**DEPARTMENT OF THE AIR FORCE**
**Headquarters US Air Force**
**Washington, D.C. 20330-1030**

**QTP24-3-D669**
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# Scraper

Vehicle Management Codes: D669

## QUALIFICATION TRAINING PACKAGE

## CONTENTS

## Section 1—OVERVIEW

### 1.1. Overview.

1.1.1. Send comments and suggested improvements on Air Force (AF) Form 847, *Recommendation for Change of Publication* through Air Force Installation and Mission Support Center (AFIMSC) functional managers via e-mail at AFIMSC.IZSL.VehicleOps@us.af.mil.

1.1.2. How to use this plan:

1.1.2.1. Instructor:

1.1.2.1.1. Provide overview of training, **Section 2** and **Section 3**.

1.1.2.1.2. Instructor's lesson plan for trainee preparation, give classroom lecture, **Section 4**.

1.1.2.1.3. Instructor's lesson plan for knowledge overview, **Section 5**.

1.1.2.1.4. Instructor's lesson plan for demonstration, **Section 6**.

1.1.2.1.5. Instructor's lesson plan for performance test evaluation, **Section 7**.

1.1.2.2. Trainee:

1.1.2.2.1. Reads this entire lesson plan prior to starting lecture.

1.1.2.2.2. Follows along with lecture using this lesson plan and its attachments.

1.1.2.2.3. Uses **Attachment 3** as a guide for vehicle inspection.

1.1.2.2.4. Takes performance test.

## Section 2—RESPONSIBILITIES

### 2.1. Responsibilities.

2.1.1. The trainee shall:

2.1.1.1. Ensure the trainer explains the Air Force Qualification Training Plan (AFQTP) process and the trainee's responsibilities.

2.1.1.2. Review the AFQTP/Module/Unit with the trainer.

2.1.1.3. The trainee should ask questions if he or she does not understand the objectives for each unit.

2.1.2. Instructor shall:

2.1.2.1. Review the AFQTP with the trainee.

2.1.2.2. Conduct knowledge training with the trainee using the AFQTP.

2.1.2.3. Sign-off the task(s).

## Section 3—INTRODUCTION

### 3.1. Objectives.

3.1.1. Given lectures, demonstrations, and a hands-on driving session, trainees will be able to perform operator's inspection and complete the performance test with zero instructor assists.

3.1.1.1. Train and qualify each trainee in safe operation and preventive maintenance of the scraper.

3.1.1.2. This training will ensure the trainee becomes a qualified scraper operator; an operator who has the knowledge and skills to operate a scraper in a safe, proficient and professional manner.

### 3.2. Desired Learning Outcomes.

3.2.1. Understand the purpose of the scraper and its role in the mission.

3.2.2. Understand the safety precautions to be followed for pre-, during- and post-operation inspections of the scraper.

3.2.3. Know the proper operator maintenance procedures of the scraper IAW applicable technical manual(s) and use of AF Form 1800, *Operator's Inspection Guide and Trouble Report*.

3.2.4. Be completely familiar with the safety features of the scraper.

3.2.5. Safely and proficiently operate the scraper.

### 3.3. Lesson Duration.

3.3.1. Recommended instructional and hands on training time is 20.5 hours:

**Figure 3.1. Recommended Training Time for Training Activities.**

| Training Activity | Training Time |
|---|---|
| Trainee's Preparation | 30 Minutes |
| Instructor's Lecture | 1 Hour |
| Instructor's Demonstration | 2 Hours |
| Trainee's Personal Experience (to build confidence and proficiency)<br>▪ Perform Operator Maintenance<br>▪ Operate the Vehicle | 16 Hours |
| Trainee's Performance Evaluation | 1 Hours |

**Note:** This is a recommended time; training time may be more or less depending how quickly a trainee learns new tasks.

**3.4. Instructional References.**

3.4.1. Risk Management (RM) and Safety Principles IAW Air Force Pamphlet (AFPAM) 90-803, *Risk Management (RM) Guidance and Tools*.

3.4.2. Applicable technical manual(s) or Manufacturer's Operator's Manual (see Vehicle Management for technical manual(s) number for vehicle being used in training).

