

**TENNESSEE VALLEY AUTHORITY  
COO TECHNICAL TRAINING**

Industrial Safety Training

**TRAINING PROGRAM**

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Contractor and Non-TVA Personnel Safety Training

00059225

**COURSE TITLE**

**ATIS NO.**

Site Access and Safe Work Practices for Non-Clearance Activities

**LESSON TITLE**

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<b>PREPARED BY</b>	----- Signature / Date
<b>G. Sinkfield</b>	
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**SAFETY TRAINING  
REVISION/USAGE LOG**

Rev.	Description of Change	Date	Pages Affected	Reviewed by
0	Initial issue.	10/01/10	All	T Pitchford

- I. **PROGRAM**: Industrial Safety Training
- II. **COURSE**: Contractor and Non-TVA Personnel Safety Training
- III. **LESSON TITLE**: Site Access and Safe Work Practices for Non-Clearance Activities
- IV. **LENGTH OF LESSON/COURSE**: 90 minutes
- V. **PREREQUISITES**: None

VI. **TRAINING OBJECTIVES**

A. Terminal Objective

Upon completion of this course, you will demonstrate your knowledge of the various responsibilities that are required of Contractors and Non-TVA Personnel. Successful completion of the material requires a minimum score of 80 percent on a written examination and the completion of course evaluation documents, where applicable. The successful participant will be provided unescorted access for performing non-clearance required activities at any of the properties that are owned and operated by the TVA.

B. Enabling Objectives

1. State the purpose and scope of TVA procedures used to isolate equipment from hazardous energy sources.
2. Recognize all protective tags and lockout devices that are used to isolate equipment and components from hazardous energy sources.
3. State the responsibilities of personnel in the vicinity of equipment that is isolated from hazardous energy sources.
4. Understand the potential physical hazards and health hazards associated with Combustible Dust.
5. Understand how to reduce the risks and hazards of Combustible Dust including the reporting of hazardous Combustible Dust levels
6. Recognize the basic properties of gaseous and liquid ammonia, and the ways to detect the presence of gaseous ammonia.
7. Understand how to properly escape the presence of gaseous ammonia and how to report a gaseous ammonia leak.
8. Understand the symptoms of personnel that have been exposed to ammonia, and the immediate first aid actions to be performed on personnel with acute ammonia exposure

**B. Enabling Objectives Continued**

9. Understand the emergency evacuation plans and individual responsibilities and accountabilities for personnel onsite during an ammonia release event .

**VII. TRAINING AIDS:**

- A. Computer with projector for Power Point Presentation
- B. Whiteboards and markers

**VIII. TRAINING MATERIALS (include props):**

- A. Computer based training (CBT) or PowerPoint file
- B. Emergency Evacuation Plans (handouts)
- C. Training Ground Rules (handout)

**IX. REFERENCES**

- A. TVA Safety Procedure 613, "Clearance Procedure to Safely Control Hazardous Energy Using Group Tag Out" TVA Safety Manual.
- B. TVA Safety Procedure 615, "Lockout / Tagout (LOTO)" TVA Safety Manual.
- C. TVA Safety Procedure 816, "Combustible Dust" TVA Safety Manual.
- D. TVA Safety Procedure 405 "Ammonia Awareness Course Standard" Revision 0
- E. TVA Safety Procedure 901 "Ammonia" Revision 0

**Safety Training**  
**COO Technical Training**

**SITE ACCESS AND SAFE WORK PRACTICES  
 FOR NON-CLEARANCE ACTIVITIES**

Clearance Procedure
Combustible Dust
Ammonia Awareness
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**X. Lesson Body**

- A. Participants Entering & Round Table Introduction

**Instructor Notes**

Project slide 5 on to screen while participants are entering the training area.

After all are seated, pass out and discuss the **Training Ground Rules** before the start of training

Conduct a roundtable introduction

## Introduction

Safety Training  
COO Technical Training

### Introduction

This course is designed to provide Contractors and Non-TVA personnel with the essential information for promoting site access and general work practice safety. An understanding of protective tags, lockout devices, essential human performance tools, and the basic safety rules to utilize while in the vicinity of isolated equipment and energy sources shall be discussed. This course shall also address generic and site specific fossil plant hazards and the Emergency Evacuation Plans associated with these hazards (site specific Evacuation Plan handouts will be provided).

Clearance Procedure

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## X. Lesson Body

### Instructor Notes

#### A. Introduction

This course is designed to provide Contractors and Non-TVA personnel with the essential information for promoting site access and general work practice safety. An understanding of protective tags, lockout devices, essential human performance tools, and the basic safety rules to utilize while in the vicinity of isolated equipment and energy sources shall be discussed. This course shall also address generic and site specific fossil plant hazards and the Emergency Evacuation Plans associated with these hazards (site specific Evacuation Plan handouts will be provided).

Read the ***Introduction*** and elaborate on the purpose below.

#### **Purpose**

- \* Overview of hazards, personal responsibilities, and basic safe work practices
- \* Defn. of signs and markings
- \* Alarm responses discussed

Two (2) graded tests given  
80 percent passing required.  
One for Industrial Safety and  
a separate one for Human  
Performance (HU)

Handout will be given of  
Emergency Evacuation Plan

## Course Objectives

Safety Training  
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### Terminal Objective

Upon completion of this course, you will demonstrate your knowledge of the various responsibilities that are required of Contractors and Non-TVA Personnel. Successful completion of the course requires a minimum score of 80 percent on a written examination and the completion of course evaluation documents, where applicable. The successful participant will be provided unescorted access for performing non-clearance required activities at any of the properties that are owned and operated by the TVA.

Clearance Procedure

Combustible Dust

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## X. Lesson Body

## Instructor Notes

### B. Course objectives

1. **Terminal objective** - Upon completion of this course, you will demonstrate your knowledge of the various responsibilities that are required of Contractors and Non-TVA Personnel. Successful completion of the course requires a minimum score of 80 percent on a written examination and the completion of course evaluation documents, where applicable. The successful participant will be provided unescorted access for performing non-clearance required activities at any of the properties that are owned and operated by the TVA.

Read the Terminal Objectives and elaborate.

