

design of the EMS system is the most influential. The dynamic use of performance indicators to analyze, modify, and refine structural characteristics will optimize system design and enhance organizational capabilities for a successful disaster medical response.

**Keywords:** disaster; EMS; organization; system design  
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### Establishing Health Epidemiology for Chemical Spills in Mining Industries

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**Objectives:** To look into health epidemiology of investigating and handling chemical spills in mining industries.

**Methods:** The research study was a preliminary study for a framework on how to investigate and handle chemical spills from a metallic mining industry in the Philippines. Consultations with experts from other disciplines such as sociology, epidemiology, occupational and environmental health, engineering, applied chemistry, and social work were done.

Chemical spills in the country from mining industries are not uncommon. When such emergencies arise, there is a need to develop a standard procedure on the proper investigation, gathering of data, and handling of the situation. The basic elements should include primarily the following: investigation of the workplace; investigation of the immediate environment, and health investigations among community dwellers, and establishing parameters of emergency management. Investigation of the workplace involves a detailed account of the industrial accident, the causes of leaks or spillage into the external environment such as the river system, looking into the breakdown of work process, machines, and other facilities. It also is necessary to establish the chemical composition and amount of use. Then, profiling of the external environment can be done for the ambient air, river site maps, and soil (whichever is affected). Samples of water and soil should be done on a scale and spatial basis to establish distance of affectation. Air sampling of chemical exposures shall provide data on concentrations. Then, affectation on livestock and people also must be investigated. This can be done by sampling nearby residents and getting some biologic samples from blood or urine, whichever is more efficient to establish biologic determinants. From such data gathering, the researcher can establish rating systems which are the most affected and serious areas/people and the consequent appropriate management.

**Conclusion:** A standard management procedure was developed on how to investigate chemical spills from mining industries to control and arrest the adverse effects of chemical spillage into the health, property, and livelihood of community dwellers.

**Keywords:** ambient air; biological monitoring; chemical spills; epidemiology; mining industry; monitoring  
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### Controlling Environmental Pollution Disaster from Industrial Emissions

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**Objectives:** To identify control measures for a possible environmental pollution disaster from industrial emissions. The Philippine Environment and Natural Resources has identified industrial pollution as a major pollutant of the environment next to vehicle emissions. The industry as the target area uses solvents such as Ethyl Acetate (EAC), Methyl Ethyl Ketone (MEK), Ethanol, and Isopropyl Alcohol (IPA) for the printing and lamination of plastics. The consumption of solvents is categorized as high using as much as 40–60 tons of mixed solvents. Therefore, there is a need to identify a control device to clean the air prior to emission into the external environment.

**Methods:** The study was conducted in a manufacturing industry with about 400 employees and in a highly populated community. Monitoring of exhaust emissions for various solvents was done using detector tubes, sampling pumps, and charcoal tubes.

**Results:** Ambient concentrations in the work area and stack emission concentrations indicated the following measurements which all were above the limit thresholds value (LTV) set by OSHA. Both workers and community dwellers were exposed to high concentrations of solvents that may cause diseases such as cancer and problems with reproductive health. Both adsorbent tubes were effective in reducing the concentrations of solvent fumes. The activated alumina was more effective for both MEK and IPA.

**Conclusion:** Environmental disaster from solvents in factories can be reduced by using adsorbents in the ducting system as an air control device.

**Keywords:** adsorbents; chemicals; ducting system; exhaust; industrial emission; pollution; solvents  
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### Disaster Surveillance Approaches for Technological Hazards in Semiconductor Industries

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The 21st Century has witnessed the growth of semiconductor industries in the Philippines as a response to the call of the government to invite more multi-national investments needed to stimulate the Philippine economy. As a result of this, semiconductor plants have been accommodated in export processing zones that focus on the back-end processing of semiconductor manufacturing, particularly the soldering of microchips on frames. Other machineries brought to the country include washing and degreasing facilities for the microchips which emit acids such as hydrochloric and sulfuric acids. This study documented allergic reactions related to this exposure. Lead soldering also was associated with spontaneous abortion among the women, including some cases with that eventually may lead to the development of leukemia. The use of

open dipping facilities with acids also have caused reports of whole fingers being burned. Fast-paced machines that could not be regulated by the workers has led to amputation of the palms of five workers. Therefore, the study resulted in the development of surveillance and monitoring systems that should be adopted by concerned agencies, and which also can be used by the Department of Labor and Employment. It consisted of the following procedures:

1. Identification of hazardous materials, processes, and chemicals.
2. Risk and hazard assessment through the review of the material safety data sheet, and an investigation of the risk factors such as concentration of chemicals in the workplace, contact to the human body (respiratory, absorption, or dermal), the effect of combined use of chemicals at the same time (e.g., trichloroethylene together with lead), and the impact of changes in temperature and duration of exposure.
3. Surveillance and monitoring using ambient air monitoring, biological monitoring of blood (for lead) and urine (for toluene), and medical surveillance. All illnesses and unusual medical cases were noted. Among them include anemia at 92%, abortion at 35%, respiratory problems (99%) among the 500 workers interviewed.
4. Implementation of control measures including engineering as well as the use of personal protective equipments.

**Conclusion:** The study is relevant to help to prevent disasters on health and safety among workers who are the foundation of the Philippine economy.

**Keywords:** amputations; chemicals; economy; exposure; hazards, technological; industry; lead; personal protective equipment; semiconductors; surveillance; toluene; The Philippines

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### "Staffordshire" System for Nuclear, Chemical, and Biological Decontamination

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**Objective:** To discuss the use of Personal Protection Equipment (PPE), and how clinical care of casualties is maintained during decontamination.

**Methods:** An outline was provided of the roles of Police, Fire and Acute Hospitals and Public Health specialists together with the Local Authority role in protecting the public.

**Discussion:** Following the events of 11 September at the World Trade Center (WTC), the UK has revised its plans to deal with nuclear, biological, and chemical (NBC) events caused by terrorist actions. More emphasis has been placed on dealing with mass casualty situations. The presentation discussed how the UK emergency and medical services will deal with such a contaminated mass casualty situation. Also, the importance of thorough training and familiarization with protocols and equipment was stressed.

**Keywords:** biological; chemical; contamination; decontamination; mass casualties; nuclear; personal protective equipment (PPE); Staffordshire

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### Hazardous Materials Emergencies: Decontamination

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Hazardous materials (HazMat) represent a complex and significant hazard for emergency healthcare workers. Events involving exposures to hazardous materials represent a relatively rare event, but still are one of the most common events that occur in a community setting. Unless the emergency department is prepared to deal with the complications arising from the management of the injuries related to such an event, a single patient exposed to a hazardous material may overwhelm even a modern, high volume facility. Victims of hazardous materials incidents often seek medical assessment and care in the emergency department. In order to evaluate and treat these victims safely, policies and procedures must be developed that govern patient care assessment and management. Although every emergency department has the capacity to offer medical care to these victims, the risk of personal injury due to secondary contamination mandates specific policies and personal protective equipment (PPE) to prevent unprotected contact with the victim. Protecting hospital employees and staff from injury due to hazardous materials is a worker safety issue and, in the US, is covered by federal and state regulations.

It is essential that every emergency department has the capacity to safely assess, decontaminate, and treat victims exposed to hazardous materials. Health care facilities (HCFs) and their administrative staff have the responsibility to provide a safe environment in which to deliver this care. Making this capacity universal will be one of the great challenges for emergency departments in this decade.

**Keywords:** capacity; contamination; decontamination; emergency department; hazardous materials; hospitals; policies; preparedness; procedures; safety

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### Decontamination in the Field and in Emergency Departments in Hazardous Material (CBR) Incidents

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#### Objectives:

1. To consider the planning required for decontamination of casualties and responders affected by a hazardous, toxic material incident, in the prehospital phase and in-hospital emergency departments.
2. To demonstrate that an all-agency response (police, fire, ambulance, rescue, and medical,) is required to contain, rescue, and treat affected persons and those who suffer minor and major traumatic injuries.
3. To show that all agencies must have training programmes to highlight the dangers that exist with unprotected