



VALDEZ AMMONIA

TRAINING PROJECT

FINAL REPORT

December 2004



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Table of Contents

SECTION	PAGE
I - Introduction, Purpose and Scope of the Project.....	I-1
II – Ammonia Training Course.....	II-1
III – Functional Exercise Summary and Lessons Learned	III-1
 Appendices	
A. Participant List	A-1
B. Course Evaluation Summary	B-1
C. Exercise Evaluation Summary	C-1
D. Training Course Agenda.....	D-1

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Section I: Introduction, Purpose and Scope of the Project

A. Background

Recent hazards analyses conducted for the Alaska Department of Environmental Conservation (ADEC) have clearly identified communities at risk from extremely hazardous substances (EHS) such as chlorine and ammonia. These two principal chemicals are the commonly targeted EHS for hazardous material (HazMat) release prevention and response planning, primarily because of their prevalence in Alaskan communities at seafood processors and water and wastewater facilities.

Recent Level A/B HazMat response capability assessments have also indicated that most Alaskan communities do not possess an offensive HazMat response capability. This continuing project is intended to provide at-risk communities (such as those in the Valdez and Cordova areas) with the training and knowledge they need to prevent and respond defensively to an EHS release.

The ADEC sponsored the initial pilot project (March 1999) at Petersburg, which included ammonia/chlorine training, non-regulatory technical assistance visits to EHS facilities, and a tabletop exercise. A follow-on project was sponsored in Kodiak, Alaska in November 1999, and included ammonia training, non-regulatory technical assistance visits, Incident Command System (ICS) training, a tabletop exercise, and a functional exercise (including the actual deployment of the Anchorage and Fairbanks Level A HazMat Teams). Other projects were held in Unalaska (April 2000) and Bristol Bay (May 2001) and featured ammonia and chlorine training, non-regulatory technical assistance visits, ICS training, and a tabletop exercise.

The Valdez Ammonia Training Project is a cooperative effort involving ADEC and the City of Valdez. Rick Warren (the course instructor) was contracted by the City of Valdez and provided academic and practical training and exercises to focus on proper emergency response procedures to anhydrous ammonia releases.

B. Purpose of Project, Goals, and Objectives

The overall purpose of this project is as follows:

- Improve the HazMat response capability in the City of Valdez and at other communities within the Prince William Sound subarea, through increased awareness of the hazards posed by anhydrous ammonia. Provide classroom training on the hazards, handling, management and response to ammonia releases.
- Update current information on existing EHS hazards in the communities.

- Conduct a functional exercise aimed at improving the local HazMat response capability by jointly exercising the local emergency response teams in response to a simulated chemical release at the Peter Pan Seafood processing facility in Valdez.

C. Executive Summary

The Alaska Department of Environmental Conservation (ADEC) Prevention and Emergency Response Program sponsored the "Preparedness, Safe Handling and Emergency Response to Ammonia" training course in Valdez on November 19-21, 2004. The event was hosted by the Valdez Fire Department and featured classroom instruction, a live release demonstration, and an emergency response exercise. Approximately 35 personnel attended the training event including staff from ADEC, the Valdez Fire Department, Cordova emergency response staff (fire department, harbor master, and solid waste manager), Doyon, TCC, Eagle Enterprises, Peter Pan Seafoods, U.S. Coast Guard (Marine Safety Office Valdez) and the Valdez Regional Hospital Association. The training was very well received as reflected in the course evaluation summary (see Appendix B). The final report was prepared and distributed by ADEC staff.

The event was held at the Valdez Civic and Convention Center and began with classroom and academic instruction on the evening of November 19th. Academic instruction continued on Saturday (November 20th), and included a live ammonia release demonstration at the Valdez Police Department firing range. The third day of the training (November 21st) featured a functional exercise. The scenario involved a simulated anhydrous ammonia release at the Peter Pan Seafoods facility. Six individuals acted out the part of victims to test the emergency medical treatment and protocols of the emergency medical teams and the Valdez Hospital.

A detailed outline of the entire training course is provided at Appendix D of this report.

Section II: Ammonia Training Course

The “Preparedness, Safe Handling and Emergency Response to Ammonia” course was held at the Valdez Civic and Convention Center on November 19-21, 2004.

