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APPENDIX B: INSPECTION GUIDELINES

The purpose of this Appendix is to provide written guidelines for evaluation of workplace programs, plans and systems for the prevention of emergencies involving environmental exposure to hazardous materials. It is aimed specifically at the conditions and processes found in the "Chemical Industry", which includes (but is not limited to) firms found in SIC's 28 and 29.[1] Appendix A describes in detail the procedures used to identify the industries and firms which are to be inspected using these guidelines.

This Appendix is divided into two major sections, the first dealing with prevention and the second, with response to emergencies. They should be used together in evaluating the whole network of protections available at the chemical plant. Clearly, many protective measures can and should be considered both from the point of view of preventing incidents and from their utility in minimizing hazards when an emergency occurs.

1 Standard Industrial Classification Manual, 1972 Edition. Office of Management and Budget, Statistical Policy Division, Government Printing Office, Washington. Pages 111-128.)

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The guidelines provided here are general. They are intended for use in a wide spectrum of workplaces which produce industrial and consumer chemical products. This means that a great deal of professional judgement will be expected of CSHO's who apply the guidelines. They should not be used as an unvarying checklist against which to judge the employer's performance, but instead as a framework for understanding 1) the employer's approach to prevention of catastrophic emergencies, and 2) the adequacy of the employer's plans for controlling damage when an emergency situation exists.

Inspections made as part of this program are OSHA "health" inspections, but they differ from other OSHA health investigations in scope and focus. To the extent that the guidelines reflect existing OSHA standards or supportable 5(a)(1) conditions , citations may be issued, but the primary purpose of the inspection is not limited strictly to enforcement of standards. Instead, the initial scope of these inspections is narrowed to include evaluation of the adequacy of emergency plans and programs as a whole, not differentiating between effects on workers and effects on non-workers (for instance, persons living and working in the vicinity of the chemical plant.)

Most of the evidence evaluated in these inspections will be documentary rather than physical. This is appropriate for evaluation of emergency plans and for assessment of preven-

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tive systems and practices. Although the absence of an emergency plan (or absence of critical parts of such a plan and organization) could be the grounds for citation (as for instance, under 29 CFR 1910.38), the larger objective here is to encourage employers to develop plans where none exist, and to improve existing plans where they are deficient. At the same time, however, it is expected that evaluation of the plan may, on occasion, lead to citation for violation of standards, for example, those dealing with respiratory protection. Powerful economic and social incentives operate to reinforce the effort that OSHA and other public agencies are making in this area.

The compliance officer entering the chemical plant has three tasks to perform before meaningful analysis of the emergency response system can begin. The first task is to identify the key processes and elements of the production process and to understand <u>how</u> operational processes are kept within safe bounds under normal conditions. Conceptually, it is the normal process instrumentation and control measures that provide the first and greatest degree of protection to plant employees and to the public. The four areas listed below identify some major <u>subsystems</u> or components which are commonly found in chemical plants. Each has a bearing on the safety of operations under normal and emergency conditions.

1. A <u>management subsystem,</u> which includes

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management personnel, process specifications, plant design, standard operating procedures, and the written emergency plan.

2. A personnel subsystem which assigns and defines roles, for both normal and emergency operations, and provides appropriate training. This may also include labor/management safety committees.

3. A physical subsystem, which may include transportation systems for materials, ventilation systems, waste removal systems, containment systems, refrigeration systems, storage areas, communications systems, and other process-related equipment.

4. An emergency services subsystem including in-plant and community components.

A second task is to understand how critical failure points are identified, and what controls are used to ensure safe operations. This involves assessing the interrelation of the components, and particularly, to identify which safety features in the system should be redundant--that is, backed-up with alternative instrumentation, procedures, or equipment designed to ensure that process variables are kept

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within safe parameters. It is appropriate to seek depth of redundancy in evaluating safety systems, particularly for very hazardous processes which may have many overlapping control systems.

