

Agrochemicals and Security

A Training Module for the
Safe and Secure Storage of
Pesticides and Fertilizers



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The Agrochemical and Security Series is available for download from the Florida Cooperative Extension's Disaster Handbook Web site <<http://disaster.ifas.ufl.edu>>. The series comprises six units:

- Why It Matters (An introduction to agrochemical security)
- Chemical Safety
- Homeland Security and Fertilizers
- Homeland Security and Pesticides
- Security and Anhydrous Ammonia
- Developing a Hazard Mitigation Plan

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About Florida AgSafe

Florida AgSafe is a program of the Florida Cooperative Extension Service that provides information and educational materials for agricultural safety and for disaster preparedness and recovery. Materials produced by Florida AgSafe are available on the Web at <www.flagsafe.ufl.edu> and at the Florida Cooperative Extension publication Web site <edis.ifas.ufl.edu>.

Our Goals

- To inform people about ways to be safe and secure, and thereby reduce the number of deaths, injuries and occupational diseases, particularly for agricultural workers and their families.
 - To build a safety infrastructure for Florida through five activities: training of workers, training of students, publications, networks, and linkages.
 - To encourage adoption of safe practices among employees and clientele. Every employee or client should be exposed to a safety tip or safety practice on a regular basis.
 - To prepare the people of Florida to face disaster of any kind, to mitigate losses, both in life and property, and to promote rapid and effective recovery.
-

Preface

For many years, producers have been aware of the health hazards of pesticides. These materials are carefully regulated, and the safety requirements for every pesticide product are spelled out in detail. Most fertilizers have been in an opposite category, considered useful, safe and inert. However, in recent years, agricultural chemicals — specifically, fertilizers — have been used in some of the most damaging terrorist attacks around the world.

These attacks have given the general public, agricultural producers and governmental authorities a new point of view. It is important for all to realize that, in the wrong hands, agricultural chemicals, including fertilizers and pesticides, could be used to do great damage.

This module provides several units which address different aspects of this problem. There are six units in this training module (with the page numbers where they can be found in this manual):

Unit 1: Introduction: Agrochemicals and Security — Why It Matters	5
Unit 2: Chemicals and Safety	15
Unit 3: Homeland Security and Fertilizers	51
Unit 4: Homeland Security and Pesticides	85
Unit 5: Security and Anhydrous Ammonia	125
Unit 6: Developing a Hazard Mitigation Plan	161

Units can be used separately or in combinations depending on audience needs. Each unit consists of:

- A narrative which gives background material;
- A PowerPoint presentation which parallels the narrative;
- Pre- and post-tests, and an evaluation; and
- Table-top exercises (selected units).

The module is structured to give the presenter plenty of flexibility. Use all six units with table-top exercises to create a day-long workshop on agricultural security, or show only one PowerPoint presentation with a question and answer period for a 20- to 30-minute training session. Reduced images of all PowerPoint slides are included with each unit and can be copied to create a participant workbook.

How to Use Pre- and Post-Tests

The idea of a “pre-post” test is that participants take the same brief quiz before and after the presentation. This gives the presenter and the participants an objective view of how much participants learned and how effective different points in the presentation were. A pre-post test takes just a few minutes before and after the presentation, but it can be a valuable tool for evaluating the presentation and reporting its impact on participants.

Unit 5: Security and Anhydrous Ammonia

Subject Anhydrous ammonia is widely used as a fertilizer, and tanks of the chemical are a common sight in many agricultural operations. Anhydrous ammonia is also widely stolen for use in the clandestine production of the illegal drug, methamphetamine. Appropriate security can reduce illegal access to anhydrous ammonia and prevent serious injury that can result from tampering with tanks and valves.

Goal Make participants aware of the potential misuse of anhydrous ammonia and explain security and awareness measures that can prevent anhydrous ammonia from falling into the wrong hands.

Objectives As a result of this session, participants will:

- Be aware that anhydrous ammonia can be used to make illegal drugs.
- Understand behaviors that may indicate suspicious activity.
- Understand that specific security measures can prevent unlawful access to anhydrous ammonia.

Session Outline

Part 1: Welcome and Introduction
Part 2: Unit Learning Objectives
Part 3: Pre-Test
Part 4: Learning Sections

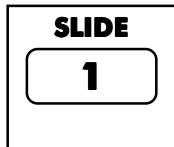
- Section 1: What is Anhydrous Ammonia?
- Section 2: Why is Anhydrous Ammonia Dangerous?
- Section 3: Situations That Might Expose You to Anhydrous Ammonia
- Section 4: Protecting Yourself from NH₃ Exposure
- Section 5: Illegal use of Anhydrous Ammonia
- Section 6: Incidents Resulting from Anhydrous Ammonia Theft
- Section 7: Hazard Reduction and Prevention
- Section 8: Improving Security
- Section 9: Recognizing Suspicious Behavior
- Section 10: Summary

Part 5: Questions and Discussion
Part 6: Post-Test
Part 7: Table-top Exercise
Part 8: Session Evaluation
Part 9: Adjourn

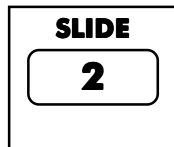
Learning Environment and Aids

To conduct this training, you will need:

1. "Security and Anhydrous Ammonia" PowerPoint presentation, and a means to show it. (Download from the UF/IFAS Disaster Handbook Web site: <<http://disaster.ifas.ufl.edu>>.)
2. Note paper or PowerPoint slide pages to serve as participant workbooks
3. If desired, sufficient copies of the Pre- and Post Test for all participants to take the test both before and after session
4. Unit 5 evaluation forms.

Part 1 — Welcome and Introduction

Take a moment at the beginning of the lesson to welcome the participants to the session. Introduce yourself as the presenter, and remind participants of the title and subject (above) of the session.

Part 2 — Unit Learning Objectives

Briefly introduce the audience to the learning objectives for this unit. As a result of this session, participants will:

- Be aware that anhydrous ammonia can be used to make illegal drugs.
- Understand behaviors that may indicate suspicious activity.
- Understand that specific security measures can prevent unlawful access to anhydrous ammonia.

Part 3 — Pre-Test

If you choose to administer pre- and post-tests, do so now before you do anything else. Explain to the participants that everyone will take a short quiz before the session just to give themselves a clearer idea of what they already know about the subject and some things they will learn during the session. Tell them that they will take the same test at the end of the session and this will help the presenter by giving an idea of the effectiveness of the session.