The course began at 6:00 pm on November 19th to allow volunteer firefighters and others to attend the course after their normal work day. A detailed outline of the course agenda is included at Appendix D.

During Session 2 (November 20th) of the course, a live ammonia release demonstration was staged at the Valdez Police Department firing range. The Valdez Hazmat Team suited out in Level A personal protective equipment and controlled the release of ammonia. Several Hazmat team members also monitored the air immediately downwind of the release to determine concentration levels. Team members and equipment were also decontaminated prior to exiting the area.

Several lessons learned were offered to improve the overall academic portion of the course (to include the live release demonstration).

- During the live release demonstration, observers spent too much time doing nothing while others set up the demonstration. Perhaps pre-stage or employ all personnel. Also need to inform crews before the demonstration and allow more set up time.
- The “safety zone” was crossed during the functional demonstration with the approval of the Safety Officer. This was not communicated completely to the response team.
- Consider transferring video to DVD allowing better “still” frame use with clearer picture.

Participants were also asked what would be desirable in terms of future training topics. The following were the responses provided.

- Cloud, plume modeling
- More hands on activities
- Chlorine, Freon, Hydrogen Sulfide training
- More gas testing.
- More ways to clean up.
- More functional exercises.
- Another full-scale drill to check additional guidelines.
- More first aid techniques.

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Section III: Functional Exercise Summary and Lessons Learned

The functional exercise was held on November 21, 2005. Rick Warren and Larry Iwamoto were the primary controllers for the exercise. Scott Chase (Peter Pan Seafoods) provided access to the Peter Pan facility for the emergency responders and also operated the smoke generator to simulate the ammonia release.

Basic Scenario:

Toward the end of the night shift (8:45 am Sunday morning, November 21st) during an ammonia transfer operation, a “liquid hammer” occurred from suspected “thermal lensing” in the HP receiver. As a result of the liquid hammer, a Sight Glass on the level column began to leak at the bottom of the HP Receiver.

A refrigeration technician attempted to isolate the leaking Sight Glass. The refrigeration technician was quickly overcome by the ammonia and left the area because of discomfort even though he was using respiratory protection.

A liquid ammonia leak is on-going. He ran into the fish processing area to report the leak and clear the area. During the resulting evacuation of the building, several people were overcome by the ammonia. A total of six simulated casualties were used for the exercise (two with minor symptoms, two moderate, and two severe).

When the ammonia release occurred, a fixed ammonia air monitor sounded an audible alarm.

One key factor to note is the resource limitations (equipment and personnel) of a small response force such as the Valdez Fire Department. In an event such as this, existing resources were quickly stretched to the maximum and several key functions (e.g., downwind and area monitoring, entry team dress-out and decontamination assistance, etc.) could not be adequately staffed.

General Timeline of Events:

- 9:23 am A 911 call was placed to the Valdez Dispatcher informing emergency services of the simulated ammonia release at the Peter Pan facility. The call indicated that a release had occurred and people may be hurt in the incident. Fire apparatus and ambulances began rolling out of the station.
- 9:30 am Initial response crews on scene.
- 9:35 am Input to Fire Chief that a report was received from the Peter Pan facility. Many evacuated employees are coughing violently. All employees are outside the facility milling around. There are many people affected by the release.

- 9:42 am Fire Chief departs station.
- 9:45 am Coast Guard (Marine Safety Office Valdez) receives initial notification of the incident.
- 9:48 am Fire Chief on site, receives input indicating the extent of the ammonia release (map and scaled overlays with projected Immediately Dangerous to Life and Health (IDLH) and Permissible Exposure Limit (PEL) areas depicted). Meets with Operations Chief for situation update. Confers with State of Alaska DEC representative. Initial Unified Command formed.
- 9:55 am Fire Chief and Police Chief confer. Valdez Police Department will tone-out additional police forces and begin evacuating the area around the small boat harbor and the Valdez Harbor Inn.
- 9:56 am Large ammonia cloud model projection provided to Fire Chief, indicating progression of cloud in overall size.
- 10:00 am Coast Guard representative on scene. Unified Command expanded to include local, federal and state on-scene command elements.
- 10:01 am Wind begins to shift, blowing smoke towards the Entry Control Point and response vehicles and personnel.
- 10:06 am Initial Entry Team enters area.
- 10:13 am Controller provides input to the Operations Chief on the location of the isolation valve.
- 10:15 am Additional simulated casualty located. Entry Team on the way out with the casualty.
- 10:17 am Unified Command informed of several vessels approaching harbor. Coast Guard representative indicates that patrol boats have been dispatched to keep vessels out of the immediate area.
- 10:18 am Simulated casualty loaded onto ambulance and transported to hospital.
- 10:21 am Unified Command informed of ducks flopping around in the water near the release. Several sea otters also sighted in the area.
- 10:22 am Operation to isolate the valve commences.
- 10:27 am Valve isolated, source secured.

