Scenario-Based Emergency Planning for Ammonia Releases

By

David A. Moore, PE, CSP
Larry Aleksandrich
Chris Youngerman
AcuTech Consulting, Inc.
100 Bush Street, Suite 200
San Francisco, CA 94104
Tel.: (415)772-5972
Fax: (415)772-5975
e-mail: inquire@acutech-consulting.com
www.acutech-consulting.com

I. Introduction

The recently enacted EPA Risk Management Program regulations (40 CFR Part 68) require over 66,000 facilities nationwide to establish a Risk Management program, including an Emergency Response Program. Most facilities in the ammonia refrigeration industry have simple emergency plans to address onsite releases, but not necessarily plans to address the offsite consequences of an ammonia release. Though releases are rare, one that effects the public requires careful emergency planning and procedures to adequately manage. As such, it is prudent to take a second look at the current emergency plans for regulated facilities and to upgrade the emergency plans in light of the requirements of the EPA RMP regulations.

EPA stated in the preamble to the final rule that they are encouraging sources to use existing emergency response programs, rather than develop a separate and duplicative program under this rule. As such, EPA has adopted the emergency response requirements found in the statute, without additional specific planning requirements beyond that necessary to implement the statute. This assumes that they already meet OSHA HAZWOPER or similar requirements.

Even so, there are new demands being placed on owners due to the new visibility of the plan, the possibility of the public to expect that all scenarios addressed in the Hazard Assessment are included in the emergency response plans, and the heightened need for coordination of the plan with the LEPC. Current plans may not stand up to public scrutiny.

This paper will present an outline of the emergency planning and response requirements EPA has imposed on regulated facilities. Practical guidelines for preparing emergency plans based on hazard scenarios identified in the Process Hazard Analyses (PHA) and for

conducting drills necessary to satisfy the RMP requirements are presented. An outline of a complete emergency response plan is included.

II. EPA RMP Regulatory Requirements

EPA Risk Management Program (RMP) regulations (40 CFR Part 68) require over 66,000 facilities nationwide to establish a Risk Management program, including an Emergency Response Program. Most facilities in the ammonia refrigeration industry have simple emergency plans to address onsite releases, but not necessarily plans to address the offsite consequences of an ammonia release. While releases are rare, one that effects the public requires careful emergency planning and procedures to adequately manage. As such, it is prudent to take a second look at the current emergency plans for regulated facilities and to use a more focused approach to upgrading the emergency plans.

EPA attempted to make the differences between the new RMP rule emergency planning requirements and any existing emergency planning requirement minimal. For example, EPA believes that plans developed to comply with other EPA contingency planning requirements and the OSHA Hazardous Waste and Emergency Operations (HAZWOPER) rule (29 CFR § 1910.120) will meet most of the requirements of the emergency response program. In addition, EPA and other National Response Team agencies have prepared Integrated Contingency Plan Guidance ("one plan") (NRT, May 1996). The NRT and the agencies responsible for reviewing and approving federal response plans to which the one plan option applies agree that integrated response plans prepared in the format provided in this guidance will be acceptable and be the federally preferred method of response planning.

The rule also provides relief for sources that are too small to respond to releases with their own employees. These sources will not be required to develop emergency response plans provided that two conditions are met: 1) procedures for notifying non-employee emergency responders have been adopted, and 2) appropriate responses to their hazards have been addressed in the community emergency response plan developed under EPCRA (42 U.S.C. § 11003), for toxics, or coordinated with the local fire department for flammables. This will undoubtedly be an important consideration for many refrigerated facilities, although experience shows that most medium to larger facilities plan to have response capabilities.

The rule specifies the requirements shown in Figure 1 for those sources that choose to respond to releases.