The pre- and post-tests should take only a few minutes each.

Part 4 — Learning Sections

Section 1. What is Anhydrous Ammonia?

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Ammonia is a very important industrial chemical which is used in a wide variety of manufacturing processes, including manufacture of other chemicals, explosives, fibers, plastics, refrigeration, pharmaceuticals, pulp and paper, mining, metallurgy, cleaning, and of course, fertilizers. Farmers use anhydrous ammonia directly as one source of nitrogen fertilizer for crops. All personnel should be familiar with the safe use of this product.

Most people think of ammonia as a liquid that comes in a bottle. It has an unusually sharp odor, but it is useful for cleaning. Ammonia itself is actually a gas; the material in a bottle of “ammonia” is ammonia gas dissolved in water.

Pure ammonia is a colorless gas at room temperature and normal atmospheric pressure. It is usually referred to as “anhydrous” ammonia, which simply means ammonia “without water.” Anhydrous ammonia is a rich source of nitrogen and farmers often inject it directly into the soil as a fertilizer.

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Ammonia is manufactured in large quantities from nitrogen taken from air and hydrogen taken from natural gas. It is distributed by tanker trucks to large scale users, including agricultural suppliers, who keep it in large storage tanks. Farmers purchase the ammonia in nurse tanks that often hold several hundred gallons. They tow the tank to the work site where it is towed behind a tractor connected to an applicator which injects the ammonia directly into the soil. In the soil, the anhydrous ammonia immediately combines with soil moisture and becomes a source of available nitrogen.

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Although pure ammonia is a gas under normal conditions, at -28 degrees F, it changes to a liquid. Pure ammonia is also liquid at room temperature if it is stored under pressure. This fact allows it to be stored in tanks, like propane or other liquified gases.

Section 2. Why is Anhydrous Ammonia Dangerous?

Bottle ammonia can be unpleasant, but pure ammonia is quite dangerous – for several reasons.

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First, anhydrous ammonia is a powerful base (alkali), and because it is "anhydrous," it has a powerful appetite for water, whether in the ground, in air, or in living tissues. If it contacts skin, it can cause severe burns. Since it is a gas, it can be inhaled, and if it is, it can seriously damage lungs and the lining of the nose and mouth. It is especially dangerous to the eyes. When acids contact skin tissue, they cause a coagulation reaction that limits the ability of acids to penetrate the skin. Strong bases like anhydrous ammonia act in the opposite way; they react with skin in a way that penetrates the skin, so burns from anhydrous ammonia can be extremely severe resulting in significant tissue loss. Similarly, anhydrous ammonia can penetrate the eye and cause the cornea to become permanently opaque, resulting in blindness.

Second, anhydrous ammonia is stored under pressure. The pressure relief valve of anhydrous ammonia tanks is usually set to open at 250 psig. This pressure will be reached if the tank temperature reaches 116 degrees F. Therefore, any conditions that cause tank temperature to increase significantly, such as being left in direct sunlight on a hot day, should be avoided. If the relief valve is activated, a sudden exposure to anhydrous ammonia could result.

Third, under pressure, anhydrous ammonia is at room temperature, but if released to the atmosphere, the liquid converts almost instantly to gas at about 30 degrees below zero. The volume ratio is 1 to 850, that is, one gallon of anhydrous ammonia liquid becomes 850 gallons (114 cubic feet) of ammonia gas. An anhydrous ammonia release produces huge clouds of freezing cold, bitterly irritating gas. A blast of this gas can cause severe frostbite in addition to the possible chemical burns.

Ammonia dissolved in water will react readily with copper, zinc, brass and many alloys. Only non-galvanized steel or iron should be used for containers, fittings and piping (Schedule 80, pipe or Schedule 40 when welded by a certified welder). All materials used with anhydrous ammonia should conform to recommended standards. Anhydrous ammonia tanks should not be used to store other materials such as propane or liquefied petroleum gas.

Section 3. Situations That Might Lead to Exposure to Anhydrous Ammonia

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The unintentional release of anhydrous ammonia can create a dangerous situation for both the handler and bystanders. The following situations are dangerous:

- Overfilling the tank
- Handling the hose by the valve handle or hand wheel
- Faulty hitch pin or weakened tongue
- Weakened undercarriage structure
- Moving the tank before disconnecting the hose
- Faulty valves and deteriorated or out-of-date hoses
- Not using personal protective equipment
- Failure to bleed pressurized NH_3 from the hose before connecting or disconnecting
- Failure to have sufficient amounts of water available
- Overturning an applicator tank
- External overheating of the storage container.

An estimated eighty percent of reported incidents result from improper procedure, lack of knowledge or training, and failure to follow proper safety precautions. Unintentional releases and injuries can be prevented if all individuals follow safety rules and maintain the equipment properly. It is essential that all equipment be in good operating condition. Only trained individuals should handle and apply anhydrous ammonia.

Section 4. Protecting Yourself from NH_3 Exposure

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Goggles, rubber gloves, and complete protective clothing are necessary when handling anhydrous ammonia. It is recommended that goggles and a face shield or an approved respirator be used to protect the eyes and face from a direct blast of ammonia that can permanently blind and disfigure an individual.

Water must be available for flushing the eyes and skin in case of exposure. Each vehicle used for anhydrous ammonia must carry a five-gallon container of clean water. Anyone handling NH_3 should carry a six- to eight-ounce squeeze bottle of water in their shirt pocket for rapid emergency access.

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Washing with water is the emergency measure to use when skin or eyes are exposed to anhydrous ammonia. Time is important! Get water onto the exposed area of the skin or eyes immediately and flush for at least 15 minutes. Never wear contact lenses when handling anhydrous ammonia, since they can trap the gas and freeze the contacts to the eye. Contaminated clothing should be removed quickly but carefully. Thaw clothing frozen to the

skin with water before attempting removal. Wash the affected skin area with abundant amounts of water, and do not apply anything except water for the first 24 hours. Stay warm and get to a physician immediately.

Section 5. Illegal Use of Anhydrous Ammonia

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The most common illegal use for anhydrous ammonia is in the production of methamphetamine because it increases the speed and efficiency of production, thus increasing the drug maker's profits. Anhydrous ammonia can be as inexpensive as \$200/ton for agricultural purposes, but can sell for as much as \$300/gallon on the black market. Anhydrous ammonia is ideal for small-scale production of methamphetamine, often by individuals producing the drug for personal use or limited, local distribution. Large-scale production of illegal methamphetamine – as is carried out by Mexican drug cartels – is usually accomplished with other chemicals.

