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## Lesson Three: Safe Truck Operation



## A. Truck Safety



Figure 3-1 Sterling Crew Cab dump truck

### 1. Overview

- a. The objective of this portion of the course is to produce a safe and competent dump truck operator. Participants will
  - i. Perform a proper CDL-style pre-trip inspection achieving a minimum score of 80%
  - ii. Complete the EM-78 inspection form
  - iii. Demonstrate operation skills on a given course, achieving a minimum score of 80%
  - iv. Achieve a minimum score of 80% on a written test
  - v. Demonstrate proper loading and dumping procedures
  - vi. Demonstrate proper methods for operating a dump truck on different types of roads
  - vii. Demonstrate safe backing procedures
  - viii. Demonstrate proper procedures for hooking up a trailer
  - ix. Demonstrate proper procedures for hooking up a snow plow

- x. Demonstrate proper lubrication procedures per the operator's manual

## **2. General safety**

- a. Every operator's primary concern must be safety. Operators must be conscious of safety at all times.
- b. Factors that are directly related to safety include
  - i. Equipment cost
  - ii. Repair cost
  - iii. Project cost
  - iv. Manpower cost
  - v. Equipment downtime
  - vi. Project delays
- c. A dump truck is a versatile piece of equipment; an operator is responsible for
  - i. Proper operation and safety of the truck
  - ii. The operator's own safety and the safety of those working around the operator
  - iii. The safety of the motoring public, especially during snow and ice season
- d. Knowing the capabilities of the truck and understanding the job at hand are essential to a successful operation
- e. Hurrying to get a job done and taking shortcuts on safety could cost a life
- f. Read and understand the operator's manual and the safety manual that accompanies it. Both are valuable reference materials.

## **B. Safe Truck Operation**

### **1. Circle of safety walk around**

- a. A circle of safety walk around inspection is mandated by federal, state, and agency regulations as well as by manufacturer's requirements. It should be performed
  - i. After the operator has been out of sight of the machine
  - ii. When the operator has been more than 25 feet away from the machine
  - iii. Before re-starting and moving the machine
- b. This walk around allows the operator to check for leaks or damage that are not visible from the cab
- c. The 30 seconds that the walk around takes may save a life

### **2. Proper entry and exit**



Figure 3-2 Three points of contact entering a dump truck

- a. Proper entry and exit of any machine is defined as
  - i. Facing the machine at all times while entering and exiting
  - ii. Maintaining three points of contact with the machine

- a) Keeping both hands and one foot in contact with the machine at all times
- iii. This method helps prevent falls
- iv. If slipping occurs, having both hands on the rails will help prevent serious injury
- b. Keep boots as clean as possible
  - i. This helps prevent slipping when entering and exiting, and during operation
- c. Keep the steps clean to help prevent slips and falls
- d. Avoid jumping out of the truck; this can lead to serious injury
  - i. The only safe way to exit the truck is to turn around on the top step and face the truck while exiting, maintaining the required three points of contact

### **3. Seat belt**

- a. Proper seat belt use is mandated by state law and agency regulations
- b. Even with air bags, crumple zones and other safety improvements, the seat belt **MUST** be worn
- c. The operator must use a seat belt when in the cab of the truck
  - i. If the seat belt is broken or unserviceable, do not use the vehicle. Notify the mechanic and red tag the equipment
- d. Seat belt should be
  - i. Properly adjusted
  - ii. Fitting snugly but not so tight as to cause discomfort

### **4. Look before backing**

- a. When in a hurry to complete a job, some operators may neglect to look before backing. Common reasons include
  - i. “No one was there a minute ago”
  - ii. “I know where everyone is at all times without looking”
- b. No excuse is valid in failing to look before backing. Looking before backing is an operator’s responsibility.