Figure 1
EPA RMP Emergency Response Program Requirements (40 CFR § 68.95)

(a) The owner or operator shall develop and implement an emergency response program for the purpose of protecting public health and the environment. Such program shall include the following elements:
(1) An emergency response plan, which shall be maintained at the stationary source and contain at least the following elements:
(i) Procedures for informing the public and local emergency response agencies about accidental releases;
(ii) Documentation of proper first-aid and emergency medical treatment necessary to treat accidental human exposures; and
(iii) Procedures and measures for emergency response after an accidental release of a regulated substance;
(2) Procedures for the use of emergency response equipment and for its inspection, testing, and maintenance;
(3) Training for all employees in relevant procedures; and,
(4) Procedures to review and update, as appropriate, the emergency response plans to reflect changes at the stationary source and ensure that employees are informed of changes.
(b) A written plan that complies with other Federal contingency plan regulations or is consistent with the approach in the National Response Team's Integrated Contingency Plan Guidance ("One Plan") and that, among other matters, includes the elements provided in paragraph (a) of this section, shall satisfy the requirements of this section if the owner or operator also complies with paragraph (c) of this section.
(c) The emergency response plan developed under paragraph (a)(1) of this section shall be coordinated with the community emergency response plan developed under 42 U.S.C. 11003. Upon request of the local emergency planning committee or emergency response officials, the owner or operator shall promptly provide to the local emergency response officials information necessary for developing and implementing the community emergency response plan."

III. New Demands for Emergency Planning and Response

EPA is encouraging sources to use existing emergency response programs, rather than to develop a separate and duplicative program under the RMP rule. Although this is what the agency says it will accept, the regulations effectively set a requirement for a new level of sophistication for emergency plans. This is because the Hazard Assessment highlights the potential impacts more explicitly. Since the Risk Management Plan (RMPlan) is a public document, the public expectation may be for higher levels of preparedness, especially after they are made aware of the offsite consequence analysis. Following an incident, the emergency plans could be more heavily scrutinized and compared to the RMPlan.

EPA believes that the RMPlan must serve to provide information to the public in a form that will be understandable and will encourage the public to use the information to improve the dialogue with sources on issues related to prevention and preparedness. While the public and implementing agencies could make use of all sections of the RMP, the executive summary will provide text descriptions and give the source a chance to explain its programs in a format that will be easy for communities to read and understand. Refrigerated facilities are encouraged to prepare an open, clear, and complete executive summary that meets this intent.

EPA states that the data elements will provide the implementing agency with the basic data it needs to assess compliance without asking for detailed documentation. In some local jurisdictions, such as Sacramento County, California, however, the regulators plan to require more information than the data elements or the Federal minimum requirements.

EPA intends that the RMPlan will be submitted in a method and format to a central point as specified by EPA. States, local entities including local emergency planning committees (LEPCs), and the public will be able to access all RMPlans electronically. The emergency plan, however, is not included in the electronic submission.

The RMP Hazard Assessment may highlight the possible offsite impacts leading the regulators and the public to ask the questions "What are the safeguards in place to prevent a major release?", "How will the emergency be controlled?", and "How adequate are the emergency planning and response systems at the facility?"

EPA’s approach will provide data that anyone can download or search. States, communities, trade associations, public interest groups, or even terrorists may want to use the data or a subset of the data to create databases that allow them to compare sources in the same industry or same area. For example, a local entity will be able to download data from all reporting sources that are similar to ones in its community to determine whether the quantities stored and process controls used are typical. This could lead to additional scrutiny and to new benchmark levels of performance that others need to emulate.

IV. Hazard Assessment Impact on Emergency Planning and Response

An emergency response plan should be scenario-based and risk-based. This involves an understanding of what scenarios may occur and how likely and serious they could be, which is part of the purpose of the Process Hazards Analysis and the Hazard Assessment. Based on these two studies, the appropriate level of emergency preparedness can be determined.

EPA has adopted the use of a worst-case and alternative case definition for the RMP Hazard Assessment. The non-worst-case accidental releases for the hazard assessment portion of the risk management plan were presumed "more likely to occur" and "more realistic" than the worst case. EPA believes sources should have flexibility to select non-worst-case scenarios that are the most useful for communication with the public and first responders and for emergency response preparedness and planning.

It is not advisable, or even feasible in most cases, to prepare for catastrophic events such as how the EPA RMP worst-case assumptions dictate. Instead, the alternative cases for the RMP are better choices for basing the emergency response plans and drills. The alternative cases, for which the agency gives less guidance (thus allowing the owner to determine credible cases), can vary from minor to nearly "worst-case". These cases should be chosen carefully since the regulator's or the public will expect that these incidents can be managed by the facility and the community.