The third task is to identify the emergency response system that is imbedded in the operating system. Conceptually, it is a latent system that is active only when preventive measures have failed and an incident has occurred. This system is the most difficult to evaluate because 1) it is not observable except in emergencies (discounting "drills" as only partially realistic); 2) the precise nature, size and duration of the hazard will be known only when (or after) it occurs; and 3) because it is therefore unknown which particular individuals and subsystems will be available to participate in emergency response at any given time. Further, the emergency response system may also involve resources and subsystems that lie wholly or partially outside of the physical or managerial boundaries of the chemical plant. For example, local firefighters may supplement in-plant fire brigades; local hospitals may provide care to injured workers in addition to in-plant first-aid; local police may be involved in traffic control, evacuation of workers and community, and with expediting communications and the flow of emergency and rescue equipment. Finally, there is the

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question of defining the point at which the emergency system "shuts down" and normal operations begin after an emergency.

Compliance officers will arrive at the chemical plant with a good deal of general information.

First, by experience and training, they will be familiar with the chemical industry and typical processes used in firms in the affected SIC codes.

Second, they will have information from the targeting system indicating which high-hazard chemicals are believed to be in use at the site. This will be supplemented with information from TDC about the chemicals, their characteristics, and how they should be handled. Thus, CSHO's will know whether the crucial hazards have to do with reactivity, flammability, or toxicity.

Third, if previous inspections have been conducted at the site, the compliance officer will have the benefit of the compliance history which may (1) indicate particular hazards and may also (2) evaluate the quality of the workplace health and safety protection program. Evaluations found in case histories, however, are typically less extensive than the review being performed here, and they should not be

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treated as equivalent. For example, they will almost certainly devote relatively less attention to plans to protect public safety in emergency conditions.

It is anticipated that a thorough review of a chemical plant and its emergency prevention and response systems will take at least as long as a typical OSHA health inspection. In the course of the inspection, the following areas should be discussed with responsible officials and employees:

I. PROGRAM FUNDAMENTALS--PREVENTION

A. Plant Management. All the planning and preparation of safe plant operation is meaningless, unless it can be implemented. In the event of a problem, there is no time for committee or front office decisions. Correct decisions have to be made at the lowest organizational level possible, and those decisions have to be communicated to other affected personnel. This section is intended to establish whether those elements have been considered in the program.

1. Who is in charge? What are the lines of authority under normal operating conditions? In transition times, like start up and shut down procedures? In emergencies?

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2. Can information be transmitted quickly and easily from:

   a. worker to supervisor?

   b. supervisor to worker?

3. How is information exchange accomplished during transition periods (starting and stopping work)?

4. Is operator jargon commonly and completely understood?

   Examples: MIC--methyl isocyanate
   Black Betsy--boiler
   Monitor--stationary fire-fighting nozzles

5. Are signals clear? Are audible signals distinguishable and understood?

6. How has management complied with requirements of the Hazard Communication Standard (29 CFR 1910.1200) as it applies to chemicals listed

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in Appendix A? Are monitoring records, training records, and material safety data sheets available?

7. Plant design and process specifications should be discussed and understood. What is produced at this site? What raw materials are used? Have modifications been made to the equipment or plant? What are the major production processes? What wastes, off-gases and by-products are generated?

8. Standard operating procedures should be examined and discussed. The process of updating these procedures--including modifications, communication and training--should be understood.

9. Does a <u>written emergency plan</u> exist? It should be discussed with management. The compliance officer should understand which contingencies are included in the plan, why they are included, and why management considers them to be adequate for the process, site and situation. (See below, part II)

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B. <u>The Personnel Subsystem</u>

1. What are the job classifications of employees who work at the site? Are all job titles present on all work shifts? Are there potentially crucial omissions?

2. Do employee job descriptions include emergency duties? Are employees aware of their roles during emergencies? Are all critical tasks represented on all shifts?

3. Who is responsible for training employees? How often is training provided covering standard operating procedures? Emergency procedures? How is effectiveness of training evaluated by management?

C. <u>The Physical Subsystem</u>.

It is obviously important to see the physical plant and to relate information contained in operating procedures, emergency plans and "blueprints" with actual structures, materials and processes. In inspecting the physical plant, the underlying question is "What keeps this operation--or this phase of the operation--within

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safe limits?", including mechanical and electronic systems, human intervention, and routine maintenance activity.