<b>Course Objectives</b>			Safety Training COO Technical Training
<p><b>1. State the purpose and scope of TVA procedures used to isolate equipment from hazardous energy sources.</b></p>			
<p><b>2. Recognize all protective tags and lockout devices that are used to isolate equipment and components from hazardous energy sources.</b></p>			
<p><b>3. State the responsibilities of personnel in the vicinity of equipment that is isolated from hazardous energy sources.</b></p>			
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## X. Lesson Body

## Instructor Notes

### B. Course objectives (cont)

#### 2. Enabling objectives

- a. Objective 1 - State the purpose and scope of TVA procedures used to isolate equipment from hazardous energy sources.
- b. Objective 2 - Recognize all protective tags and lockout devices that are used to isolate equipment and components from hazardous energy sources.
- c. Objective 3 - State the responsibilities of personnel in the vicinity of equipment that is isolated from hazardous energy sources.

Read each objective and briefly expound on what it means

<b>Course Objectives</b>			Safety Training COO Technical Training
4. Understand the potential physical hazards and health hazards associated with Combustible Dust.			
5. Understand how to reduce the risks and hazards of Combustible Dust including the reporting of hazardous Combustible Dust levels.			
6. Recognize the basic properties of gaseous and liquid ammonia, and the ways to detect the presence of gaseous ammonia			
Clearance Procedure	Combustible Dust	Ammonia Awareness	9

## X. Lesson Body

## Instructor Notes

### B. Course objectives (cont)

#### 2. Enabling objectives

- d. Objective 4 – Understand the potential physical hazards and health hazards associated with Combustible Dust.
- e. Objective 5 – Understand how to reduce the risks and hazards of Combustible Dust including the reporting of hazardous Combustible Dust levels
- f. Objective 6 – Recognize the basic properties of gaseous and liquid ammonia, and the ways to detect the presence of gaseous ammonia

Read each objective and briefly expound on what it means

<b>Course Objectives</b>		Safety Training COO Technical Training
7. Understand how to properly escape the presence of gaseous ammonia and how to report a gaseous ammonia leak		
8. Understand the symptoms of personnel that have been exposed to ammonia, and the immediate first aid actions to be performed on personnel with acute ammonia exposure		
9. Understand the emergency evacuation plans and individual responsibilities and accountabilities for personnel onsite during an ammonia release event		
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## X. Lesson Body

## Instructor Notes

### A. Course objectives (cont)

#### 2. Enabling objectives

- g. Objective 7 – Understand how to properly escape the presence of gaseous ammonia and how to report a gaseous ammonia leak
- h. Objective 8 – Understand the symptoms of personnel that have been exposed to ammonia, and the immediate first-aid actions to be performed on personnel with acute ammonia exposure
- i. Objective 9 – Understand the emergency evacuation plans and individual responsibilities and accountabilities for personnel onsite during ammonia release event

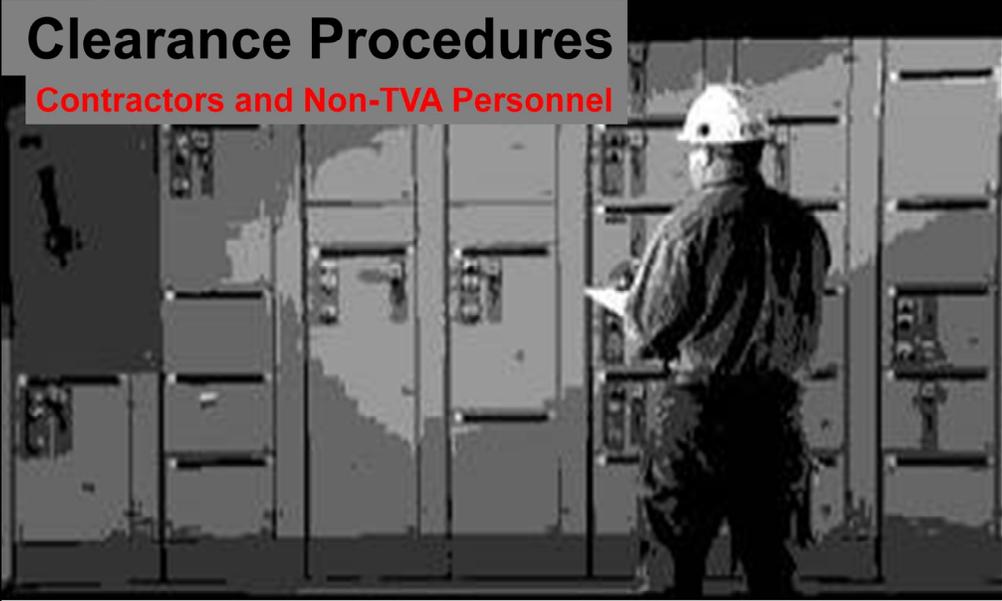
Read each objective and briefly expound on what it means

**Site Access Topic**

Safety Training  
COO Technical Training

# Clearance Procedures

## Contractors and Non-TVA Personnel



Clearance Procedure    Combustible Dust    Ammonia Awareness    11

## X. Lesson Body

## Instructor Notes

### Introduction - Clearances

This section is designed to train Contractors and Non-TVA Personnel of their responsibilities when working in the vicinity of equipment that is isolated from hazardous energy sources. The protective tags and lockout devices used to isolate equipment in this manner will be identified. Also, basic safety rules to follow when in the vicinity of equipment that is isolated, will be presented.

**Course Objectives** Safety Training  
COO Technical Training

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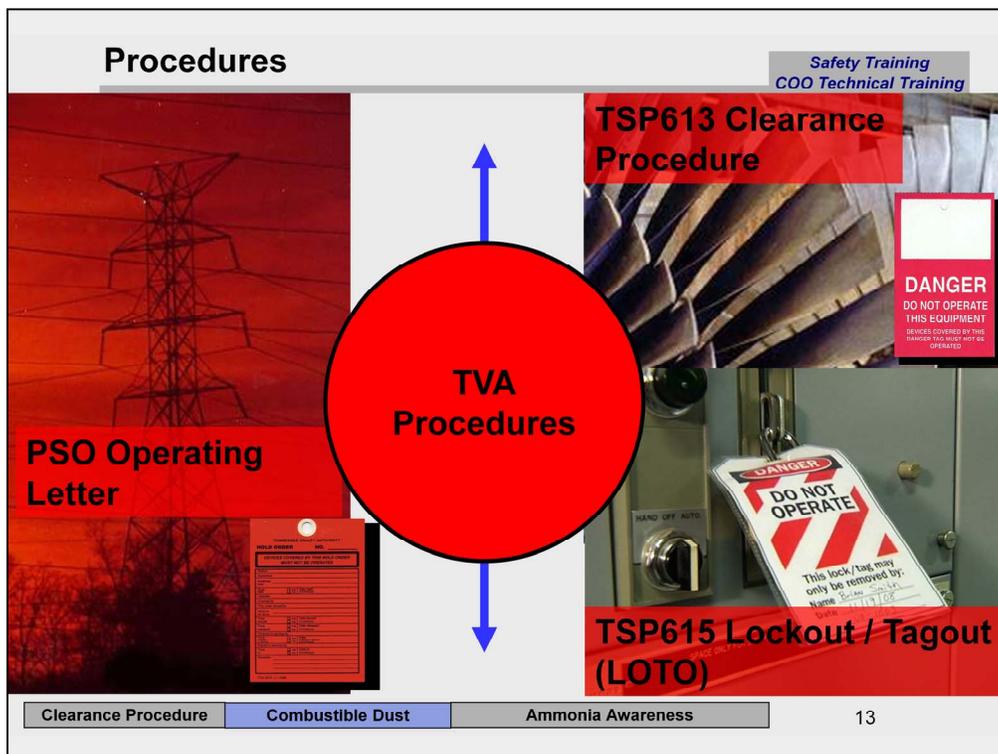
**Objective 1**  
**State the purpose and scope of TVA procedures used to isolate equipment from hazardous energy sources**