- c. Prior to placing the transmission in reverse, look over both shoulders and make sure that the area is clear
  - i. Check the west coast mirrors and convex mirrors, and, if necessary, look out the driver's side window
  - ii. Trucks are large. The style and type of beds of ODOT's trucks have many blind spots
  - iii. Use a spotter for assistance in backing up, especially when pulling a trailer or when in a congested area
  - iv. Get out and walk around to the rear of the truck to check for obstructions, if unsure

## **5. Operating speed**

- a. Operators are judged by how well and how quickly they complete a job
- b. Characteristics of a good operator include
  - i. Doing a job correctly
  - ii. Being efficient
  - iii. Employing good cycle time
- c. Going too fast causes the following problems
  - i. Reaction time
    - a) The higher the speed of the truck, the less reaction time the operator has, and the more distance the truck covers before the operator can react
  - ii. Steering problems
    - a) Speed impacts maneuverability. High speed could cause the operator to lose control of the wheel
  - iii. Load shifting
    - a) Causes unnecessary wear and tear on the frame and suspension systems
  - iv. Damage to tires
  - v. Usually does not contribute to completing a job any more quickly

- vi. Spills materials
  - a) Can create a hazard for the motoring public
- vii. Causes difficulty stopping
  - a) Causes unnecessary wear and tear on the brake systems
- viii. Can make the truck tip over easily if turned too quickly
  - a) Especially during dumping or snow and ice control when the bed is up in the air

## 6. Operator platform – cab



Figure 3-3 Sterling Cab with Force America hydraulic control

- a. Cleanliness is essential in the cab
  - i. Be sure to secure
    - a) Chains
    - b) Emergency equipment
    - c) Lunch boxes
    - d) Thermos bottles
  - 1) If a roll over occurs, these materials could cause injury

- b. Familiarization with all controls is a must
  - i. If operating a new or unfamiliar truck, refer to the operator's manual for review
  - ii. The operator needs to know the location of the following controls without taking eyes off the road
    - a) Lights
    - b) Wipers
    - c) Strobes
    - d) Heater
    - e) Hydraulic controls
    - f) State radio

## **7. Center of gravity**

- a. Also known as the balance point or tipping point
- b. Center of gravity depends on
  - i. Width
  - ii. Wheel base
  - iii. Turning radius
  - iv. Tires
- c. The tipping point varies from manufacturer to manufacturer, even from model to model
- d. The amount of weight in the bed and the height at which the bed is carried will change the tipping point of the truck

## **8. Controls**

- a. Hydraulic
  - i. Dump trucks have many types of hydraulic controls, depending on
    - a) Model
    - b) Manufacturer



- c) District ordering preferences
- ii. The brand-specific systems listed below control the truck's
  - a) Spreader gate
  - b) Hopper and wetting systems for snow and ice control
  - c) Hydraulics, including bed height and auxiliary systems
- iii. Some systems may have external hydraulic controls that are separate from the control box for bed and plow controls
- iv. Brand-specific systems
  - a) Pengwyn



Figure 3-4 Pengwyn hydraulic control

- 1) The most common type of spreader and hydraulic control system
- 2) Most Pengwyn systems have the hydraulics built into the control box
- 3) The Pengwyn system controls the
  - (a) Auger rate

(1) An auger is a screw style device that places material into the spreader

(2) The auger rate is the speed at which the auger turns

(b) Spinner speed

(1) A spinner is a flat plate that turns and distributes the material onto any given surface

(2) The spinner rate is the speed at which the spinner turns

(c) Brine system

(1) The brine system is a holding tank pump and nozzle system that distributes liquid brine onto the road surface (brine is a combination of rock salt and water)

(d) Auxiliary systems such as the wing and belly plow

(1) A wing plow is plow that sits out from the right side of the truck

(2) A belly plow is a plow that sits under the truck

4) Pengwyn also has digital readouts that inform the operator of

(a) Speed

(b) Time of day

(c) How many pounds or gallons of material per lane mile is being applied

b) Hydro-Tech and Dickey John

1) Hydro-Tech and Dickey John have the same function as the Pengwyn

## c) Force America



Figure 3-5 Force America hydraulic control

- 1) Approximately 10% of the ODOT fleet uses the Force America system
  - 2) It includes all systems listed under the Pengwyn description above; the operator uses a joy stick with finger and thumb controls to work all systems
  - 3) Blade, bed, spread rate and auxiliary systems are all controlled by the operator's right hand
- d) Once the operator becomes familiar with these systems, they can be operated while the operator's eyes are on the road. All systems have advantages as well as disadvantages. The system used will be determined by county and district.