Particular attention should be given to:

1. Materials Compatibility

At least two factors should be considered in materials selection: First, will the material contaminate or cause a reaction in the chemicals to be handled or processed, and second, will the chemicals to be processed attack or destroy the equipment? For all chemical processes, there are preferred materials; sometimes preferences are economic, and sometimes they are based on chemical reactivity or compatability. The intent here is to identify readily available materials that might be used but that are incompatible with the chemicals involved (e.g., copper tubing should not be used with acetylene because it catalyzes a reaction in the acetylene.) These questions are pertinent to chemicals in all categories (i.e., health, flammability, reactivity). Among questions to be asked are:

1. Are any metals incompatible with the chemicals so they should not be used for process equipment, piping or storage systems?

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2. Are any sealing materials for use in packing (e.g. pumps) or gaskets (e.g., flanges) incompatible with the chemicals so they should not be used in process equipment, piping or storage systems.

If incompatible materials are identified, what procedures does the company have to ensure that only acceptable materials are used in new or refurbished equipment? Besides purchase order specifications, is there also inspection by plant personnel to ensure the specifications were followed?

2. Contamination Control

Potentially reactive chemicals may have their reactions catalyzed by common materials that easily enter systems whenever seals are opened. Examples include water or rust which may easily enter a system during transfer from one vessel to another, either during hook up or disconnect, or during pressurizing or venting of tanks.

If such potential catalysts are identified, how are they excluded from the system? Examples include:

If vessels are pressurized by inert gases, are there filters in the gas lines to remove solid particles?

If vacuum relief or pressure relief valves are on the vessels, how are they protected so no potentially hazardous contaminant can enter through them when they are open?

When systems are opened for maintenance purposes, what precautions are taken to prevent contamination? What is done to safeguard the system while it is open? What precautions are taken to ensure that replacement parts are free of contaminants and/or incompatible material? When connections are made and broken (e.g., during transfer from rail cars or trucks) what measures are taken to ensure contaminants do not enter the system?

3. Plant Layout

Plant layout, while generally not a safety problem, has some specific safety aspects. Examples include:

A. Separation and Isolation

i. Chemicals which may react with one another should be physically separated, e.g., oxidizers should be stored in areas remote from fuel storage.

ii. Areas of potential explosions (e.g., storage of explosives, reaction vessels) should be isolated so if there is an explosion, the damage and risk to employees is minimized.

B. Drainage

i. Where hazardous liquids may leak or spill from piping or vessels, what provisions are made to prevent their spread to areas where employees may be exposed to the hazard? Examples of possible methods include diking and grading.

ii. Has the company made any provisions to control hazardous vapor or gas releases? Have prevailing wind conditions been considered?

C. Housekeeping

Are work areas well maintained so they don't hinder evacuation or emergency response personnel (1910.22,-----)

D. Enclosed Spaces

Some processes which are safe in open air may become hazardous if enclosed. If areas of potential or frequent leaks or spills are enclosed to prevent environmental contamination or the spread of the chemical, are there adequate precautions to protect employees? Examples include ventilating the room and treating the exhaust; automatically sampling the air in the room or vault; having employees sample before entering the room.

4. Physical Facilities

Much plant equipment could be considered ancillary to the production processes. Most of OSHA's concern will be with safety or other protective systems. Examples of systems that may need to be present, properly inspected and functional are:

1. Emergency eye wash or shower. (29 CFR 1910.151(c))

2. Fixed fire suppression equipment. (Subpart L)

3. Portable fire fighting equipment, if employees or a fire brigade are to use portable fire fighting equipment.

Questions to be asked about these systems include:

How often are they tested?

What capacity do they have?

Is the capacity sufficient for the anticipated emergency?

5. Inspection and Maintenance

All equipment must be shut down sometime, no matter how infrequently. When safety systems are shut down, what backup systems or procedures are available to provide replacement protection (e.g., stop process until safety systems are available again)? If shut off valves can isolate safety relief valves, what measures assure that the system is protected from over pressurization (e.g., person stationed to monitor pressure)?