3.4.3. Air Force Manual (AFMAN) 24-306, *Operation of Air Force Government Motor Vehicle*.

3.4.4. AF Form 1800.

3.4.5. Air Force Instruction (AFI) 91-203, *Air Force Consolidated Occupational Safety Instruction*.

3.4.6. AFI 24-302, *Vehicle Management*.

3.4.7. 3E251-02-EC02 (CDC Volume 2).

**3.5. Instructional Training Aids and Equipment.**

3.5.1. Scraper Lesson Plan.

3.5.2. Scraper.

3.5.3. Applicable technical manual or manufacturer's operator's manual.

3.5.4. AF Form 1800.

3.5.5. Suitable training area.

## Section 4—TRAINEE PREPARATION

### 4.1. Licensing Requirements.

4.1.1. Trainee must have in his/her possession a valid state driver's license.

4.1.2. AF Form 171, *Request for Driver's Training and Addition to U.S. Government Drivers* in accordance with (IAW) AFI 24-301, *Ground Transportation*.

4.1.3. Applicable local licensing jurisdiction requirements.

### 4.2. Required Reading.

4.2.1. Read this entire lesson plan.

4.2.2. Read AFMAN 24-306.

4.2.3. Read manufacturer's operator's manual for the vehicle being trained on.

## Section 5—KNOWLEDGE LECTURE AND EVALUATION

### 5.1. Overview of Training and Requirements.

5.1.1. Training objectives:

5.1.1.1. Given lectures, demonstrations, hands-on operating session(s), the trainee must be able to perform operator's inspection and complete the performance evaluation with zero instructor assists.

5.1.1.2. Train and qualify each trainee in safe operation and preventive/operational maintenance of the scraper.

5.1.1.3. This training will ensure the trainee becomes a qualified scraper operator—an operator who has the knowledge and skills to operate a scraper in a safe, proficient and professional manner.

5.1.2. Desired learning outcomes:

5.1.2.1. Understand the principals of operation, the purpose of the scraper and its role in the mission.

5.1.2.1.1. Scrapers are designed primarily for loading, hauling, and spreading material during the initial earth- moving phase of construction. The ability of the scraper to load, haul, and spread material in one normal working cycle makes it desirable for most earth-moving projects.

5.1.2.1.2. Role in the mission (Unit/Base/Community (during natural disasters)/Air Force).

5.1.2.2. Understand the importance of efficient operation and performance of preventative maintenance on the scraper to meet mission requirements. Preventative maintenance ensures safe operation and availability for daily and emergency use.

5.1.2.3. Understand the safety precautions to be followed pre-, during- and post-operational inspection of the scraper.

5.1.2.4. Be completely familiar with the safety features of the scraper.

5.1.2.5. Safely and proficiently operate the scraper.

5.1.3. Scraper design. The design of a scraper varies depending on the vehicle manufacturer. Scrapers are used for loading, hauling, dumping and spreading of loose materials. Scrapers are used for medium-haul earthmoving operations and to move ripped materials and rock. The haul distance (zone of operation), the load volume, and the type and grade of surface traveled on are the primary factors in determining whether to use a scraper on a particular job. The optimum haul distance for small and medium-size scrapers is 3,000 feet or less. Refer to the manufacturer's operator's manual(s) for additional information on the specific scraper being operated.

5.1.4. Equipment characteristics, capabilities and features. See **Figure 5.1.**

5.1.4.1. Bowl. The bowl is the loading and carrying component. It has a cutting edge, which extends across the front bottom edge. Lower the bowl until the cutting edge enters the ground for loading, raise it for carrying, and lower it to the desired lift thickness for dumping and spreading.

5.1.4.2. Apron. The apron is the front wall of the bowl. It is independent of the bowl and, when raised, it provides an opening for loading and spreading. Lower the apron during hauling to prevent spillage.

5.1.4.3. Ejector. The ejector is the rear wall of the bowl. Keep the ejector in the rear position when loading and hauling materials. Activate the ejector to move forward during spreading to provide positive discharge of materials.

