

**Anhydrous Ammonia Program  
Inspection and Consumer Services Division  
Department of Agriculture**

**Performance Audit  
July 2010**



---

**OFFICE OF THE  
STATE AUDITOR**

**LEGISLATIVE AUDIT COMMITTEE  
2010 MEMBERS**

*Senator David Schultheis*  
Chair

*Senator Lois Tochtrop*  
Vice-Chair

*Senator Morgan Carroll*  
*Representative Jim Kerr*  
*Representative Frank McNulty*

*Representative Joe Miklosi*  
*Senator Shawn Mitchell*  
*Representative Dianne Primavera*

**OFFICE OF THE STATE AUDITOR**

*Sally Symanski*  
State Auditor

*Cindi Stetson*  
Deputy State Auditor

*Greg Fugate*  
Legislative Audit Manager

*Mindy Gates*  
*Anne Jordan*  
Legislative Auditors

*The mission of the Office of the State Auditor is to improve the efficiency, effectiveness, and transparency of government for the people of Colorado by providing objective information, quality services, and solution-based recommendations.*



**STATE OF COLORADO**

**OFFICE OF THE STATE AUDITOR**

303.869.2800  
FAX 303.869.3060

Sally Symanski, CPA  
State Auditor

Legislative Services Building  
200 East 14th Avenue  
Denver, Colorado 80203-2211

July 8, 2010

Members of the Legislative Audit Committee:

This report contains the results of a performance audit of the Anhydrous Ammonia Program administered by the Department of Agriculture's Inspection and Consumer Services Division. The audit was conducted pursuant to Section 2-3-103, C.R.S., which authorizes the State Auditor to conduct audits of all departments, institutions, and agencies of state government. The report presents our findings, conclusions, and recommendations, and the responses of the Inspection and Consumer Services Division and the Department of Agriculture.

*Sally Symanski*

## TABLE OF CONTENTS

	<b>PAGE</b>
<b>Report Summary .....</b>	<b>1</b>
<b>Recommendation Locator .....</b>	<b>5</b>
<b>CHAPTER 1: Overview of the Anhydrous Ammonia Program .....</b>	<b>9</b>
<b>CHAPTER 2: Program Effectiveness .....</b>	<b>17</b>
<b>Tank Inventory .....</b>	<b>18</b>
<b>Tank Inspections .....</b>	<b>25</b>
<b>Enforcement .....</b>	<b>34</b>
<b>Incident Reporting.....</b>	<b>39</b>
<b>Cash Receipts .....</b>	<b>41</b>
<b>Information Management.....</b>	<b>43</b>
<b>APPENDIX A .....</b>	<b>A-1</b>
<b>APPENDIX B .....</b>	<b>B-1</b>

## *Glossary of Terms and Abbreviations*

**Anhydrous ammonia** – Denoted by the chemical symbol  $\text{NH}_3$ , ammonia is a nonflammable, colorless gas with a pungent odor. It is often called anhydrous ammonia, which emphasizes the absence of water in the chemical. Anhydrous ammonia is widely used as an agricultural fertilizer because of its rich nitrogen content.

**Applicator** – A small-volume (e.g., 500 gallons or less) mobile storage tank mounted on equipment that is pulled behind a tractor and injects anhydrous ammonia directly into the soil.

**Bulk tank** – A large-volume (e.g., 6,000 to 30,000 gallons) storage tank fixed at a specific location, such as a farm cooperative or commercial fertilizer dealer, that is used to fill smaller, mobile tanks.

**CDPHE** – Colorado Department of Public Health and Environment. A principal department in Colorado state government responsible for protecting and improving the health of Colorado residents and the quality of the state's environment.

**Commission** – Agricultural Commission. A nine-member governing body whose statutory powers and duties include formulating general policy for the Department of Agriculture and matters pertaining to agriculture. Commissioners are appointed by the Governor and confirmed by the Senate for four-year terms.

**Commissioner** – Commissioner of Agriculture. The chief administrative officer of the Colorado Department of Agriculture with direct control and management of its functions, subject only to the enumerated powers and duties of the Agricultural Commission.

**Department** – Colorado Department of Agriculture. A principal department in Colorado state government responsible for various activities related to the promotion, production, distribution, regulation, and inspection of agricultural products in Colorado.

**Division** – Inspection and Consumer Services Division. A division within the Colorado Department of Agriculture responsible for administering a number of consumer protection and animal and human health and safety programs, including the Anhydrous Ammonia Program.

**Nurse tank** – A medium-volume (e.g., 3,000 gallons or less) mobile storage tank that is mounted on a trailer and used to transport anhydrous ammonia from the bulk tank to the field or from field to field.

**Program** – Anhydrous Ammonia Program. The state program within the Inspection and Consumer Services Division responsible for the registration and inspection of anhydrous ammonia tanks, as well as the enforcement of state statutes and rules related to the storage, handling, transportation, and utilization of anhydrous ammonia as an agricultural fertilizer.



SALLY SYMANSKI, CPA  
State Auditor

**Anhydrous Ammonia Program  
Inspection and Consumer Services Division  
Department of Agriculture  
Performance Audit  
July 2010**

## **Purpose and Scope**

The purpose of this performance audit was to review the Anhydrous Ammonia Program administered by the Inspection and Consumer Services Division (Division) within the Department of Agriculture (Department). Specifically, we examined registration, inspection, and enforcement practices intended to ensure that anhydrous ammonia tank owners comply with minimum safety requirements prescribed in state statute and rules governing the storage, handling, transport, and use of anhydrous ammonia as an agricultural fertilizer. We performed audit work from October 2009 through July 2010. We acknowledge the cooperation and assistance provided by Department and Division management and staff.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## **Overview**

Ammonia, denoted by the chemical symbol  $\text{NH}_3$ , is a nonflammable, colorless gas with a pungent odor. It is often called *anhydrous ammonia*, which emphasizes the absence of water in the chemical. Anhydrous ammonia is widely used as an agricultural fertilizer because of its rich nitrogen content. In 2007 Colorado accounted for about 1 percent of the more than 4.2 million tons of anhydrous ammonia used in agriculture nationwide. In addition to its use in agriculture, anhydrous ammonia has a number of different commercial uses and is often used as a key ingredient in the illicit manufacture of the drug methamphetamine.

Anhydrous ammonia is classified as a hazardous material by the U.S. Department of Transportation and is potentially one of the most dangerous chemicals used in agriculture. Although it is a gas under normal atmospheric conditions, anhydrous ammonia is typically stored as a liquid under high pressure in tanks that meet certain technical specifications. If not stored or handled properly, it can cause serious and potentially life-threatening injuries. Although reported anhydrous ammonia releases have declined in the state in recent years, a single release of the chemical carries the potential for serious harm to public health and safety.

Federal and state laws and regulations subject owners of anhydrous ammonia storage facilities and tanks to a number of different requirements pertaining to the storage, transfer, transportation, and application of anhydrous ammonia, as well as to the maintenance of the equipment and the availability of personal protective equipment. Accordingly, a variety of federal, state, and local agencies have regulatory oversight or other responsibilities related to anhydrous ammonia. In Colorado, the Inspection and Consumer Services Division within the Department of Agriculture administers the Anhydrous Ammonia Program (Program) that oversees the registration and inspection of anhydrous ammonia tanks to enforce state statute and rules governing anhydrous ammonia's use as an agricultural fertilizer. The Program represents only a small portion of the Division's total workload and activities. Collectively, the Division has allocated about 0.62 of one full-time equivalent position to the Program. The Division's commercial fertilizer programs, including the Anhydrous Ammonia Program, had total Fiscal Year 2009 revenues of about \$323,500 and total expenditures of about \$275,500.

## Key Findings

According to state statute [Section 35-13-101(2), C.R.S.], any violation of statutory or regulatory requirements related to the storage, handling, transport, and use of anhydrous ammonia as an agricultural fertilizer "shall constitute a substantial danger to public health and safety." In administering the Anhydrous Ammonia Program, the Division has a responsibility to ensure that anhydrous ammonia tank owners comply with applicable statutes and Department rules. Overall we found that gaps in the Division's registration, inspection, and enforcement activities increase the risk to public safety and limit the Division's ability to be an effective regulator.

**Tank Inventory.** The Division does not have a complete and accurate inventory of all anhydrous ammonia tanks in the state. This is not consistent with state statute, which requires that *all* anhydrous ammonia tanks in the state be registered annually. We found that the Division requires owners to register only those tanks that will be *in use* for a given year. Thus, the approximately 105 bulk tanks and 1,750 nurse tanks and applicators that were registered in Calendar Year 2009 understates the total population of tanks that could potentially be used to store anhydrous ammonia. We also found duplicate identification numbers, incomplete data, and other inaccuracies in the Division's registration data. For example, approximately 1,185 (68 percent) of the 1,750 registered nurse tanks and applicators had the same tank identification number as at least one other nurse tank or applicator in the state. Moreover, inventory reports pulled from the Division's licensing system did not include the approximately 105 bulk storage tanks inspected in Calendar Year 2009, some of which were capable of storing up to 30,000 gallons of anhydrous ammonia.

**Tank Inspections.** The Division's inspectors sometimes pass tanks with noted violations. We reviewed 24 inspection reports, covering a total of 627 tanks, completed from Calendar Years 2007 through 2009 for a sample of eight businesses with anhydrous ammonia tanks. Of the 627 tank inspection records reviewed, the Division's inspectors passed 110 tanks (18 percent) even though the inspector noted violations on the inspection report. For example, inspectors passed 23 tanks despite listing violations with the tanks' pressure release valves. Inspectors also passed 50 tanks that did not have the required "anhydrous ammonia" labels denoting the substance

contained in the tank. We also found instances where inspectors used outdated versions of the inspection report form or did not document the inspection results consistently.

**Inspection Coverage.** The Division's goal is to inspect as many anhydrous ammonia tanks as possible each year. However, we found that the Division does not inspect every tank every year for several reasons. For example, use of anhydrous ammonia is seasonal and, although the Division attempts to time its inspections to occur just prior to the season, nurse tanks and applicators may already be in use in the field and, therefore, unavailable at the time of the inspection. We also found that the Division does not track or monitor inspection coverage statistics for the Program. Consequently, the Division does not know (1) which individual tanks are being inspected from one year to the next or (2) the overall percentage of the tank population that is being inspected. For a sample of eight businesses with anhydrous ammonia tanks, the overall tank inspection coverage for 2009 was 85 percent (251 of 295 registered tanks inspected). Coverage by location varied significantly from a low of 36 percent of tanks inspected at one location to a high of 100 percent at other locations. As a result of gaps in inspection coverage, it is highly probable that there are anhydrous ammonia tanks being used in the state that have never been inspected by the Division.

**Enforcement.** The Division does not take steps to hold owners accountable for correcting tank safety violations noted during inspections. We found that, from one year to the next, inspectors failed many of the same tanks and identified repeat violations for the same tanks. Specifically, for our sample of 209 anhydrous ammonia tanks inspected in Calendar Years 2007, 2008, and 2009, inspectors failed the same 50 tanks (about 24 percent) in two of the three years we reviewed and the same 25 tanks (about 12 percent) in all three years we reviewed. Additionally, inspectors noted one or more of the same violations for the same 95 tanks (about 45 percent) in two of the three years we reviewed and for the same 24 tanks (about 11 percent) in all three years we reviewed. For example, inspectors noted a pressure release valve violation for the same 39 tanks in two of the three years we reviewed and for the same two tanks in all three years we reviewed.

