

## **Section 3: Railroads and Anhydrous Ammonia Transport** *60 min.*

### **Lesson Goal**

After completing this lesson, the student shall have the knowledge and skills to help them respond to rail transportation emergencies involving anhydrous ammonia safely and efficiently

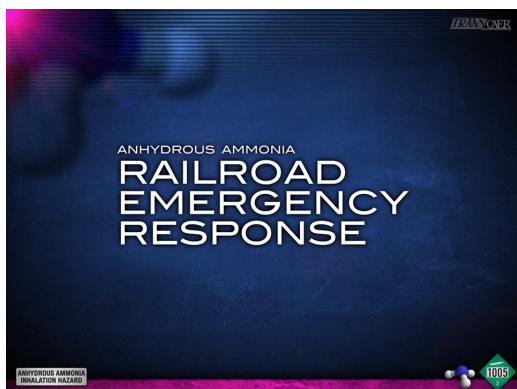
### **Objectives**

Upon successful completion of this section, the student should be able to:

1. Contact and work with the railroad
  - a. Explain the importance of contacting the railroad
  - b. Explain how to contact the railroad
  - c. Explain the information needed by the railroad
  - d. Explain the resources does the railroad brings to the incident
  - e. Explain the role of the railroad in ICS
2. Assess the incident
  - a. Explain the use of shipping papers to identify materials
  - b. Explain the importance of the reporting marks and number on the shipping paper
  - c. Recognize shipments of anhydrous ammonia
3. Identify pressure tank cars for transporting anhydrous ammonia
  - a. Explain construction features of tank cars transporting anhydrous ammonia
  - b. Explain the importance of safety systems on tank cars in transporting anhydrous ammonia (shelf couplers, head shields, thermal protection and jackets)
  - c. Explain the types of service equipment found on tank cars transporting anhydrous ammonia (valves and fittings – liquid eduction lines, vapor eduction lines, pressure relief valves, gauging devices, sample line, thermometer well)
4. Assess tank car damage
  - a. Explain the importance of using the railroad teams to do damage assessment

# I. RAILROADS AND ANHYDROUS AMMONIA TRANSPORT

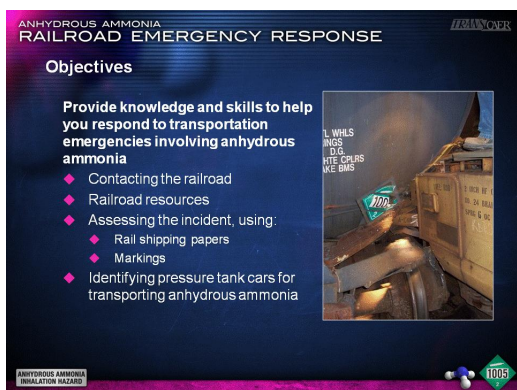
**Instructor Note:** The purpose of this section is to introduce students to the rail transportation of anhydrous ammonia.



## A. Transporting Hazardous Materials by Rail

1. DOT reported that over 1.7 million bulk shipments are transported every year by rail
2. 99.96% of those shipments arrive at the destination without incident
3. When accidents happen you are not alone in handling the incident. The railroads are prepared to help you





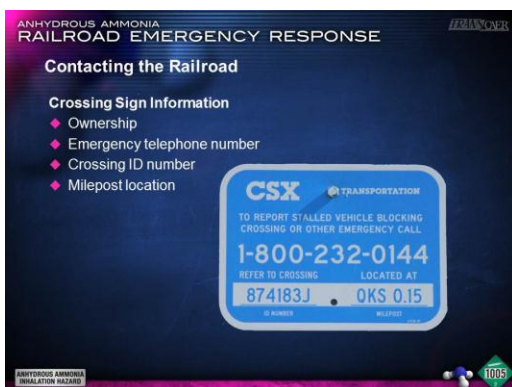
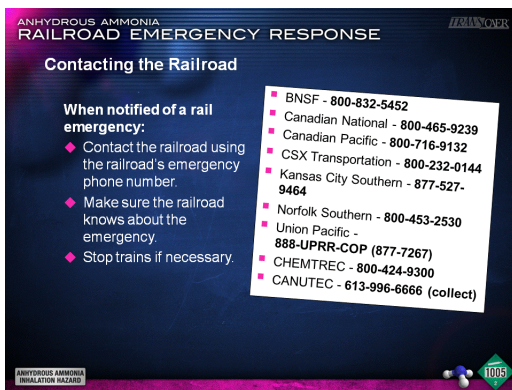
## B. Objectives