10:28 am Entry Team on the way out. Secondary search to be accomplished after air re-supply procedure takes place.

10:35 am Exercise terminated.

Lessons Learned: (Also see Appendix C for a summary of comments provided on the Exercise Evaluation form)

Things That Went Well:

- Good response overall; Would have probably prevented the entire release of ammonia from the leaking source (release rate was approximately 60 lbs per minute).
- Good initial briefing from the Operations Chief to the arriving Fire Chief.
- Air monitoring quickly established while victims in the area.
- General notifications went well. Alyeska SERVS responded very well and simulated evacuating their facility and moved the vessels away from the pier. Coast Guard notified the port facility and issued a notice to mariners to warn them of the hazards in the area.
- The use of positive pressure ventilation fans (PPV) was good. PPVs were situated to control the smoke plume. A separate PPV was left at the entry point to support self-decontamination of the Entry Team as they exited the site.
- During the pullback from the area due to the wind shift, positive control and good organization was maintained.

Areas Requiring Improvement:

- On-Scene Communications: The Fire Chief needed an immediate situation update upon arrival at the scene. The Operations Chief was extremely busy directing tactical operations. Call signs were part of the problem as responders were apparently confused between “Command” and “Chief” or “Incident Command”.
- The Entry Control Point and the Unified Command was set up too close to the incident. When the wind changed direction at 10:01 am, the swirling cloud cut off the only egress route for the responders. The Unified Command would have become casualties as well. The Exclusion Zone was too small; the entire road

including the Alyeska SERVS facility should have been part of the Exclusion Zone.

- Specific Notification Issues:
 - DEC representative was not able to contact the State O-Scene Coordinator via cell phone.
 - Coast Guard unable to contact the Valdez Harbormaster.
- Patient treatment protocols for ammonia casualties requires additional work at the hospital.
- The Entry Team did not receive an initial entry briefing, and an initial entry plan was not developed. The Entry Team also needed better direction from the Operations Chief. Communications problems (pins did not match up on the radios) also hampered the Entry Team's response, and they improvised to ensure comms was maintained with the Operations Chief.
- The Entry Team needed better tools for source control. A pipe wrench is a necessity in closing off isolation valves. The valves cannot be simply closed by hand.
- Need to work better on maintaining accountability of fire and emergency medical team staff.

Recommendations:

- Sheltering In Place: One of the initial actions should be directing facilities at-risk to shelter in place, especially if time does not permit for a rapid and orderly evacuation.
- Be sure those responding to direct or assist in the evacuation (e.g., police, Coast Guard, etc.) have the proper PPE in the event the wind shifts or the plume expands rapidly and places them at risk.
- Staging Area location:
 - An initial visual assessment of the incident location and general layout of the location should provide some degree of risk assessment and criteria for site selection, and address levels of concern.
 - The first fire vehicle into the area was not able to visually acquire the smoke plume until the plume began to eddy around the buildings. It would

have been better to locate the plume, then determine the appropriate distance to stage response vehicles and establish the operational zones.