To illustrate the difference between worst-case and a more reasonable alternative case, Appendix A-1 and A-2 present two scenarios: Appendix A-1 is an EPA worst-case, and Appendix A-2 is an alternative case. Table 1 summarizes the results of the two cases. Note the difference in estimated radius of exposure for both cases to the ERPG-2 toxic endpoint (200 ppm for anhydrous ammonia) is on the order of 50 times less for the more reasonable planning case. This, of course, is highly subject to the assumed release rate, but a release rate of the EPA RMP worst-case is not considered credible. It is the owner's responsibility to determine the appropriate release cases and their associated magnitude.

While the EPA RMP requires calculation to the ERPG-2 level, there are other toxic endpoints that may be of interest to the company or to the emergency responders. It is important for emergency responders to realize the distinction between various endpoints. Appendix A-1 and A-2 illustrate the difference between distances to toxic endpoints for a typical worst case ammonia release scenario under worst case meteorological conditions. The toxic endpoints of ERPG-1 (25ppm), ERPG-2 (200 ppm), ERPG-3 (1,000 ppm), OSHA PEL (35 ppm), EEGL (100 ppm), IDLH (500 ppm) and LC-50 (11,590 ppm) are presented. Owners may need to realize the full range of estimates for a release in order to effect the proper emergency response. The results are summarized in Table 1.

Table 1
Worst Case vs. Alternative Case Radius of Concern

Toxic Endpoint	Endpoint Level (ppm)	Radius of Concern - WCS (miles)	Radius of Concern - ARS (miles)	Ratio of Potentially Affected Areas (WCS/ARS)
ERPG-1/ACGIH-TWA	25	4.3	0.63	46.6
OSHA-PEL**/ ACGIH-STEL***	35	3.7	0.53	48.7
NAS 1987 ERPGL	100	2.3	0.32	51.7
ERPG-2	200	1.7	0.23	54.6
IDLH	500	1.0	0.15	44.4
ERPG-3	1,000	0.8	0.10	64.0
LC-50 (Rat), 1 hour exposure	11,590	0.2	0.03 (52 yds.)	44.4

Key:
WCS – Worst Case Scenario (as defined by 40 CFR Part 68) - See Appendix A-1
ARS – Alternative Release Scenario (as defined by 40 CFR Part 68) - See Appendix A-2
ppm – parts per million by volume
ERPG – 2 – Emergency Response Planning Guideline, Level 2
ERPG –3 - Emergency Response Planning Guideline, Level 3
IDLH – Immediately Dangerous to Life and Health
LC-50 – Lethal Concentration 50%
NAS ERPGL – National Academy of Sciences, Emergency Exposure Guidance Levels
OSHA PEL – Permissible Exposure Level
ACGIH – American Congress of Government Industrial Hygienists
TWA – Time-Weighted Average

V. Ammonia Release Scenarios for Emergency Response Drills

This section describes an approach to selecting the scenarios for the RMP and gives a few practical scenarios under which ammonia may be released and would result in an off-site impact (i.e., beyond the fenceline). A first principle of emergency planning is that resources need to focus on the most significant risks. The RMP requires that the hazards of the process be identified, but not necessarily that the risks be estimated. As such, it may be confusing for owners to determine the required emergency plans to address the multitude of hazards identified.

Two solutions to this problem are: (1) to estimate the likelihood and severity of every identified scenario; and (2) to ensure that every credible scenario has an appropriate level of safeguards to prevent, detect, and mitigate it should it occur. The latter two safeguard categories are particularly important in emergency planning. As the Process Hazards Analysis team identifies a scenario, the team should discuss the adequacy of each of the safeguards provided. An assessment of adequacy includes the expected completeness of the safeguard to address the hazard, the effectiveness of the safeguard, and the reliability of the safeguard.

Particular attention should be given to acceptable risk judgments where a significant risk may still exist. The team may determine that additional changes are not justified, leaving a residual risk that may still be significant. Even if the risk is determined to be acceptable, there is a chance that the safeguards will not perform as expected, or are overwhelmed by a scenario greater than was hypothesized. This suggests that a worst credible, in addition to the worst case, scenario be defined. Typically, this is done during the PHA by assuming a reasonable level of primary safeguards failing, thus leading to a more challenging release. These scenarios should be used as a baseline for the emergency plans.