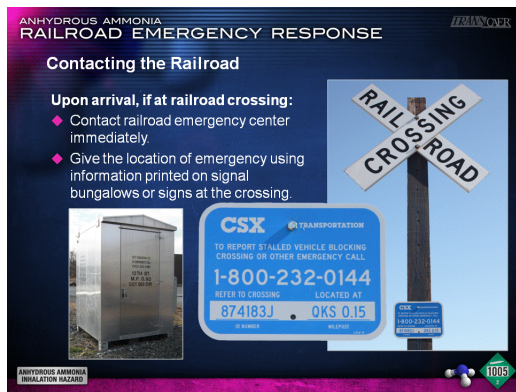
1. Contact and work with the railroad
  - a. Explain the importance of contacting the railroad
  - b. Explain how to contact the railroad
  - c. Explain the information needed by the railroad
  - d. Explain what resources the railroad brings to the incident
  - e. Explain the role of the railroad in ICS
2. Assess the Incident
  - a. Explain the importance of shipping papers to identify materials in the train
  - b. Explain the importance of the reporting marks and numbers on the shipping paper
  - c. Recognize shipments of anhydrous ammonia
3. Identify pressure tank cars for transporting anhydrous ammonia
  - a. Explain construction features of tank cars transporting anhydrous ammonia

- b. Explain the importance of safety systems on tank cars in transporting Anhydrous Ammonia (shelf couplers, head shields, thermal protection and jackets)
  - c. Explain the types of service equipment found on tank cars transporting anhydrous ammonia (valves fittings, liquid education lines, vapor education lines, pressure relief valves, gauging devices, sample line, thermometer well)
4. Assess tank car damage
    - a. Explain the importance of using railroad teams to do damage assessment

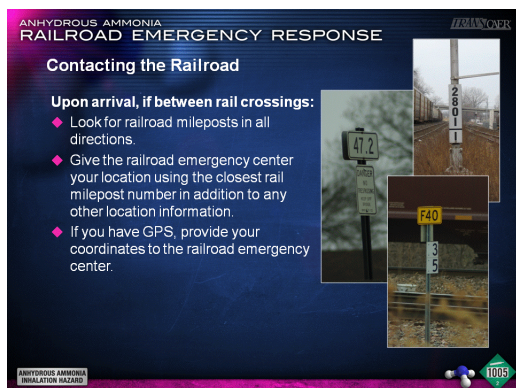
## C. Contacting the Railroad

1. When notified of a rail emergency make sure the railroad is aware that you are responding
2. You may have received a call through 911 but the railroad may not be aware of the emergency
3. You will want to request that all incoming trains are stopped in a safe location





4. Upon arrival if at a rail crossing
  - a. Contact the railroad emergency number immediately
  - b. Give the location using information printed on the signal bungalow or signs at the crossing
  - c. Information provided on the sign includes: the railroad name, 24 hour emergency contact number, the mile post, US DOT crossing numbers
  - d. Discuss the information on the railroad signs



5. Upon arrival if between rail crossings
  - a. Look for railroad mileposts in all directions
  - b. Give the railroad emergency center your location using the closest rail milepost or other pertinent location information
  - c. If you have GPS, provide your coordinates
  - d. Discuss the information on railroad signs





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**Railroad Resources**

**Railroad Emergency Center**

- ◆ Stay in contact with the emergency center - you are their eyes and ears.
- ◆ They are staffed 24 hrs/day.
- ◆ They make reports/calls to CHEMTREC, National Response Center and shippers.
- ◆ They make mandatory notifications to state and federal agencies.