Anhydrous ammonia is used in a number of industrial processes, but it is most readily available from farms. Large storage tanks and nurse tanks on farms are usually unguarded or unlocked. Thieves often improvise and use small tanks from other applications, such as propane tanks, to transfer anhydrous ammonia from storage tanks or nurse tanks. These transfers are dangerous because the equipment is usually makeshift and does not seal properly. The danger is increased because thieves usually work at night.

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For many people, illegal drug use might be associated with urban or suburban settings, however, methamphetamine production is a problem in almost all states. In 2001, 8,290 methamphetamine labs were seized, according to the El Paso Intelligence Center's National Clandestine Laboratory Seizure System. California has been the site of most, but not all, large-scale seizures, but the Midwest United States has a very high prevalence of small-scale operations. The Midwest states provide plenty of remote locations for setting up meth labs as well as access to anhydrous ammonia.

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Because of the chemicals used in methamphetamine production, a large-scale operation can cause significant damage to the environment. For every pound of the chemical produced, five pounds of hazardous waste are generated. The by-products of making methamphetamine are often disposed of by flushing them down toilets, pouring them down drains, or simply dumping them on the ground. In this way, meth lab sites often become highly contaminated. Clean-up costs fall on the land owner. Many houses where small-scale operations have been located become uninhabitable and must be demolished. Property owners can be responsible for high costs of hazard-

ous materials clean-up. These ideas also apply to the so-called “rolling meth labs” built into trailers and trucks.

Section 6. Incidents Resulting from Anhydrous Ammonia Theft

Thieves put not only themselves in danger, but workers and bystanders who may be involved with equipment that has been tampered with or are involved with rescue operations. Note the following examples.

- More than 2,000 pounds of anhydrous ammonia were released from a refrigerated warehouse. A fence was cut to gain entry into the facility and the anhydrous ammonia was removed through a valve on an oil separator. The valve was left open. Fortunately, the release was mitigated by a rain storm that knocked down the anhydrous ammonia vapor as it was being released to the outside air. The warehouse owner replaced the fence, installed a valve lock on the oil separator valve, and requested enhanced police surveillance following the incident.
- An individual attempted to steal anhydrous ammonia from a nurse tank at a retail agricultural dealer in Iowa. The liquid withdrawal valve was left open on the nurse tank and caused ammonia release that quickly vaporized into the air. One passerby was overcome by the anhydrous ammonia fumes and collapsed. Another nearby resident was overcome by ammonia fumes after leaving her home. Both individuals were hospitalized. Several other area residents were evacuated as a precaution. The agricultural dealer installed security lights following the incident.
- One person was killed when a makeshift container of anhydrous ammonia he was holding exploded. The death occurred when two individuals were driving on an interstate highway in Missouri. The driver was severely injured. The ammonia was to be used for methamphetamine production. Since the cause of the smoke emanating from the car was not immediately known, one firefighter, one emergency medical technician, and one member of the general public, all of whom stopped to help and drag the passenger and driver from the car were also injured as a result of the ammonia release.

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Section 7. Hazard Reduction and Prevention

- Employees should be properly educated about problems associated

with anhydrous ammonia theft.

- Store tanks in well-lit areas.
- Know your inventory to quickly identify missing chemicals.
- Visually inspect tanks each morning, especially following weekends or other periods where the facility was not occupied.
- Consider auditing your facility and setting up a valve protection plan for critical valves that could cause significant releases if left open.
- Consider installing valve locks or fencing, especially for unattended tanks.
- Consider installing other theft deterrent measures, such as motion detector lights, motion detector alarms, security patrols, and/or video surveillance.

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Note that the Clean Air Act (1970) states: "Facilities handling extremely hazardous chemicals (including anhydrous ammonia) have a general duty to assess hazards, design and maintain a safe facility, and minimize the consequences of accidental releases." [Section 112(r)(1) of the Act]

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Users of anhydrous ammonia may benefit from a new product called GloTell. This product was developed by researchers at Southern Illinois University (Carbondale, Illinois) and is distributed by Royster-Clark, Inc. (Norfolk, Virginia). GloTell is an additive which can be combined with anhydrous ammonia. When anhydrous ammonia containing GloTell is exposed to air, it turns fluorescent pink. GloTell will stain whatever it comes into contact with. Methamphetamine made with anhydrous ammonia containing GloTell is a brilliant pink color, and will stain the skin of users bright pink upon contact. Also, the brilliant, unnatural color discourages drug buyers, who prefer a brilliant white product. There are reports that GloTell reduces the efficiency of methamphetamine production. In test markets, GloTell has significantly reduced anhydrous ammonia thefts.

GloTell has the additional benefit of making leaks of anhydrous ammonia from hoses or valves immediately visible. For more information about GloTell, visit the Royster-Clark Web site, <www.roysterclark.com>.

Section 8: Improving Security

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[Note: Much of this security section appears in the Fertilizers and Pesticides units, as well as this one. The Transportation Section is specific to anhydrous ammonia. If more than one unit is being presented to the same audience on

the same program, the presenter may wish to adapt this security section accordingly.]

Now that you know the hazards and potential misuse of anhydrous ammonia, you can understand the need for an attitude of security in dealing with it. Virtually everyone who uses anhydrous ammonia – especially bulk suppliers and bulk users – needs to increase security so that this material does not fall into the wrong hands.

Good security begins with an effective security plan. A good security plan has several parts. The parts you use depend on the size and activities of your operation. An effective plan does not need to be complicated, but it should take into account each of the following areas.

- Storage
- Transportation
- Personnel
- Disposal
- Response

For each of these areas, we provide tips to improve security. Consider these tips. Decide which ones apply to your operation and make some notes about actions you can take.

8A. Security: Storage

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Key question: How easy would it be for anhydrous ammonia to “disappear” from your facility? —

Suggested tips:

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- Maintain inventories so that you always know the exact quantities of ammonia you have.
- Use logbooks to keep track of who removes ammonia from your facility.
- Store ammonia in a well-ventilated building which can be locked or in a fenced enclosure with a locked gate.
- If appropriate, provide a second security perimeter, such as a fence with a locked gate surrounding your storage facility.
- Perform a walk-through and walk-around daily to check for attempted

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entry, vandalism, and structural integrity.