At a minimum, the emergency planning effort should consider the risks of the emergency situations identified in the PHA. Common accident scenarios for an ammonia refrigeration system are outlined in Table 2. Many of the causes are attributable to human error, so human error leading to failures of safeguards, such as forklift safe driving rules or maintenance procedures, needs to be assumed. A common release scenario would involve a process chiller utilizing ammonia to chill a food product in which the operator fails to cut off the liquid ammonia flow before activating the clean-up cycle. The clean-up cycle enables hot caustic solution to enter the chiller where the heat is exchanged with the ammonia. The result is a buildup of pressure in the system, which causes the pressure safety relief valves to open. The release would be outdoors, probably on the roof, and would likely result in an offsite impact.

Another scenario could include a release due to human error in which a forklift operator strikes ammonia piping in a cooler or refrigerated storage space. While placing product in the cooler, the forklift operator accidentally strikes a liquid line that results in a release within the room.

A scenario could include the unloading of ammonia from the ammonia supplier vehicle into the ammonia refrigeration system. During transfer, scenarios could include transfer hose failure, improper connection to the system, or the vehicle accidentally strikes piping and causes a release.

Another credible scenario may include a leak from the coils on a condenser on which water treatment chemicals were never or improperly used to prevent corrosion. As a result, the corrosion will produce a small leak.

Table 2
Release Scenarios for Ammonia Refrigeration Systems

Leaking valve packing/flange/seal	Condenser tube corrosion/failure
Vessel overfill/relief Due to solenoid failure	Forklift accident- indoor or outdoor
Catastrophic vessel failure	Oil draining error
Outdoor/rooftop equipment corrosion/failure	Fitting/piping failure Due to liquid-hammer
Level bridle/sight glass failure	Cleaning cycle error-overpressure
Relief valve failure	Transfer hose failure during unloading
Improper isolation of liquid full piping/equipment	Improper hose connection During unloading

Although smaller in scale to the drill scenarios mentioned above, the most common leak occurs from flange leaks connecting piping or vessels in the system. The emergency response should practice size up, isolation, containment, and mitigation techniques to prevent catastrophic releases.

Besides hypothetical scenarios, it is prudent to include a simulated reenactment of a previous ammonia refrigeration system accident at the facility or a known incident in the industry.

Facility siting may also lead to other credible drill scenarios such as the proximity to vehicular traffic or other hazardous material facilities that would impact the ammonia refrigeration system.

VI. Overview of an Emergency Response Plan

Emergency response plans have been developed to outline and coordinate the actions to be taken in the event of an emergency that endangers or potentially endangers the facility, facility personnel, the environment, and the surrounding community. The proximity of the facility to other facilities and the community is of particular concern during emergencies. The plan should address the requirements of EPA's Risk Management Programs Regulation 40 CFR Part 68 as well as other applicable agency regulations. Appendix B contains an example of an outline for a typical emergency plan.

The plan should be designed to address the types of emergencies likely to occur at a facility, identify the persons responsible for implementing the plan, and provide general guidelines for handling these emergencies.

The plan should include coordination with local emergency response personnel with regards to Incident Command System (ICS) and available resources. The plan should

outlines specific roles and lines of authority facility and public agency personnel will assume during the plan activation and implementation.

The facility and the emergency response personnel should hold periodic training sessions and exercises to optimize coordination during actual emergency events. The facility should evaluate the plan on an annual basis for continuous improvement as well as keeping the plan active, rather than simply an "on-the-shelf document."

The emergency response plan should include a complete facility description which should include the location of the facility with a thorough description of the surrounding community such as residences and industry, and identification of sensitive offsite receptors such as schools, hospitals, and senior citizen housing complexes. The facility description should include a description of the process and products produced as well as the hours of operation and the number of personnel onsite during each shift.

Emergency response plans must use the Incident Command System as a model to identify and develop the roles and responsibilities of the emergency responders. Identification of key players such as Facility Emergency Coordinators and emergency responders is essential. The facility Incident Command System should coordinate with the local agency incident command structure to ensure proper transition for a large-scale event. It is a good procedure for the emergency responders to re-delegate to a knowledgeable plant operating person the task of valving off the leak, although this requires pre-planning with the emergency responders and a great deal of trust.