Pressure vessels also need periodic inspection and testing because of normal wear and potential corrosion either at welds, or in the base material. The combination of pressure and volume determine the hazard: a large volume, low pressure system can have the same potential energy for release as a low volume, high pressure system.

When potentially corrosive chemicals are used (e.g., acids, caustics), or the plant atmosphere is corrosive (e.g., near the ocean, or from chemical releases within the plant), what measures are taken to insure system integrity? Examples include periodic pressure testing, x-ray, etc.

6. General Containment and Controls

During normal operations it is difficult if not impossible to keep a material completely in a closed system. Vacuum must be relieved when a liquid level drops, and pressure must be relieved when the tank is refilled. For toxic, flammable and reactive chemicals, the questions to be asked focus on minimizing such necessary releases, and then rendering the released chemicals harmless before discharge to the atmosphere. Examples of questions to be pursued include:

A. Where do process vents (safety relief and normal process) discharge? Are they piped to scrubbers, neutralizers, incinerators, precipitators, etc., to remove hazardous materials?

B. What precautions are taken to minimize spills when connections are broken? Is the line purged prior to the disconnect? Are purge gases treated? Are quick disconnects used? Do employee wear PPE when disconnecting? Is there a

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dike or some method to collect and contain small spills or releases? Is the area ventilated and is ventilated air treated?

C. Is there any open storage of potentially hazardous materials? An example might be solids which are subject to spontaneous combustion in open piles.

D. What precautions are taken during sampling procedures? Are closed containers used? Is the area ventilated? Do employees wear PPE?

7. <u>Material Handling</u>

As long as chemicals are maintained in a closed system, they are safe and harmless. Chemical processes using hazardous chemicals should be designed to maintain that closed system. After design and maintenance , the only potential problems are:

1. Introduction of raw materials into the closed system.

2. The removal of products (either the desired product for shipment or waste) from the closed systems.

This section deals with those hazards.

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A. How are raw materials received and shipped?

B. Are raw materials transfers accomplished in a closed system?

1. Who performs transfer (company or shipper)?

2. Is the system pressurized or blanketed?

3. Do critical systems have connections that are not interchangable? Examples:

    a. Potable water with process water?

    b. Respirator air lines with nitrogen lines?

4. Is transfer equipment multi-purpose?

    a. How is it decontaminated?

    b. Reactive compatibility of chemicals?

5. Is personal protective equipment provided for:

    a. Normal operations?

    b. Emergency conditions?

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C. How are waste products disposed of:

1. Vents: are vents properly directed?

2. Flare towers

3. Scrubbers

4. Ditches: properly lined? Where do they drain?

5. Tertiary treatment?

6. Are provisions made or considered to preclude incompatible chemical mixing in waste drainage?

8. <u>Instrumentation</u>

Suitable controls and instruments should be provided for both normal conditions of operation and for emergencies. Instrumentation includes sensors, indicators, recorders, and transmitters for measurements such as temperature, pressure, flow, liquid level, and analysis.

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A. Are instruments and controls of the "fail-safe" type?

Examples: Control valves should be arranged so that, on loss of instrument air or actuating power, they will go into the safe position. Where loss of instrument air or power could lead to an unsafe condition, emergency air or power supplies should be provided.

Many self-acting control devices, such as pressure regulators, normally fail in the open position, which may be the unsafe position. In such cases, emergency backup controls should be provided. In the case of pressure regulators, this includes pressure relieving devices down-stream and automatic shutoff valves interlocked with excess pressure switches.

B. Are instruments made of material capable of withstanding the corrosive or erosive conditions to which they are subjected?

C. Do instruments operate fast enough to respond to rapidly developing unsafe conditions?

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Note: Where response time is important, an electrical instrument will usually respond faster than a mechanical or pneumatic instrument.

D. Do instrument sensors measure the true status of the system they are designed to protect or control?

Examples:

1. In large reactor, many thermocouples may be needed since the temperature may not be uniform throughout.

2. In sensing liquid flow through a pipe, a flow switch in the pipe is more reliable than monitoring power supply to a pump.