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## D. Railroad Resources


1. Stay in contact with the railroad emergency center
2. They are staffed 24 hours per day
3. Railroad emergency centers are typically co-located with the primary dispatching center for controlling trains and railroad operations
4. They make reports/calls to Chemtrec<sup>®</sup>, National Response Center, and shippers
  - a. They maintain communication with these agencies
  - b. Chemtrec<sup>®</sup> can set up a land bridge communication with all these agencies as necessary
5. They make mandatory notifications to state and federal agencies
6. Railroad emergency centers may have detailed GIS mapping
7. Railroads can share this information with responders

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RAILROAD EMERGENCY RESPONSE

**Railroad Resources**

**Geographic Information System - GIS**

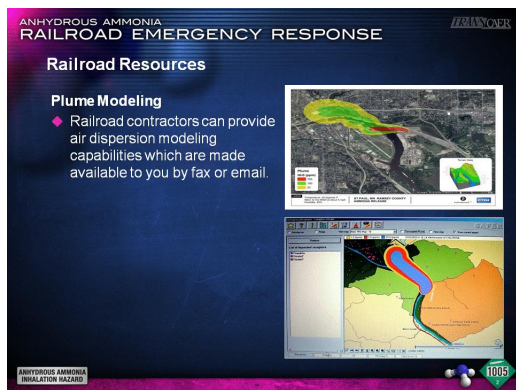
- ◆ Railroad emergency centers may have detailed GIS
  - ◆ Maps include data on pipelines, infrastructure, soil types, streams, waterways, environmentally sensitive areas, schools, hospitals, etc.
- ◆ Railroads share this information about handling the incident.



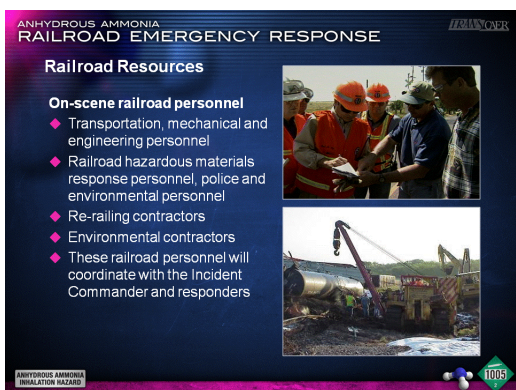
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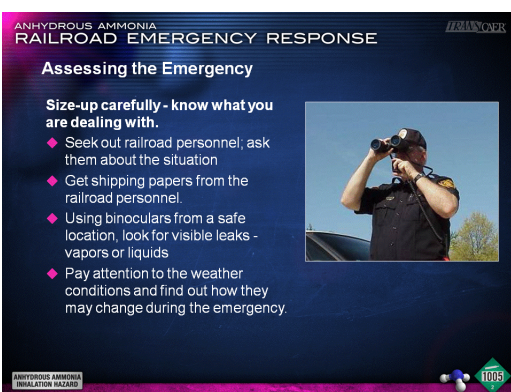
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8. Railroads can assist by providing plume modeling through contracted vendors



9. The railroad will provide on-scene personnel
  - a. Transportation, mechanical and engineering management staff
  - b. Hazardous materials response, environmental response and railroad police
  - c. Re-railing contractors
  - d. All these personnel will coordinate with the Incident Commander and responders



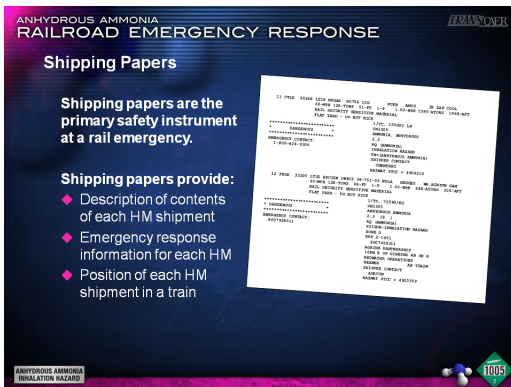
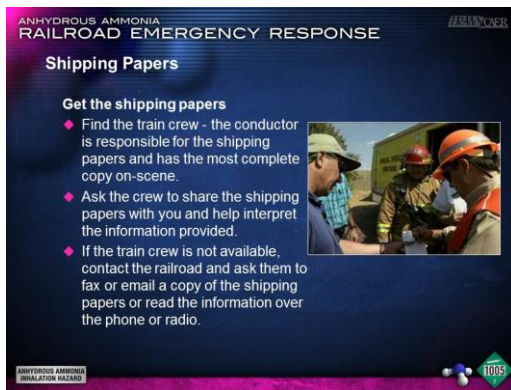
## E. Assessing the Emergency

1. Size up the scene carefully so you can understand the full breadth of the emergency
2. Seek out railroad personnel for assistance