Clearance Procedure   **Combustible Dust**   Ammonia Awareness   12

**X. Lesson Body**

**Instructor Notes**

- A. TVA Clearance Procedures  
Objective 1 – State the purpose and scope of TVA procedures used to isolate equipment from hazardous energy sources.



**X. Lesson Body**

**Instructor Notes**

A. TVA clearance procedures (cont)

1. The current Power Systems Operations (PSO) Operating Letter is used to isolate equipment and components of TVA transmission systems, which includes overhead transmission lines, and substations.
2. The TVA Clearance Procedure TSP613 is used to isolate generating plant equipment and components.
3. TVA Safety Procedure TSP615 is used to isolated equipment and components that are not involved in the generation of electricity.

Discuss the different tagging methods of :

PSO – Transmission System  
Ex. – Switchyards & substations

TSP 613 – Generating Facilities  
Ex. – Any plants where electricity is produced.

TSP615 – Non-generating Facilities

Ex. TVA Property with electrical work, such as office buildings and campgrounds.

**Purpose**

Safety Training  
COO Technical Training



- ✓ The primary purpose of TVA Clearance Procedures is to protect personnel & equipment
- ✓ Isolate machines and/or equipment from energy source and rendered non-operative, prior to work activities
- ✓ Color protective tags and locks are used to warn personnel of the hazards involved

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## X. Lesson Body

## Instructor Notes

- A. TVA clearance procedures (cont)
4. Purpose - the primary purpose is to protect personnel, and equipment.
    - a. Before performing work on equipment or components where the unexpected energizing, start up, or release of stored energy could occur and cause injury or property damage, the components and equipment are isolated from energy sources.
    - b. A series of colored protective tags and locks are used to warn all personnel who must work in the vicinity of the isolated equipment of the hazards involved.

## Application

Safety Training  
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**Applies to:**

- ✓ **Work on machines and equipment**
- ✓ **Personnel who work on or are in the vicinity of equipment that is isolated from hazardous energy sources including TVA, contractor, and staff augmented employees**

Clearance Procedure
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Ammonia Awareness

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## X. Lesson Body

## Instructor Notes

- A. TVA clearance procedures (cont)
5. Scope:
    - a. Applies to work on machines, components, and equipment.
    - b. Applies to personnel who work on or in the vicinity of equipment that is isolated from hazardous energy sources. This includes TVA, contractor, and staff augmented employees.

All unescorted personnel must understand these guidelines.

<b>Course Objective</b>			Safety Training COO Technical Training
<b>Objective 2</b> Recognize all protective tags and lockout devices that are used in the isolation of equipment and components from hazardous energy sources			
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**X. Lesson Body****Instructor Notes**

- A. TVA clearance procedures (cont)
  - 1. Protective tags and lockout devices

Objective 2 - Recognize all protective tags and lockout devices that are used in the isolation of equipment and components from hazardous energy sources.

**TSP613 Clearance Procedure**

Safety Training  
COO Technical Training

## Generating Equipment Tags

The image displays three safety tags used at TVA generating sites. The first is a red tag with white text that reads 'DANGER DO NOT OPERATE THIS EQUIPMENT DEVICES COVERED BY THIS DANGER TAG MUST NOT BE OPERATED'. The second is a yellow tag with black text that reads 'CAUTION ORDER Abnormal or hazardous conditions exist. Follow the instructions of this Caution Order. SEE OTHER SIDE' and includes the code 'TVA 19629'. The third is a blue tag with black text that reads 'OPERATING PERMIT This device may be operated only when approved by the holder of this Operating Permit tag. This tag does not signify that the device is deenergized. OPERATING PERMIT See Other Side' and includes the code 'TVA 19632 (9-2004)'.

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## X. Lesson Body

- A. TVA clearance procedures (cont)
1. Generating equipment tags are used at TVA generating sites:
    - a. Danger tag (red with white letters).
    - b. Caution order tag (yellow with black letters).
    - c. Operating permit (blue with black letters).

## Instructor Notes

Notice also the white lettering on the red danger tag for generating equipment.

**TSP615 Lockout / Tagout (LOTO)**

*Safety Training  
COO Technical Training*



## Non-Generating Equipment Lockout / Tagout Devices



Clearance Procedure
Combustible Dust
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## X. Lesson Body

- A. TVA clearance procedures (cont)
2. Non-generating equipment lockout / tagout devices are used on equipment that is not involved in the generation of electricity:
    - a. “Do Not Operate” tag (red, black and white).
    - b. Lockout devices (keyed locks of a standard color).

## Instructor Notes

Note again the black lettering on the danger tag.