F. Are grouped instrument leads and control locations protected against exposure to explosion, fire or toxic chemicals where they are critically needed to shut down the process safely? In addition to normal controls, are accessible emergency controls provided by which pumps or automatic valves controlling the flow of flammable liquids could be operated in event of fire?

G. Are all indicating dials, indicating lights, recorders, alarms, and switches which affect process safety conspicuously labeled as to their function and meaning?

H. Are instruments constructed and installed so that they can be easily inspected and maintained?

I. Are separate safety control and interlock systems relied upon rather than relying on the production process control system for safety supervision of the process?

For example, in a dryer, the heat input is regulated by a temperature controller, but a separate excess temperature interlock is needed to shut down the unit and sound an alarm in case the regular temperature controller fails.

J. Are instruments in hazardous areas (as defined in NEC) intrinsically safe or enclosed so that they will not act as ignition sources?

K. Are critical measurements recorded (as is preferable) rather than merely indicated by lights or dials so that rate of change in processes will be

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more readily evident, and greater management supervision can be maintained over operator practices?

L. Do important control valves have steel bodies and yoked to withstand fire exposure, impact, and vibration?

M. How often is routine maintenance or replacement performed on key instruments?

9. Piping Systems

Piping and instrument diagrams (PID or P & I)) are used to follow the formulation or reaction process and also to check safety devices and system protections. Questions that may be asked include:

A. Do reaction vessels, storage tanks, or pressure vessels have safety relief devices to prevent over pressurization?

B. Are there shutoff valves that can render safety relief devices ineffective? If so, what additional precautions are taken?

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C. Where do materials vent when released through the safety relief devices?

D. If there is a loss of electrical or pneumatic power, do controls fail in the safe mode?

E. Will instrumentation detect leaks and spills (e.g., when material is being pumped from one vessel to another, is there any check to assure that, as the level falls in one vessel, it rises in the other?)

F. Are temperature or liquid level controls or alarms provided?

G. Are piping, valves, and fittings designed according to the recognized standards for the working pressures, temperatures, structural stresses, and chemical conditions to which they may be subjected? Is non-destructive testing conducted routinely to ensure that minimum wall thicknesses are maintained?

H. Is piping well-supported and protected against physical damage? *

I. Are pipe lines for reactive chemicals pitched to drain, with drain valves at low points? *

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J. Are main shutoff valves which can affect the safety of the system conspicuously labeled?*[2]

K. Do shutoff valves indicate their "open" or "shut" position?

L. Where improper operations or leaking of valves can lead to hazardous situation, are interlocked valves or double valves and vents use to minimize hazard?

M. Are check valves installed in the appropriate places?

10. Protective Systems (not quality control)

A. Heating or cooling systems may be for product control or for safety control. Cooling may be necessary to prevent a runaway reaction in reaction vessels. Reactive chemicals may also be cooled in storage to provide more time to respond to an initiated reaction.

2 *It is recommended that these items be verified by physical inspection as well as review of drawings and documents.

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What protective devices are there for the heating or cooling systems? Temperature alarms? Back up systems or redundancies? Procedural controls?

Are heat transfer materials for heating or cooling incompatible with reactive materials?

Is refrigeration automatically actuated in emergencies?

Are valves located in safe areas?

B. What kinds of fire fighting systems are in the plant and where are they located? Stand pipe and hose? Automatic sprinkler? Inert gas? (See Subpart L, 29 CFR 1910.)

C. What respiratory protective equipment is stationed throughout the plant or areas of the plant for emergency use? This would include both respirators for emergency escape from the facility and respirators that are provided as back up for personnel responding to the emergency.