3. Get shipping papers from the railroad personnel
4. From a safe distance assess for leaks, or vapors, or liquids
5. Pay attention to the weather and be ready for any changes to current weather

## F. Railroad Shipping Papers

1. Find the railroad crew to obtain the shipping papers- the conductor is responsible for the shipping papers and will have the most complete copy on scene
2. Ask the crew to share the shipping papers and help you interpret them
3. If the train crew is not available, contact the railroad and ask them to fax or email a copy of the shipping papers or ask them to read the shipping papers over the phone or radio
4. Shipping papers are the primary safety instrument at a rail emergency when hazardous materials are involved. They provide:
  - a. Description of contents of each hazardous material on the shipment





- b. Emergency response information for each hazardous material on the train
- c. Position of the hazardous material shipments in the train
- d. Note the shipping paper shown provides shipping description entries for two shipments of anhydrous ammonia - one for a U.S. shipment and one for a Canadian shipment
- e. These shipping description entries are shown in subsequent slides for discussion of the differences between the U.S. and Canadian entries

5. The rail shipping papers (train list, train consist, wheel report (called by different names on different railroads) will show:

- a. Line number-typically railroads designate the car's position (line number) from the front of the train, but may designate that position from the rear of the train
- b. Emergency contact telephone number

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RAILROAD EMERGENCY RESPONSE**

**Shipping Papers**

**Key information for each hazardous material on the train:**

- ◆ Line number
- ◆ Emergency contact number
- ◆ Reporting marks (initials) and number
- ◆ Shipping description entries

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19 UTLX 95248 1L19 HFGRS R0754 TCG DUEB R80S IN ZAP COOL
60-MPH 126-TONS 51-FT 1-P 1.00-BK 1585-ATONS 1068-APT
RAIL SECURITY SENSITIVE MATERIAL
FLAT YARD - DO NOT KICK
***** 1/TC, 150000 LB *****
***** UNLOS *****
***** DANGEROUS ***** AMMONIA, ANHYDROUS
***** 2.2 *****
***** EQ (AMMONIA) *****
***** EMERGENCY CONTACT ***** INHALATION HAZARD
***** 1-800-424-9300 ***** TM-(ANHYDROUS AMMONIA)
***** SHIPPER CONTACT *****
***** CHEMFREC *****
***** HAZMAT STIC = 4904210 *****
  
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ANHYDROUS AMMONIA  
INHALATION HAZARD