- Another consideration in establishing a good location for a staging area is the length of travel for the Entry Team, especially when in Level A and with a limited supply of air. One possible solution would be to use a secondary vehicle (such as a truck or a Gator ATV) to transport the Entry Team to the site.
- The use of Coast Guard remote security cameras may be a good means of providing a safe visual assessment of the site and for remote area surveillance (to locate casualties, determine cloud direction and facilities at risk, etc.)
- On-Scene Field Decontamination: The simulated casualties should have been field decontaminated through the use of the PPVs. This would have minimized any residual vapor contamination on their clothing, and also minimized the risk to the ambulance crews (potential off-gassing of ammonia vapors from the casualties).
- Victim Status Cards: As part of exercise control and for future exercises, it would be good to have status cards for victims to present to rescue and medical treatment staff. These cards could be developed for three phases of the response: initial on-scene rescue, treatment at the ambulance, and triage at the hospital.
- For initial victim rescue, options for providing some form of respiratory protection should be considered. These could include wet towels, spare SCBA, or some other form of respiratory protection.
- Communications: Use different channels to avoid radio clutter. Separate channels for medical, entry, and on-scene command functions could have been used to minimize overload on one frequency.
- Thermal imagery devices may be capable of determining the level of ammonia in the tank.
- Plant Facility Manager/Refrigeration Specialist: Always attempt to acquire as much information as possible from these individuals. They may be able to provide or draw a rough floor plan of the facility indicating the source of the release, access routes, as well as any information on additional casualties in the area (or an employee head count for personnel accountability).

- Five-Minute Tasking: Develop prioritized, incremental tasking for the Entry Team and others to focus on specific tasks. They would then be able to finish a task and move on to the next task in a sequential and orderly fashion, as opposed to trying to accomplish several tasks simultaneously and slowing down the overall response.
- Visibility while in Level A Suits: Not much can be done to improve visibility while in the suit. Carrying a towel in the suit is probably the best option. However, team members should not attempt to clear the visor and walk at the same time. This could easily result in a slip, trip or fall.
- A handout for RV park owners, hotel managers, cruise ship captains, and other public establishments would be very useful during the peak tourist season to provide the general public with emergency response measures in the event of an ammonia release. The handout needs to be carefully tempered to avoid alarming people, while also providing good guidance such as procedures for sheltering in place.
- Arrangements could be made with other response resources during a major incident. Mutual aid agreements with Doyon and TCC should be explored.
- CAMEO and ALOHA training should be obtained in order to develop cloud footprints for ammonia releases from the few seafood plants in town. Pre-planning could include addressing potential release scenarios and determining potential release volumes, prevailing winds, and IDLH overlays.

APPENDIX A: Course Evaluation Summary

The following is a summary of the comments received following the academic portion of this training project.

Training Course Evaluation on Preparedness, Safe Handling and Emergency Response to Ammonia Valdez, Alaska

Instructor: Rick Warren **Dates Attended:** November 19-21, 2004 **Evaluation by:** Participants

1. List the topics you felt were most valuable to you in this course.

- Physical properties, actual live releases and study and discussion of same, discussion of lessons learned.
- I felt the classroom demos with water and ammonia and the reactions were great.
- Chemical and physical properties, health considerations.
- Ammonia characteristics, hands-on use of many brands and types of portable gas detectors, especially the ISC VX500 PID.
- Hands-on with gases and meters, using the Industrial Scientific VX500 on ammonia gas.
- Community awareness, Hazmat teams, sources.
- Signs and symptoms of ammonia exposure.
- Everything was very, very good information.
- Everything.
- Characteristics and properties of ammonia, and hands-on training.
- Chemical properties and treatment guidelines.
- Hazard and risk assessments.
- Properties and characteristics of released NH₃ as both liquid and vapor.
- Behavior of ammonia during and after a release.
- Properties of ammonia.
- All.
- Classroom modules were because we gained the knowledge needed to perform a safe and effective emergency response.
- Properties of ammonia and how it reacts in different circumstances; ways to treat an exposed person.
- The ammonia release exercise was an eye-opener.

Least Valuable

- It was all good.
- Way too much stand around time at the site where the ammonia was released.
- Everything was good.
- None, great course.
- Dealing with four people on why they could not go and shoot at the range.
- Recondensation.