- Provide good lighting on all sides of your storage facility.
- For some facilities, install security systems, such as alarms and camera systems, and make sure they are properly maintained.

8B. Security: Transportation**SLIDE****24**

Is transportation the weak link in your security? — A side-trip by an untrustworthy driver or a hijacking could deliver anhydrous ammonia into criminal hands. Consider the following tips for more secure transportation of anhydrous ammonia.

Suggested tips:

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- Drivers should go directly to the delivery point when possible, taking the best route available to avoid high population areas, tunnels and bridges.
- Drivers should exercise caution if it becomes essential to stop. They should avoid unguarded and unlighted areas where theft is a substantial risk and be on their way as soon as possible.
- Drivers should be alert to vehicles following their truck, strangers asking questions, or anyone snooping around your cargo.

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- Drivers should not pick up hitchhikers or talk about their cargo on CB radio; and they should not discuss their cargo with those not involved.
- Drivers should always check in if they find they will be late for a delivery.
- Make sure that nurse tanks are well attended or properly secured.
- Carefully check background of all new drivers. Every driver should be properly licensed and trained in good practices for transporting anhydrous ammonia. Also, it may be appropriate to look into criminal background.

8C. Security: Personnel**SLIDE****27**

Do you know your employees? Do you know who has access?

Suggested tips:

- Develop effective hiring and labor relations policies.
- Consider background checks for current/new employees, particularly if the person handles hazardous materials.

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- Consider fingerprinting and photographing employees who handle hazardous materials.
- Be aware of personal identity theft, such as stolen Social Security Numbers, references, etc.
- Request employees to watch for suspicious activities and ask persons they don't recognize to identify themselves and state their reasons for being at the facility.

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- Adopt a company security whistleblower protection policy.
- Know who has keys and access to hazardous material storage areas.
- Retrieve keys and employment identification cards from an employee and change computer access passwords when their employment ends.
- Assess a worker's violence potential and take appropriate security precautions when terminating or disciplining an employee.

8D. Security: Disposal

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Do you have a plan for safe and secure disposal?

Suggested tips:

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- Maintain security over material which is being disposed of until it is claimed by appropriate authorities.
- Arrange for prompt and safe disposal of materials.

8E. Security: Response

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Do you have a formal response plan? Do your employees know it?

Suggested tips:

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- Develop an emergency plan for your facility. Train your workers in the plan and rehearse it with them.
- Post emergency response numbers, including fire, law enforcement, medical contacts, and poison control in several locations in your facility. Make all employees aware of these response numbers.
- Report to appropriate authorities any suspicious activities, vehicles, persons, threats to personnel or facilities, sabotage/vandalism to facilities or equipment, and thefts, inventory shortages, or missing products that could pose a risk to public health or safety.

Section 9. Recognizing Suspicious Behavior

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The Drug Enforcement Administration (DEA) has developed a list, which can help you identify individuals who may be seeking to purchase chemicals for illegal purposes:

- Customer cannot answer or is evasive about agricultural use questions.
- Customer insists on taking possession rather than having it delivered.
- Customer insists on using cash, money order, or cashier's check.
- Customer is a stranger and unfamiliar to the area or your business.
- Customer provides suspicious business or credit information.
- Customer intends to fill their own inappropriate tank (e.g., a 20-pound propane cylinder).

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Report thefts, signs of tampering, leaks, or any unusual activity to local law enforcement officials.

Section 10. Summary

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1. Anhydrous ammonia is a pure form of ammonia. Although it is a colorless gas at normal pressure and temperature, it is stored as a liquid under pressure.
2. Anhydrous ammonia is a very strong base that tends to penetrate skin tissues and cause severe damage.
3. Always be very careful when transferring or applying anhydrous ammonia. Use appropriate personal protective equipment and have first aid materials available for immediate use.
4. Anhydrous ammonia can be used by small-scale drug makers in the production of the illegal drug methamphetamine.
5. When thieves tamper with anhydrous ammonia tanks and valves, the potential for unintentional exposure and injury is increased. Theft of anhydrous ammonia puts both the thief and the tank owner/user at risk of severe injury.
6. Report suspicious activity or thefts of anhydrous ammonia immediately to the proper authorities.

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Part 5 — Questions and Discussion

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You may wish to have a discussion period where your audience can talk about what they have just learned. Here are some suggestions to start the discussion.

- Ask participants to share about how they work with anhydrous ammonia. Emphasize personal protective equipment and a correct “safety attitude.”
- Ask participants to share stories about injuries involving anhydrous ammonia that they are aware of.
- Ask the participants how what they have just learned will change their work habits.

Part 6 — Post-Test

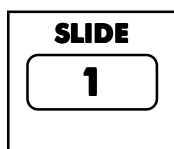
If you choose to administer the post-test, do so now. You have already prepared the audience for this when you administered the pre-test. Just remind them that it will take only a couple of moments.

Part 7 — Table-top Exercise

At the end of this lesson plan, there is a scenario which participants can use to further explore the issues and to examine the issues in a different way. The table-top exercise is useful but optional; the presenter may judge that the table-top is not appropriate for the audience or that there is not enough time for it. See the table-top exercise for instructions.

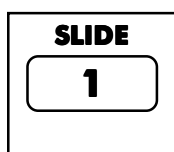
The table-top exercise is helpful for further development and understanding of the issues in this session. However, the presenter may wish to substitute *Unit 6 — Developing a Hazard Mitigation Plan* in which participants learn about hazard mitigation and are guided in developing a mitigation plan for their operation.

Part 8 — Session Evaluation



An evaluation form is supplied in this booklet. Ask participants to take a few minutes to fill out this form, tear it out of the workbook and turn it in. If you allow participants to fill these forms out at home or return them to you at a later time – even later in the workshop – the chances of getting any evaluations are greatly reduced.

Part 9 — Adjourn



Thank the participants for their attention and encourage them to adopt a security program for their anhydrous ammonia.

Additional Resources

The Fertilizer Institute <www.tfi.org> offers a fact sheet titled “Help Keep Anhydrous Ammonia Safe and Secure.”