## 9. Transmissions

### a. Automatic shift

- i. Over 80% of ODOT's dump truck fleet have automatic transmissions
  - a) The engine should be at an idle in order for the transmission to engage in both of the automatic type transmissions
    - 1) Otherwise, the t-handle truck will jump, and an error code will display in the display area of the push button type

### ii. T – handle transmission shifter



Figure 3-6 T-handle automatic transmission selector

- a) Most of our automatic transmission selectors have a t-handle selector
- b) The selector should always be in neutral when starting or parking the truck
- c) To engage the transmission
  - 1) Push the button on the left side of the t-handle and select the desired range



- 2) Push the handle up to select reverse and pull the handle down to select forward
- 3) For forward movement, the following choices are available in most automatic transmissions

(a) 5 thru 1

- (1) Most of the time, the operator selects the highest gear needed for the job, allowing the transmission to shift up and down as it needs to
- (2) Depending on the situation, the operator may need to select a specific range for off road, or to keep the RPMs up and the speed down

iii. Push button transmission shifter



Figure 3-7 Push button automatic transmission selector

- a) If the truck is equipped with the push button type selector, always remember when changing directions to select the neutral position first
- b) This allows the transmission's electronic components to re-set before shifting to the other direction

1) The selections for a push button transmission in the forward gears are either

(a) 5 thru 1

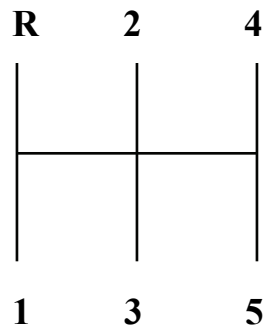
(b) 6 thru 1

(c) Use the down arrow to select the proper gear

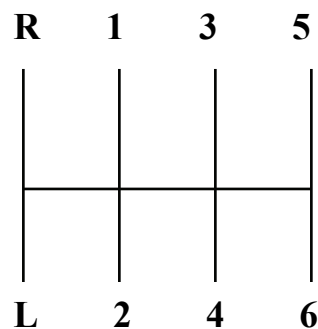
b. Standard shift

- i. In this course, a standard transmission will be used for the road truck
- ii. Many serious accidents have occurred from improper starting procedures with standard transmissions. Most of these are a result from trying to start equipment from the ground or cross jumping starters. Always have an operator in the seat, and the clutch fully disengaged before starting any type of equipment.
- iii. Depending on the district, a six plus manual transmission, a five speed manual transmission, or a five speed with a high/low axle range manual transmission will be used

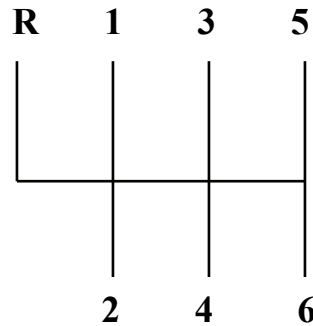
a) The five speed has a double H shift pattern



b) The 6 plus has a triple H shift pattern



- c) The six speed transmission is the same triple H pattern without low gear



- d) When shifting any manual transmission into gear, the transmission should engage smoothly and the equipment should start to move without jumping
- e) Do not shift when making a 90 degree turn, while crossing railroad tracks, or in the middle of an intersection
- f) Do not shift on a steep grade
  - 1) Usually, the gear used going down a steep grade will be the same gear or a gear lower than the one used going up a steep grade

## iv. Clutch use

- a) Check the free play in the clutch
  - 1) Depress the clutch slowly. The amount of pedal travel before the clutch engages should not exceed 1 to 1 ½ inches
- b) The transmission should engage smoothly and the equipment should start to move without jumping
  - 1) If the truck jumps or the transmission slips, notify a mechanic
- c) Select the proper gear for starting to move---the gear that starts the vehicle moving with the engine at idle speed
  - 1) This is usually first gear
- d) Do not travel with the clutch depressed

- 1) The transmission should always be engaged and under power
- 2) The truck should never coast longer than the length of the unit
- e) Select the proper RPMs for shifting
  - 1) Usually between 1600 and 2000 for up shifting
  - 2) 500 to 1200 for down shifting
- f) Do not rest the foot on the clutch pedal while operating because friction causes heat
  - 1) Excessive heat will glaze a clutch and make it slip
- g) Do not rest a hand on the gear shift while operating
  - 1) The pressure can cause excessive wear to the shifting forks and can cause the transmission to go out of gear

**Exercise: Lesson Three Review**

1. True or False: The operator is responsible for his/her own safety, the safety of the truck, and the safety of the motoring public.
2. It is necessary to read and understand the operator's manual before operating an unfamiliar truck to \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.