**ANHYDROUS AMMONIA  
RAILROAD EMERGENCY RESPONSE**

**Shipping Papers**

**Train List - "Cars Listed from Rear of Train"**

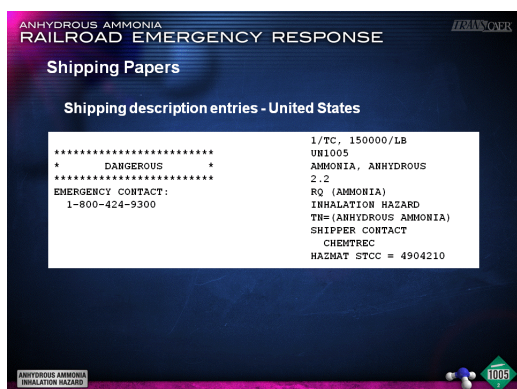
CARS LISTED FROM REAR OF TRAIN

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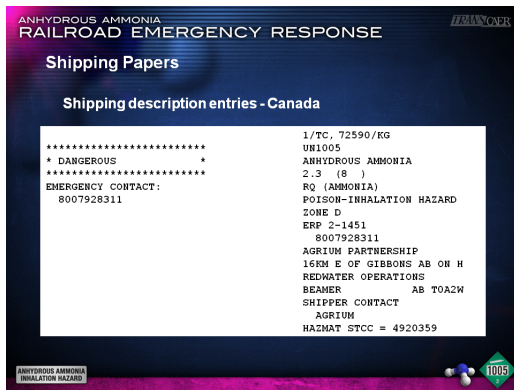
TRAIN/DIR- 0809 14 WITH FOLLOWING CARS DES MOINES IA TIME- 09/17 2205
REQ EQUIPMENT ID AND COMDTY DESTN STR/CARR WHEEL CITY/STATE CONSIGNEE
BLOCK-- BLK# X 344
1 ORLE 20884 L65L FIRM 09570 ORLE COESHA TX RED MAN FT
60-MPH 81-TONS 58-FT 1-P 1.0-BK 212-ATONS 118-APT
2 MP 782062 L240 SUGAR T9250 BNSF BNSF WILCHEER OH MERZEL AGO
3 UTLX 95248 1L19 HFGRS R0754 TCG DUEB R80S IN ZAP COOL
60-MPH 126-TONS 51-FT 1-P 1.00-BK 1585-ATONS 1068-APT
RAIL SECURITY SENSITIVE MATERIAL
FLAT YARD - DO NOT KICK
***** 1/TC, 15132/RS *****
***** UNLOS *****
***** DANGEROUS ***** AMMONIA, ANHYDROUS
***** 2.2 *****
***** EQ (AMMONIA) *****
***** EMERGENCY CONTACT ***** INHALATION HAZARD
***** 1-800-424-9300 ***** TM-(ANHYDROUS AMMONIA)
***** SHIPPER CONTACT *****
***** CHEMFREC *****
***** HAZMAT STIC = 4904210 *****
  
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ANHYDROUS AMMONIA  
INHALATION HAZARD

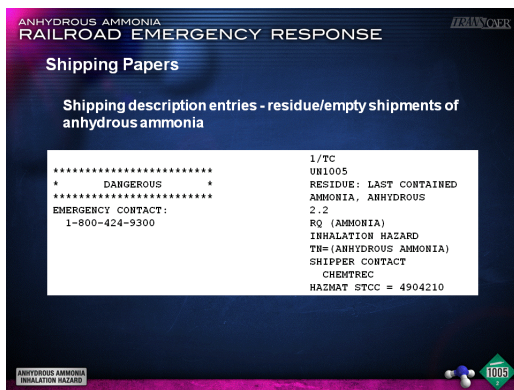
- c. Reporting marks (initials) and numbers: Cars are identified on the train by this number.
  - i. This car's reporting mark and number is UTLX 95248 which uniquely identifies this car
  - ii. No other car in North America will have these initials or numbers
  - iii. Similar to a car's license plate
  - iv. Match the cars reporting marks and number to the shipping papers
- d. Shipping description entries-U.S. shipments of anhydrous ammonia
  - i. Hazmat is quickly identified on shipping papers by the presence of a box of asterisks. This box of asterisks may contain wording or not. Shipping papers for anhydrous ammonia will typically show DANGEROUS or HAZMAT. Other hazardous material shipments will show one of the following:



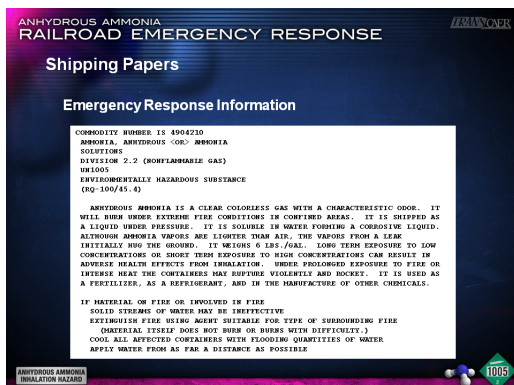
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- (a) Hazmat
  - (b) Dangerous
  - (c) Poison Gas
  - (d) Explosives
  - (e) Radioactive
  - ii. Emergency Contact number
  - iii. Total quantity of product
  - iv. Identification number- (possibly two locations)
  - v. Proper shipping name
  - vi. Hazard class
  - vii. Packing group (not required for NH3)
  - viii. Reportable Quantity designation
  - ix. Inhalation Hazard notification
  - x. Trade Name notation
  - xi. Shipper contact
  - xii. Hazardous Material STCC (Standard Transportation Commodity Code)
  - xiii. Shipper Consignee info (if provided)



6. Shipping description entries - Canadian shipment of anhydrous ammonia. Note differences in the Canadian shipping description entries for anhydrous ammonia
  - a. Hazard Class is 2.3 (Poison Gas) not 2.2 (Flammable Gas)
  - b. Poison-Inhalation Hazard, not just Inhalation Hazard as in US
  - c. Also provides Canadian emergency response plan information