## PSO Operating Letter

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# Transmission Clearance Tags

**TENNESSEE VALLEY AUTHORITY**  
**HOLD ORDER NO.** \_\_\_\_\_  
**DEVICES COVERED BY THIS HOLD ORDER**  
**MUST NOT BE OPERATED**

Station \_\_\_\_\_  
 Substation \_\_\_\_\_  
 Type \_\_\_\_\_  
 Held \_\_\_\_\_  
 Covered by \_\_\_\_\_  
 This order issued to \_\_\_\_\_  
 Work to be done \_\_\_\_\_  
 Time \_\_\_\_\_  
 Released \_\_\_\_\_  
 Covered in service by \_\_\_\_\_  
 Time \_\_\_\_\_  
 Placed in service by \_\_\_\_\_  
 Time \_\_\_\_\_  
 Remarks \_\_\_\_\_

TVA 6270 (1-1998)

TVA 6280 (PO-12-72)

**TENNESSEE VALLEY AUTHORITY**  
**HOLD NOTICE FOR HOLD NO.** \_\_\_\_\_

**DEVICES TAGGED WITH**  
**THIS HOLD NOTICE**  
**MUST NOT BE OPERATED**

STATION \_\_\_\_\_  
 ATTACHED TO SWITCH NO. \_\_\_\_\_

THIS HOLD NOTICE IS SUPPLEMENTARY TO THE HOLD ORDER BEARING THE SAME HOLD NUMBER AND COVERING THE SAME EQUIPMENT.  
 THIS HOLD NOTICE MUST NEVER BE USED ALONE TO HOLD OUT OF SERVICE ANY LINES OR EQUIPMENT. IT MUST BE USED ONLY WHEN A HOLD ORDER TO COVER THE SAME HOLD NUMBER IS ATTACHED TO ONE OF THE CONTROL POINTS.

**Tennessee Valley Authority**  
**Caution Order No.** \_\_\_\_\_

**Conditions Abnormal**  
**Follow Instructions Below**

Station \_\_\_\_\_  
 Apparatus \_\_\_\_\_  
 Type of Work \_\_\_\_\_

**For Remote Caution Order**

Breaker Control Handle Number \_\_\_\_\_  
 Time \_\_\_\_\_  
 Placed \_\_\_\_\_  
 If circuit opens automatically, do not close control.

Ordered By \_\_\_\_\_  
 Operator \_\_\_\_\_

**Automatic Recloser Off**  
 Time \_\_\_\_\_  
 Off \_\_\_\_\_  
 If circuit opens automatically, do not close before \_\_\_\_\_ minutes.

**Ordered Normal By**  
 Time \_\_\_\_\_  
 Normal \_\_\_\_\_

TVA 6273 (1-2000)

Clearance Procedure

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## X. Lesson Body

- A. TVA clearance procedures (cont)
  - 3. Power Systems Operations (PSO) Clearance Tags are used on transmission systems equipment:
    - a. Hold Order tag (red, with black letters).
    - b. Hold Notice Tag (white with red letters).
    - c. Caution order tag (yellow with black letters).

## Instructor Notes

The transmission danger tag (PSO) also is red with black letter.

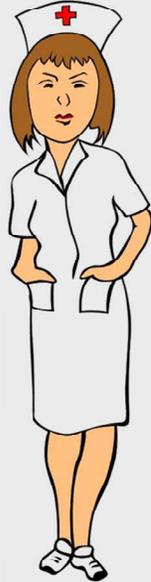
Elaborate on these danger card lettering color differences.

**Affected Personnel Responsibilities**

*Safety Training  
COO Technical Training*

**Objective 3**

**State the responsibilities of personnel in the vicinity of equipment that is isolated from hazardous energy sources**



Clearance Procedure    Combustible Dust    Ammonia Awareness

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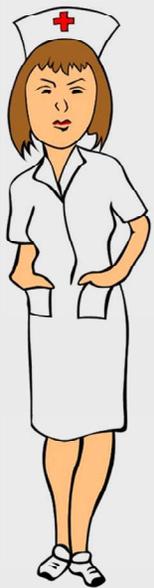
**X. Lesson Body**

**Instructor Notes**

B. Affected Personnel (Contractors and Non-TVA) Responsibilities

Objective 3 – State the responsibilities of personnel in the vicinity of equipment that is isolated from hazardous energy sources.

**Definition**
Safety Training  
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**Affected Personnel:**

**Affected Personnel - anyone in the area of equipment isolated from hazardous energy sources, however, not involved in the work activities**

Clearance Procedure
Combustible Dust
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**X. Lesson Body**

**Instructor Notes**

B. Affected Personnel (Contractors and Non-TVA)  
(cont)

Responsibilities

1. Affected personnel - anyone in the area of equipment isolated from hazardous energy sources, however, not involved in the work activities.

Examples of affected personnel include:  
Plant nurse  
Administrative professionals  
Vendors, Contractors, unescorted others

## Basic Safety Rules

Safety Training  
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**While in the Plant:**

- ✓ Stay on main walkways and do not cross safety barriers
- ✓ Wear PPE to include hardhat, safety glasses, gloves, and hearing protection
- ✓ Do not touch plant equipment and components

Clearance Procedure

Combustible Dust

Ammonia Awareness

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## X. Lesson Body

## Instructor Notes

### B. Affected Personnel (Contractors and Non-TVA) (cont)

#### Responsibilities

2. The power plant environment has many areas that are potentially dangerous. Temperatures as high as 2700 degrees Fahrenheit, and system pressures up to 4,000 psi are present. Also, equipment that is remotely operated can start up unexpectedly. Therefore, when it is necessary for you to be in these operating areas remain on the main walkways whenever possible, and do not cross any safety barriers. Always wear the required personal protective equipment to include hardhat, safety glasses with side shields, gloves, and hearing protection. Refrain from touching equipment such as pumps, valves, controllers, push buttons, control switches, electrical distribution boards, and conduits.

**Basic Safety Rules**

Safety Training  
COO Technical Training

✓ Do not operate equipment that is locked or tagged

✓ Turn in or report any lost or misplaced protective tags or locks to your supervisor



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## X. Lesson Body

## Instructor Notes

### B. Affected Personnel (Contractors and Non-TVA) (cont)

#### Responsibilities

3. Do not operate equipment that is locked and/or tagged.
4. If you find any lost or misplaced protective tags or locks, turn them in to your supervisor, contract manager, site contact, or make your escort aware of the issue.

## Basic Safety Rules



Safety Training  
COO Technical Training

✓ Protective tags and locks are not to be used for any other purpose except that which is allowed by TVA procedures

Clearance Procedure

Combustible Dust

Ammonia Awareness

SEE OTHER SIDE  
**DANGER**  
 DO NOT OPERATE THIS EQUIPMENT

DO NOT OPERATE THIS EQUIPMENT  
 SEE OTHER SIDE

○  
**DANGER**  
 DO NOT OPERATE THIS EQUIPMENT  
DEVICES COVERED BY THIS DANGER TAG MUST NOT BE OPERATED

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**X. Lesson Body**

**Instructor Notes**

- B. Affected Personnel (Contractors and Non-TVA) (cont)
- Responsibilities
5. Protective tags and locks are not to be used for any other purpose except for that which is allowed by TVA procedures.