**Information Management.** We found that although the Anhydrous Ammonia Program is targeted at the tank level, the Division's data systems and information management practices do not track uniquely identified tanks and related tank-level information over time. This significantly limits the Division's ability to conduct tank-level analysis and report on its registration, inspection, and enforcement functions. In addition, the Division does not have complete, accurate, and reliable reporting of tank inventories and registration counts. Finally, the Division does not compile tank-level inspection data into a centralized database and track and analyze these data over time.

Our recommendations and the responses from the Inspection and Consumer Services Division and the Department of Agriculture can be found in the Recommendation Locator and in the body of this report.



---



---

## RECOMMENDATION LOCATOR

---

Rec. No.	Page No.	Recommendation Summary	Agency Addressed	Agency Response	Implementation Date
1	20	Maintain a complete tank inventory by ensuring that tank owners comply with the statutory requirement that all anhydrous ammonia tanks be registered annually. Work with the Agricultural Commission to: (a) define “use status” categories for anhydrous ammonia tanks and require owners to report each tank’s use status during the registration process, and (b) align the registration fee structure to minimize the financial impact on owners from registering tanks that will not be in use.	Inspection and Consumer Services Division	Agree	January 2012
2	24	Ensure the ability to track and report on the population of anhydrous ammonia tanks in the state by: (a) assigning unique statewide tank identification numbers during the registration process, incorporating this information into the licensing system, and exploring viable options to physically mark tanks with this identification number; (b) capturing bulk tank information in the licensing system, tracking all tanks’ registration and use status in separate data fields, and considering restricting Program staff’s ability to delete tank information; and (c) reviewing and correcting system coding and query functions to produce accurate and reliable registration counts and tank inventory reports.	Inspection and Consumer Services Division	a. Agree b. Agree c. Agree	a. January 2012 b. July 2012 c. July 2012

---

---



---

## RECOMMENDATION LOCATOR

---

Rec. No.	Page No.	Recommendation Summary	Agency Addressed	Agency Response	Implementation Date
3	32	Ensure that inspectors apply anhydrous ammonia tank inspection procedures appropriately and consistently and that the inspection program maximizes inspection coverage by: (a) developing a written policies and procedures manual for anhydrous ammonia tank inspections; (b) strengthening the review and sign off of tank inspection reports; (c) establishing inspection coverage goals and using these goals to target the inspection program using a cyclical, risk-based approach; (d) improving data management systems and practices to centrally compile, track, and analyze tank-level inspection data over time; and (e) reassessing the allocation of inspection resources and making adjustments, as appropriate, to ensure that inspection coverage and program goals are being met.	Inspection and Consumer Services Division	a. Agree b. Agree c. Agree d. Agree e. Agree	a. January 2011 b. March 2011 c. January 2011 d. July 2012 e. February 2011
4	38	Hold anhydrous ammonia tank owners accountable for correcting tank safety violations by: (a) establishing time frames for owner submission of attestations certifying that tanks have been fixed or taken out of service, developing procedures for following up with owners who do not submit attestations within established time frames, and maintaining attestation forms in the inspection files; (b) building a routine follow-up component into the inspection program; and (c) developing written guidelines and procedures for inspectors on how and when to issue civil penalties and/or cease-and-desist orders, and using these enforcement actions accordingly for tanks found to be out of compliance with minimum safety requirements.	Inspection and Consumer Services Division	Agree	January 2011
5	40	Work with the General Assembly, the Agricultural Commission, and other stakeholders, as appropriate, to develop and implement incident reporting requirements for anhydrous ammonia's use as an agricultural fertilizer.	Inspection and Consumer Services Division	Agree	July 2012

---

---



---

**RECOMMENDATION LOCATOR**

---

<b>Rec. No.</b>	<b>Page No.</b>	<b>Recommendation Summary</b>	<b>Agency Addressed</b>	<b>Agency Response</b>	<b>Implementation Date</b>
6	42	Strengthen controls and segregation of duties over the cash receipts process for the Anhydrous Ammonia Program by: (a) restricting Program staff to invoicing tank owners regarding underpayment in registration fees and instructing owners to remit additional monies owed directly to the cashier in the Department's main office, and (b) requiring inspectors to remit all payments collected in the field directly to the cashier at the Department's main office and routinely tracking and reconciling inspectors' receipt books to amounts deposited.	Department of Agriculture and Inspection and Consumer Services Division	a. Agree b. Agree	a. Implemented b. January 2011
7	45	Ensure the Division's ability to routinely compile, track, analyze, and report on key programmatic data for the Anhydrous Ammonia Program by: (a) identifying the data needs, system requirements, reporting capabilities, and other functions necessary to effectively manage the Program's registration, inspection, and enforcement processes and communicate these needs to the systems development team; and (b) developing interim solutions to achieve better data analysis and reporting for the Program given current system capabilities until the new system can be fully implemented.	Department of Agriculture and Inspection and Consumer Services Division	a. Agree b. Agree	a. July 2012 b. January 2011

---

---

# Overview of the Anhydrous Ammonia Program

## Chapter 1

---

Ammonia, denoted by the chemical symbol  $\text{NH}_3$ , is a nonflammable, colorless gas with a pungent odor. It is often called *anhydrous ammonia*, which emphasizes the absence of water in the chemical. Although it is a gas under normal atmospheric conditions, anhydrous ammonia is typically stored as a liquid under high pressure in tanks that meet certain technical specifications. Anhydrous ammonia should not be confused with ammonium hydroxide, or “aqua” ammonia, which results when ammonia gas is dissolved in water. Household ammonia, commonly used as a cleaning agent, is a diluted solution of ammonium hydroxide.

Anhydrous ammonia is widely used as an agricultural fertilizer because of its rich nitrogen content. According to the American Association of Plant Food Control Officials, in 2007 more than 4.2 million tons of anhydrous ammonia was used nationwide as an agricultural fertilizer. Colorado accounted for about 1 percent of this total usage. (See Appendix A for anhydrous ammonia tonnage statistics.) Anhydrous ammonia also has a number of different commercial uses, including as a coolant in large-scale refrigeration systems. Finally, anhydrous ammonia is often used as a key ingredient in the illicit manufacture of the drug methamphetamine.

Anhydrous ammonia is classified as a hazardous material by the U.S. Department of Transportation and is potentially one of the most dangerous chemicals used in agriculture. If not stored or handled properly, anhydrous ammonia can cause serious and potentially life-threatening injuries. Generally, the severity of symptoms depends on the degree of exposure. Ammonia can usually be detected by most people at concentrations above 5 parts per million. Exposure to small amounts of anhydrous ammonia (e.g., 100 parts per million) can cause irritation of the eyes, nose, and throat. Exposure to high levels of anhydrous ammonia (e.g., above 700 parts per million) can cause chemical burns to the throat and lungs, thereby affecting the victim’s ability to breathe and potentially resulting in death from suffocation. Eye exposure to concentrated ammonia gas or liquid can cause corneal burns or blindness. Several of anhydrous ammonia’s properties increase its potential for harm. For example:

- Ammonia gas is lighter than air. However, when released suddenly, such as through an accidental release, the liquefied anhydrous ammonia aerosolizes (i.e., liquid droplets become suspended in the air) and forms a

dense vapor cloud that hugs the ground and spreads along low-lying areas, increasing the likelihood of contact with humans and animals.

- “Anhydrous” means “without water,” and the chemical quickly combines with water from the nearest source. When anhydrous ammonia comes into contact with body tissue, such as the eyes, lungs, and skin, it rapidly dissolves into the tissue, causing dehydration and severe chemical burns.
- Anhydrous ammonia boils at –28 degrees Fahrenheit and must be kept under pressure to be stored as a liquid above this temperature. When released from pressure, the liquid anhydrous ammonia expands rapidly, and its temperature falls to subzero levels capable of freezing exposed skin instantly, as well as freezing clothing to the skin. Additionally, a sudden rupture of a storage tank, valve, or hose can shoot anhydrous ammonia 10 to 20 feet from the source.

Anhydrous ammonia releases can be accidental in nature, resulting from faulty equipment (e.g., storage tanks, valves, or transfer hoses) or from a person’s failure to follow proper safety protocols when transporting the substance or applying it to the soil. Some releases are caused by individuals attempting to steal anhydrous ammonia for methamphetamine production.

According to data from the Colorado Department of Public Health and Environment, reported anhydrous ammonia releases have declined in the state in recent years. There were 101 reported releases during the five-year period 1993 through 1997; however, there were only 105 reported releases for the 13-year period 1997 through 2009. This decline in the number of reported releases may be due to a variety of factors, including safer handling practices and improvements in the design and safety of storage materials. The decline could also be due in part to a failure to report releases. Not all anhydrous ammonia releases occur in agricultural settings; many releases are associated with the substance’s use as a large-scale commercial refrigerant. During the period 1997 through 2009, according to available data, only about 6 percent of all reported anhydrous ammonia releases in the state were related to agricultural operations. Despite the decline in the total number of reported releases and the small percentage that were related to the substance’s use as an agricultural fertilizer, anhydrous ammonia remains a dangerous chemical. A single release carries the potential for serious harm to public health and safety.

## **Storage of Anhydrous Ammonia**

As mentioned previously, anhydrous ammonia is typically stored as a liquid under high pressure in tanks. Anhydrous ammonia storage tanks and their associated valves and hoses must meet minimum technical specifications and tolerances as established by various federal and state agencies. Storage tanks designed for

anhydrous ammonia use generally conform to uniform industry standards established by the American National Standards Institute. For example, tanks must be built to withstand internal operating pressures of at least 250 pounds per square inch.

In the agricultural setting, a number of different types of tanks are used to store anhydrous ammonia:

- *Bulk tanks* are large-volume (e.g., 6,000 to 30,000 gallons) storage tanks fixed at a specific location, such as a farm cooperative or commercial fertilizer dealer, and used to fill smaller, mobile tanks.
- *Nurse tanks* are medium-volume (e.g., 3,000 gallons or less) mobile storage tanks mounted on trailers and used to transport anhydrous ammonia from the bulk tank to the field or from field to field. (See Appendix B for a photo of a nurse tank.)
- *Tank-mounted applicators (applicators)* are small-volume (e.g., 500 gallons or less) mobile storage tanks mounted on equipment that is pulled behind a tractor and injects anhydrous ammonia directly into the soil.

Distributors deliver anhydrous ammonia from the production site directly to locations that have bulk tanks (e.g., farm cooperatives or commercial fertilizer dealers); from these locations, the substance is sold to end users such as farmers. Some farmers own their own nurse tanks and/or applicators and bring them to the farm cooperative or commercial fertilizer dealer to be filled. Other farmers lease their nurse tanks and/or applicators from a farm cooperative or commercial fertilizer dealer.

## Regulation of Anhydrous Ammonia

Due to its classification as a hazardous material, anhydrous ammonia is a highly regulated product. Federal and state laws and regulations subject owners of anhydrous ammonia storage facilities and tanks to a number of different requirements pertaining to the storage, transfer, transportation, and application of anhydrous ammonia, as well as to the maintenance of the equipment and the availability of personal protective equipment. A number of federal, state, and local agencies have regulatory oversight or other responsibilities related to anhydrous ammonia:

- **Pipeline and Hazardous Materials Safety Administration.** Within the U.S. Department of Transportation, this agency is responsible for ensuring the safe transport of hazardous materials by air, rail, highway, water, or pipeline. Regulations [49 C.F.R. 173.315] specify minimum requirements for containers used to transport anhydrous ammonia.