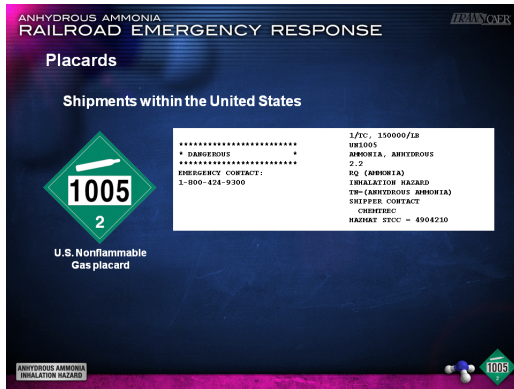


7. Residue Shipments
  - a. Tank cars that have been unloaded typically have small amounts of residue in them
  - b. Regulations require that shipping papers for residue shipments display the notation "Residue: Last Contained" before the proper shipping name
  - c. These containers will still be placarded like a loaded car



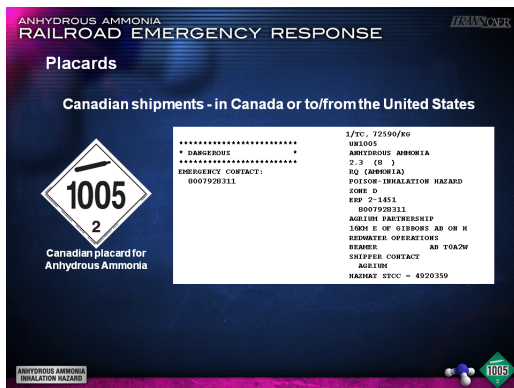
8. Emergency Response Information
  - a. U.S. railroads include emergency response information in or with their train documents
  - b. This emergency response information is more product specific than the Emergency Response Guidebook



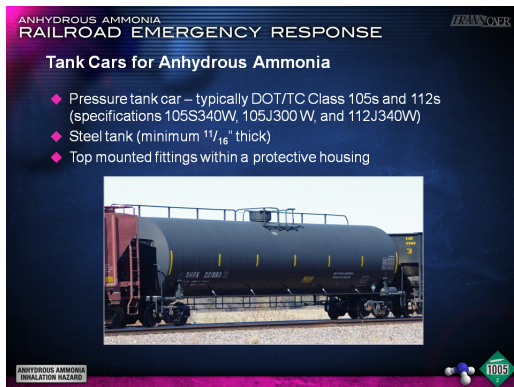


## G. Placards

1. Anhydrous ammonia shipments in the US will display the green Non-Flammable Gas 2.2 placard on both sides and both ends of the tank car



2. Anhydrous ammonia shipments in Canada will display the white Canadian anhydrous ammonia placard
3. Reciprocity between Transport Canada and US DOT allow for the Canadian anhydrous ammonia placard to be displayed in the US for shipments to and from Canada only

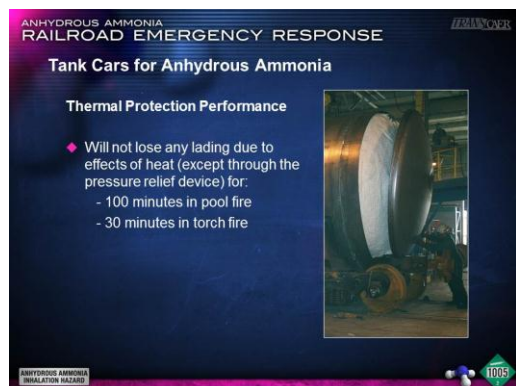
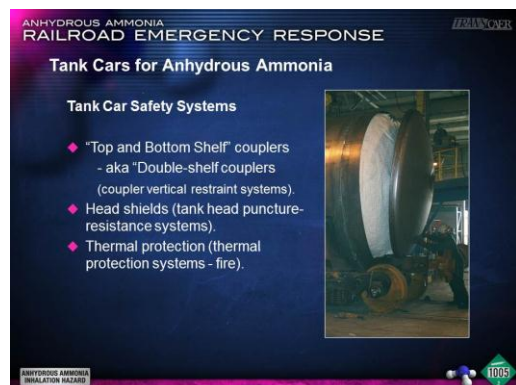
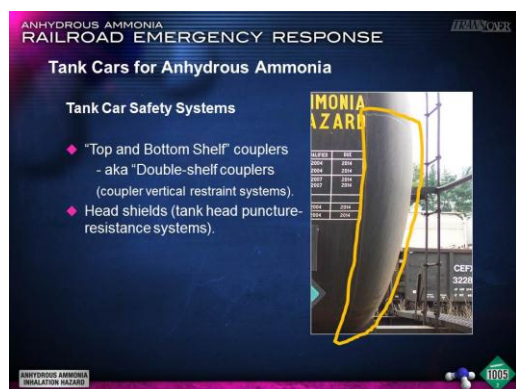
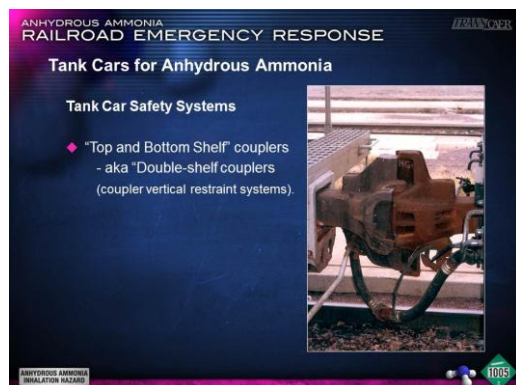


