CONTAMINATION AND CORROSION FROM FIRE

INTRODUCTION

Contamination involves damage to buildings and structural elements as well as equipment and product. Some deposits, such as soot or unreactive ash from the burning of ordinary materials, can be cleaned from non-absorptive surfaces by simply washing with clear water. Other products of combustion, such as those resulting from the burning of plastics, contain acidic smoke. This smoke in a humid or moist environment initiates corrosive chemical attack immediately to many materials.

The accidental release or spillage of harmful liquid with subsequent vapor formation may cause contamination due to a hazardous material. Exotic or space age materials are not required for a contamination incident. A common substance such as hydrochloric, nitric or sulfuric acid would react in a corrosive manner. Crankcase oil from an internal combustion engine or gasoline fuel will contaminate the floors and ground.

POSITION

Provide a pre-emergency plan designed to mitigate loss from contamination. AXA XL Risk Consulting's *OVERVIEW*, Section 7 provides information for establishing a pre-emergency plan.

The plan should:

- Identify sources of contamination.
- Acknowledge equipment and areas of the facility subject to severe damage from contamination.
- Identify precautions that can be taken to prevent contamination.
- Identify action required to mitigate contamination or corrosion after an incident.
- Identify cleaning procedures available on-site or locally accessible if contamination occurs.
- Secure professional assistance and advice for cleaning and remediation techniques and application.
- Formulate a plan for salvage and cleanup following an incident. This should also include sources of outside assistance.
- Provide a means to review and update the plan periodically.

It may be necessary to arrange for some equipment to operate in an emergency mode; special materials may need to be provided and special procedures prescribed for action to be taken in the event of fire or accidental contaminant release.

Route grouped cables and cable trays containing plastic insulated cable through non-sensitive areas. Minimize the use of plastic or other material capable of generating large volumes of smoke and soot.

The first order of business following an incident is to check the entire facility to identify areas that have been contaminated. Determine the full extent of corrosion and contamination. Then establish a realistic and systematic approach to testing for harmful substances as required. A rule of thumb approach suggests that testing should be completed within 24 h and cleanup procedures initiated immediately.

Following an incident, measures need to be taken immediately to prevent further corrosion.

- Disconnect electric power to electronic equipment and control circuitry so moisture or contaminants cannot create short circuits.
- Ventilate. Windows can be opened and portable fans used if building ventilation is not adequate.
- Remove or cover undamaged goods.
- Mop up and dry excess water and moisture from exposed surfaces. Dehumidify if possible or induce drying by wiping, heating or other means.
- Apply a corrosion inhibitor if it is compatible with the objects, materials and surfaces involved.

DISCUSSION

Contamination may be the result of an accident causing the release of a harmful substance, the release of products of combustion from fire, or from other chemical action or reaction. The seriousness of contamination depends upon the nature of the product or objects being contaminated and the materials available for dispersion.

Foodstuffs, pharmaceuticals and cosmetics in particular are subject to contamination from many substances and are under the control of Food and Drug Administration guidelines. Raw foods almost always are considered a total loss if exposed to smoke, soot, gaseous odors, toxic or hazardous substances. If exposed, they may need to be destroyed. Containers of canned goods frequently cannot be washed, decontaminated or cleaned sufficiently to meet purity standards.

Electronic products are extremely susceptible to corrosion, particularly if exposed to combustion products from burning plastics. Some plastic smoke contains elements of the halogen family: fluorine; chlorine; bromine; and iodine. These combine readily with the moisture in the atmosphere to form acids that immediately attack exposed surfaces. A more in-depth discussion of smoke effects on electrical equipment is found in PRC.5.0.3.

Modern production techniques employ cleanroom environments, precision machine tools and parts with critical-tolerance surfaces. Any and all of these are subject to contamination or corrosion damage. Occupancies where products of a less sensitive nature are present, such as job machine shops, automobile manufacture and other consumer products are also subject to contamination damage.

Where susceptible equipment, products or parts are present, the design and arrangement of processes can offer means for atmosphere and environmental control. This is particularly true where cleanrooms are provided. The design and operation of the air handling systems can isolate, ventilate or evacuate the atmosphere within the room. If improperly designed, contamination from a small incident within one area can be spread throughout the facility.

It is desirable to limit the number of areas common to an air handling system. Make-up air should be taken from a clean outdoor source, not from other areas within the facility. Guidance for cleanroom applications is found in PRC.17.11.0.

Filter systems provided for special areas might remove solid particles but they cannot be relied upon to remove gases. Critical, sensitive areas should be isolated and arranged on independent ventilation

systems. Dampers should be provided to allow isolation of each area where multiple areas are connected to a common distribution system.

Some professional firms specialize in hazardous substance contamination cleanup and site remediation as well as fire salvage. The advice and services of a reputable cleanup firm will be needed.

Limited salvage operations may be initiated. The extent of nonprofessional salvage work that can be accomplished will depend upon the occupancy and sensitivity of the equipment affected. Cleaning may require the use of special solutions, deionized water, blowing with compressed air, steam cleaning or ultra sonic cleaning, any of which may require professional applications. Alternately, cleaning may require little more than wiping with dry towels.