## Basic Safety Rules

Safety Training  
COO Technical Training



✓ Remember, failure to follow the rules and procedures involving equipment that is isolated from hazardous energy sources can result in injury to yourself and others, and may result in disciplinary action up to and including termination of your TVA employment

Clearance Procedure
Combustible Dust
Ammonia Awareness

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## X. Lesson Body

## Instructor Notes

### B. Affected Personnel (Contractors and Non-TVA) (cont)

#### Responsibilities

6. Remember, failure to follow the rules and procedures involving equipment that is isolated from hazardous energy sources can result in injury to yourself and others, and may result in disciplinary action up to and including termination of your TVA employment.

**Summary**

Safety Training  
COO Technical Training

**TVA procedures used to isolate equipment are among the most important safety procedures**

**Remember:**

- 1. Do not remove or alter protective tags or locks**
- 2. Do not operate any equipment that is locked or tagged**
- 3. Turn in unattached locks & tags to your supervisor**

**Your safety and the safety of others depends on you**



Clearance Procedure    Combustible Dust    Ammonia Awareness    26

## XI. Summary

TVA procedures used to isolate equipment are among the most important safety procedures in the TVA Safety Manual. It is essential that you remember the following when in the vicinity of equipment that is isolated from hazardous energy sources:

1. Do NOT remove or alter protective tags, or locks.
2. Do NOT operate any equipment or component that is locked and/or tagged.
3. Turn in unattached locks and tags to your supervisor on shift.

Remember, your safety and the safety of others depends on you.

**Clearance Procedure**

*Safety Training*  
*COO Technical Training*

**Contractors and Non-TVA Personnel**



**Questions?**

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**XI. Lesson Body**

**Instructor Notes**

Affected Personnel (Contractors and Non-TVA)

Allow for discussion of presented material at this point.



**Course Objectives**

Safety Training  
COO Technical Training

**Objective 4**  
**Understand the potential physical hazards and health hazards associated with Combustible Dust**

Clearance Procedure   **Combustible Dust**   Ammonia Awareness   29

**XI. Lesson Body**

**Instructor Notes**

A. Combustible Dust

Objective 4

Understand the potential physical hazards and health hazards associated with Combustible Dust

Physical and Health Hazards			Safety Training COO Technical Training
<b>Combustible dust</b> presents two (2) potential hazard types:			
<ul style="list-style-type: none"> <li>• <b>Physical hazards</b> that are readily (physically) seen and produce immediate results</li> <li>• <b>Health hazards</b> that once internally introduced, effect personal health but typically without long-term symptoms</li> </ul>			
Clearance Procedure	Combustible Dust	Ammonia Awareness	30

## XI. Lesson Body

## Instructor Notes

### A. Combustible Dust

Two potential hazard types are:

1. Physical hazards that are readily (physically) seen and produce immediate results..
2. Health hazards that once internally introduced, effect personal health but typically without long term symptoms.

## Physical and Health Hazards

Safety Training  
COO Technical Training

- **Physical** hazards include:
  - fires
  - dust fall exposure
  - explosions
  - engulfment
  - etc.
- **Physical** hazards of combustible dust are:
  - primary explosion: combustion (ignition) capability if exposed to an ignition source (spark)
  - secondary combustible dust explosion
  - spontaneous combustion of stagnant combustible dust piles

Clearance Procedure

Combustible Dust

Ammonia Awareness

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### XI. Lesson Body

### Instructor Notes

#### A. Combustible Dust

## Physical and Health Hazards

Safety Training  
COO Technical Training

- **Health** hazards include:
  - asbestosis
  - lead poisoning
  - inorganic arsenic hazards
  - chemical hazards
  - etc.
- **Health** hazards associated with prolonged combustible dust exposure are:
  - silica (quartz) content leading to silicosis
  - pulmonary fibrosis and impaired lung function
  - prolonged exposure can occur during:
    - cleaning operations with limited ventilation
    - air arc cutting and needle gunning coal containment equipment

Clearance Procedure

Combustible Dust

Ammonia Awareness

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### XI. Lesson Body

### Instructor Notes

#### A. Combustible Dust

**Course Objectives** Safety Training  
COO Technical Training

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**Objective 5**  
**Understand how to reduce the risks and hazards of Combustible Dust including the reporting of hazardous Combustible Dust levels**

Clearance Procedure   **Combustible Dust**   Ammonia Awareness   33

**XI. Lesson Body**

**Instructor Notes**

A. Combustible Dust Risks and Hazards

Objective 5

Understand how to reduce the risks and hazards of Combustible Dust including the reporting of hazardous Combustible Dust levels.

**Risks and Hazards** Safety Training  
COO Technical Training

**Combustible dust** explosions typically consist of two (2) distinct explosion types. The **primary** explosion and the **secondary** explosion:

The diagram illustrates the progression of a combustible dust explosion. On the left, a small yellow starburst labeled 'Boom!' is identified as the 'Primary' explosion. A red arrow points from this primary explosion to a much larger yellow starburst on the right, which is labeled 'BOOM!!' and identified as the 'Secondary' explosion.

Clearance Procedure    **Combustible Dust**    Ammonia Awareness    34

**XI. Lesson Body**

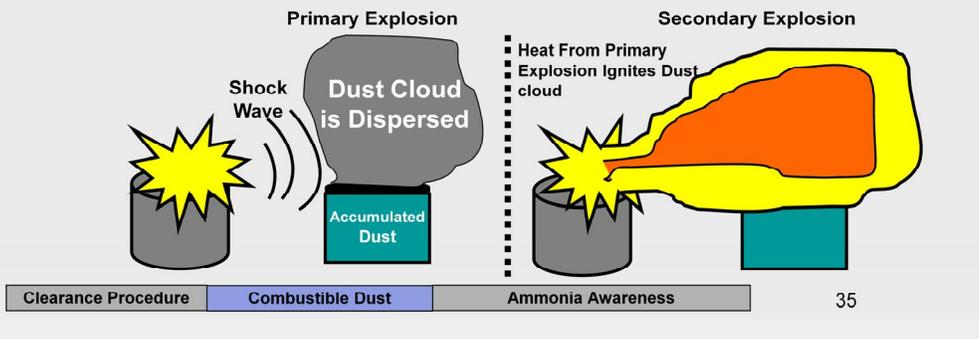
**Instructor Notes**

- A. Combustible Dust Explosions

## Risks and Hazards

Safety Training  
COO Technical Training

- **Primary explosions** – small combustible dust explosion that by vibration or shock, dislodges and disperses the combustible dust particles. Dust particle dispersion can also occur by mill or boiler puffs, water hammer, etc. Any spark (ignition source) present during the instance of dust particle dispersion can lead to a secondary explosion.
- **Secondary explosions** – occurs if the fire or ignition source remains present after a primary explosion. The secondary explosion's devastation is significantly greater than that of the primary explosion.