- **Occupational Safety and Health Administration.** Within the U.S. Department of Labor, this agency is responsible for ensuring that employers furnish a place of employment that is free from recognized hazards likely to cause death or serious physical harm to employees. Regulations [29 C.F.R. 1910.111] specify minimum requirements for the design, construction, location, installation, and operation of anhydrous ammonia systems, including systems mounted on farm vehicles for the application of anhydrous ammonia.
- **U.S. Environmental Protection Agency.** This agency is responsible for administering a number of environmental laws, including the Clean Air Act [42 U.S.C. 7412(r)(1)], which specifies that facilities handling hazardous chemicals, including anhydrous ammonia, have a general duty to assess the risk of accidental releases, design and maintain safe facilities to prevent releases, and minimize the consequences of releases that do occur. Regulations [40 C.F.R. 302, 355, and 370] further specify that facilities, including farms, with certain quantities of anhydrous ammonia must comply with emergency planning and release notification requirements.
- **Office of Infrastructure Protection.** Within the U.S. Department of Homeland Security, this agency is responsible for reducing and mitigating risks to the nation's critical infrastructure and key resources posed by acts of terrorism and natural disasters. This agency issues security standards for facilities that manufacture, use, store, or distribute certain chemicals at or above a specified quantity—the threshold quantity for anhydrous ammonia is 10,000 pounds or more.
- **Colorado Department of Agriculture (Department).** This agency is responsible for various activities related to the promotion, production, distribution, regulation, and inspection of agricultural products in Colorado. The Department administers the State's Anhydrous Ammonia Program, which was the focus of this audit. Specifically, Title 35, Article 13 of the Colorado Revised Statutes vests the Department, through the Commissioner of Agriculture (Commissioner), with statutory responsibility for promulgating and enforcing rules that set forth minimum safety standards covering the design, construction, location, installation, and operation of equipment for the storage, handling, transport, and use of anhydrous ammonia as an agricultural fertilizer. Department rules [8 CCR 1202-5] establish the detailed technical specifications for anhydrous ammonia storage tanks and application systems.
- **Colorado Department of Public Health and Environment (CDPHE).** This agency is responsible for protecting and improving the health of Colorado residents and the quality of the state's environment. CDPHE's

Emergency Response and Preparedness Division receives and responds to reports of releases of hazardous materials in the state, including anhydrous ammonia, through its 24-hour emergency hotline. Since anhydrous ammonia is an inhalation hazard, CDPHE's Air Pollution Control Division assists local agencies with the emergency response to anhydrous ammonia releases. CDPHE's Hazardous Materials Waste Management Division may also assist when a release requires physical cleanup of the anhydrous ammonia liquid.

- **Colorado State Patrol.** This agency is responsible for the permitting, routing, and safe transportation of hazardous materials by motor vehicle on Colorado roadways. In accordance with federal regulations [49 C.F.R. 173.5] and state law [Section 42-20-108.5, C.R.S.], the Colorado State Patrol has adopted rules that exempt certain agricultural products, including anhydrous ammonia, from federal emergency response information and training requirements when the products are being transported over local roads between fields of the same farm, or to or from a farm within 150 miles of such farm.
- **Local law enforcement, fire, and emergency response agencies.** Local agencies are typically the first responders on scene when there is an accidental release of a hazardous material, including anhydrous ammonia, that causes injury or the threat of injury. Local law enforcement is also involved when there is a reported theft of anhydrous ammonia because thefts typically relate to anhydrous ammonia's illicit use in manufacturing methamphetamine.

## Inspection and Consumer Services Division

The Inspection and Consumer Services Division (Division) within the Department administers the Anhydrous Ammonia Program (Program). Specifically, the Division oversees the registration and inspection of anhydrous ammonia tanks to ensure compliance with requirements prescribed in state statute and rules governing anhydrous ammonia's use as an agricultural fertilizer.

The Anhydrous Ammonia Program represents only a small portion of the Division's total workload and activities. For example, although about 10 different Division staff perform Program-related administrative and inspection duties, none of these staff is allocated to the Program full time. Collectively, the Division has allocated about 0.62 of one full-time equivalent position to the Program. Most of the Division's resources are devoted to inspections related to other programs or commodities. For example, Division staff inspect animal feed, eggs, grain warehouses, agricultural commodity handlers and dealers, custom meat and wild game processors, door-to-door food sales companies, other commercial fertilizers, and weighing and measuring devices. The Division also provides metrology and



other laboratory services, such as testing feed, fertilizer, groundwater, and pesticides.

## Fiscal Overview

Overall in Fiscal Year 2009 the Division spent about \$4.2 million—\$1.2 million from the State General Fund and \$3.0 million from the Inspection and Consumer Services Cash Fund. Personal services (e.g., salary and benefits) accounted for the largest share of the Division's total expenditures.

The Division does not segregate the Anhydrous Ammonia Program from its other commercial fertilizer programs in the State's accounting system. Thus, with the exception of anhydrous ammonia tank registration fees discussed below, isolating the revenue and expenditure detail specific to the Anhydrous Ammonia Program is not possible. The Division's commercial fertilizer programs, including the Anhydrous Ammonia Program, had total Fiscal Year 2009 revenues of about \$323,500 and total expenditures of about \$275,500.

The Anhydrous Ammonia Program has been fully cash funded since Fiscal Year 2004. State statute grants the Agricultural Commission (Commission) the authority to establish fee amounts. Two types of fees support the Program, as follows:

- **Tank registration fee.** The Division collects annual registration fees from anhydrous ammonia tank owners [Section 35-13-109, C.R.S.]. Currently bulk tank owners pay a flat \$100 registration fee. That is to say, the fee does not vary depending on the number of bulk tanks an owner has. Nurse tank and applicator owners pay a registration fee of \$5 per tank. In Fiscal Year 2009 revenues from anhydrous ammonia tank registration fees totaled about \$16,020, all of which was credited to the Inspection and Consumer Services Cash Fund to support Division operations.
- **Distribution fee.** The Division collects annual fees from all distributors that sell commercial fertilizers, soil conditioners, or plant amendments in the state [Section 35-12-106, C.R.S.]. Currently the distribution fee is 60 cents per ton. Of this total fee, 10 cents is credited to the Inspection and Consumer Services Cash Fund to support Division operations, and 50 cents is credited to the Groundwater Protection Cash Fund to protect groundwater and the environment from impairment or degradation due to the improper use of agricultural chemicals. Fiscal Year 2009 revenues from distribution fees for all fertilizers, including anhydrous ammonia, totaled about \$383,250.

## **Audit Scope and Methodology**

Our audit focused on the Anhydrous Ammonia Program within the Colorado Department of Agriculture's Inspection and Consumer Services Division. We examined the Division's registration, inspection, and enforcement practices intended to ensure anhydrous ammonia tank owners' compliance with minimum safety requirements prescribed in state statute and rules governing the storage, handling, transport, and use of anhydrous ammonia as an agricultural fertilizer. Our audit work included analyzing registration and inspection data, reviewing file documentation, interviewing Division managers and staff, and researching federal and state statutes and regulations pertaining to anhydrous ammonia. In addition, to identify common practices in tank inspection programs, we obtained information on other states' anhydrous ammonia programs and on the Colorado Department of Labor and Employment's Petroleum Storage Tank and Boiler Programs.

Our audit scope did not include the Division's other programs, non-agricultural uses of anhydrous ammonia (e.g., as a commercial refrigerant), or any anhydrous ammonia-related activities performed by other state, federal, and local agencies.

**This page intentionally left blank.**

---

# Program Effectiveness

## Chapter 2

---

Anhydrous ammonia is widely used as an agricultural fertilizer because of its rich nitrogen content. At the same time, anhydrous ammonia is a hazardous material that can cause serious and potentially life-threatening injuries if it is not stored or handled properly. For example, according to data from CDPHE, in 1993 a hose ruptured during the transfer of anhydrous ammonia to a storage tank at a farmers' cooperative, releasing 2,870 pounds of the substance into the air. An employee and two members of the general public were taken to the hospital with respiratory distress, and 15 acres of crops were destroyed. More recently, in 2002 at another farmers' cooperative, damage resulting from the attempted theft of anhydrous ammonia from a nurse tank caused the release of 4,000 pounds of the substance into the air. Eleven individuals were injured, including two individuals who were hospitalized.

As a matter of public policy, the State has chosen to protect public health and safety by regulating the storage and use of anhydrous ammonia as an agricultural fertilizer. During our audit we identified gaps in the Division's registration, inspection, and enforcement activities for the Anhydrous Ammonia Program. Collectively, the problems we identified increase the risk to public safety and limit the Division's ability to be an effective regulator. Changes are needed in the Anhydrous Ammonia Program to ensure that tank owners comply with minimum safety requirements, thereby reducing the risk of an accidental release and mitigating any hazards should a release occur.

Specifically, we found that the Division does not: (1) ensure that all anhydrous ammonia tanks in the state are registered in accordance with statutory requirements; (2) adequately track tank registration data to completely, accurately, and reliably report on the population of anhydrous ammonia tanks; (3) have well-defined, consistently applied inspection policies and procedures or an inspection program that maximizes inspection coverage; (4) hold owners accountable for correcting tank safety violations noted during inspections; (5) receive information on anhydrous ammonia releases or other incidents that create the threat of a release; (6) have sufficient controls over the receipt of registration fee revenues; and (7) routinely compile, track, analyze, and report on key programmatic data. We discuss these issues in the remainder of this chapter.

## Tank Inventory

The Division's Anhydrous Ammonia Program is a public safety program targeted at the tank level. That is to say, the minimum safety requirements outlined in state statute and Department rules apply to each individual tank. Thus, effective administration of the Anhydrous Ammonia Program is ultimately based on the Division's ability to identify and track the population or universe of tanks that are used or potentially used to store anhydrous ammonia. A complete and accurate inventory of all anhydrous ammonia tanks in the state provides the foundation for the Division's registration, inspection, and enforcement activities. Only by knowing the population of tanks can the Division ensure that all tanks have been properly registered, routinely inspected, and repaired as needed to correct noted safety violations.

Moreover, due to varying economic and seasonal conditions within the farming industry, tank owners commonly move their tanks in and out of operation during the growing season and from year to year. Some farm cooperatives or commercial fertilizer dealers with multiple business locations move their nurse tanks from one location to another. Finally, some owners buy tanks to increase their physical inventories, whereas other owners sell their tanks and no longer carry or use anhydrous ammonia. This type of movement in the anhydrous ammonia tank population makes having a complete and accurate tank inventory all the more necessary to achieving an effective regulatory program.

As described in the following sections, we found the Division does not have the policies, procedures, and systems in place to ensure a complete and accurate inventory of all anhydrous ammonia tanks in the state. Specifically, the Division does not (1) register all anhydrous ammonia tanks in accordance with statutory requirements or (2) adequately track registration data.

## Unregistered Tanks

State statute clearly requires that all anhydrous ammonia tanks in the state be registered annually. According to Section 35-13-109(1), C.R.S.:

“. . . each year, **every** person who **owns** one or more anhydrous ammonia storage tanks, mobile transportation tanks, or tank-mounted applicators within this state shall register **each** of such tanks or applicators with the Department and shall pay a registration fee as established by the Agricultural Commission.” [Emphasis added.]

