an unexpected circumstance (Noji, 1991).

Risk Assessment

Once the level of emergencies is identified for a specific location, either natural or man-made, the WPEAT needs to make a determination of the likelihood that one or more types of emergencies can occur. Then, each of the identified emergencies needs a full, on-site risk assessment to further determine the probability of any one emergency happening and the probability of such an emergency occurring.

Allen and Derr (2016) identified four phases of risk assessment that include:

1) **hazard identification:** The internal team needs to identify all types of hazards that are likely to occur including natural and man-made situations that can cause routine and catastrophic emergency situations.

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- 2) **vulnerability assessment:** The internal team needs to make a determination of whom and what is in danger during an emergency. Obviously, employees are at the forefront of this determination, but also consideration needs to be taken for the environment, local and surrounding area concerns for people and infrastructure, transportation, public utility affects, supply-chain disruptions, customers, etc.
- 3) **exposure assessment:** The internal team needs to estimate the magnitude, frequency, and duration of identified hazards listed in "Hazard identification." This will determine the Level of Emergency for attention and planning of the WPEAT.
- 4) **impact analysis:** The internal team needs to be very succinct on what measurable impact each type of emergency can have on people, infrastructure, environment, local and surround areas, etc.

Categories of Emergencies

The WPEAT must be able to properly classify the different categories of emergencies. They are: a routine emergency, a minor emergency, major emergency, or a catastrophic emergency. The proper categorization of the emergency will dictate the type(s) of response needed and the people involved inside or outside the plant (Gupta et al., 2016).

Routine Emergency

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It is one that an organization is able to prepare for and has likely trained local personnel for handling. It usually involves a small number of people and does not usually shut down operation for any length of time. These are usually day-to-day occurrences where WEAT can manage locally or with limited outside assistance. This type of emergency may have a temporary recovery time but can be completed in a short time. These might include situations such as a fire where the local fire department is called and where police may be needed to re-route traffic or a small hazardous spillage that can be localized.

Minor Emergency

This emergency is sometimes referred to as critical incident. It is one usually requires more resources than the responding department has available (e.g. single injury, small and easily contained fire). This usually encompasses the WEAT and several outside resources and may involve the facility shutting down for a short period of time until the emergency is subsided. This type of emergency usually has a short-term to long-term road to recovery depending on the extent of the emergency. Some examples of these might include localized flooding after a massive rainstorm, wind-caused damage where trees may be down that is blocking traffic, local utility disruption, or a larger-than-normal hazardous spillage that needs additional outside assistance for containment.

Major Emergency

It is any event, usually with little or no warning, that causes or threatens injury or death, that can cause serious disruption of essential services, that can cause serious damage to property, the environment, or infrastructure beyond the normal capabilities of the normal emergency

services, and that can have a serious impact on local and/or surrounding communities. This category will need a significant commitment of resources from local, city, state (and maybe beyond). This type of an emergency has a long-term road to recovery but can be recoverable. Some examples of these might include substantial flooding beyond city and surrounding areas, minor earthquake, major winter storm in some areas including extreme temperatures (either cold or hot), brush fires (in some areas), or a major hazardous spillage or localized chemical fire.

Catastrophic Emergency

This emergency is usually associated with any incident, regardless of location, that can result in extraordinary levels of mass casualties, damage, or disruption severely affecting the local and surrounding areas, local and surrounding infrastructures, local and surrounding environment, local and surrounding economy (transportation of goods. supply-chain disruptions, massive clean-up, extensive overall damage/ interruption to local, city and surrounding area functions. The overall impact goes beyond local and surrounding area propensity to handle such an emergency and one which will call for a hugely aggressive response. This type of emergency usually has a prolonged, enduring, and lasting road to recovery. Some examples of these might include massive flooding well beyond local, city and surrounding areas, massive earthquakes, prolonged storms including winter and rain situations.

Emergency Preparedness Plan Management Team (EPPMT)

Beyond the WPEAT is the development of a comprehensive Emergency Management Team that will have a role or is a stakeholder in emergency response especially when the emergency is classified as major or catastrophic. This team then becomes the pivotal action group for the design and implementation of this comprehensive plan. Members of this team should include a diverse action group that will have specific duties if a major or catastrophic emergency event occurs. These might include:

- first responders—e.g., initial plant personnel, law enforcement, Emergency Medical Services (EMS) personnel, fire department, Hazardous Material (HAZMAT) personnel (if needed) and other personnel/departments as identified by the EPPMT,
- secondary responders—e.g., public utilities, physicians, nurses, local emergency managers, public and mental health practitioners, hospitals, public utilities (since in an emergency, many systems you rely on may not function as well or at all), and other personnel/organizations as identified by the EPPMT, and
- stand-by responders—e.g., media, air support, business and government leaders, legal, community organizations, Red Cross, counselors, psychologists, clergy, medical examiner, morticians, veterinarians, and other personnel identified by the EPPMT (Auf der Heide, 1996).