Clear emergency response procedures are essential for a successful plan. The first actions will be to alert facility personnel that an emergency or release condition exists. The next responsibility for the facility is an accurate assessment or "size-up" of the severity of the situation. The Incident Commander of the facility may decide, based on information initially received, that an evacuation or shelter-in-place is required. The Incident Commander shall identify all hazardous substances such as ammonia or other conditions present. The Incident Commander must be aware of events and be sensitive to any changes, such as evolving weather, that might pose undue risk to facility personnel, the surrounding community, and the environment.

The plan should identify the monitoring equipment necessary that would detect the ammonia release so that proper protective equipment and strategies may be selected and implemented.

Once it has been determined that an emergency exists, the facility shall assume control of the site and initiate the emergency response. This includes control of the public, media, bystanders, and support personnel until the police arrive and assume control.

Evacuation procedures should be clearly written and communicated to all facility employees. The plan should include the identification of the primary and secondary assembly areas, which are dependent on wind direction. Responsibility for visitors and

contractors must be clearly identified. The decision to order a community evacuation can only be made by outside response agencies such as the fire and police departments.

The training plan should list the training required for all facility personnel and state the proficiency required for each position on the response team. The plan should define the three aspects of the training:

1. What is the training content and agenda?
2. Who needs to be trained?
3. How will the training be conducted?

At a minimum, all employees should have ammonia awareness training as part of the hazard communications program. Refresher training should take place on an annual basis.

Procedures for other emergency scenarios such as floods, neighboring plant accidents, rail accidents, hurricanes, earthquakes, tornadoes, and bomb threats should be considered if applicable to the facility.

Drill scenarios could also include the condensers and associated piping since most designs place this equipment on the roof of the facility. Condenser flange leaks or coil leaks due to corrosion could also be considered as practical scenarios.

Drills should be conducted at least once per year. The drills should include the participation of the fire department, HAZMAT team, emergency medical services, and police. The drills should consist of a "roll-out" exercise involving an actual physical response by the emergency team and outside agencies and an evacuation of company employees to practice accountability. All drills will be conducted according to pre-planned scenarios.

Annual plan review and response critiques are used to ensure that the plan reflects current conditions at the facility. Critical items, such as emergency contacts, phone numbers, system changes, personnel changes or assignments, should be updated as changes occur.

Annual reviews are used to audit the plan and to discuss new ideas or changes to improve the plan. Response critiques should be conducted after every emergency response incident to evaluate response effort and plan implementation.

VII. Conclusions

The emergency response requirements of EPA’s RMP, while on the surface relatively easy to meet, in practice require owners to reevaluate their emergency response programs and upgrade them to a new level of competency and completeness. The required Process

Hazards Analysis and Hazard Assessment should be used to identify realistic accident scenarios that form the basis of emergency plan and drills. Rather than worst case emergency planning, worst credible alternative scenarios should be assumed. Common emergency scenarios were identified in the paper. Applying these ideas to the specific site will result in the selection of optimal scenarios for the emergency plans and drills.

The emergency responders need to realize the potential impacts of ammonia releases on the community. Consequence modeling should be used to estimate impact zones based on the alternative scenarios identified above. Other toxic endpoints than the EPA-required ERPG-2 should be calculated to give a more complete understanding of the potential hazards.

A complete emergency plan outline was included. Emergency plans should start with the basics centered on the concept of an Incident Command System. When the core plan is developed, more sophisticated levels of planning can be done.

References

American Industrial Hygiene Association. *Emergency Response Planning Guidelines.* AIHA Publications. 1996.

International Institute of Ammonia Refrigeration. *Ammonia Data Book*. IIAR. 1992.

Kuespert, Daniel R. "Risk Management and Hazard Reduction Practices in the Ammonia Refrigeration Industry." *Proceedings of the CCPS International Conference and Workshop on Risk Analysis and Process Safety*. October 21, 1997.

Lewis, Richard J. *Hazardous Materials Desk Reference, Second Edition.* Van Nostrand Reinhold, New York. 1991.

Science Applications International Corp. "Model Risk Management Program for Ammonia Refrigeration." May 1996.