Additionally, state statute:

- Prohibits anyone from filling, refilling, delivering, or permitting to be delivered any anhydrous ammonia tank that has not been registered with the Department [Section 35-13-105, C.R.S.].
- Requires all equipment to be installed and maintained in a safe operating condition and in conformity with Department rules and regulations [Section 35-13-104, C.R.S.].

During our audit we found that the Division has not complied with the statutory registration requirement since it was first enacted in 2003. Specifically, the Division does not require owners to register all of their anhydrous ammonia tanks every year. Rather, the Division requires owners to register only those anhydrous ammonia tanks that will be *in use* for that year. For example, if a business owns 100 nurse tanks but, due to fluctuating market conditions, only plans to use 60 tanks for the ensuing growing season, the Division would require the owner to register and pay registration fees only for those 60 tanks. Based on our analysis of Division data, in Calendar Year 2009 a total of 69 business locations with approximately 105 bulk tanks and 1,750 nurse tanks and applicators were registered statewide. However, due to the Division's lack of enforcement of the statutory registration requirement, these summary registration statistics do not reflect the total population of tanks in the state.

Division staff raised several practical reasons that the Division requires owners to register and pay fees only for those tanks that will be in use. First, only those tanks that are in use contain anhydrous ammonia and, therefore, have the potential for an accidental release. Second, the Division focuses its inspection program on tanks that are in use to ensure the tanks are properly maintained and meet minimum safety requirements. Since the Division's practice is to inspect only the tanks that are registered each year, the Division reported that requiring registration of all tanks would effectively increase its inspection workload. Third, a registration requirement for all tanks would impose an additional financial burden on the tank owners, since owners would pay an annual registration fee for each owned but unused nurse tank or applicator. Division staff were also concerned that requiring registration of all tanks could force owners to make potentially costly and time-consuming repairs to maintain tanks that are empty and not being used.

According to the Division, it is common that owners use only a portion of the tanks in their inventories in a given year. However, the Division's current registration practices do not align with statutory requirements and result in unregistered tanks, as well as an incomplete tank inventory. The General Assembly added the tank registration requirement to statute in 2003 as the mechanism for refinancing the Anhydrous Ammonia Program with cash funds as opposed to general funds. Yet regardless of how the Program is funded, the Division is statutorily responsible for ensuring owners' compliance with

minimum tank safety requirements, which requires that the Division know how many anhydrous ammonia tanks exist and where the tanks are located. In many ways, the annual tank registration requirement put in place by the General Assembly should help the Division to maintain a complete and accurate statewide tank inventory.

The Division should ensure a complete tank inventory by aligning its registration practices with the statutory requirement that all anhydrous ammonia tanks, including those tanks not currently in use but which have the potential to be used, are registered annually. Additionally, to address the Division's concerns regarding the payment of registration fees for tanks that are not in use, the Division should work with the Agricultural Commission to (1) require owners to report each tank's use status during the registration process and (2) align the registration fee structure to minimize the financial impact on owners from registering tanks that will not be in use. For example, the registration fee for out-of-service tanks could be set to \$0.00 or some nominal amount. The Division could continue its current practice of inspecting only those anhydrous ammonia tanks that are in use.

We identified another state agency that follows this type of a tiered approach. Specifically, the Division of Oil and Public Safety's Petroleum Section within the Department of Labor and Employment requires petroleum tank owners to register all petroleum tanks and indicate the tank's "use status" (e.g., in service, temporarily out of service, permanently out of service) when registering. Petroleum tank owners pay a registration fee until tanks are permanently closed or there is a change in service to another substance. All petroleum must be removed from tanks that are out of service, temporarily closed, or permanently closed. By pursuing a similar tiered approach for the Anhydrous Ammonia Program, the Division would ensure that it complies with statutory registration requirements and maintains a complete tank inventory as the foundation for its inspection and enforcement processes while acknowledging that owners may not actively use all of their anhydrous ammonia tanks in a given year.

---

## **Recommendation No. 1:**

The Inspection and Consumer Services Division should maintain a complete tank inventory by ensuring that owners comply with the statutory requirement that all anhydrous ammonia tanks in the state be registered annually. Additionally, the Division should work with the Agricultural Commission to:

- a. Define "use status" categories for anhydrous ammonia tanks and require owners to report each tank's use status during the registration process.

- b. Align the registration fee structure to minimize the financial impact on owners from registering tanks that will not be in use.

## **Inspection and Consumer Services Division Response:**

Agree. Implementation date: January 2012.

The Division agrees that it should maintain a complete tank inventory by ensuring that tank owners comply with statutory requirements to register all of their tanks annually.

The Division will work with the Agricultural Commission to adopt rules defining registration classes for tanks that reflect their use status. A fee structure will be developed to reflect the use status of the tanks.

---

## **Registration Data**

Anhydrous ammonia tank owners submit a registration application, including a list of tanks being registered and associated registration fees, to the Division each year. Once all fees are paid, the Division sends owners a registration certificate, a list of registered tanks, and registration stickers for each registered tank. During the registration process program staff enter registration information into the Division's electronic licensing system. The licensing system is used to record basic information about each owner (e.g., business name and address), registration fee amounts, and some information on nurse tanks and applicators (e.g., tank capacity and owner-assigned tank identification number).

As discussed previously, a complete and accurate tank inventory provides the foundation for administering the Anhydrous Ammonia Program. The underlying registration data are a critical part of ensuring a complete and accurate tank inventory. We found that the Division does not have sufficient procedures and systems in place to adequately track tank registration data to produce a complete, accurate, and reliable tank inventory and to report on other registration information. Specifically, we identified the following problems:

- **Duplicate tank identification numbers.** We reviewed the Division's Calendar Year 2009 registration data and found that approximately 1,185 (68 percent) of the 1,750 registered nurse tanks and applicators had the same tank identification number as at least one other nurse tank or applicator in the state. Additionally, approximately 328 (19 percent) of the 1,750 registered nurse tanks and applicators had the same tank identification number as at least one other nurse tank or applicator owned



by the same owner at another location. For example, one owner had five tanks that were each identified as “Tank 14.” Lastly, one owner had nine pairs of tanks with differing capacities that shared the same tank identification number at the same location. This duplication occurred because the Division does not assign unique statewide tank identification numbers during the registration process. Instead, the Division tracks tanks by the owner-assigned tank identification numbers. Lack of a unique statewide tank identification number prevents the Division from generating and maintaining a complete tank inventory report to track the tank population statewide as owners move tanks in and out of use, move tanks from one location to another, and buy and sell tanks. As discussed in more detail in Recommendation No. 3, the lack of a unique statewide tank identification number further limits the Division’s ability to definitively identify which tanks have been inspected and to track tank-level inspection data over time.

- **Incomplete data.** We identified two significant gaps in the completeness of the underlying registration data that limit the Division’s ability to generate and maintain a complete tank inventory. First, tank inventory reports pulled from the Division’s licensing system do not include bulk storage tanks. Based on our manual compilation of information from the Division’s inspection reports, we determined there were approximately 105 bulk tanks inspected in Calendar Year 2009. However, these 105 tanks are not captured in the Division’s registration data because its licensing system lacks the data fields to do so. Second, the registration data used by the licensing system to generate nurse tank and applicator inventory reports are incomplete. Specifically, between December 2003 and November 2007 staff did not enter nurse tank and applicator registration information into the system. Program staff started entering tank information from paper registration files in November 2007 in an attempt to build a complete tank inventory report. However, during the Calendar Year 2009 registration period staff deleted records for tanks that were not being used from the underlying data tables because the system currently does not separately track each tank’s registration and use status. Although unintentional, this action created further gaps in the Division’s registration data and limited the Division’s ability to build a complete tank inventory report.
- **Inaccurate and unreliable registration counts.** We found that system-produced registration counts do not include all nurse tanks and applicators, business locations, and bulk tank sites that had been registered over the full course of the annual registration period. Rather, the system provides registration counts only for business locations actively engaged in the anhydrous ammonia business at the time the system is queried. For example, the Division’s licensing system reported 57 business locations for the 2008 registration period. However, this count excluded the 17

business locations that were registered but subsequently went out of the anhydrous ammonia business later in the year. This problem was further reflected in the individual nurse tank and applicator counts. Our analysis of the Division's registration data showed that the licensing system underreported the number of registered nurse tanks and applicators by 114 tanks in 2005, 218 tanks in 2006, 378 tanks in 2007, and 308 tanks in 2008. We found no underreporting of tanks for the 2009 registration period because no registered business locations had gone out of the anhydrous ammonia business between January 1 and December 31, 2009. Finally, we found that a separate query function in the Division's licensing system inaccurately, yet consistently, reports a total of 1,965 registered nurse tanks and applicators, regardless of the registration year specified.

Accurate and complete registration data provide the foundation for the Division's Anhydrous Ammonia Program. Accordingly, the Division should take several key steps to ensure its ability to track and report on all anhydrous ammonia tanks in the state. First, the Division should assign anhydrous ammonia tanks a unique statewide tank identification number during the registration process and enter this information into its licensing system. We identified another state agency that uses unique identifiers. Specifically, the Division of Oil and Public Safety within the Department of Labor and Employment assigns unique identification numbers to each petroleum storage tank and each boiler in the state. Regarding anhydrous ammonia tanks, a Division-assigned, unique statewide tank identification number is the only way the Division will be able to generate and maintain a statewide tank inventory report for tracking the tank population over time and to link registration and inspection data currently maintained in different systems. A Division-assigned identification number need not replace the owner-assigned identification number; both identification numbers could be tracked within the licensing system. Currently anhydrous ammonia tanks are not physically marked with anything other than the owner-assigned identification number. As an additional control, the Division should explore and consider viable options, such as metal tags, for physically marking the anhydrous ammonia tanks with the Division-assigned, unique statewide tank identification number.

Second, the Division should improve its electronic licensing system and data management practices. The Division should capture bulk tank information in its licensing system, since some bulk tanks in the state can store upwards of 30,000 gallons of anhydrous ammonia. The Division should track all anhydrous ammonia tanks' registration and use status in separate data fields. The Division should also consider restricting Program staff's ability to delete tank records without supervisory approval to help prevent unintended gaps in the registration data from occurring in the future.

Finally, some of the problems we identified with the accuracy and reliability of registration counts in the Division's licensing system were due to a coding error and query functions that did not meet the Program staff's needs. The Division

should review and correct system coding and query functions to ensure that queries of registration data produce accurate and reliable registration counts and tank inventory reports, including reporting all business locations, bulk tanks, nurse tanks, and applicators that are registered during any portion of the registration period.

---

## **Recommendation No. 2:**

The Inspection and Consumer Services Division should improve its electronic licensing system to ensure its ability to track and report on the population of anhydrous ammonia tanks in the state. Specifically, the Division should:

- a. Assign anhydrous ammonia tanks a unique statewide tank identification number during the registration process and enter this information into the licensing system. The Division should explore and consider viable options for physically marking anhydrous ammonia tanks with the Division-assigned, unique statewide tank identification number via metal tags or some other means.
- b. Capture bulk tank information and track all tanks' registration and use status in separate data fields. The Division should also consider restricting Program staff's ability to delete tank records without supervisory approval.
- c. Review and correct system coding and query functions to ensure that queries of registration data produce accurate and reliable registration counts and tank inventory reports, including reporting all business locations, bulk tanks, nurse tanks, and applicators that are registered during any portion of the registration period.