D. Are there explosion suppression systems? How are they tested and maintained?

E. Are systems inerted to exclude contaminants which may be catalysts or reactive materials? Examples include:

1. Passivating vessels and piping or components (before system start up)

2. Providing an inert gas atmosphere such as a nitrogen blanket on flammable materials

3. Submerging reactive materials (such as sodium in kerosene).

11. <u>Heaters and Furnaces</u>

Do furnaces and heaters have:

a. adequate draft
b. positive fuel ignition
c. combustion safeguards
d. fuel controls
e. water or liquid level indicators
f. pressure relief devices
g. high temperature alarms
h. emergency shutoff facilities
i. backflow protection

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12. Electrical Equipment

A. All wiring and electrical equipment in chemical plants should be installed in accordance with the National Electrical Code. Equipment used should be approved where applicable.

B. Proper installation and maintenance is essential.

C. Adequate clearance or insulation should be provided between conduits and hot surfaces to prevent damage to the wiring insulation.

D. Equipment must be properly grounded and/or bonded in hazardous areas to minimize static electricity, both within and outside of equipment. Are other appropriate steps taken to prevent build up of a static charge?

E. Equipment should be shielded from lightning by protective ground wires, rods or masts.

13. Pressure Vessels and Storage Tanks

A. Pressure Vessels should be designed and constructed in accordance with applicable codes, standards, state and local laws and regulations.

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1. Vessels should be equipped with overpressure protection as required. Vents should be arranged to discharge to a point where ignition of escaping vapors or liquids will not seriously expose personnel, the equipment or structures. Relief devices should be kept free of corrosion or fouling and should be operable at all times.

2. Often an inert atmosphere is maintained in a vessel or tank to keep the atmosphere out of the explosive range. The consequences of contamination or failure to use an inert gas should be analyzed and equipment or procedures should be devised to cover the situation.

3. Unprotected sight glasses should be avoided in process equipment wherever possible.

B. Storage tanks should be designed based on the quantity, temperature, pressure, reactivity, and corrosiveness of the material stored. The design should include overpressure equipment and vents.

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14. Pumps and Compressors

Pumps and compressors are the work horses of chemical plants for moving every type of liquid and gas.

A. Failure of moving parts or packing glands can cause escape of flammable or toxic liquids or gases. Remotely controlled switches and shutoff valves are needed to control the flow of fuel in an emergency.

B. Equipment used for transfer of flammable vapors or gases should be installed to minimize vibration and thus to avoid loosening of fittings and joints.

II. RESPONSE TO EMERGENCIES

A. General Principles

Assessing the adequacy of a written emergency plan is an art, not a science. It involves judgement as to the reasonableness of the assumptions underlying the plan (e.g., what is a reasonable worst-case estimate) as well as the adequacy of countermeasures designed to protect life and to limit enviromental and property damage.

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A few general principles may be useful in approaching this task:

1. Are the priorities of the plan clearly stated as--

   a. safety of plant personnel and the public

   b. control of hazard

   c. minimizing damage to property

2. Does the plan deal with reasonable "worst-case" scenarios?

3. Is the plan practical?

4. Is the plan simple?

5. Is the plan easy to understand?

6. Will it deal with any type of emergency? For example, are contingencies included for:

   a. Fire and explosion

   b. Release of highly toxic materials

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c. Large chemical spills

d. Acts of nature

e. Power failure

f. Sabotage including bomb threats, etc

7. Has attention been given to emergencies which may occur during inclement weather?

8. Is the plan updated periodically; e.g., annually or whenever processes, materials procedures or key personnel change?

9. Are there emergency drills or simulations involving all members of the response team including public agencies?

   a. Are responses reviewed to determine areas where improvement is needed?

   b. How are the results of the drill evaluations communicated to the employees?

   c. Are drills conducted for all shifts?

10. Are safety responsibilities a "critical element" in supervisors performance standards; e.g., how is safety performance considered relative to production demands and is it factored into performance appraisals?

11. Has plant management worked with community leaders to develop an appropriate public response plan?

B. Control and Coordination:

1. Will one person be designated to coordinate all efforts?

2. Has there been prior consideration/coordination of all potential response groups or agencies such that there will not be loss of control due to over- or under-response?

3. Does the safety committee hve oversight relative to the plan? Are employee representatives an integral part of the committee? Are members involved in plant audits? How do they receive feed back on action taken relative to their recommendations?