## XI. Lesson Body

## Instructor Notes

- A. Combustible Dust  
Primary and Secondary Explosions

<b>Risks and Hazards</b>			Safety Training COO Technical Training
<ul style="list-style-type: none"> <li>• <b>Ignition Sources</b> (spark) – the following are typical plant site initial spark sources for combustible dust explosions that must be eliminated or significantly controlled:               <ul style="list-style-type: none"> <li>➤ welding/cutting</li> <li>➤ other hot work</li> <li>➤ grinding</li> <li>➤ exposed &amp; energized electrical conductors</li> </ul> </li>   <li>• <b>Water hammer</b> – no spark occurs during water hammer activities, but combustible dust dispersion can result from the vibration and shock associated with water hammer.</li> </ul>			
Clearance Procedure	Combustible Dust	Ammonia Awareness	36

**XI. Lesson Body****Instructor Notes**

- A. Combustible Dust  
What can cause an explosion?

## Risks and Hazards

Safety Training  
COO Technical Training

### **Combustible Dust Housekeeping and Safe Work Practices**

- ensure vacuum is designed for Class II hazardous locations (no shop vacs, wet-and-dry vacs, or non-Class II HEPA vacs)
- properly ground Class II vacs & attachments
- hazardous dust exposure risk is increased for cleaning personnel
- cleaning activities increase the exposure risk of others
- **DO NOT** use air blowing for surface cleaning
- all potential hazard sources shall be documented and mitigated
- do not allow layers of combustible dust to accumulate



Clearance Procedure

Combustible Dust

Ammonia Awareness

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## XI. Lesson Body

## Instructor Notes

### A. Combustible Dust

Know the types of vacuums that are used within TVA in the elimination of combustible dust.

Understand that pressurized air shall not be used to disperse combustible dust.

**Combustible Dust**
Safety Training  
COO Technical Training



Clearance Procedure
Combustible Dust
Ammonia Awareness
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## XII. Summary

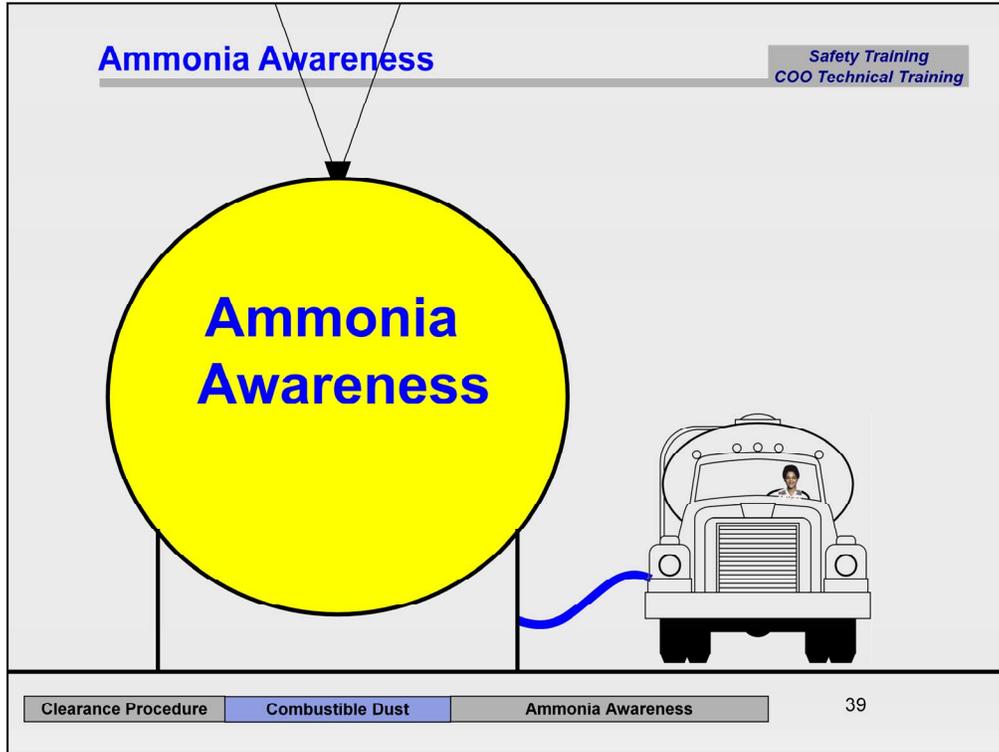
## Instructor Notes

### Combustible Dust

TVA provides procedures to deal with combustible dust; know what is expected of you or ask your supervisor. This training session will provide you with a better understanding of how combustible dust can impact your work experience.

### AGAIN

Remember, your safety and the safety of others depends on you.



**XIII. Lesson Body**

**Instructor Notes**

Introduction Ammonia Awareness

The purpose of this section is to increase the participant’s awareness of the hazards associated with ammonia. The methods to detect ammonia in the air, and the physical effects of exposure to ammonia will be presented, as well as first aid procedures. Emergency instructions, and evacuation plans are in place at the site, in the event of an ammonia

Course Objectives			Safety Training COO Technical Training
<p><b>Objective 6</b>  <b>Recognize the basic properties of gaseous and liquid ammonia, and the ways to detect the presence of gaseous ammonia</b></p>			
Clearance Procedure	Combustible Dust	Ammonia Awareness	40

## XI. Lesson Body

## Instructor Notes

A. Ammonia awareness

Objective 6

Recognize the basic properties of gaseous and liquid ammonia, and the ways to detect the presence of gaseous ammonia.

## Properties of Ammonia (NH<sub>3</sub>)

Safety Training  
COO Technical Training

**Ammonia gas is:**

- the most water soluble of all gases
- a colorless gas with a very pungent odor
- lighter than air

**Ammonia liquid is:**

- lighter than water

Clearance Procedure

Combustible Dust

Ammonia Awareness

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### XIII. Lesson Body

### Instructor Notes

- B. Properties of Ammonia
1. Ammonia is one of the most water soluble of all gases.
  2. Ammonia is a colorless gas with a very pungent odor

Water spray can be used to disperse ammonia

## Ammonia Detection

Safety Training  
COO Technical Training

- **The nose is sensitive to the presence of ammonia gas in the air because of its very pungent odor**
- **Ammonia in the air appears as a dense heavy fog**




Clearance Procedure

Combustible Dust

Ammonia Awareness

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### XIII. Lesson Body

### Instructor Notes

- C. Ammonia Detection
1. The nose is a very sensitive indicator of the presence of ammonia in air because of its very pungent odor
  2. Ammonia is a colorless gas, however when it is released from a pressurized system it draws water vapor from the air because of its cold temperature of around -28 degrees F. Therefore, ammonia in the atmosphere appears as a dense heavy fog .