Appendix A-1
Ammonia Refrigeration Worst-Case Example
Dispersion Modeling Endpoints vs. Distance to Level of Concern

Endpoint Name	Endpoint Level (ppm)	Radius of Concern* (mi.)
ERPG-1/ACGIH-TWA	25	4.3
OSHA-PEL**/ ACGIH-STEL***	35	3.7
NAS 1987 Emergency Exposure Guidance Levels	100	2.3
ERPG-2	200	1.7
IDLH	500	1.0
ERPG-3	1,000	0.8
LC-50 (Rat), 1 hour exposure	11,590	0.2

* distance to designated endpoint, using assumptions shown below
** PEL- OSHA "Permissible Exposure Limit"
*** American Conference of Governmental Industrial Hygenists, Short-Term Exposure Limit to prevent eye/respiratory irritation to uninjured workers.
Release Scenario with atmospheric conditions as defined by RMP (F Stability, 1.5 m/s wind speed, 77 degrees F, Urban/Forested Roughness factor) and worst case release scenario information for an outdoor release of a toxic gas stored as a liquid under pressure (release of vessel contents over 10 minute period. Assuming a typical high pressure receiver with 10,000 lbs. liquid ammonia capacity. Release rate 10,000 lbs./10 minutes or 1,000 lb/min. Gaussian Dispersion assumed. ALOHA model used.

Appendix A-2
Ammonia Refrigeration Worst Case Example
Dispersion Modeling Endpoints vs. Distance to Level of Concern

Endpoint Name	Endpoint Level (ppm)	Radius of Concern* (mi.)
ERPG-1/ACGIH-TWA	25	0.63
OSHA-PEL**/ ACGIH-STEL***	35	0.53
NAS 1987 Emergency Exposure Guidance Levels	100	0.32
ERPG-2	200	0.23
IDLH	500	0.15
ERPG-3	1,000	0.10
LC-50 (Rat), 1 hour exposure	11,590	0.03 (52 yds.)

* distance to designated endpoint, using assumptions shown below
** PEL- OSHA "Permissible Exposure Limit"
*** American Conference of Governmental Industrial Hygenists Short-Term Exposure Limit to prevent eye/respiratory irritation to uninjured workers.
Release Scenario with atmospheric conditions as defined by RMP (F Stability, 1.5 m/s wind speed, 77 degrees F, rural roughness factor) and release data for a condenser coil failure due to corrosion. Condenser leak modeled as a ¼" circular hole in a 2" coil section. Process conditions modeled as similar to those for a typical ammonia system with an operating pressure of 180 psig. and saturated ammonia temperature at this pressure (95^{o}F) No mitigation factor was accounted due to typical condenser operation with water. Gaussian Dispersion assumed. ALOHA model used.

Appendix B
Typical Emergency Response Plan

Table of Contents

1. Introduction
    - 1.1 Scope (According to Regulations)
    - 1.2 Purpose
    - 1.3 Plan Structure/Statement of Policy
    - 1.4 Mutual Aid Agreement
    - 1.5 Coordination With Public Agencies
    - 1.6 Facility Description
    - 1.7 Location of Facility
    - 1.8 Distribution List
    - 1.9 Vulnerable Offsite Areas
2. Fire/Chemical Release Notification and Reporting Procedures
    - 2.1 Emergency Notification and Reporting Procedures
        - 2.1.1 Fire/Chemical Release Notification Procedure
        - 2.1.2 Injury Notification Procedure
    - 2.2 Level of Incident
        - 2.2.1 Level One
        - 2.2.2 Level Two
        - 2.2.3 Level Three
    - 2.3 Reporting Procedures
        - 2.3.1 Primary
        - 2.3.2 Agencies
        - 2.3.3 Written Notification
    - 2.4 Interface With Outside Responders
    - 2.5 Emergency Telephone Directory
3. Emergency Notification
    - 3.1 Emergency Communication System
    - 3.2 Emergency Radio Procedure
    - 3.3 Operation of Emergency Telephone
    - 3.4 Emergency On-Call Manager
    - 3.5 Emergency Coordinator
    - 3.6 Incident Command System (ICS)
    - 3.7 Community Incident Command System
    - 3.8 Company Incident Command System
    - 3.9 Company Emergency Response System
        - 3.9.1 Incident Command Unit
        - 3.9.2 Operations Unit
        - 3.9.3 Decontamination Unit
        - 3.9.4 Rescue Unit
        - 3.9.5 Evacuation Unit
    - 3.10 Company Emergency Response Chain of Command
        - 3.10.1 Activation Procedures