2. In which ways this course will help you to carry out your responsibilities on the job.

- It gives a much better feel for how we might expect NH₃ to react when released and things to do to safely and effectively monitor it.
- It makes me more aware of how it travels and how deadly this chemical is.
- Response to discharge.
- I learned many new concepts to help teach about ammonia handling and Hazmat response, especially with regards to proper monitoring and use of PPE.
- Better understanding of how ammonia reacts.
- Awareness of hazards.
- I now know more about the meter readings to look for.
- Be safe, how to deal with and respond properly.
- Knowledge is power – the more we know about a certain chemical the better we can respond to these types of emergencies. Hopefully, this will keep me personally more safe as well.
- Member of Valdez Regional Hazmat Team. This will assist me in responding safely and management of ammonia release incidents.
- Better knowledge of ammonia.
- Allow a better interaction with other response agencies in establishing defensive measures in protecting people, environment and property.
- By being more aware.
- Be more aware.
- Better pre-planning for events such as this one. Also a better communication with the agencies of this community, hospital, DEC, USCG, and city.
- I will be able to understand response actions to an ammonia incident and I will be able to assist and plan my agency's role.
- Knowledge of the properties of ammonia will provide guidance during a response to a release.

3. How do you feel the instructor's use of materials contributed to the course in the following areas? Please Make Comments!

The Presentations/Lectures

- Very good, good flow, well-presented.
- A little slow and dry at times.
- All were adequate and pertinent to subject.
- Excellent use and balance of PowerPoint, videos, PPE products.
- Good instructor knowledge.
- Good.
- Good. They were interactive.
- Excellent lecture, very enjoyable. Thank you.
- Excellent presentation.
- Presented professionally and was well organized in his delivery.
- Multimedia presentations coupled with informative lectures, provided a good deal of information and relevant anecdotes.

- Very good presentation. I especially appreciate the close adherence to the printed schedule.
- Good.
- Very well.
- Very good and pleasant. One suggestion would be to change the background of your PowerPoint for each section.
- Very good. I appreciate the retelling of personal experiences.
- I felt we got off track often. Some things seem to be repeated often. Spent too much time in work groups.

The Demonstrations

- Unique opportunity to actually witness a release and study it without the stress of an emergency response.
- Great. Thanks. They helped me understand.
- Great use of props with live ammonia to sense real time exposure in a hazardous condition.
- Great.
- Excellent.
- Very interesting.
- Fun and educational.
- The demonstrations were very effective and appropriate.
- Adds a nice hands-on component to the course material.
- Very good.
- Smelly, but good.
- Poorly planned. Observers spent too much time doing nothing while others set up Saturday's demonstration. Perhaps pre-stage or employ all personnel.
- Good.
- Very well.
- Need to inform crews before the demonstration and allow more set up time.
- Set up ahead of time.
- Engaging. Really drives the point home. I think we spent too much time on the in-class release with monitoring equipment.
- The "safety zone" was crossed, in my opinion, during the functional demonstration.
- Went well.

The Presentation Materials and Visual Aids

- Pretty good.
- PowerPoint and written booklets were very good.
- Good pictures and videos.
- Good.
- Good.
- Great, entertaining, very good resource.
- All of the materials and visual aids were very informational and educational.
- Consider transferring video to DVD allowing better "still" frame use with clearer picture.
- Good local (Alaska) incidents.

- Beaver slide was awesome.
- Great.
- Very well.
- Using material was good. Would like to have a chart/picture of chemical make up of NH₃.
- Very good except for the one old video tape that was hard to see.
- Good.

The Handout Material

- Good idea. The work books were good.
- Great.
- Good.
- Good.
- Good.
- Easy to use, resource is great.
- The workbook and handouts were well thought-out and informative.
- Will make an easy reference for later use.
- Outstanding! Following visual material in the workbook is an excellent way to focus the attention of the class.
- Good.
- Very well.
- Laid out really well. Corresponding slides to work book exercises is an excellent idea.

The Ammonia Functional Exercise

- Excellent (see above comment for the Demonstrations)
- Should have been set up before the class was taken out into the field.
- This really showed the properties of NH₃.
- Great job by the Valdez Fire Department crew.
- Excellent.
- Good.
- Always good to do hands-on.
- Hands-on experiences are always the best methods of learning.
- Good hands-on demo.
- Good for responders, not too informative for observers.
- Not attended.
- Great.
- Very well.
- Need to layout exercise prior to event. All aids gathered and set up.
- Good.
- We should have stuck to original schedule to let VFD get set up before bringing the class out. Otherwise very good.
- The instructor provided a good example of what not to do around an ammonia release. The relaxed attitude around this extremely hazardous material could prove disastrous to less experienced class participants.
- Good day for it. Thought there were a few safety issues, like the instructor not using any

protective gear when getting examples of liquid and when “deconing” tarps. Not a good example for the Explorers.