## **Inspection and Consumer Services Division Response:**

- a. Agree. Implementation date: January 2012.

The Division agrees that its electronic registration program needs to be improved to allow the Division to track and report on the population of anhydrous ammonia tanks, and the Division will develop a system to assign each tank with a unique identification number. This number will be a combination of the unique business number assigned to each site and the tank identification number assigned by the tank owner. This number system will result in a unique identification number for each tank.

The Division will explore and consider viable options for the physical marking of anhydrous ammonia tanks with the unique identification number.

- b. Agree. Implementation date: July 2012.

The Department has commenced a complete revision of the Centralized Demographic Database (CDD) system, which includes the licensing and inspection databases for all of the Department's licensing programs. A complete rewrite of the Division's Anhydrous Ammonia Program components will be included in this project. As part of this process, the Division will ensure that the new system captures bulk tank information and tracks all tanks' registration and use status in separate data fields. The Division will also reassess users' access rights in the system.

- c. Agree. Implementation date: July 2012.

The Division will modify the existing database to improve the data and reports available to management by January 2011. The Division will also reassess the query and reporting functions for the Anhydrous Ammonia Program as part of the redesign of the Department's Centralized Demographic Database (CDD), which is expected to be completed by July 2012.

---

## Tank Inspections

State statute [Section 35-13-107(2), C.R.S.] grants the Commissioner the authority to make any investigations necessary to ensure anhydrous ammonia tank owners' compliance with applicable statutory requirements and Department rules. The Division employs 12 inspectors who conduct inspections for the Division's various consumer protection programs (e.g., animal feed, eggs, grain warehouses, meat and wild game processors, weighing and measuring devices). Six of the Division's 12 inspectors also inspect anhydrous ammonia tanks as part of their assigned job responsibilities. Inspectors conduct unannounced inspection visits, typically during the late winter and early spring, before owners move the nurse tanks and applicators into the field for soil preparation. As discussed previously, the Division only inspects those anhydrous ammonia tanks that owners report will be in use for the ensuing growing season. In Calendar Year 2009 the Division reported inspecting a total of 1,328 anhydrous ammonia tanks, of which 832 (63 percent) passed inspection and 496 (37 percent) failed.

Minimum tank safety requirements vary depending on the type of tank. For nurse tanks, the following key requirements apply, and Division inspectors assess compliance with these requirements during inspections:

- *Anhydrous ammonia labels.* All four sides of the tank must be labeled with the words “ANHYDROUS AMMONIA” in letters that are a minimum of four inches high.
- *DOT placards.* All four sides of the tank must have the standardized U.S. Department of Transportation placard noting the tank contents, chemical identification number, and hazard classification.
- *Inhalation hazard labels.* At least two sides of the tank must be labeled with the words “INHALATION HAZARD” in letters that are a minimum of two inches high.
- *Hoses.* Transfer hoses should be rated for anhydrous ammonia use and in good overall condition (e.g., free from cuts, soft spots, bulges, and kinks).
- *Hitch, drawbar, and safety chain.* Trailers carrying nurse tanks must have a suitable hitch, drawbar, and safety chain for the purpose of towing the tank.
- *Pressure release valve.* Tanks must be equipped with a pressure release valve that is within five years of its manufacture date.
- *Valve labels and paint.* Liquid valves should be painted red or labeled “LIQUID,” and vapor valves should be painted yellow or labeled “VAPOR”.
- *Tires.* Tires on trailers used to tow tanks should be properly inflated with no excessive damage.
- *Tank structure.* The tank’s overall structure should be sound. To minimize the effect of solar heating on the internal tank pressure, the tank should be painted a light, reflective color with no bare or rust spots showing.
- *Federal agency guidelines.* Owners should adhere to safety guidelines issued by federal agencies, such as those guidelines calling for the presence of release protection devices, emergency shut-off valves, and decals depicting transfer instructions and first-aid procedures, as well as the availability of personal protective equipment (e.g., gloves, goggles, and a fresh water supply) for tank operators.

At the conclusion of the inspection, the inspector completes an inspection report that lists each tank inspected at the business location and the results. The inspector provides a copy of the inspection report to the business owner and sends a copy to the Division’s office. For each tank that passes inspection, the inspector affixes to the tank an inspection sticker indicating that the tank has been inspected and approved for use. For each tank that fails inspection, the inspector notes the violations (e.g., expired pressure release valves, missing labels, inadequate paint, or faulty trailer tires) on the inspection report. Failed tanks do not receive an inspection sticker. Before the tank can be used, owners are responsible for making the necessary repairs and sending the Division a signed and dated copy of the inspection report certifying that the violations have been corrected.

During our audit we reviewed 24 inspection reports, covering a total of 627 tanks, completed from Calendar Years 2007 through 2009 (the same 209 tanks were inspected in each year) for a sample of eight businesses with anhydrous ammonia tanks. The following table shows our analysis and summary of the types of violations noted. Three types of violations occurred most frequently in the sample data—pressure release valves, anhydrous ammonia labels, and safety requirements addressed under other federal agency guidelines. For example, inspectors identified violations with the pressure release valves for 167 (27 percent) of the 627 tanks inspected over the three-year period. In total, 341 tanks (54 percent) had at least one violation.

<b>Anhydrous Ammonia Tank Inspection Results</b> <b>Frequency of Tank Safety Violations by Type</b> <i>Calendar Years 2007 Through 2009</i>		
<b>Violation Type</b>	<b>Number of Tanks With Violation</b>	<b>Percent of Tanks With Violation</b>
Pressure Release Valve	167	27%
Anhydrous Ammonia Labels	131	21
Federal Agency Guidelines	123	20
DOT Placards	58	9
Valve Labels/Paint	46	7
Inhalation Hazard Labels	45	7
Tires	22	4
Tank Structure	13	2
Hitch, Drawbar, and Safety Chain	9	1
Hoses	8	1
<b>Number of Tanks Inspected = 627</b> <b>Number of Tanks Inspected With At Least One Violation = 341 (54 percent)</b>		
<b>Source:</b> Office of the State Auditor’s analysis of inspection reports completed in 2007, 2008, and 2009 for a sample of eight businesses with anhydrous ammonia tanks.		

We reviewed the Division's anhydrous ammonia tank inspection program and identified problems related to inspection procedures and inspection coverage, as discussed in the following sections.

## **Inspection Procedures**

Inspection procedures should be well defined and consistently applied so that Program staff, inspectors, and anhydrous ammonia tank owners have clear expectations and understanding regarding minimum safety requirements and what constitutes a violation. Consistent application of inspection procedures is also important for ensuring inspection quality and equitable treatment of business owners. Overall we found that the Division does not have well-defined, consistently applied inspection policies and procedures.

First, we found that a significant number of anhydrous ammonia tanks with safety violations passed inspection. Specifically, of the 627 tank inspection records we reviewed, 110 tanks (18 percent) passed inspection even though the inspector noted violations on the inspection report. For example, inspectors passed 23 tanks despite listing violations with the pressure release valves on the inspection reports. According to the Division, in most instances, such a violation means that the valve has exceeded its five-year useful life. Inspectors also passed 50 tanks that did not have the required "anhydrous ammonia" labels denoting the substance contained in the tank. Finally, we found two inspection reports on which an inspector neither passed nor failed a total of four tanks (two tanks on each inspection report). Thus, it was unclear from the inspection reports whether these four tanks were approved for use. Violations were noted for two of the four tanks.

It is reasonable to afford inspectors some degree of discretion; however, the Division has not established standards to ensure that inspectors use the same basis for making decisions about passing or failing tanks. During our interviews with Division staff, we received conflicting information regarding the conditions under which tanks pass or fail inspection. For example, some inspectors reported they fail a tank if any of the minimum tank safety requirements are not met. Other inspectors reported that some violations, such as missing or incorrect tank labels, are not significant enough to warrant failing a tank. Because tank owners are not allowed to use tanks that fail inspection, and every violation constitutes noncompliance with a minimum tank safety requirement, it is important that inspectors are consistent and apply the same standards when determining whether tanks pass or fail inspection. Additionally, we caution that even those violations that appear to be less severe can compromise public safety. For example, "anhydrous ammonia" and "inhalation hazard" labels are important for alerting emergency responders and others about the tank's contents and what precautions to take, should there be a release.

Second, we found that inspectors did not complete the inspection reports consistently. Of the 24 inspection reports we reviewed, we found three reports where the inspector used an outdated version of the inspection report form. As a result, these three inspection reports included evaluation categories that were inconsistent with those listed on the more current inspection report form, potentially resulting in an incomplete inspection. For example, the outdated version of the inspection report form did not list “hoses” as an evaluation category. Therefore, any problems observed with tank hoses would not necessarily have been noted separately on the inspection report. We also found three other inspection reports in which the inspector appears to have incorrectly marked every violation box on the inspection report form to indicate that he had evaluated each tank against the evaluation category. According to Program staff, inspectors are only supposed to mark the violation box when the tank is out of compliance with an applicable requirement. As a result, the inspection results for 64 tanks appear to be documented incorrectly and in a manner that was inconsistent with the other inspection reports. The types of inconsistencies we observed in the inspection reports raise questions about whether inspectors are applying inspection procedures appropriately and equitably. Additionally, as discussed in the next section, incomplete and inconsistent tracking on inspection reports creates problems when compiling tank inspection data for analysis and aggregate reporting purposes.

The Division lacks a written policies and procedures manual for conducting, documenting, and concluding on the results of anhydrous ammonia tank inspections. Moreover, although the Program administrator reviews the inspection reports submitted by inspectors, the Division does not have established review criteria for determining the accuracy and completeness of the reports. Neither the inspectors’ direct supervisor nor the Anhydrous Ammonia Program administrator signs off on completed inspection reports. Although inspectors receive training on an annual basis, and many of the Division’s anhydrous ammonia tank inspectors have extensive inspection experience, a written policies and procedures manual and supervisory review are basic controls to ensure that inspectors apply inspection procedures appropriately and consistently. Therefore, the Division should develop written policies and procedures governing anhydrous ammonia tank inspections. For example, the Minnesota Department of Agriculture has a comprehensive standard operating procedures manual for its anhydrous ammonia tank inspections. At a minimum, the Division’s written policies and procedures should establish clear criteria for inspectors to use when passing and failing tanks, as well as provide instruction to inspectors for completing inspection reports accurately, completely, and consistently. The manual should be updated annually to communicate any changes in inspection procedures. Finally, the Anhydrous Ammonia Program administrator and/or the inspectors’ direct supervisor, as appropriate, should strengthen the routine review and sign off on completed anhydrous ammonia tank inspection reports to ensure that inspectors adhere to established inspection policies and procedures.



Conducting such reviews is entirely consistent with both positions' current job responsibilities.

## **Inspection Coverage**

Anhydrous ammonia tanks that do not meet minimum safety standards pose a risk to public health and safety, and the Division's routine inspection program is the mechanism by which the Division identifies tank safety violations. The Division has a responsibility to conduct routine inspections in a manner that maximizes inspection coverage, thereby increasing the likelihood that tank safety violations will be identified and corrected.