## H. Anhydrous Ammonia Rail Tank Cars

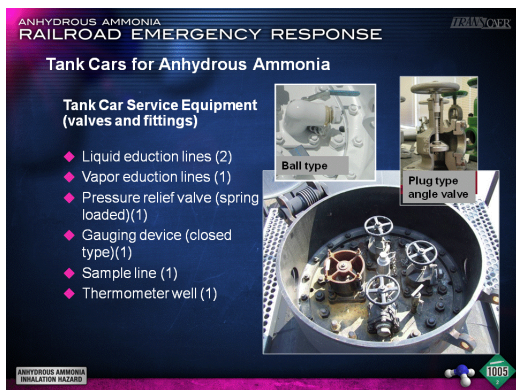
1. Are pressure tank cars
2. All tank cars are built to US DOT, Transport Canada, and/or American Association of Railroads regulations/specifications

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3. Tank cars for anhydrous ammonia:
    - a. Typically DOT Class 105s and 112s
    - b. Steel tank at least 11/16" thick with a 1/8" thick jacket. The jacket is not designed to hold the product. Jacketed tanks are recognized by the following characteristics:
      - i. Flashing over body bolster (or cradle)
      - ii. Rough weld seams-wide, smooth crowns to welds, widely spaced along the tank side tells you that you are looking at a non-jacketed tank
      - iii. Weld seam on the tank head or end of car
      - iv. Patches are welded onto the jacket; tank car tanks are not patched
    - c. Top mounted fittings inside a protective housing
    - d. Capacity of 34,500 gallons but due to outage requirements will contain less than 30,000 gallons

## I. Tank Car Safety Systems for Anhydrous Ammonia

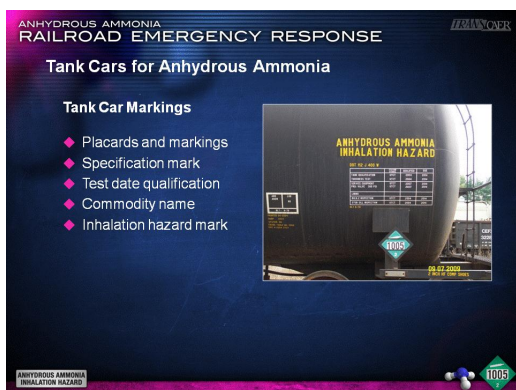


1. Double Shelf Couplers (coupler vertical restraint systems)
  - a. All tank cars in North America transporting hazardous materials must be equipped with double shelf couplers
  - b. The shelves attached to the top and bottom of the coupler are designed to keep the cars coupled and avoid punctures to adjacent cars during a derailment
2. Head Shields (tank head puncture-resistance systems)
  - a. Half or full head shields to protect the head of the tank are required for liquefied compressed gases or materials in US DOT Hazard Class 2
  - b. They may be separate and visible but may be built as part of the jacket head
3. Thermal Protection
  - a. Thermal protection is typically held in place with a jacket
  - b. Thermal protection is required for liquefied compressed gasses or materials in US DOT Hazard Class 2



## J. Tank Car Service Equipment - Valves and Fittings

1. Two liquid eduction lines pointing toward the ends of the tank and either ball or plug type control valves
2. One vapor eduction line pointing to the side of the tank car, with ball or plug type valves
3. Pressure relief valve (spring loaded)
4. Gauging device (closed type)
5. Sample line
6. Thermometer well
7. All the above are found inside a protective housing on the top of the car



## K. Tank Car Markings


1. Placards
2. Markings
3. Specification mark
4. Test date qualification
5. Commodity Name
  - a. Required for many hazardous materials
  - b. Match what you see to the train list or shipping papers
6. Inhalation Hazard mark



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### Damage Assessment

Utilize railroad responders to determine damage; they are trained to assess damage to tank cars and other rail equipment.