The Facility Inspections – Not applicable for this course.

4. What topics would you like training on in a future or follow-up session?

- Cloud, plume modeling
- More hands on. Also chlorine.
- Chlorine, Freon.
- H2S and Chlorine.
- More gas testing.
- More ways to clean up.
- More functional exercises.
- Another full-scale drill to check additional guidelines.
- More first aid techniques.

5. Check boxes below for ratings that best describe this training course under each heading.

	Training Materials	Training Facility	Demonstrations	Practicality	Instructor	Exercise	Overall
4 =Excellent	15	12	15	15	19	10	15
3 = Good	8	11	6	7	3	6	6
2 = Fair			1	1		1	
1 = Poor			1				
Not rated					1	6	2
Overall Average	3.65	3.52	3.52	3.61	3.86	3.53	3.71
Overall Rating	Near Excellent	Good to Excellent	Good to Excellent	Near Excellent	Near Excellent	Good to Excellent	Near Excellent

Note: The numbers in each box for the first four rows indicate the number of respondents who provided that rating for the specific category.

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APPENDIX B: Participant List

The following is an alphabetical listing of the participants for this training event.

Approximately 35 personnel attended the training event including representatives from the Alaska Department of Environmental Conservation, the Valdez Fire Department, Cordova emergency response (fire department, harbormaster, and solid waste manager), Doyon, TCC, Eagle Enterprises, Peter Pan Seafoods, United States Coast Guard (Marine Safety Office Valdez) and the Valdez Regional Hospital Association.

Final Participant Listing – Ammonia Training (November 19-21, 2004)

Name	Organization	Phone	Fax	Email
Darrel Banner	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	dbanner@ci.valdez.ak.us
Alan Bolton	Eagle Enterprises	244-0048	562-6955	alan@eaglesafety.net
Gary Bullock	MSO Valdez P.O. Box 486 Valdez, AK 99686	835-7210	835-7207	
Courtney Byrum	Valdez Fire Dept (Explorer) P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	
Scott Chase	Peter Pan Seafoods, P.O. Box 1027 Valdez, AK 99686	835-2080		
Bryan Corsi	Valdez Fire Dept (Explorer) P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	bcorsi@alaska.com
David Duncan	TCC SERVS	835-2366		
Randy Dowd	ADEC- Kenai, 43335 Kalifornsky Beach Road, Ste 11 Soldotna, AK 99669	262-5210	262-2294	Randy_dowd@dec.state.ak.us
Doug Dresnek	MSO Valdez P.O. Box 486 Valdez, AK 99686	835-7210	835-7207	
John Engles	ADEC-Valdez P.O. Box 1709 Valdez, AK 99686	835-4698	835-2429	John_engles@dec.state.ak.us
A. J. Fishel	Valdez Fire Dept (Explorer) P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	
David Gildersleeve	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	dgildersleeve@ci.valdez.ak.us
Steve Hackworth	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	shackworth@ci.valdez.ak.us
Branlund T. Holmes	TCC SERVS	835-2602		
Jennifer Henderson	ADEC-Anchorage 555 Cordova Street Anchorage, AK 99501	269-7532	269-7648	Jennifer_henderson@dec.state.ak.us
Charis Hollingsworth	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	chollingsworth@ci.valdez.ak.us
Larry Iwamoto	ADEC-Anchorage 555 Cordova Street Anchorage, AK 99501	269-7683	269-7648	Larry_iwamoto@dec.state.ak.us
George Keeney	Valdez Fire Dept, P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	gkeeney@ci.valdez.ak.us