As discussed previously, the Division currently has six inspectors who inspect anhydrous ammonia tanks, and in Calendar Year 2009 these inspectors completed inspections covering approximately 1,330 tanks. The Division reported that its goal is to inspect as many tanks as possible each year. However, the Division does not inspect every tank every year for several reasons. First, the Division focuses its inspection program only on those tanks that will be in use for the ensuing season; therefore, tanks that are in inventory but out of service are not inspected. Second, use of anhydrous ammonia is seasonal and, although the Division attempts to time its inspections to occur just prior to the season, inspectors reported that nurse tanks and applicators may already be in use in the field at the time of the inspection. Finally, owners may decide to register and place more tanks in operation midway through the season, after the initial inspection is complete. Inspectors generally do not conduct follow-up inspections, which means those tanks that are not present at the inspection site or are in use at the time of the initial inspection visit may not get inspected. We discuss the issue of follow-up inspections later in Recommendation No. 4.

In addition, we found that the Division does not track or monitor inspection coverage statistics for the Anhydrous Ammonia Program. Consequently, the Division does not know (1) which individual tanks are being inspected from one year to the next or (2) the overall percentage of the tank population that is being inspected. The Division reported that its current allocation of inspection resources is sufficient for balancing the needs of the Anhydrous Ammonia Program with other Division priorities. However, without tracking and monitoring inspection coverage data, the Division is unable to substantiate this assertion or measure the effectiveness of its inspection program. Gaps in inspection coverage, especially when such gaps are unknown, create risks that tanks with safety violations will not be identified and may not be remedied.

It is highly probable there are anhydrous ammonia tanks being used in the state that have never been inspected by the Division. We reviewed 2009 inspection data for a sample of eight businesses with anhydrous ammonia tanks. The overall tank inspection coverage for these eight businesses was 85 percent (251 of 295

registered tanks inspected); however, coverage by location varied significantly, from a low of 36 percent of tanks inspected at one location to a high of 100 percent of tanks inspected at other locations. Since the Division does not have a complete inventory of all anhydrous ammonia tanks in the state (see Recommendation Nos. 1 and 2), these statistics only represent inspection coverage for those tanks that were registered and in use in 2009 at each sampled business location.

Additionally, during our interviews one inspector reported that during a 2007 inspection an owner in his region could not account for three registered nurse tanks. That is to say, at the time of the inspection, the owner did not know where these three tanks were located, yet the owner had registered them with the Division. The Division reported that this situation has since been corrected; however, this example illustrates the potential for gaps in inspection coverage to exist. This example is also a concern because owners' ability to account for all tanks is a key deterrent in curbing the theft of anhydrous ammonia for methamphetamine production.

The Division needs to take several steps to ensure that its routine inspection program provides the maximum inspection coverage possible given resource constraints and other practical limitations. First, the Division should establish inspection coverage goals and use these goals to target its routine inspection program. It may be unrealistic for the Division to inspect every anhydrous ammonia tank every year. If so, the Division should adopt a cyclical, risk-based approach whereby tanks are inspected on a routine but less-frequent-than-annual basis. For example, the Division should set a goal that all tanks will be inspected at least once within a certain time frame (e.g., every three years) and then use factors, such as certain types of violations or patterns of noncompliance over time, to target inspections for higher-risk owners on a more frequent basis. We found that other states (e.g., Minnesota, North Dakota) utilize a similar inspection approach for their anhydrous ammonia programs. Adopting a risk-based approach can be a cost-effective way for the Division to ensure that limited inspection resources are appropriately targeted to provide the maximum benefit to the State and the public.

Second, the Division should improve its data management systems and practices to centrally compile, track, and analyze tank-level inspection data over time. During our audit we encountered significant limitations in the Division's inspection data. Specifically, the Division does not compile tank-level inspection data into a centralized database. Inspection reports that contain all tank-level inspection data for each business location are separately maintained in individual spreadsheets that are not linked. Additionally, as discussed in Recommendation No. 2, the Division does not assign unique statewide tank identification numbers, which prevents (1) the linking of inspection data over time that would allow the Division to generate tank-level inspection histories and identify those tanks that have not been inspected from one year to the next and (2) the linking of

inspection data with registration data and tank inventories that would allow the Division to generate overall inspection coverage statistics.

Central tracking of tank-level inspection data over time is also essential to the Division's ability to identify patterns and trends in inspection results as a means of facilitating a risk-based inspection program. Our earlier analysis summarized inspection results for a sample of owners. The Division could conduct a similar analysis across all owners and inspections. The Division could then use the results to focus inspections on those specific tank safety requirements where violations occur most frequently. The Division could also segregate the results by business and over time to target inspections on those tank owners with repeat violations or certain types of violations.

Finally, once the Division has implemented a risk-based inspection approach and has started tracking and monitoring inspection coverage and other inspection data, the Division should reassess its allocation of inspection resources and make adjustments, as appropriate, to ensure that established inspection coverage and other Program goals are being met.

---

### **Recommendation No. 3:**

The Inspection and Consumer Services Division should ensure that inspectors apply anhydrous ammonia tank inspection procedures appropriately and consistently and that its anhydrous ammonia tank inspection program maximizes inspection coverage given available resources. Specifically, the Division should:

- a. Develop a written policies and procedures manual governing anhydrous ammonia tank inspections. At a minimum, such policies and procedures should establish clear criteria for passing and failing tanks, as well as provide instruction for completing inspection reports accurately, completely, and consistently. The Division should update the written policies and procedures manual annually.
- b. Strengthen the routine review of completed tank inspection reports for adherence to established inspection policies and procedures. The Anhydrous Ammonia Program administrator and/or the inspectors' direct supervisor, as appropriate, should sign off on completed tank inspection reports.
- c. Establish inspection coverage goals and use these goals to target the routine inspection program. The Division should adopt a cyclical, risk-based approach whereby all tanks will be inspected at least once within a certain time frame and higher-risk owners will be inspected on a more frequent basis.

- d. Improve data management systems and practices to centrally compile, track, and analyze tank-level inspection data over time. Inspection data should be routinely analyzed to monitor inspection coverage and to identify patterns and trends in inspection results.
- e. Reassess its allocation of inspection resources and make adjustments, as appropriate, to ensure that established inspection coverage and other Program goals are being met, once the risk-based inspection approach is implemented and inspection coverage data are available.

## **Inspection and Consumer Services Division Response:**

- a. Agree. Implementation date: January 2011.

The Division currently utilizes industry standard inspection procedures developed by The Fertilizer Institute. We agree that the Division should develop a complete inspection manual with inspection procedures, criteria for passing or failing tanks and guidance on completing reports.

- b. Agree. Implementation date: March 2011.

The Division agrees that the routine review process for submitted reports could be improved. The Division believes that the implementation of Recommendation 3a will eliminate many of the reporting concerns that the audit discovered. The review will be strengthened by having the Program administrator and/or the inspector's supervisor routinely review the inspection reports, as necessary, to ensure that reports are being completed in compliance with inspector guidance and inspection policies.

- c. Agree. Implementation date: January 2011.

The Division will develop inspection goals and establish a risk-based schedule for tank inspections.

- d. Agree. Implementation date: July 2012.

The Department has commenced a complete revision of the Centralized Demographic Database (CDD) system, which includes the licensing and inspection databases for all of the Department's licensing programs. A complete rewrite of the Division's Anhydrous Ammonia Program components will be included in this project. As

part of this process, the Division will ensure its ability to compile, track, and analyze tank-level inspection data over time. The Division will routinely analyze inspection data to monitor inspection coverage and to identify patterns and trends in inspection results.

- e. Agree. Implementation date: February 2011.

The Division continually reassesses its inspection needs and resources and adjusts resource allocations as necessary to meet the Division inspection goals.

---

## Enforcement

As a regulatory agency, the Division has a responsibility to ensure that tank safety violations noted during inspections are corrected. Enforcement is the means by which the Division holds tank owners accountable for correcting violations. Enforcement represents a broad spectrum of activity ranging from follow-up inspections to more formal action such as civil penalties (e.g., fines) and cease-and-desist orders.

During our audit we compiled data from 24 inspection reports completed in Calendar Years 2007 through 2009 for a sample of eight businesses with anhydrous ammonia tanks. We used the owner-assigned tank identification number to match individual tank inspection records and identify the subset of 209 tanks that the Division inspected in all three years. We then created a three-year inspection history for each tank. There were 153 tanks that we did not include in our tank history analysis because (1) we could not make a definitive match among inspection records using the owner-assigned tank identification number or (2) the tank was not inspected in each year of the three-year period we reviewed.

Overall we found a pattern of evidence that strongly suggests anhydrous ammonia tank violations are not being remedied subsequent to inspection. Specifically, we found that inspectors failed many of the same tanks from one year to the next. Of the 209 tanks in our sample, inspectors failed the same 50 tanks (about 24 percent) in two of the three years we reviewed and the same 25 tanks (about 12 percent) in all three years we reviewed. Additionally, we found that, for a large number of tanks, inspectors identified repeat violations for the same tank from one year to the next. Of the 209 tanks in our sample, inspectors noted one or more of the same violations for the same 95 tanks (about 45 percent) in two of the three years we reviewed and for the same 24 tanks (about 11 percent) in all three years we reviewed.

The following table shows the specific number of repeat tank violations by category. For example, between 2007 and 2009, inspectors noted a pressure

release valve violation for the same 39 tanks in two of the three years we reviewed and for the same two tanks in all three years we reviewed.

<b>Three-Year Anhydrous Ammonia Tank Inspection History</b> <b>Repeat Tank Safety Violations by Type</b> <i>Calendar Years 2007 Through 2009</i>		
<b>Violation Type</b>	<b>Number of Tanks With the Same Violation in 2 of 3 Years<sup>1</sup></b>	<b>Number of Tanks With the Same Violation in All 3 Years</b>
Pressure Release Valve	39	2
Anhydrous Ammonia Labels	35	9
Federal Agency Guidelines	26	11
DOT Placards	9	3
Inhalation Hazard Labels	9	3
Valve Labels/Paint	9	2
Tires	5	0
Hitch, Drawbar, and Safety Chain	3	0
Hoses	2	0
Tank Structure	2	0
<b>Unduplicated Tank Count = 209</b>		
<b>Source:</b> Office of the State Auditor’s analysis of inspection reports completed in 2007, 2008, and 2009 for a sample of eight businesses with anhydrous ammonia tanks. Data were filtered to identify the subset of 209 anhydrous ammonia tanks that were inspected in each year of the three-year period.		
<sup>1</sup> Tank violations did not necessarily occur in consecutive years.		

The results of our tank-level inspection history analysis demonstrate a lack of assurance that owners are making the necessary repairs and maintenance to address tank safety violations noted during inspections. Ultimately, a lack of enforcement by the Division contributes to owners’ noncompliance with minimum safety requirements, thereby undermining the Division’s inspection efforts and the effectiveness of the Anhydrous Ammonia Program to protect the public’s health and safety. As discussed in the following sections, we identified three areas where the Division’s current practices allow anhydrous ammonia tank violations to persist from one year to the next.

### Attestations

As discussed previously, inspectors provide a copy of the inspection report to the tank owner once the inspection is complete. For tanks that fail inspection, owners must make the necessary repairs and send the Division a copy of the inspection report with their signature and date beside each failed tank certifying that the violations have been corrected. The inspection report form notifies owners that the tank may be placed in service only after the repairs have been completed. This self-reported attestation is the Division’s primary means of obtaining assurance from tank owners that failed tanks have been repaired.