The Environmental Protection Agency offers a number of materials on its “Homeland Security Measures for Agriculture” Web page <<http://www.epa.gov/agriculture/thom.html>>. Of particular interest may be “Chemical Accident Prevention: Site Security,” which reviews an overall security plan for a chemical storage site.

Cornell Cooperative Extension has produced a fact sheet titled “Reducing the Risk of Anhydrous Ammonia Theft” which may be helpful for small to medium operations. The complete text can be found after the table-top exercise.

For excellent general surveys of anhydrous ammonia use and safety precautions:

- “Using Agricultural Anhydrous Ammonia Safely.” University of Nebraska Cooperative Extension. Access on the Web at <<http://ianrpubs.unl.edu/safety/ec738.htm>>.
- “Using Anhydrous Ammonia Safely on the Farm.” John Shutske, University of Minnesota Extension Service. Access on the Web at <<http://www.extension.umn.edu/distribution/cropsystems/DC2326.html>>.

Security and Anhydrous Ammonia — Pre-test

This pre-test is intended to gauge your level of knowledge before participating in the *Security and Anhydrous Ammonia* training. Please answer all the following questions to the best of your ability.

1. What is the material form of anhydrous ammonia at normal pressure and temperature? _____

2. Identify 3 scenarios that can result in unintentional exposure to anhydrous ammonia.

3. In what illegal activity is anhydrous ammonia used, and why is it so desirable?

4. What are three things you can do to reduce the hazards of anhydrous ammonia theft?

5. What are two factors that make a purchaser of anhydrous ammonia suspect?

6. Who do you contact in the event of suspected theft or misuse of anhydrous ammonia?

Security and Anhydrous Ammonia — Post-test

This post-test is intended to gauge your level of knowledge after participating in the *Security and Anhydrous Ammonia* training. Please answer all the following questions to the best of your ability.

1. What is the material form of anhydrous ammonia at normal pressure and temperature? _____
2. Identify 3 scenarios that can result in unintentional exposure to anhydrous ammonia.

3. In what illegal activity is anhydrous ammonia used, and why is it so desirable?

4. What are three things you can do to reduce the hazards of anhydrous ammonia theft?

5. What are two factors that make a purchaser of anhydrous ammonia suspect?

6. Who do you contact in the event of suspected theft or misuse of anhydrous ammonia?

Security and Anhydrous Ammonia — Answer Key

1. What is the material form of anhydrous ammonia at normal pressure and temperature? Vapor or gas

2. Identify 3 scenarios that can result in unintentional exposure to anhydrous ammonia.
 - Overfilling the tank
 - Handling the hose by the valve handle or hand wheel
 - Faulty hitch pin or weakened tongue
 - Weakened undercarriage structure
 - Moving the tank before disconnecting the hose
 - Faulty valves and deteriorated or out-of-date hoses
 - Not using personal protective equipment
 - Failure to bleed pressurized NH_3 from the hose before connecting or disconnecting
 - Failure to have sufficient amounts of water available
 - Overturning an applicator tank
 - External overheating of the storage container

3. In what illegal activity is anhydrous ammonia used, and why is it so desirable?

Anhydrous Ammonia is sought out because of its low cost and accessibility. Only a small amount is needed to make large amounts of Methamphetamine, which is its major illegal use.

4. What are three things you can do to reduce the hazards of anhydrous ammonia theft?
 - Employees should be properly educated about problems associated with anhydrous ammonia theft.
 - Store tanks in well-lit areas.
 - Know your inventory to quickly identify missing chemicals.
 - Visually inspect tanks each morning, especially following weekends or other periods where the facility was not occupied.
 - Consider auditing your facility and setting up a valve protection plan for critical valves that could cause significant releases if left open.
 - Consider installing valve locks or fencing, especially for unattended tanks.
 - Consider installing other theft deterrent measures such as motion detector lights, motion detector alarms, security patrols, and/or video surveillance.

Answer Key, continued

5. What are two factors that make a purchaser of anhydrous ammonia suspect?
- Customer cannot answer or is evasive about agricultural use questions.
 - Customer insists on taking possession rather than having product delivered.
 - Customer insists on using cash, money order, or cashiers check.
 - Customer is a stranger and unfamiliar to the area or your business.
 - Customer provides suspicious business or credit information.
 - Customer intends to fill their own inappropriate tank (e.g., a 20-pound propane cylinder).
6. Who do you contact in the event of suspected theft or misuse of anhydrous ammonia?

Report thefts, signs of tampering, leaks, or any unusual activity to local law enforcement officials.

Participant’s Evaluation of Security and Anhydrous Ammonia

Please circle the number that best expresses your opinions for each of the following statements. Circle only one number per question for questions 1 through 4.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-------------------	----------	---------	-------	----------------

1. The training unit’s format was easy to follow. 1 2 3 4 5

2. The information presented is useful to me. 1 2 3 4 5

3. The time it took to complete the training session was acceptable. 1 2 3 4 5

4. As a result of this session, I understand better how to work with anhydrous ammonia. 1 2 3 4 5

5. We welcome your comments about this program:

Please use the back of this sheet for any further comments.

Thank you for your time!

Table-top Discussion

Participants should use the following information in small groups to apply what they have just learned and to brainstorm their responses to this scenario. After the groups have worked separately, it may be useful to bring them back together and have a reporter from each group describe how their group responded to the discussion questions.

The Tell-Tale Valve

Scenario

Note: "The Tell-Tale Valve" is a work of fiction. Characters in this story are fictional and not intended to represent any real person.

The day began normally as Alex Hamilton started his routine at Vega Farm Supply. He walked around the nurse tanks which contained anhydrous ammonia, and began taking readings on how much chemical was left in each tank. He did not notice anything out of the ordinary, except for a brass valve on one of the tanks that appeared to have a lot of oxidation on it. He wrote it off as corrosion due to the recent salting of the roads, because the first snow had just fallen. The nurse tank had just been rented out by a local farmer and long-time customer of Vega, Steve Lancer. Steve had returned the tank the previous day just before closing time. Steve rented out a full nurse tank about every three weeks, and is one of the most active customers of Vega.

Later that day, around 1:00 o'clock, Alex began talking with their anhydrous supplier, who was doing a bimonthly calibration check on the outflow valves of the nurse tanks. They check these to make sure that the gauge is giving the farmer a correct indication as to the amount of anhydrous being dispensed into the ground. For curiosity's sake, Alex began to talk about the oxidation he discovered on the valve earlier that morning.