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4. Has the plan been distributed to:

   a. All key personnel up and down the company chain of command including employee representatives and the switch board operator?

   b. Police officals

   c. Fire officals and paramedics

   d. Local government

   e. Hospitals and physicians

   f. Mutual aid industries

   g. Utility Companies

5. When changes are made in the emergency plan have provisions been established to communicate those changes to individuals with a need to know?

6. What mechanisms exist toallow the reporting of unsafe acts or unauthorized employees in high hazard areas?

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7. Will a control center be established in a safe location? (Alternatively, are process control centers already established in safe locations, with appropriate architecture and support systems)

8. Are procedures in place for notifying transient personnel on the site such as delivery and shipping services of an emergency through the most likely site contacts; e.g., shipping, receiving sections?

9. Are emergency rosters and call out plans developed?

10. Are emergency services listings and phone numbers developed and distributed? Does the switch board operator have a copy? Do all phones have a brief listing of immediately needed emergency numbers posted on them?

11. Are organizational charts developed and distributed for day-to-day operators and emergency operators?

12. Are lists of raw materials, intermediates, products and their locations within the plan provided with the plan?

a. Are the associated hazardous chemicals listed in accordance the Hazard Communication Standard?

b. Are flammable, reactive, physical, radioactive and other hazards listed?

c. Are appropriate disposal methods listed?

13. Are current maps, flow charts, diagrams, and blueprints part of the plan?

a. Overall site map?

b. Adjoining City and, or, State maps including local topography?

14. Will additional security be needed and planned for?

a. Will strict accountability of personnel entering and leaving the area be maintained?

b. Will only authorized personnel be granted entry?

c. Will traffic control be a problem?

d. Are certain areas of the site more vulnerable to sabotage?

C. Procedures

1. Are condensed instructions (such as checklists for evacuation or shutdown) part of the written plan?

2. Are designated duties and alternate duties of each person clearly and briefly described? Are vacations, holidays, weekends and 2nd and 3rd shift situations considered?

3. Have procedures been established for employees who remain on site to perform critical operations during emergency situations?

4. Have responsibilities and procedures been established for those who are assigned rescue or fire fighting duties? Are these employees required to take physical examinations which demonstrate their fitness to perform such duties? If so, how frequently are these examinations administered?

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5. If the company has elected to use a fire brigade are the appropriate requirements of 19101.156 being met.

6. What is the company's position on the use of and availability of fire extinguishers? (29 CFR 1910.157)

7. Are rescue teams formally trained in search and rescue procedures? Are they familiar with the location of utility disconnects and all evacuation routes? Are they provided with appropriate PPE and trained in first aid/EMT? Are they provided with communication equipment? Are rescue/response personnel provided with a properly equipped vehicle(s) to reduce response time?

8. Are decision logic (decision making) charts (or other documents) formulated for planning and executing the following activities:

Are these documents readily available for reference in an emergency?

a. Selection of protective clothing?

b. Selection of respiratory protection?

c. Emergency shutdown of equipment?

d. Evacuation of the plant?

e. Evacuation of the surrounding populace?

f. How did management arrive at these decisions?

9. Have definite volumes of air contaminants been established which, when released, trigger either on-site and/or off-site emergencies?

10. Have dispersion models been calculated to assist in planning of evacuation?

11. Is emergency equipment provided in adequate quantities and placed in useable locations; eg., emergency power generators for emergency lighting and shutdowns, pumps and valve locateds for supplying water to fight fires, ppe, safety showers connected to alarms, etc.

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a. Is emergency equipment checked, tested, and calibrated periodically for operational readiness?

b. Are personnel trained and experienced in its use?

c. Is emergency equipment of appropriate type for any emergency which may occur?

12. Are local emergency response personnel brought into the site periodically for familiarization?

a. Are potential problem areas and processes pointed out and discussed?

b. Are locations where personnel normally work pointed out?

13. Are primary and back-up two-way communication systems developed and in place? Are they vulnerable to power failure or other disruption? Do ambient plant noise levels interfere with voice communication?