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## L. Damage Assessment

1. Utilize railroad responders to determine levels of damage
2. They are trained to assess damage to tank cars and other rail equipment
3. There may be jacket damage but not tank damage

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### Damage Assessment

Jacket damage - not leaking.



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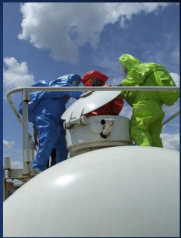
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RAILROAD EMERGENCY RESPONSE

### Questions

- ◆ Contacting the railroad
- ◆ Railroad resources
- ◆ Assessing the incident, using:
  - ◆ Rail shipping papers
  - ◆ Markings
- ◆ Tank cars for transporting anhydrous ammonia



Remember, you are NOT out there alone.  
Railroad response personnel are on their way to help.

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## M. Summary

1. Contact and work with the railroad
  - a. Explain the importance of contacting the railroad
  - b. Explain how to contact the railroad
  - c. Explain the information needed by the railroad
  - d. Explain what resources the railroad brings to the incident
  - e. Explain the role of the railroad in ICS

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## 2. Assess the Incident

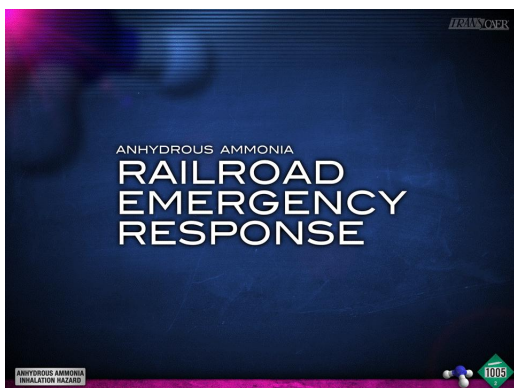
- a. Explain the importance of shipping papers to identify materials in the train
- b. Explain the importance of the reporting marks and numbers on the shipping paper
- c. Recognize shipments of anhydrous ammonia

## 3. Identify pressure tank cars for transporting anhydrous ammonia

- a. Explain construction features of tank cars transporting anhydrous ammonia
- b. Explain the importance of safety systems on tank cars in transporting anhydrous ammonia (shelf couplers, head shields, thermal protection and jackets)
- c. Explain the types of service equipment found on tank cars transporting anhydrous ammonia (valves fittings, liquid eduction lines, vapor eduction lines, pressure relief valves, gauging devices, sample line, thermometer well)

## 4. Assessing tank car damage

- a. Explain the importance of using railroad teams to do damage assessment



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## **EMERGENCY RESPONSE CONTACT NUMBERS**

<b>Burlington Northern Santa Fe</b>	<b>800-832-5452</b>
<b>Canadian National</b>	<b>800-465-9239</b>
<b>Canadian Pacific</b>	<b>800-716-9132</b>
<b>CSX Transportation</b>	<b>800-232-0144</b>
<b>Kansas City Southern</b>	<b>877-527-9464</b>
<b>Norfolk Southern</b>	<b>800-453-2530</b>
<b>Union Pacific</b>	<b>888-877-7267</b>
<b>CHEMTREC®</b>	<b>800-424-9300</b>
<b>CANUTEC</b>	<b>613-996-6666 (call collect)</b>

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The materials developed for the Anhydrous Ammonia Training Tour 2011 are intended to provide general understanding and guidance to emergency responders in addressing anhydrous ammonia incidents. They include information about the chemical and helpful considerations that the emergency responder can employ when faced with such an incident. The materials are in no way intended to be prescriptive or otherwise recommend specific procedures on how to respond. Emergency responders are encouraged to consult with the product manufacturer, carrier and other experts when assessing and managing any incident involving anhydrous ammonia.