We reviewed the Division's Calendar Year 2009 inspection files and found the Division did not obtain attestations from the majority of business locations with failed tanks. Specifically, the Division did not receive attestations from owners at 34 of the 48 business locations (71 percent) with failed tanks. Additionally, we found that owners do not sign off on all failed tanks when completing the attestation. In a separate analysis, we reviewed Calendar Year 2007 through 2009 inspection files for a sample of eight business locations and found that of the 233 failed tanks listed on the inspection reports for these business locations over the three-year period, owners attested to repairing only 22 tanks (9 percent).

Self-reported attestations provide the Division with some minimal level of assurance that owners correct tank safety violations identified during inspections. However, the Division must be diligent in ensuring that it receives these attestations. Currently there is no established time frame within which owners must complete the attestation, and there are few repercussions for failing to do so. We discuss the issuance of civil penalties in a subsequent section. The Division should establish a time frame for owners who have failed tanks to submit the attestation. The Division should also develop procedures for identifying and following up with owners who do not submit the attestation within the established time frame. The attestation should require owners to certify to the Division that each failed tank has been fixed or taken out of service for the year. Currently, the inspection report allows owners the ability to certify when tanks are repaired. However, if an owner chooses not to make such repairs, the Division should also obtain certification from the owner that the tank has been taken out of service. Finally, the Division should ensure that all attestation forms are maintained in the inspection files.

## **Follow-up Inspections**

Follow-up inspections can be an effective means of ensuring that owners correct tank safety violations. However, the Division does not currently conduct routine followup to reinspect anhydrous ammonia tanks that failed during the initial inspection. Division staff reported that once the initial inspection is completed, resource limitations and the start of the growing season generally prevent inspectors from returning for any follow-up activities.

The Division needs to build a routine follow-up component into its inspection program to help ensure that owners are correcting tank safety violations noted during the initial inspection. Currently initial inspections consume all of the Division's inspection resources. However, by conducting initial inspections on a less frequent basis (see Recommendation No. 3), the Division could reallocate existing resources to conduct more follow-up inspections and to take formal enforcement action if violations have not been addressed. Additionally, the Division should apply a risk-based approach to its follow-up inspections. For

example, inspectors could target their follow-up inspections on those tank owners who (1) fail to return their attestation forms within established time frames, (2) have certain types of violations (e.g., pressure release valves), or (3) demonstrate a pattern of noncompliance. As discussed previously in Recommendation No. 3, it is critical that the Division compile and track inspection data at the tank level over time to facilitate the type of tank history analysis we performed during our audit. These data would provide the Division with a key means of identifying patterns of noncompliance to effectively and efficiently target its follow-up inspections.

## **Formal Enforcement Action**

According to state statute [Section 35-13-101(2), C.R.S.], any violation of statutory or regulatory requirements “constitutes a substantial danger to public health and safety.” Therefore, it is incumbent upon the Division to ensure that anhydrous ammonia tank owners comply with applicable statutes and Department rules. State statute grants the Commissioner the power to impose civil penalties of up to \$750 per day per violation [Section 35-13-108(1)(a), C.R.S.], as well as to issue a cease-and-desist order when there is reasonable cause to believe a violation has occurred and immediate enforcement action is necessary [Section 35-13-107(4)(a), C.R.S.].

Although the Division has had the statutory authority to issue civil penalties and cease-and-desist orders since 2003 and 2008, respectively, we found that the Division has never issued a civil penalty or a cease-and-desist order to any anhydrous ammonia tank owner. The Division reported that it prefers to encourage anhydrous ammonia tank owners to voluntarily comply with minimum tank safety requirements rather than to take formal enforcement action. We recognize that regulatory programs often must strike a balance between being too forgiving and too heavy-handed. However, in the absence of any formal enforcement action, there are no consequences for tank owners who do not meet the minimum tank safety requirements. The Division’s inaction effectively creates an unequal playing field and places tank owners who choose not to comply at a relative advantage over those tank owners who expend the resources needed to maintain their tanks in proper working condition. Statute grants the Division the authority to take formal enforcement action precisely for those situations when tank owners choose not to comply. Additionally, we note that several regulatory agencies at the federal level (e.g., Mine Safety and Health Administration, Securities and Exchange Commission) have come under recent scrutiny by Congress for failing to use available enforcement tools to address known risks and patterns of violations that eventually led to incidents affecting the public’s financial and physical well-being.

The Division should utilize its existing enforcement authority by issuing civil penalties and/or cease-and-desist orders for tanks found to be out of compliance



with minimum safety requirements. Other states' anhydrous ammonia programs have enforcement authority similar to Colorado's. For example, staff from the Minnesota Department of Agriculture reported increased compliance since 2007 when they began issuing fines for violations found during tank inspections. The possibility of a \$250 fine for an expired pressure release valve can be a sufficient incentive for owners to ensure their tank valves are replaced. In addition to fines, other states (e.g., Illinois, Iowa, Indiana, and Minnesota) reported issuing stop orders on individual anhydrous ammonia tanks that fail inspection due to more serious violations. For example, inspectors with the Illinois Department of Agriculture affix a tag to the tank preventing its use, and the inspector must reinspect the tank before the tag can be removed. So-called "red tagging" is an attractive enforcement tool because it allows regulators to mandate the removal of a tank from service until it meets minimum safety requirements. The Division reported that it tried "red tagging" for the Anhydrous Ammonia Program in 1998 but stopped soon thereafter due to a concern that it lacked the statutory authority to take such enforcement action. However, the Division recently acquired cease-and-desist authority in 2008 and could pursue a red tagging approach within the scope of this authority. To ensure that enforcement actions are applied consistently and appropriately, the Division should develop written guidelines and procedures for inspectors on how and when to take formal enforcement action. The Division has established similar enforcement guidelines for its other consumer protection programs.

---

#### **Recommendation No. 4:**

The Inspection and Consumer Services Division should hold anhydrous ammonia tank owners accountable for correcting tank safety violations noted during inspections by:

- a. Establishing a time frame for owners to submit an attestation certifying that each failed tank has either been fixed or taken out of service for the year, developing procedures for identifying and following up with owners who do not submit the attestation within the established time frame, and maintaining all attestation forms in inspection files.
- b. Building a routine follow-up component into its inspection program. Follow-up inspections should be conducted using a risk-based approach.
- c. Developing written guidelines and procedures on how and when to issue civil penalties and/or cease-and-desist orders to ensure that such enforcement actions are applied consistently and appropriately. The Division's inspectors should issue civil penalties and/or cease-and-desist orders in accordance with these guidelines and procedures for tanks found to be out of compliance with minimum safety requirements.

---

## **Inspection and Consumer Services Division Response:**

Agree. Implementation date: January 2011.

- a. The Department will establish a time requirement for the owner to submit the certification that failed tanks have been repaired or taken out of service, and will implement a tracking procedure to follow up with tank owners that do not return their certifications. Completed attestation forms will be maintained in the Division's inspection files.
- b. The Division will develop a risk-based follow-up procedure for failed inspections.
- c. The Division agrees that anhydrous ammonia tank owners should be held accountable for correcting tank safety violations noted during inspections. The Division will develop written guidelines and procedures for taking appropriate enforcement action when violations of the safety requirements are encountered.

---

## **Incident Reporting**

As a hazardous material, anhydrous ammonia is subject to a number of different laws and regulations that require releases to be reported to federal and state environmental agencies to ensure proper emergency response and cleanup. For example, releases of anhydrous ammonia that meet or exceed a 100-pound threshold must be reported at the state level to CDPHE and at the federal level to the U.S. Environmental Protection Agency's National Response Center. As discussed in Chapter 1, according to CDPHE data, there were 105 reported anhydrous ammonia releases for the 13-year period from 1997 through 2009, approximately 6 percent of which were related to agricultural operations.

As the state agency responsible for regulating anhydrous ammonia's use as an agricultural fertilizer and for conducting tank inspections, the Division should be in a central position to receive information on anhydrous ammonia releases and other incidents that create the threat of a release. However, we found that there are no requirements for anhydrous ammonia tank owners to report releases or other incidents to the Division. We also found that the Division does not routinely inquire regarding anhydrous ammonia releases reported to CDPHE.

During our interviews, Division staff reported that 100 pounds of anhydrous ammonia is a high threshold and that reporting of smaller releases and incidents that create the potential for a release would provide valuable information to

regulators. For example, in 2000 a nurse tank valve cracked open and released 60 pounds of anhydrous ammonia, injuring a firefighter who responded to the release. However, the Division was unaware of this incident. We, too, would not have known about this incident had it not been voluntarily reported to CDPHE. The release did not meet the required 100-pound federal reporting threshold.

Other state anhydrous ammonia programs have incident reporting requirements beyond those required under federal laws and regulations. For example, the Minnesota Department of Agriculture requires the person who, at the time of the incident, has custody of, control of, or responsibility for the anhydrous ammonia or its container to report incidents that (1) release or immediately threaten to release anhydrous ammonia of any quantity or (2) cause injury or adversely affect the environment. Even those incidents in which no anhydrous ammonia is released, such as a nurse tank rollover, must be reported due to the risk of a release that such an event creates. Vandalism to tanks or suspected theft of anhydrous ammonia must also be reported.

The Division should work with the General Assembly, the Agricultural Commission, and other stakeholders, as appropriate, to develop and implement incident reporting requirements for anhydrous ammonia's use as an agricultural fertilizer. Incident reporting requirements are a common component to many regulatory programs because the reporting complements inspection and enforcement activities. For example, incident reporting requirements provide additional coverage between routine inspections. Incident reports could also be used to inform the Division's risk-based inspection approach. That is to say, more frequent incident reports by tank owners could indicate higher risk, thereby warranting more frequent inspection or followup by the Division.

---

## **Recommendation No. 5:**

The Inspection and Consumer Services Division should work with the General Assembly, the Agricultural Commission, and other stakeholders, as appropriate, to develop and implement incident reporting requirements for anhydrous ammonia's use as an agricultural fertilizer.

### **Inspection and Consumer Services Division Response:**

Agree. Implementation date: July 2012.

The Department agrees there is a need for an incident reporting requirement, and will work with the appropriate parties to develop and implement such requirements.

---

## Cash Receipts

As discussed in Chapter 1, the Anhydrous Ammonia Program is cash funded through registration and distribution fees paid by tank owners and distributors. In Fiscal Year 2009 revenues from anhydrous ammonia tank registration fees totaled about \$16,020, and revenues from distribution fees for all fertilizers, including anhydrous ammonia, totaled about \$383,250.