The supplier requested that Alex show him, and he discovered that the valve in question was not one that the farmer would have used for normal operation, and told Alex that it was probably due to tampering with the valve. He told him that the anhydrous will react with the brass to cause oxidation. He told Alex that he would try to investigate the matter further.

Alex spoke with his manager, who decided to report the incident to the local authorities. They decided to go undercover and see if Steve was doing anything illegal.

When Steve came to Vega again, Alex rented him a tank of anhydrous ammonia. The police discovered that Steve had been selling small amounts of ammonia to local meth labs for about \$250.00 for a small propane cylinder's worth. Steve was apprehended and is currently awaiting trial.

**Questions/
Discussion**

1. What factors should have made Alex suspicious?
2. Did Alex handle the situation correctly?
3. Did the fact that Steve was a long-time customer have a direct effect on his credibility?

**Points for
Discussion**

1. What factors should have made Alex suspicious?

Alex should have become suspicious about how frequently Steve was renting the tank. Once every three weeks is not normal.

- The fact that it had just started to snow was another factor. As the winter months come, farmers have less and less need for agricultural products.
- Oxidation on the tank that Steve had just rented.

2. Did Alex handle the situation correctly?

Alex handled the situation very well. He notified management, who after discussion with him, also found the situation suspicious.

3. Did the fact that Steve was a long-time customer have a direct effect on his credibility?

Yes. Steve had been coming to Vega for many years, therefore he was well-known and allowed many times to slip through where others might have been suspected.

Reducing the Risk of Anhydrous Ammonia Theft

By Bob King, Senior Extension Educator
Cornell Cooperative Extension – Monroe County

Due to increases in the number of anhydrous ammonia thefts on New York farms, it has become increasingly important to be more aware of the physical security of the storage and handling of this agricultural fertilizer. Anhydrous ammonia is a key ingredient in the manufacture of methamphetamine, which is a powerful illegal drug that makes users feel euphoric and go days without sleep. Side effects of this drug include irritability, paranoia, aggression and violence. Thefts occur during the day and night, with most thefts occurring at night. Five to six gallons of anhydrous ammonia are sufficient to manufacture a large quantity of methamphetamine.

Tampering can cause the weakening of flow valves and result in malfunctioning valves that will leak or spill material. Physical contact and inhalation of anhydrous ammonia can result in serious injuries including chemical burns to the eyes, lungs and body.

Anhydrous ammonia theft can also increase the risk of an explosion especially when using an improper container for storage and transport. Anhydrous ammonia exerts the same pressure as a fully inflated car tire when placed in a closed container at 30 degrees F.

Anhydrous ammonia is a known hazardous substance and creates a dangerous condition; consequently, farmers may be liable for the harm to any farm visitor, including the trespassing thief. Documenting reasonable precautions to secure the chemical and posting signs warning of dangerous conditions may help reduce liability.

Since the amount of material stolen is relatively small compared to the total volume of the tank, farmers are often unaware that a theft has occurred. Signs of tampering also include footprints in the soil, stained soil, tank valves which are not tightly closed or which have been tampered with; items left near the tank, such as duct tape, garden hoses, plastic tubing, bicycle inner tubes, or coolers; or the presence of barbeque grill propane tanks.

Extreme caution should be used when empty containers are found, especially small barbeque propane tanks. Propane tanks found with blue- or green-colored valves or with frost indicate anhydrous ammonia and compromised copper or galvanized valve fittings.

Light it up. At night, portable tanks and storage tanks should be kept in well-lit locations — preferably with motion-sensored lights — that can be easily observed and monitored by

family, employees, and neighbors at any time.

Just-in-time inventory. Inventory only what you need and receive it just before the time of application. Promptly return tender tanks back to your supplier. A just-in-time inventory schedule may significantly decrease your exposure to this crime. Bleed and remove hoses at the end of the day to remove excess liquid and prevent use of them to steal your material.

Keep it out of sight. When doing fieldwork, avoid storing portable tanks in plain view, especially from a road. Move portable tanks to an inconspicuous location to avoid detection by a passerby.

Keep an eye on it. Whenever possible, take a quick look at your storage tanks and surroundings. When using the bathroom at night, take a quick look out your windows to observe any unusual activity on your farm, especially motion lights that may have turned on. Place brightly colored plastic wire ties or seals between the valve wheel and the roll cage to facilitate quick visual checks. If the tie or seal has been broken, it is likely that someone has tampered with your tank.

Report it. Call local law enforcement immediately about any suspicious vehicles or activity that you observed at any time near or on your farm. When possible, write down a license plate number and/or description of vehicle(s) and/or individual(s). Report it immediately. We highly recommend that you **do not confront any suspicious vehicles and/or individuals**. Individuals engaged in this crime are likely to be under the influence of methamphetamine, which can result in aggressive, violent and dangerous behaviors.

Know whom to call. When you are concerned about suspicious activities on your farm, have important phone numbers readily available so you can call at a moment's notice.

Call 911, Sheriff's Office or State Police.

Locking a tank valve has proven to be less than an effective measure, since perpetrators break off the lock and/or valve, which can result in, significant environmental and repair problems. Restricting access to a tank through the use of fencing and other physical barriers can be an effective deterrent.

Make sure that all tanks are labeled with caution labels to warn others of the highly hazardous nature of anhydrous ammonia.


Ultimately, sharpening your skills as an observer requires networking with your neighbors and community. The more you are aware of your surroundings, the more proficient you will be at reducing the risk of this opportunistic crime.


Sources: New York State Police; Offices of the Sheriff - Monroe, Livingston, & Wyoming Counties

PowerPoint Slides 1-3

Agrochemicals and Security

Security and Anhydrous Ammonia




 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-01

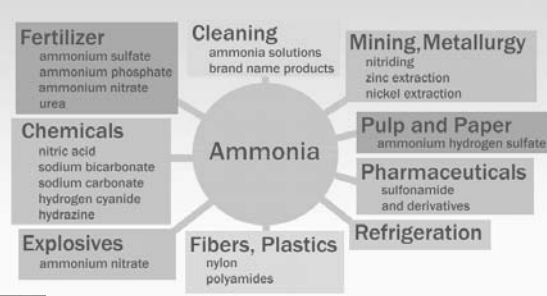
Learning Objectives

As a result of this session, participants will:

- ▶ Be aware that anhydrous ammonia can be used to make illegal drugs.
- ▶ Understand behaviors that may indicate suspicious activity.
- ▶ Understand that specific security measures can prevent unlawful access to anhydrous ammonia.