Although this group may seem large, it is critical that all stakeholders be represented so there are no avenues left open during a major or catastrophic emergency. Each of these representatives brings a unique perspective in dealing with different types of emergencies—some situations such as routine or minor emergencies may not have been identified with a more inclusive group of

plant-only personnel or some outside assistance. However, this type of team allows important information that may help minimize confusion while implementing an organized plan during the emergency.

It is important, in any event, to bring in a diverse group of people to help create the Emergency Preparedness Plan so any unexpected emergency occurrences can be minimized with a prearranged and orderly response. Another thing to consider is that people with disabilities and the aging workforce may be especially vulnerable during and after emergencies so there needs to be contingency plan on handling this type of situation.

Five Phases of Emergency Management by WPEAT and EPPMT

In early preparation for designing an Emergency Preparedness Plan, both the WPEAT and EPPMT groups need to make an assessment of the usually identified five segments of Emergency Management. Each of these segments needs to be reviewed with proper analysis and review so there are no surprises when an emergency occurs. These segments usually comprise the following pieces.

Prevention

After both the WPEAT and EPPMT identify possible emergency situations surround the facility and the probability of occurrence, there needs to be a systematic plan to prevent any of these situations from occurring. Obviously, there are instances outside the control of either group, but there needs to be a high-level focus on real-time prevention strategies. Even with these prevention strategies in place, there is always the possibility of an unexpected occurrence but that fall into the Emergency Preparedness Plan and WPEAT and EPPMT. The best preparation is prevention and a constant audit of the identified prevention strategies can go a long way to avoid any emergency situation that leadership can control (Noji & Toole, 2002; Gupta et al., 2016).

Mitigation

In its most basic description, mitigation is the process of minimizing any risk of loss from the occurrence of an emergency situation. Most logically, it follows the prevention segment as volatile areas can be identified and the impact can be reduced. This can lead into the impact analysis of differing magnitudes of emergencies so a well-designed Emergency Preparedness Plan can have a significant impact on mitigation—giving local and surroundings a more safe feeling but does not prevent emergencies from occurring (Noji & Toole, 2002; Gupta et al., 2016).

Preparedness

The event that an emergency occurs, the level of preparedness from a facility can make a huge difference in the types and amount of damage to people, environment, city, and surrounding areas. One fundamental aspect of preparedness is the comprehensive analysis, design, training, implementation, and constant review/updates to an Emergency Preparedness Plan (Noji & Toole, 2002; Gupta et al., 2016).

Response

Another of the critical aspects to an emergency situation involves response time or the time it takes from the inception of an emergency to where first-responders actually become engaged. A fast response time can be the difference between, for example, a minor emergency situation and a major emergency situation—between minor medical traumas and major medical disasters including loss of life—between minor infrastructure damage to major losses—between confinement of a situation to something out of control—between utilizing local emergency teams and major outside resources. Response time is a critical component to marginalize mitigation and its impact (Noji & Toole, 2002; Gupta et al., 2016).

Recovery

In its most basic form, recovery is identified as the time it takes from the occurrence of an emergency to restoring the facility, local, and surrounding areas to pre-emergency operations. Obviously, the higher the category of an emergency, the longer the recovery time for the facility, local, and surround communities. That is what the previous segments are a crucial component in reducing the recovery time to pre-emergency status (Noji & Toole, 2002; Gupta et al., 2016).

Analysis of Emergency Preparedness Plan

From the beginning of this article, information has been provided to more accurately define what an Emergency Preparedness Plan including definitions, participants, outcomes, resources, and WFEAT and EPPMT involvement. What is missing from the usual analyses is the occurrence of shift change-over which can double the amount of employees on site.

Shift Change-Over/Extended Shift and Emergency Preparedness Plan

From experience, one of the most over-looked aspect of any Emergency Preparedness Plan is accounting for the difference in employees during shift change-over. This situation can easily double the number of employees on site and make it difficult for accountability of personnel in any evacuation or in-house shelter. Also included here are the presence of contractors, visitors, support personnel, and new-employee orientation/training. This is why it is critical to have an accurate account of on-site personnel in case of any category of emergency.

The most occurring emergency within the Midwest is a tornado. These emergencies can come unexpectedly and cause a wide-range of impact damage. Many in-house shelters are established for shift employee numbers only, but when an active tornado occurs during a shift change-over, there can be a lot of disorientation concerning safe in-house shelters.

Shift Change-Over or Extended Shift Simulation

To provide some sense of the impact of a minor to major tornado emergency, a preliminary tornado drill experiment was conducted within a Fortune 500 Company in the

Midwest. One hundred and forty-eight employees (N = 148) were identified and a simulation was conducted to evaluate the performance of the current Emergency Preparedness Plan during a 3rd Shift and 1st Shift crossover.