Final Participant Listing – Ammonia Training (November 19-21, 2004)				
Name	Organization	Phone	Fax	Email
Todd Keetch	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	
Dave Lawson	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	dlawson@ci.valdez.ak.us
Jerry LeMaster	City of Cordova P.O. Box 1210 Cordova, AK 99574	424-6200		
Ann Logan	MSO Valdez P.O. Box 486 Valdez, AK 99686	835-7210	835-7207	
Robert Mattson	City of Cordova P.O. Box 1210 Cordova, AK 99574	424-6200		
Paul Mac Donald	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	
Chris McDonald	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	
Ben Moore	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	
Charlie Parham	VRHA/COV	831-1573	834-1891	cparham@valdezrha.org
Steve Pepper	Valdez Hazmat Team P.O. Box 307 Valdez, AK 99686	834-6104		Stephen.Pepper@alaska-pipeline.com
Greg Rankin	City of Cordova P.O. Box 1210 Cordova, AK 99574	424-6200		
Gary Shoop	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	gshoop@ci.valdez.ak.us
Jim Swaney	TCC SERVS	835-4932		
Rick Warren	Agrium PO Box 575 Kenai, AK 99611	776-3162	776-3213	rewarren@agrium.com
Mike Weber	Valdez Training Officer P.O. Box 307 Valdez, AK 99686	835-4313	835-2992	mweber@ci.valdez.ak.us
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Rhonda Williams	Valdez Fire Dept P.O. Box 307 Valdez, AK 99686	835-3418	835-2992	
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APPENDIX C: Exercise Evaluation Summary

Functional Exercise Participants Evaluation Form for Anhydrous Ammonia Exercise Peter Pan Processing Facility Valdez, Alaska November 21, 2004

Note: A total of eleven respondents provided input on the exercise evaluation form. These individuals and the remainder of the group participated in the exercise debrief immediately following the exercise.

1. Do you feel you were adequately prepared to perform your tasks/job as described in your local ER Plan or Response Guides?

Yes - 9

No - 1

N/A - 1

If not, in what areas do you think you need more training or experience?

- Always room to improve and make everything better
 - More practice
 - ICS
 - Hazmat tactics
 - Command and control
 - Industry specific (site specific) training
 - Mechanical systems information
2. What "tools" or other information do you need in advance of an incident like this one that would help you fulfill your ER responsibilities better?
 - Better information
 - More practice
 - I think we covered every aspect of a release. I would like the duty phone numbers for seafood plant personnel
 - To be told what the drill is and what kind of patients they will be treating
 - CAMEO/ALOHA training class
 - Pipe wrench ... everything else is good
 - Pre-planning
 - Cloud modeling
 - Personnel accountability
 - More tattletales on vehicles

3. List three areas where you think your ER section, group or team performed well during this exercise:
- Response time
 - Rescue
 - EMS
 - Overall really well
 - Dressed out really well
 - Kept focused on overall outcome
 - Our watch center (VTC) made notifications quickly
 - The Incident Commander provided timely, concise information that I could easily brief up my chain of command
 - National Response Center sent their report to the correct parties
 - Organization
 - Use of resources
 - Good teamwork
 - Good cooperation between government, agencies, Incident Commander
 - When we were acting like we were really victims of ammonia on scene, in the ambulance truck, and at the nurse's station
 - First search
 - Warning Alyeska SERVS
 - Initial scene confinement and perimeter search
 - Select appropriate monitoring equipment
4. List three priority areas where you think the ER section, group or team needs improvement before your next exercise:
- Lots of small details
 - General practice
 - Communications practice (tactical communications/command and control issue)
 - We need to be able to get a hold of the harbormaster
 - Command post needs to be located in a safer area away from the release; Unified Command and responders ended up engulfed
 - Persons at the end of the spit (RVers and residents) need immediate notification
 - Need to have plans in place on how to treat people involved in ammonia
 - ER did not know how or what the different signs were on people or what levels they should be concerned with
 - Accountability of response staff
 - Communications gear
 - Medical protocols
 - The nurses (at the hospital) could be there waiting (to receive patients)
 - Better tools for Entry Team
 - Different Tactical channels for ops, medical, etc.
 - Staging area location, setup
 - Gas monitoring
 - Speed in suiting up
 - Need better comms implementation; equipment is good; implementation needs more work.
 - Initial notifications didn't work as well as it should.

5. Please describe, comment or suggest items that will make future exercises more fulfilling for you.

- More drills in general
- I thought this exercise was excellent; the most useful I have ever been to
- Progressive symptoms for patients
- Department SOPs
- It was great!
- Just need more practice
- Great class! Thanks!
- Continue in same vein. Use of smoke was very helpful as it gave excellent visual reference.

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APPENDIX D: Training Course Agenda

Safe Handling and Emergency Response to Anhydrous Ammonia

Valdez Convention and Civic Center November 19 – 21, 2004

November 19, 2004: Session One - Ammonia Class Room Training and Demonstrations

6:00 PM

Getting to know each other

ADEC representatives – Background of the Ammonia and Chlorine Safety Project

Fish processors – Who is Represented?