 Agrochemicals and Security: Homeland Security and Pesticides Anhyd-02

Ammonia is an important industrial chemical.



Fertilizer
ammonium sulfate
ammonium phosphate
ammonium nitrate
urea

Cleaning
ammonia solutions
brand name products

Mining, Metallurgy
nitriding
zinc extraction
nickel extraction

Chemicals
nitric acid
sodium bicarbonate
sodium carbonate
hydrogen cyanide
hydrazine


Pulp and Paper
ammonium hydrogen sulfate

Pharmaceuticals
sulfonamide
and derivatives

Explosives
ammonium nitrate


Fibers, Plastics
nylon
polyamides

Refrigeration

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-03

PowerPoint Slides 4-6

Ammonia Distribution Network

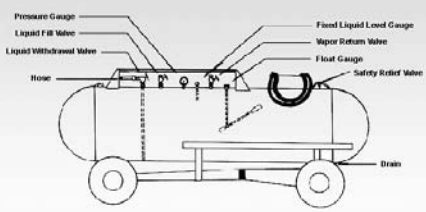


Manufacture Application

Distribution Storage Delivery

Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-04

Anhydrous Ammonia Tank



Pressure Gauge Fixed Liquid Level Gauge

Liquid Fill Valve Vapor Return Valve

Liquid Withdrawal Valve Float Gauge


Hose Safety Relief Valve

Drain

Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-05

Ammonia Hazards

- Caustic (alkali) burns
- Freezing burns
- Inhalation danger to lining of mouth, throat and lungs
- Does not support respiration - suffocation danger
- Especially dangerous to eyes

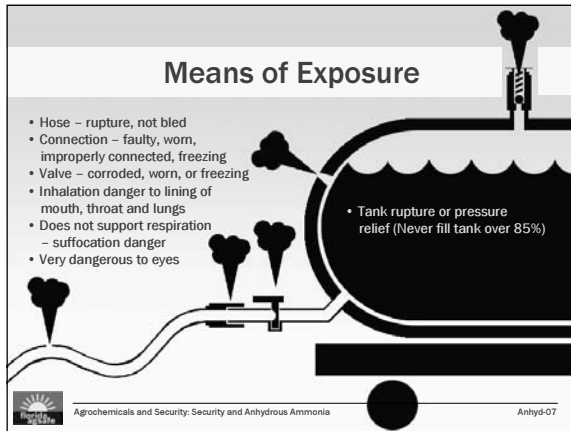


Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-06

PowerPoint Slides 7-9

Means of Exposure

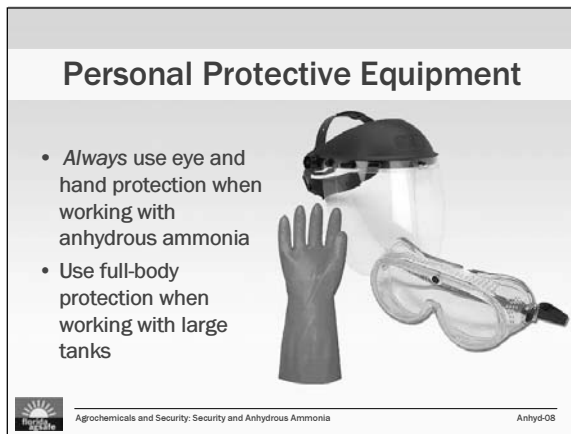
- Hose – rupture, not bled
- Connection – faulty, worn, improperly connected, freezing
- Valve – corroded, worn, or freezing
- Inhalation danger to lining of mouth, throat and lungs
- Does not support respiration – suffocation danger
- Very dangerous to eyes
- Tank rupture or pressure relief (Never fill tank over 85%)



Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-07

Personal Protective Equipment

- Always use eye and hand protection when working with anhydrous ammonia
- Use full-body protection when working with large tanks



Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-08

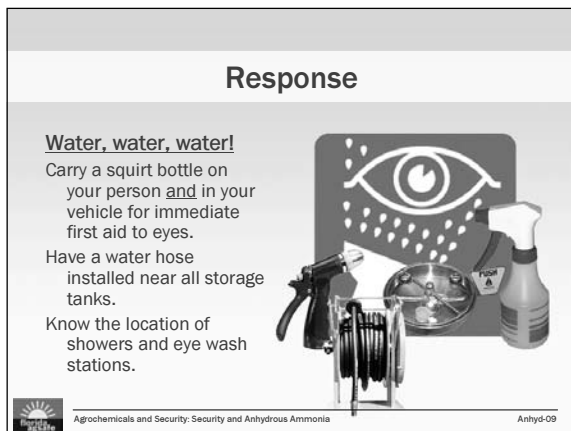
Response

Water, water, water!

Carry a squirt bottle on your person and in your vehicle for immediate first aid to eyes.

Have a water hose installed near all storage tanks.


Know the location of showers and eye wash stations.




Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-09

PowerPoint Slides 13-15


Meth Labs




This trailer was used as a meth lab. It is concealed with a tarp and piles of brush and debris.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-13

Meth Labs




Small-scale meth lab. Notice propane tank used to store anhydrous ammonia.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-14

Meth Labs



An entire portable meth lab fits in this storage tub.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-15

PowerPoint Slides 16-18

Meth Dumps



Meth lab garbage includes muriatic acid, starter fluid, Sudafed, lithium, batteries, coffee filters and pseudoephedrine.

Photo Des Moines Register

Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-16

Hazard Reduction and Prevention

- ▶ Educate employees about anhydrous ammonia theft
- ▶ Store tanks in well-lit areas
- ▶ Know your inventory
- ▶ Inspect tanks every morning and before every use
- ▶ Consider valve locks, fences, or other physical security measures, especially for infrequently used tanks
- ▶ Consider other deterrents such as motion detector lights, alarms, security patrols or video surveillance

Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-17

Legal Responsibility

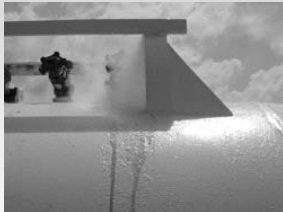
“Facilities handling extremely hazardous chemicals (including anhydrous ammonia) have a general duty to assess hazards, design and maintain a safe facility, and minimize the consequences of accidental releases.” – Clean Air Act (1970)


Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-18

PowerPoint Slides 19-21

GloTell


GloTell additive causes anhydrous ammonia to leave a bright pink stain. It can help to detect thefts or leaks. It interferes with illegal drug production.