According to Department and Division staff, tank owners should remit registration applications and applicable registration fees to the cashier at the Department's main office (700 Kipling Street) for processing and entry into the State's accounting system. The cashier then forwards the registration applications to the Division's office (2331 W. 31<sup>st</sup> Avenue), where Program staff complete the registration process. However, during our review we identified instances in which some registration fees are not being collected in accordance with the Department's stated policies. Instead, some payments are being collected by Program staff at the Division's office, as well as by inspectors in the field:

- When reviewing the registration applications forwarded by the cashier, Program staff occasionally identify an underpayment of registration fees. In these situations, Program staff prepare and send an invoice letter informing the tank owner of the underpayment. The invoice letter instructs the owner to remit the additional monies owed to Program staff in the Division's office instead of to the cashier at the Department's main office. Program staff also do not notify the cashier that underpayments have been identified and additional monies are owed to the State.
- When conducting inspections, inspectors occasionally discover that a tank owner is operating an unregistered anhydrous ammonia tank. In these situations, inspectors collect the registration application and any applicable registration fees and late fees on site. The inspector provides the owner with a receipt and then forwards the registration materials, payment, and a copy of the receipt to Program staff in the Division's office. A third copy of the receipt is retained in the inspector's receipt book. Fees collected in the field are not sent directly to the cashier in the Department's main office. Additionally, although inspectors maintain prenumbered receipt books with triplicate copies, the Department does not reconcile inspectors' individual receipt books on a regular basis. For example, Department staff reported that some inspectors need a replacement receipt book on a monthly basis, whereas other inspectors may not need a new receipt book for several years.

Department and Division staff reported that the majority of cash receipts for the Anhydrous Ammonia Program are remitted directly to the cashier at the Department's main office and that efficiencies are created by having Program staff and inspectors perform multiple duties. Nonetheless, each of the situations we identified represents a gap in controls, thereby creating the opportunity for errors and irregularities to occur without detection.

The Department and the Division should strengthen controls over the cash receipts process for the Anhydrous Ammonia Program to ensure that all fees owed are collected and to reduce the potential for errors and irregularities. First, Program staff responsible for the registration process, identifying underpayment of registration fees, and preparing invoice letters to tank owners should not also receive the payments. This is a lack of segregation of duties between the invoicing, recording, and collection functions and vests too much authority with a single individual. Program staff should invoice tank owners for any underpayment in registration fees and instruct owners to remit the additional monies owed directly to the cashier at the Department's main office. Program staff should also forward a copy of the invoice letter to the cashier as a notice that an additional payment is forthcoming.

Second, ideally, inspectors would not be responsible for collecting any registration fees in the field. However, if this is not feasible given current staffing levels and business processes, the Department and Division should have adequate compensating controls over the cash receipts process. Specifically, inspectors should remit all payments collected in the field directly to the cashier in the Department's main office. Inspectors should continue to be assigned prenumbered receipt books with triplicate copies. The original receipt copy should be provided to the tank owner, one receipt copy should be forwarded with the payment to the cashier, and one receipt copy should remain in the receipt book. Department staff should track and reconcile inspectors' receipt books to the amounts deposited with the cashier on a routine basis and follow up on any anomalies.

---

### **Recommendation No. 6:**

The Department of Agriculture and the Inspection and Consumer Services Division should strengthen controls over the cash receipts process for the Anhydrous Ammonia Program by:

- a. Establishing appropriate segregation of duties by restricting Program staff to invoicing tank owners regarding underpayment in registration fees and instructing owners to remit the additional monies owed directly to the cashier in the Department's main office. Program staff should also

forward a copy of the invoice letter to the cashier as a notice that an additional payment is forthcoming.

- b. Requiring inspectors to remit all payments collected in the field directly to the cashier in the Department's main office. Inspectors should continue to be assigned prenumbered receipt books with triplicate copies. The original receipt should be provided to the tank owner, one receipt copy should be forwarded with the payment to the cashier, and one receipt copy should remain in the receipt book. Department staff should track and reconcile inspectors' receipt books to amounts deposited on a routine basis and follow up on any anomalies.

### **Department of Agriculture and Inspection and Consumer Services Division Response:**

- a. Agree. Implementation date: Implemented, April 2010.

The Department and Division agree with this recommendation, and have already implemented procedures to strengthen the cash receipt controls by changing the invoice letter to instruct owners to remit the additional monies owed directly to the Department's cashier. Additionally, Program staff forward a copy of the invoice to the cashier as a notice that an additional payment is forthcoming.

- b. Agree. Implementation date: January 2011.

The Department and Division will strengthen cash controls by requiring the field inspectors to forward all cash payments with a copy of the receipt to the cashier's office. The Department will implement a tracking system for receipts issued for cash payments received in the field and reconcile receipt books on a routine basis.

---

## **Information Management**

Whether via electronic systems or other means, good information management represents the ability to routinely compile, track, analyze, and report on key programmatic data in a manner that informs decisionmaking, facilitates reporting to stakeholders and policymakers, enables internal and external monitoring and evaluation, and supports the achievement of program goals and objectives. Good information management practices are critical for effective administration of regulatory programs such as the Anhydrous Ammonia Program in which protecting the public's health and safety is paramount.

As discussed throughout the audit report, problems with the Division's data, data systems, and information management practices emerged as a common theme. The Anhydrous Ammonia Program is targeted at the tank level; however, the Division's data systems and information management practices are not set up to track uniquely identified tanks and related tank-level information over time. This is a fundamental problem that significantly limits the Division's ability to conduct tank-level analysis and reporting for any of its registration, inspection, and enforcement functions. Additionally, we identified the following related concerns:

- **Tank inventories and registration counts.** The Division does not have complete, accurate, and reliable reporting of tank inventories and registration counts. Tank inventory reports pulled from the Division's licensing system did not include any bulk storage tanks nor list all nurse tanks and applicators in inventory. In addition, system-produced registration counts did not include all nurse tanks and applicators, business locations, and bulk tank sites that had been registered at some point during the registration period.
- **Inspection and enforcement data.** The Division does not compile tank-level inspection data into a centralized database and track and analyze these data over time. Consequently, the Division is unable to efficiently monitor and report on individual tank inspection histories over time, tank-specific inspection coverage, overall inspection coverage, or summary inspection results by business or statewide. Additionally, leveraging the available inspection data is essential to the Division's follow-up inspection and enforcement actions to ensure that owners address tank safety violations.

The Division manages the Anhydrous Ammonia Program through hardcopy files, as well as multiple sources of electronic data: the licensing system for registration data, a field activity reporting system and stand-alone inspection report spreadsheets for inspection data, and a stand-alone database for inspector workload and productivity data. However, these multiple data sources lack the integration required to routinely compile, track, analyze, and report on key programmatic data. For example, as discussed previously, calculating inspection coverage rates requires a link between the inspection data and the registration data. Such a link does not currently exist. Contributing to integration issues is the fact that different data sources use different time frames. For example, the Division's licensing system tracks data on a calendar-year basis to be consistent with the registration period. However, the Division's stand-alone inspection workload database tracks inspectors' workload data (e.g., number of inspections completed, number of tanks passed and failed) from February 1 through January 31 for the purpose of completing inspectors' performance evaluations, which are due by March 31 each year.

Fundamentally, the Division's inability to routinely compile, track, analyze, and report on key programmatic data is rooted in a lack of alignment between the Anhydrous Ammonia Program's business needs, data systems, and information management practices and the prioritization of resources to meet these needs. During our audit the Department reported that it is working on developing a new enterprise system that will replace and/or integrate many of the Division's systems and critical applications. As this process moves forward, the Department and Division should adhere to systems development life cycle principles. In general, the systems development life cycle includes different phases for identifying system requirements, system design and development, data validation and system testing, user training and ownership, and ongoing operations and maintenance. Specifically, the Department and the Division should work together to identify the specific data needs, system requirements, reporting capabilities, and other functions necessary to effectively manage the registration, inspection, and enforcement processes for the Anhydrous Ammonia Program. Program needs should be communicated to the systems development team to ensure that the new system is designed and developed to support these needs. Additionally, since developing a new system will likely take time, the Department and the Division should develop interim solutions, which could include manual compilation and tracking of data, to achieve better analysis and reporting for the Anhydrous Ammonia Program given current system capabilities until the new system can be fully implemented.

---

### **Recommendation No. 7:**

The Department of Agriculture and the Inspection and Consumer Services Division should work together to ensure the Division's ability to routinely compile, track, analyze, and report on key programmatic data for the Anhydrous Ammonia Program. Specifically, the Department and the Division should:

- a. Identify the specific data needs, system requirements, reporting capabilities, and other functions necessary to effectively manage the Program's registration, inspection, and enforcement processes. Program needs should be communicated to the systems development team to ensure that the new system is designed and developed to support these needs.
- b. Develop interim solutions to achieve better data analysis and reporting for the Program given current system capabilities until the new system can be fully implemented.



## **Department of Agriculture and Inspection and Consumer Services Division Response:**

- a. Agree. Implementation date: July 2012.

The Department has commenced a complete revision of the Centralized Demographic Database (CDD) system, which includes the licensing and inspection databases for all of the Department's licensing programs. A complete rewrite of the Division's Anhydrous Ammonia Program components will be included in this project.

- b. Agree. Implementation date: January 2011.

The Department and Division will work together to modify the existing database to improve the data and reports available to management until the new system is implemented.

---

**Appendix A**  
**Anhydrous Ammonia Consumption<sup>1</sup> (In Tons) by State**  
*Calendar Year 2007*

State	Anhydrous Ammonia Tons Consumed	Percent of Total	State	Anhydrous Ammonia Tons Consumed	Percent of Total
Iowa	781,731	18.4%	North Carolina	4,282	0.1%
Illinois	730,021	17.2	Arizona	3,658	0.1
Kansas	390,761	9.2	Georgia	3,362	0.1
North Dakota	381,674	9.0	Utah	2,278	0.1
Minnesota	321,589	7.6	Mississippi	1,400	<0.1
Indiana	298,720	7.0	Nevada	1,393	<0.1
Nebraska	274,964	6.5	Alabama	1,159	<0.1
Missouri	183,291	4.3	Florida	762	<0.1
California	122,757	2.9	Virginia	658	<0.1
Texas	102,452	2.4	Pennsylvania	473	<0.1
Ohio	94,768	2.2	South Carolina	409	<0.1
Kentucky	78,253	1.8	Arkansas	266	<0.1
Washington	73,107	1.7	New Jersey	96	0.0
Wyoming	71,711	1.7	Vermont	15	0.0
Oklahoma	55,170	1.3	Maryland	8	0.0
Wisconsin	51,733	1.2	Rhode Island	3	0.0
Michigan	45,245	1.1	New Hampshire	2	0.0
<b>Colorado</b>	<b>42,458</b>	<b>1.0</b>	Alaska	0	0.0
South Dakota	36,594	0.9	Connecticut	0	0.0
Oregon	32,138	0.8	Delaware	0	0.0
Idaho	24,275	0.6	Hawaii	0	0.0
Montana	10,462	0.2	Maine	0	0.0
Tennessee	9,217	0.2	Massachusetts	0	0.0
New Mexico	5,744	0.1	West Virginia	0	0.0
New York	5,659	0.1	<b>Total</b>	<b>4,249,987</b>	<b>100.0%</b>
Louisiana	5,269	0.1			

**Source:** American Association of Plant Food Control Officials and The Fertilizer Institute.

<sup>1</sup> Data are based on fertilizer consumption information submitted by state fertilizer control officials, which includes total fertilizer sales or shipments. Figures only apply to consumption of anhydrous ammonia for use as an agricultural fertilizer.

## Appendix B

### Anhydrous Ammonia Nurse Tank



**Source:** U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

The electronic version of this report is available on the website of the  
Office of the State Auditor  
**[www.state.co.us/auditor](http://www.state.co.us/auditor)**

A bound report may be obtained by calling the  
Office of the State Auditor  
**303.869.2800**

Please refer to the Report Control Number below when requesting this report.

**Report Control Number 2058**