Cities of Valdez, Cordova and Others – Who is represented?

USCG – Who is represented?

Other agencies – Who is represented?

6:20 PM

What we will do in the next 2.5 days

Classroom Instruction

Field Demonstrations

Training Exercise/Drill

What do you need?

Rules to guide us

6:30 PM

Begin Classroom Instruction on Ammonia

Exercise – See Anything Wrong Here?

Objectives of Ammonia Training

Uses of Ammonia – Past, Present, & Future

Exercise – Team Competition

What is in Ammonia?

Exercise – Open to all Chemists

Properties and Characteristics of Ammonia

The Useable Stuff ~ Numbers to Remember

How is Ammonia Made?

The Recipe – Minor Chemistry and Physics Lesson

Hazards of Ammonia

How Do We Know Where It Is?

7:30 PM - BREAK

7:45 PM

Health Effects of Ammonia
 Can This Stuff Hurt Me? How?
 Health Effects... First Aid/Treatment
Personal Protective Equipment (PPE)
 PPE for three different "Operations"
 What to use when

8:45 PM Break

Emergency Response Hazard and Risk Assessment
 Always Consider Protecting These Three
 Hazards and the Risks Associated with Them
 Chemical - Physical
 Decision Making Process
Make Good Emergency Response Decisions

10:00 PM End of Session 1

November 20, 2004: Session 2 Ammonia Class Room Training and Demonstrations (continued)**8:00 AM**

Key Characteristics of Ammonia
 Core Things to Remember
Demonstration - Review Ammonia's P's and C's
 Exercise – Measure Air Concentrations of Ammonia
 Use Your Air Monitoring Equipment
Video Clip – Ammonia/What/How/What If

9:00 AM Break**9:15 AM**

Introduction to "Reading Ammonia Releases"
 Ammonia Release Formations
 Four Formations to Remember
 Ammonia will Burn – Video

10:15 Break

Evolution of an Ammonia Release
 How Does NH₃ Act When it is Released?

10:45

Ammonia Release Studies
 Videos tell the Stories
 Phillips 66 Pooled Release

11:45

Set up for Ammonia Release Demonstration
Location Valdez PD Gun Range
Coordinated with Municipal Agencies and ADEC

12:00 LUNCH BREAK

12:30 – 12:45 PM - Let's go the demonstration site

12:50 PM - Live Ammonia Release Demonstration

Demonstrations to be Conducted

1. Open Air Anhydrous Ammonia Releases
2. Anhydrous Ammonia Tarp and Cover Recondensation Demonstration
3. Open Air Forced Ventilation Demonstration

2:30 PM – Back in the Classroom

In Depth Study of "Reading Ammonia Releases"
Continue Ammonia Release Studies
Risk Assessment of Each Formation
Review Ammonia Release Formations by Video
You Identify What is Happening
Videos Clips From Some or All:
Lawrence Livermore
Mapco Pipeline Release
Desert Tortoise

3:30 PM Break

3:15 PM

Ammonia Spill/Release Actions
What-Works-Best-When
"Recondensation" Explained
Where did the Cloud go?

3:45 PM

Actual Incident Findings –Two Incidents
Lessons Learned

4:15 PM Break

4:30 PM Positive Pressure Ventilation
Fixed Facility Ventilation
Air Decontamination and Outside Forced Ventilation
Environmental Impact
Remember Ammonia is everywhere!

5:30 PM- END OF DAY

November 21, 2004 –Session 3 Functional Exercise

Conduct FX Commencing at approximately 9:00 AM
Location is Peter Pan Seafoods Fish Processing Facility

8:00 – 8:45 Orientation to the Functional Exercise Conduct
Location is Valdez Convention Center
Discuss Objectives and Ground Rules

Functional Exercise
9:00 AM – (Maybe After) 11:00 PM

11:00 Noon – Termination of FX
Restore ER Equipment to Ready Condition

1:30 PM - Debrief and Evaluation
Location is Valdez Convention Center

3:00 PM

Complete Debriefing of Functional Exercise
Will You Please Evaluate the Functional Exercise?

4:30 PM End of Training