3.11 Personnel Requirements and Job Descriptions
3.11.1 Company Incident Commander
3.11.2 Hazardous Materials Specialists
3.11.3 Hazardous Materials Technicians
3.11.4 Specialists
3.11.5 Evacuation Team
3.12 Duty Roster
3.12.1 Monthly Incident Commander Rotation
3.12.2 Monthly Duty Roster For All Personnel
3.13 Facilities and Resources
4. Emergency Response Plans
4.1 Emergency Alerting
4.2 Situation Severity Assessment
4.2.1 Measurement
4.2.2 Personal Protective Equipment Selection
4.3 Site Security and Control
4.3.1 Emergency Response on Company Products
4.4 Specific Hazardous Chemical Response Procedures
4.4.1 Chlorine
4.4.2 Ammonia
4.4.3 Propane
4.5 Other RQ Releases and Emergencies
4.6 Special Responsibilities
4.6.1 Evacuation Routes
4.6.2 Safety Officer
4.7 Evacuation Management
4.7.1 Office
4.7.2 Building Search
4.7.3 Assembly Area
4.7.4 Head Count
4.7.5 Maintenance
4.7.6 Plant
4.7.7 Press Relations
4.8 Post Emergency Operations
4.8.1 Critique
4.8.2 Assessment
5. Emergency Response Training Plan
5.1 Personnel Training
5.1.1 Training Requirements For Each Level
5.1.2 Documentation of Personnel Training Requirements
5.1.3 Associate Notification
5.1.4 Training Requirements
5.2 Training Schedule
5.2.1 Annual Refresher Training
5.3 Training Documentation
5.4 Emergency Response Training Requirements

5.4.1 First Responder Awareness Level
5.4.2 First Responder Operations Level
5.4.3 Hazardous Materials Technician
5.4.4 Hazardous Materials Specialist
5.4.5 On Scene Incident Commander
5.5 Trainers
5.6 Emergency Response Team Training & Drills
5.6.1 Monthly ERT Meeting
5.6.2 Monthly Shift ERT Training Meetings
5.6.3 Table Top Drills
5.7 Equipment Training and Maintenance
5.7.1 Equipment Maintenance
5.7.2 Equipment Training
5.8 Student Training Manuals
6.0 Emergency Response Procedures
6.1 Emergency Scenarios
6.1.1 Chemical Release
6.1.2 Flood
6.1.3 Rail Yard Accident
6.1.4 Neighboring Plant Accident
6.1.5 Explosion
6.1.6 Personal Injury
6.1.7 Bomb Threats
6.1.8 Hurricane/Tornado
6.2 Plant Evacuation
6.2.1 Evacuation Coordinator
6.2.2 Evacuation Coordinator Responsibilities
6.2.3 Office Evacuation
6.2.4 Maintenance Evacuation
6.3 Responsibility For Guests and Visitors
6.4 Medical Support and Surveillance
6.5 Baseline Physical Examination
6.5.1 Medical Clearance
6.5.2 Medical review of the ER Members
6.6 Non-Routine Examinations
6.6.1 Symptom Reporting
6.7 Annual Physical Examination
6.8 Medical Support For Emergency Response
6.9 MSDS Sheets
7.0 Personal Protective Equipment Program
7.1 Protective Clothing
7.1.1 Selecting Protective Clothing
7.1.2 Using Protective Clothing
7.1.3 Decontamination Procedures
7.2 Respiratory Protection
7.3 PPE Training

8. Plan Review and Response Critique

- 8.1 Annual Plan Review
  - 8.1.1 Annual Review
  - 8.1.2 Annual Review Schedule
  - 8.1.3 Annual Plan Update
- 8.2 Modification Updates
- 8.3 Response Critique
- 8.4 Drills
  - 8.4.1 Scenarios
  - 8.4.2 Assessment