**Course Objectives** Safety Training  
COO Technical Training

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**Objective 7**  
**Understand how to properly escape the presence of gaseous ammonia and how to report a gaseous ammonia leak**

Clearance Procedure   **Combustible Dust**   Ammonia Awareness   43

**XIII. Lesson Body**

**Instructor Notes**

- I. TVA Ammonia Awareness  
Objective 7  
Understand how to properly escape the presence of gaseous ammonia and how to report a gaseous ammonia leak

<b>Escape and Emergency Reporting</b>		Safety Training COO Technical Training
<b>If you smell ammonia in the workplace, REPORT IT</b>		
		
<p><b>Movement of gaseous ammonia is affected by the following:</b></p> <ul style="list-style-type: none"> <li>• wind direction</li> <li>• land surface features</li> <li>• atmospheric temperature and humidity, and</li> <li>• amount of ammonia released</li> </ul>		
<p>➤ <b>All personnel onsite are <u>required to report ammonia leaks</u></b></p> <p>➤ <b>To escape an ammonia cloud <u>move crosswind &amp; upwind</u></b></p>		
Clearance Procedure	Combustible Dust	Ammonia Awareness
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**XIII. Lesson Body****Instructor Notes**

## J. Emergency Reporting

1. Employees, contractors, vendors, and visitors (onsite personnel) are required to report leaks of ammonia and/or the presence of ammonia in the atmosphere

If you smell ammonia in the workplace, report it

**Escape and Emergency Reporting**

Safety Training  
COO Technical Training

**To Exit Cloud:**

First move crosswind  
Then move up wind

Ammonia Vapor Cloud  
You are here

Up Wind

Wind Direction

Cross Wind

Clearance Procedure    Combustible Dust    Ammonia Awareness    45

### XIII. Lesson Body

### Instructor Notes

- K. Ammonia Cloud Hazard
1. If you find yourself enveloped in an ammonia cloud follow these instructions to exit:
    - a. First move crosswind until you exit the cloud
    - b. Then move upwind to a safe zone follow decontamination procedures

Cloud exit instructions are demonstrated on this slide

Safety Training  
COO Technical Training

## Escape and Emergency Reporting



To Report Ammonia Hazards Call:

Site	Emergency Number
• Allen Fossil Plant	2291
• Bull Run Fossil Plant	299
• Colbert Fossil Plant	399
• Cumberland Fossil Plant	6299
• Kingston Fossil Plant	299
• Paradise Fossil Plant	2299
• Widows Creek Fossil Plant	3911

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Clearance Procedure   Combustible Dust   Ammonia Awareness

### XIII. Lesson Body

### Instructor Notes

- L. Emergency Reporting
2. Site Emergency Telephone Numbers:
    - a. Allen Fossil Plant – 2291
    - b. Bull Run Fossil Plant – 299
    - c. Colbert Fossil Plant – 399
    - d. Cumberland Fossil Plant – 6299
    - e. Kingston Fossil Plant – 299
    - f. Paradise Fossil Plant – 2299
    - g. Widows Creek Fossil Plant - 3911

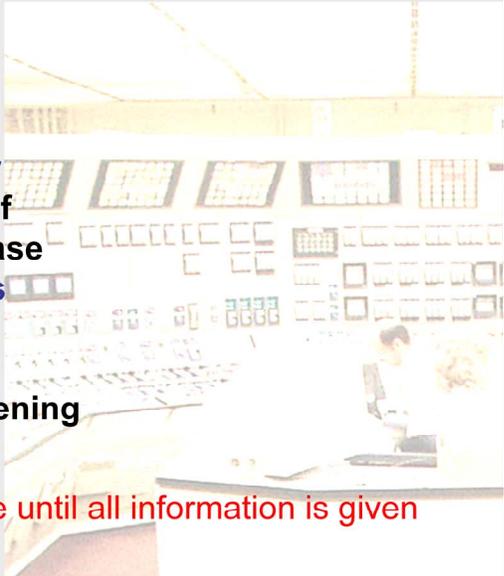
To report an ammonia leak, go to the nearest plant telephone in a safe location and call the site emergency telephone number listed on this slide for your particular site.

## Escape and Emergency Reporting

Safety Training  
COO Technical Training

- ✓ Your name
- ✓ Call back telephone number
- ✓ The location and direction of travel of the suspected release
- ✓ Method of detection such as sight, smell, or equipment reading or alarm
- ✓ Description of what is happening and personnel in the area

DO NOT hang up the phone until all information is given



Clearance Procedure
Combustible Dust
Ammonia Awareness

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### XIII. Lesson Body

### Instructor Notes

#### M. Emergency Reporting

3. Information to Report - be prepared to give specific information about the situation to include the following.
  - a. Your name
  - b. Call back telephone number
  - c. The location and direction of travel of the suspected release
  - d. Your method of detection such as sight, smell, or equipment reading or alarm
  - e. A description of what is happening and personnel in the area

Stay on the line until released by the person receiving the call.

After completing the emergency call, then report the emergency to your supervisor.

<b>Course Objectives</b>			Safety Training COO Technical Training
<p><b>Objective 8</b>  <b>Understand the symptoms of personnel that have been exposed to ammonia, and the immediate first aid actions to be performed on personnel with acute ammonia exposure</b></p>			
Clearance Procedure	Combustible Dust	Ammonia Awareness	48

### XIII. Lesson Body

### Instructor Notes

- |   |  |
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| <p>I. TVA Ammonia Awareness</p> <p>Objective 8</p> <p>Understand the symptoms of personnel that have been exposed to ammonia, and the immediate first aid actions to be performed on personnel with acute ammonia exposure.</p> |  |
|---|--|

<b>Exposure to Ammonia</b>		Safety Training COO Technical Training	
<b>Physical Effects</b>			
<p>Acute ammonia acts corrosively to bare skin, and concentrations greater than 5 ppm can cause detrimental respiratory affects. The symptoms of acute ammonia exposure are burning of the eyes, nose, throat and/or respiratory system and could result in death.</p>			
Clearance Procedure	Combustible Dust	Ammonia Awareness	49

### XIII. Lesson Body

### Instructor Notes

- J. Physical Effects of Ammonia Exposure
1. Ammonia acts as a corrosive to human tissue, and burns can result from contact with body parts
  2. As the concentration of ammonia increases, the symptoms become more severe. Acute exposures to ammonia can cause immediate burning of the eyes, nose, throat and/or respiratory system and could even result in death.