14. Is mutual aid equipment that might be borrowed in an emergency compatible with site equipment?

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15. Is there a written spill control plan; eg., containment, neutralization, disposal, appropriate ppe, etc.?

16. Are incompatibilities of released material anticipated?

17. Are normally innocuous materials likely to become hazardous due to an emergency e.g., any materials which are water reactive would influence the method of fire fighting; materials, which when heated, release toxic substances which would not exist at hazardous levels during normal conditions; etc.?

18. Are hospitals, physicians and paramedics provided with:

a. Lists of hazardous chemicals and MSDS's?

b. Acute symptoms?

c. Delayed symptoms?

d. Bioassay tests?

e. Special treatment required?

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19. Have local health care professionals been involved in the development or review of the plan?

20. Is public information planned and is one person designated as spokesperson to avoid speculation and panic? Coordinated with other responding groups?

21. Are there formal accident and near-miss investigation responsibilities and procedures developed? What is the policy on investigating injury versus non-injury accidents? Are reports required? Are causal analyses performed?

22. Has any consideration been given to potential sewer contamination during an emergency/disaster; e.g., introduction of flammable/explosive or toxic materials into the system?

D. Training

1. Are supervisors trained periodically? Are front line supervisors and employees involved in plan review and development in their areas?

2. Have employees and front line supervisors been trained in the recognition of early warning signs (eg., unusual odors or sounds, signs and symptoms of exposure, unusual vessel temperature or pressure readings, leaks, vibration, etc.)?

3. Is safety and emergency plan training provided to all new employees and all other employees who assume a new job? How often is emergency response training repeated?

4. Are front line supervisors involved in training employees? To what extent?

5. Is there a method to evaluate training?

6. Are contractors who come on site required to undergo training specific unit hazards and precautions?

E. Evacuation

1. Are decision logic charts available such that supervisors on each shift could make an informed decision to evacuate the site?

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2. Are decision logic charts available such that the supervisors on each shift could provide local authorities the information necessary to decide when to evacuate the surrounding population?

3. Has cooperation of the local weather bureau been coordinated to predict temperature, winds, inversion levels and other meteorlogic conditions that could effect gas or vapor concentrations?

4. Are formulas or dispersion models provided for calculating concentrations of air contaminants down wind?

5. Have evacuation routes inside and outside the plant been planned and coordinated with local authorities?

   a. Have employees and the local populace been informed of the routes to be used?

   b. Are primary and alternate evacuation routes clearly indicated in the plan?

6. Are detection and alarm systems provided; i.e., fire or toxic release?

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a. Are there any periodic checks to assure that detection and alarm systems are maintained in an operable conditions?

b. Do alarm systems meet the requirements, as appropriate, of 1910.165?

7. Are evacuation instructions and signals for evacuation clear and understood by employees and surrounding populace?

8. Have provisions been made for the evacuation of handicapped persons?

9. Have "safe distances" been considered when regrouping areas were designated?

10. Have evacuation wardens been designated?

12. Are supervisors on each shift capable of executing the entire plan on their own?

13. Are employees instructed to proceed to regrouping points located cross wind from the contaminants source and at a "safe distance" from the danger

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zone? Are the regrouping points well known by employees? Have restrictive topographical conditions been considered?

a. Is there a wind sock or wind vane on the site to determine wind direction?

b. Is a complete copy of the emergency plan located at a safe place?

c. Are adequate supplies and equipment located at these points?

d. Are key personnel designated to make accountability checks at the regrouping points and to report the medical condition of those present and the names of those missing.

e. Are adequate communication systems available at these points?

F. Re-Entry and Clean-up

1. Will safe levels for re-entry be determined through environmental sampling by competent persons?

2. Are chemical residues likely to present a hazard?

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3. Could the disaster have created unstable chemicals.

4. Are "booby traps" likely to be present from the incident?

   a. Hang-up?

   b. Unstable structures?

   c. Developed pressure in pipes, vessels, containers and pumps?

5. Are employees qualified to do clean-up tasks? Will greater hazards likely result from attempting to maintain their employment rather than contract companies who are experienced in the required tasks?