Outcome of Simulation

Based on the results from this shift change-over tornado drill, problem areas were identified. They are:

- confusion as no directions were provided and individual responsibilities not clear,
- need to be more organized/prepared,
- lack of preparedness,
- employee rosters not updated,
- some shelters were at or beyond capacity when employee arrived,
- poor timing to designated safe zone,
- a unique challenge in itself,
- roles and responsibilities for designated team were not outline in detail,
- poor employee accountability (3rd shift was not called to participate in drill),
- management was not engaged in this shift change-over issue,
- awkwardness in locating an in-house shelter that was not already at capacity, and
- no policy or procedure to deal with this type of emergency situation.

Recommendations for Shift Change-Over Simulation

Recommendations were formulated based on the simulation. They include:

- practice safety before production, employ safety systems to immediate stop production to improve workplace safety in critical events and lack of awareness for employees arriving onsite,
- develop safety protocols to alert those arriving onsite,
- have designated safety areas inside and outside to ensure employee safety and accountability,
- provide workers with their responsibilities during critical events (weather, bomb threat, etc.),
- update roster each time someone's hired/fired and send rosters electronically to each department and safety personnel (Human Resources responsibility),
- communicate with corporate safety, safety personnel from other plants/locations owned by the company, and safety personnel in close proximity of your plant (to see if they have large chemicals stored that can result in catastrophic event),
- plan meetings, quarterly and develop programs to maximize workplace safety,
- identify short-comings during drills, disseminate key findings to all workers and assigned persons for improvement,
- designate a safety team to assist in roll call, to quickly identify those unaccounted for, and to designate a search team to bring employees to safe area, and

• create dual-shift rosters, programs, and policies in place for shift crossover training for all personnel disorganization.

Accountability Procedures

In the overall spectrum of an Emergency Preparedness Plan, shift change-over issues are critical, especially in the event of a tornado or other natural or man-made disasters. To assist in bringing this often-over-looked aspect in an Emergency Preparedness Plan, recommendations are provided:

- 1) Develop a system for knowing who is in the building in the event of an emergency.
- 2) Establish an alarm system to warn all workers especially at shift change-over.
- 3) Test systems frequently.
- 4) Audit roster continually to make sure all personnel are accounted for at any given shift.
- 5) Account for workers, visitors, and customers as they arrive in the shelter and make this roster available on a daily basis to the designated on-site coordinator.
- 6) Develop plans to communicate warnings to personnel with disabilities or who do not speak English.
- 7) Assign specific duties to workers in advance.
- 8) Create checklists for each specific responsibility.
- 9) Designate and train employees including alternates in case the assigned person is not there or is injured.
- 10) Make sure the evacuation plan is posted so each area knows where the shelters are located and the capacity of each and how to evacuate the building to the designated group area for roll call.
- 11) Use a prepared roster or checklist.
- 12) Take a head count for each designated area and compare to daily roster.

Occupational Safety and Health Administration (OSHA) Emergency Requirements

Currently, OSHA requires all workers be trained on emergency preparedness. This includes:

- training with new hires,
- training on new equipment,
- training on a new/modified layout,
- training on changes to an emergency plan,
- when emergency drills and training normally are conducted,
- training conducted during all shifts (1st, 2nd, and 3rd), and
- training refreshers annually (Occupational Safety and Health Administration, 2021).

Currently, there is no OSHA required training during shift crossover because it is not an OSHA requirement. It does not mean that it should not be incorporated into the Emergency

Preparedness Plan. In fact, it is one area that should be reviewed and included to maximize employee safety.

Summary

It is important to understand that no-one expects an emergency of any kind to happen. Unfortunately, this is the type of thinking where plant management is reduced to more of a reaction mentality rather than a preventive one. In reality, an emergency can happen at any time, and at any place, and to anyone.

To minimize the impact of any emergency, there needs to be a well-designed, wellorganized, and well-tested Emergency Preparedness Plan that encompasses a full training program to all employees. For the Emergency Preparedness Plan to remain up-to-date, continuous emergency simulations need to be conducted that cover different emergency situations. This type of planning and foresight should be at the forefront of any facility.

When simulations are conducted, employee feedback will be critical as well as management review. Different questions need to be asked that include, but not limited to:

- 1) What has occurred since the last similar disaster that might increase the expected risks and damage?
- 2) What can be done to make response more effective?
- 3) What can be done to mitigate the potential recovery problems?
- 4) What different testing simulations are needed (including shift change-over?
- 5) How effective were training programs (improve lessons learned from simulations)?
- 6) What feedback was given from workers and what they think/feel? Survey any concerns of current safety programs.

Incorporating a functional Emergency Preparedness Plan can make a difference between being proactive in preparation for an emergency with identifiable duties/responsibilities and proper communication and being reactive to an emergency leading to confusion, disorientation, and panic among employees. Those management personnel who become proactive in an Emergency Preparedness Plan are more likely to minimize the impact of an emergency, especially those emergencies that usually come unexpectedly.

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Appendix



Sample Emergency Evacuation Plan