<b>Exposure to Ammonia</b>		Safety Training COO Technical Training	
<b>Physical Effects</b>			
<p>The following activities are required for personnel exposed to gaseous or liquid ammonia:</p> <ul style="list-style-type: none"> <li>• excessive exposure to ammonia gas requires moving the individual to a fresh air source</li> <li>• individuals involved with liquid ammonia contacting the skin must immediately and thoroughly wash the skin by flushing the affected area with water</li> <li>• seek immediate medical attention for injury assessment</li> </ul>			
Clearance Procedure	Combustible Dust	Ammonia Awareness	50

### XIII. Lesson Body

### Instructor Notes

- K. First Aid Treatment for Ammonia Exposure
1. Workers exposed to ammonia vapors must be removed to fresh air
  2. Ammonia must be immediately and thoroughly washed from affected areas of your body
  3. Seek medical treatment and injury assessment

**Course Objectives** Safety Training  
COO Technical Training

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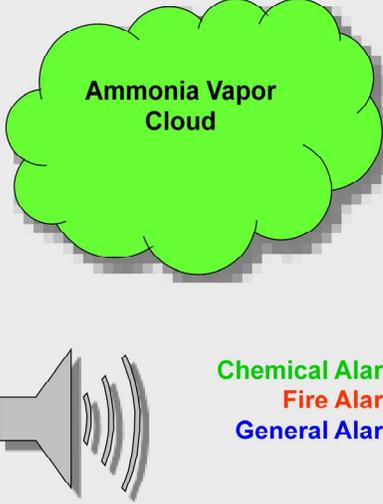
**Objective 9**  
**Understand the emergency evacuation plans and individual responsibilities and accountabilities for personnel onsite during an ammonia release event**

Clearance Procedure    Combustible Dust    Ammonia Awareness    51

**XIII. Lesson Body**

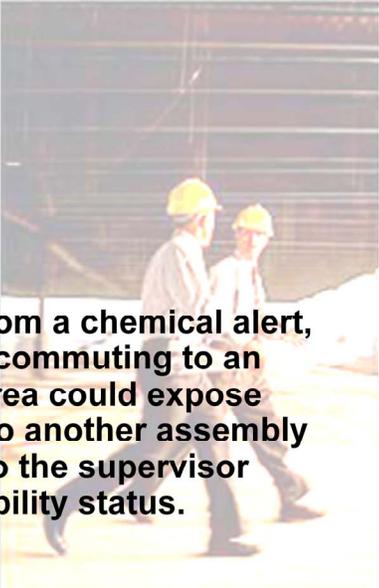
**Instructor Notes**

TVA Ammonia Awareness  
Objective 9  
Understand the emergency evacuation plans and individual responsibilities and accountabilities for personnel onsite during an ammonia release event.

<b>Site Evacuation Plans</b>		<small>Safety Training COO Technical Training</small>
<b>Individual Responsibilities</b>		
<p><b>Personnel in the vicinity of the leak must leave the area immediately</b></p> <p><b>Personnel on site must follow the instructions of the site alarms and the emergency team to evacuate and assemble for accountability when directed</b></p>		<p><b>Chemical Alarm</b> <b>Fire Alarm</b> <b>General Alarm</b></p>
<small>Clearance Procedure</small>	<small>Combustible Dust</small>	<small>Ammonia Awareness</small>
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**XIII. Lesson Body****Instructor Notes**

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|---|--|
| <ul style="list-style-type: none"> <li>L. Site Evacuation Plans           <ul style="list-style-type: none"> <li>1. Individual Responsibilities               <ul style="list-style-type: none"> <li>a. Personnel in the vicinity of the leak must leave the area immediately</li> <li>b. Personnel on site must follow the instructions of site alarms, announcements, and the emergency team to evacuate and assemble for accountability when directed</li> </ul> </li> </ul> </li> </ul> |  |
|---|--|

<b>Site Evacuation Plans</b>	Safety Training COO Technical Training		
<b>Individual Responsibilities</b>			
<p><b>During evacuation and assembly from a chemical alert, hazards must be considered when commuting to an assembly area. If reporting to an area could expose you to the hazard, you may report to another assembly area and make phone notification to the supervisor responsible for reporting accountability status.</b></p>			
Clearance Procedure	Combustible Dust	Ammonia Awareness	53

### XIII. Lesson Body

### Instructor Notes

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| <p>M. Site Evacuation Plans</p> <ol style="list-style-type: none"> <li>1. Individual Responsibilities (cont)             <ol style="list-style-type: none"> <li>c. During evacuation and assembly you must consider hazards when commuting to an assembly point if a chemical alert is in effect. If reporting to an assembly area may expose you to unnecessary hazards, you may report to another assembly area and make phone notification to the appropriate supervisor responsible for collecting and reporting your accountability status.</li> </ol> </li> </ol> |  |
|---|--|

## Site Evacuation Plans

### Individual Responsibilities

Safety Training  
COO Technical Training

Review the individual fossil site evacuation plans that you are assigned to or will visit in the future:

Allen Fossil Plant

Bull Run Fossil Plant

Colbert Fossil Plant

Cumberland Fossil Plant

Kingston Fossil Plant

Paradise Fossil Plant

Widows Creek Fossil Plant

Clearance Procedure
Combustible Dust
Ammonia Awareness

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**XIII. Lesson Body**

**Instructor Notes**

- I. Site Evacuation Plans (cont)
  2. Individual Sites - Review the individual fossil site evacuation plans

Personnel are required to review any sites that they are assigned to

**Ammonia Awareness** Safety Training  
COO Technical Training

**Contractors and Non-TVA Personnel**



Clearance Procedure   **Combustible Dust**   Ammonia Awareness   55

**XI. Lesson Body**

**Instructor Notes**

Affected Personnel (Contractors and Non-TVA)

Allow for discussion of presented material at this point.

**Ammonia Awareness**

Safety Training  
COO Technical Training

**Contractors and Non-TVA Personnel**



Clearance Procedure    **Combustible Dust**    Ammonia Awareness    56

**XI. Lesson Body**

**Instructor Notes**

Affected Personnel (Contractors and Non-TVA)

THE END