 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-19


Improving Security

- ▶ Storage
- ▶ Transportation
- ▶ Personnel
- ▶ Disposal
- ▶ Response

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-20

Security: Storage


How easy would it be for anhydrous ammonia to “disappear” from your facility?

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-21

PowerPoint Slides 22-24


Security: Storage

- ▶ Maintain inventories so that you always know the exact quantities of anhydrous ammonia you have.
- ▶ Use logbooks to keep track of who removes anhydrous ammonia from your facility.
- ▶ Store anhydrous ammonia in a building which can be locked or in a fenced enclosure with a locked gate.
- ▶ If appropriate, provide a second security perimeter, such as a fence with a locked gate surrounding your storage facility.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-22


Security: Storage


- ▶ Perform a walk-through and walk-around daily to check for attempted entry, vandalism, and structural integrity.
- ▶ Provide good lighting on all sides of your storage facility.
- ▶ For some facilities, install security systems, such as alarms and camera systems, and make sure they are properly maintained.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-23

Security: Transportation

Is transportation the weak link in your security?




 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-24

PowerPoint Slides 25-27


Security: Transportation

- ▶ Create a paper-trail for any anhydrous ammonia you ship.
- ▶ Ship anhydrous ammonia in a locked vehicle.
- ▶ Go directly to delivery point when possible, taking the best route available to avoid high population areas, tunnels, and bridges.
- ▶ Exercise extreme caution if it becomes necessary to stop. Avoid unguarded and unlighted areas where theft is a substantial risk and be on your way as soon as possible.
- ▶ Be alert to vehicles following your truck, strangers asking questions, or anyone snooping around your cargo.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-25


Security: Transportation

- ▶ Do not pick up hitchhikers, do not talk about your cargo on CB radio, and do not discuss your cargo with those not involved.
- ▶ Always telephone your customer if you find you will be late for a delivery.
- ▶ Check your load at delivery to ensure no product is missing. Do not leave product at field site unless it is well attended or secured within buildings. Always obtain a signed delivery ticket.
- ▶ Carefully check background of all new drivers. Every driver should be properly licensed and trained in good practices for handling chemicals that may be hazardous in the hands of dangerous people.


 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-26


Security: Personnel

Do you know your employees?



Do you know who has access?




 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-27

PowerPoint Slides 28-30


Security: Personnel

- ▶ Develop effective hiring and labor relations policies.
- ▶ Consider background checks for current/new employees, particularly if the person handles hazardous materials.
- ▶ Consider fingerprinting and photographing employees who handle hazardous materials.
- ▶ Be aware of personal identity theft, such as stolen Social Security numbers, references, etc.
- ▶ Request employees to watch for suspicious activities and ask persons they don't recognize to identify themselves and state their reason for being on the facility.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-28

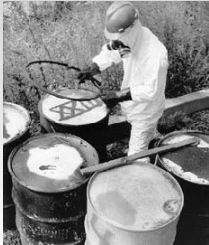
Security: Personnel

- ▶ Adopt a company security whistleblower protection policy.
- ▶ Know who has keys and access to hazardous material storage areas.
- ▶ Retrieve keys and employment identification cards from an employee and change computer access passwords when their employment ends.
- ▶ Assess a worker's violence potential and take appropriate security precautions when terminating or disciplining an employee.


 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-29

Security: Disposal

Do you have a plan for safe and secure disposal?




Hazmat worker inspects aging chemical drums abandoned in a field.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-30

PowerPoint Slides 31-33

Security: Disposal


- ▶ Maintain security over material which is being disposed of until it is claimed by appropriate authorities.
- ▶ Arrange for prompt and safe disposal of materials.



Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-31

Security: Disposal


- ▶ Maintain security over material which is being disposed of until it is claimed by appropriate authorities.
- ▶ Arrange for prompt and safe disposal of materials.



Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-31

Security: Response

- ▶ Develop an emergency plan for your facility. Train your workers in the plan and rehearse it with them.
- ▶ Post emergency response numbers, including fire, law enforcement, medical contacts, and poison control in several locations in your facility. Make all employees aware of the these response numbers.
- ▶ Report to appropriate authorities any suspicious activities, vehicles, persons, threats to personnel or facilities, sabotage/vandalism to facilities or equipment, and thefts, inventory shortages, or missing products that could pose a risk to public health or safety.




Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-33

PowerPoint Slides 34-36

Identifying Suspicious Behavior

Watch for unusual or suspicious behavior by a purchaser who:

- Seems unfamiliar with details of using fertilizers
- Acts nervous, seems uneasy or vague, and avoid eye contact
- Demands immediate possession of purchase material instead of future delivery
- Asks for material in smaller individual containers rather than in bulk
- Insists on paying in cash instead of using a check cash or credit card



Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-34

If someone is acting suspicious...


- ▶ Notify your manager.
- ▶ Notify local law enforcement.



Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-35

Summary 1

1. Anhydrous ammonia is a pure form of ammonia. Although it is a colorless gas at normal pressure and temperature, it is stored as a liquid under pressure.
2. Anhydrous ammonia is a very strong base that tends to penetrate skin tissues and cause severe damage.
3. Always be very careful when transferring or applying anhydrous ammonia. Use appropriate PPE and have first aid materials available for immediate use.
4. Anhydrous ammonia can be used by small-scale or large-scale manufacturers of the illegal drug methamphetamine.



Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-36

PowerPoint Slides 37-39

Summary 2


5. Tampered tanks and valves increase the potential for unintentional exposure and injury to both the thief and the tank owner/user.

6. Examine storage and handling procedures and develop a security plan that covers the following areas:

- Storage
- Transportation
- Personnel
- Disposal
- Response


7. Suspicious Behavior

- Watch for unusual or suspicious behavior.
- Contact your manager or local law enforcement to report suspicious persons.

 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-37


Agrochemicals and Security: Security and Anhydrous Ammonia

Questions and Discussion


 Agrochemicals and Security: Security and Anhydrous Ammonia Anhyd-38

**Agrochemicals and Security:
Security and Anhydrous Ammonia**

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