5.1.5. The operator must know the location and function of all controls and indicators prior to operating the vehicle.

**Figure 5.1. Equipment.**

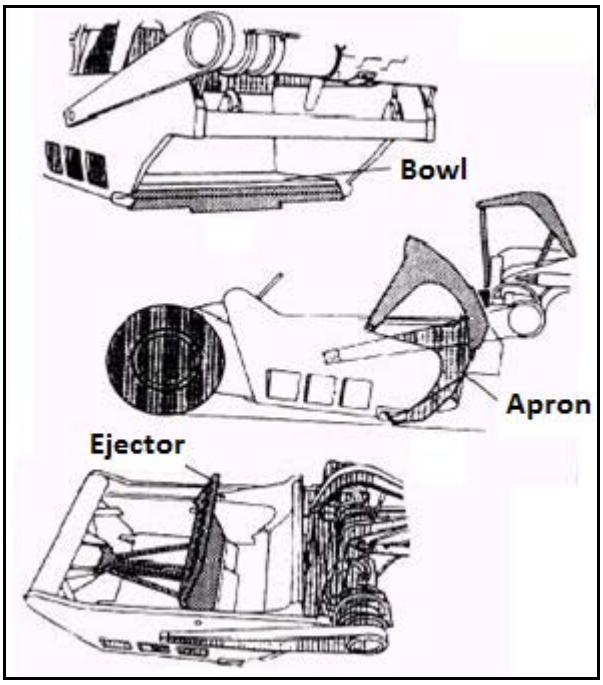


**Table 5.1. Controls and Indicators.**

| **Control/Indicator** | **Description** |
|---|---|
| Engine oil pressure gauge | Indicates engine oil pressure when the engine is running. |
| | |
| Coolant temperature gauge | Indicates engine coolant temperature. |
| Voltmeter | Indicates the charging level of the electrical system. |
| Transmission oil temperature gauge | Indicates the temperature of the transmission fluid. |
| Fuel gauge | Indicates the amount of fuel in the fuel tank. **Caution –** Always visually inspect the fuel level. Never solely check the fuel gauge. |
| Speedometer | Indicates vehicle speed. |
| Tachometer | Indicates engine rpm. |
| Ignition switch | Turns the electrical system on/off and engages the starter. |
| Light switch | Operates the driving and marker lights. |
| Windshield wiper/washer control knob | Operates the windshield wipers and windshield washer. |
| Shift lever | Enables gear selection of the automatic transmission. |
| Converter temperature gauge | Indicates converter oil temperature. |
| Horn button | Activates the horn. |

| | |
|---|---|
| Forward/reverse lever | Selects the direction of the scraper. |
| Gear selector lever | Selects the desired gear. |
| Fuel shut off lever | Shuts off the fuel supply to the engine. |

**5.2. Vehicle Inspection.**

5.2.1. Pre-operation vehicle inspection test. Use AF Form 1800 as a 360 walk-around guide.

5.2.2. A Seven-Step Inspection Method will help ensure the inspection is the same each time it is conducted, and that nothing is left out. See **Attachment 3** for the Seven-Step Inspection Method.

5.2.3. Types of Vehicle Inspection. If discrepancies are found the operator must report them to Vehicle Control Officer/Vehicle Control Non-Commissioned Officer (VCO/VCNCO), the supervisor, and/or vehicle maintenance:

5.2.3.1. Pre-operation inspection – identify items/problems that could cause accidents or breakdowns.

5.2.3.1.1. Vehicle Maintenance may authorize continued use for all other maintenance discrepancies.

5.2.3.1.2. Cleanliness/damaged/missing items.

5.2.3.1.3. Leaks (fuel/oil/coolant/air).

5.2.3.1.4. Fluid levels; ensure levels are is within limits:

5.2.3.1.4.1. Engine oil.

5.2.3.1.4.2. Coolant.

5.2.3.1.4.3. Power steering fluid.

5.2.3.1.4.4. Transmission fluid.

5.2.3.1.4.5. Hydraulic fluid.

5.2.3.1.5. Battery; security, fluid, damage and corrosion.

5.2.3.1.6. All wheel rims (cracks, splits, etc.); check for loose or missing lug nuts.

5.2.3.1.7. All tires.

5.2.3.1.7.1. Proper inflation.

5.2.3.1.7.2. Sidewalls, tread, to include depth, bulges.

5.2.3.1.7.3. Cuts and abrasions.

5.2.3.1.7.4. Lug nuts.

5.2.3.1.8. Transmission.

5.2.3.1.8.1. Differential(s). Damage, wear and leaks.

5.2.3.1.8.2. Drive train. Damage, wear and leaks.

5.2.3.1.9. Drive belts; tension and fraying.

5.2.3.1.10. Air filter(s).

5.2.3.1.11. All hoses and wiring.

5.2.3.1.12. Frame bolts and other fasteners, visual inspection for damage.

5.2.3.1.13. Welds visual inspection for cracks.

5.2.3.1.14. Visual and auditory warning devices.

5.2.3.1.15. Storage bin doors properly latched, if applicable.

5.2.3.1.16. Underbody scraper components.

5.2.3.1.16.1. Cutting edge/moldboard.

5.2.3.1.16.2. Hydraulic lift cylinders.

5.2.3.1.16.3. Hydraulic hoses.

5.2.3.1.16.4. Frame assembly/bolts/pins.

5.2.3.1.17. Fuel tank(s) assembly for damage.

5.2.3.1.18. Wiring/lights/reflectors (interior/exterior).

5.2.3.1.19. Mirrors.

5.2.3.1.20. Windshield and windshield wipers/washers.

5.2.3.1.21. Doors.

5.2.3.1.22. Windows.

5.2.3.1.23. Seatbelts.

5.2.3.2. During-operation inspection.

5.2.3.2.1. Ensure master switch is turned to the ON position.

5.2.3.2.2. Ignition to accessory position.

5.2.3.2.3. Check all gauges and warning lights/indicators for proper operations.

5.2.3.2.4. Ignition to start.

5.2.3.2.5. Check for unusual conditions (interior).

5.2.3.2.5.1. Sounds.

5.2.3.2.5.2. Odors.

5.2.3.2.5.3. Vibrations.

5.2.3.2.6. Conduct 360 walk-around; check for unusual conditions (exterior).

5.2.3.2.6.1. Sounds.

5.2.3.2.6.2. Odors.

5.2.3.2.6.3. Vibrations.

5.2.3.2.6.4. Leaks.

5.2.3.2.6.5. Light function.

5.2.3.2.7. Conduct function check of all controls.

5.2.3.2.7.1. Steering wheel.

5.2.3.2.7.2. Shift selector.

5.2.3.2.7.3. Parking brake.

5.2.3.2.7.4. Bowl levers.

5.2.3.2.7.5. Windshield wipers.

5.2.3.2.7.6. Climate control.

5.2.3.2.7.7. Conduct 360 walk-around; check for unusual conditions (exterior).

5.2.3.2.7.7.1. Sounds.

5.2.3.2.7.7.2. Odors.

5.2.3.2.7.7.3. Vibrations.

5.2.3.2.7.7.4. Leaks.

5.2.3.2.8. Sign AF Form 1800. Verify Standard Form (SF) 91, Motor Vehicle Accident Report, SF 94, Statement of Witness, and Department of Defense (DD) Form 518, Accident Identification Card are on-hand.

5.2.3.3. Post-operation inspection.

5.2.3.3.1. Check fuel level (< ¾ tank, refuel).

5.2.3.3.2. Ensure vehicle and components are cleaned.

5.2.3.3.3. Park vehicle. Ensure transmission in neutral, apply parking brake.

5.2.3.3.4. Ground bowl.

5.2.3.3.5. Follow manufacturer's shut-down procedures.

5.2.3.3.6. Shut off lights and accessories.

5.2.3.3.7. Ensure master switch is turned to the OFF position

5.2.3.3.8. Post 360 walk-around. Check for leaks and damage.

**5.3. Vehicle Safety and Equipment.**

5.3.1. Hazards and human factors:

5.3.1.1. Traffic due to size and weight.

5.3.1.2. Jerky starts and stops.

5.3.1.3. Traveling too fast and turning too sharply.

5.3.1.4. Slip hazards.

5.3.1.4.1. Always maintain three-points of contact when mounting/dismounting the vehicle.

5.3.1.5. High rollover risk.

5.3.1.6. Restricted visibility.

5.3.2. Safety clothing and equipment:

5.3.2.1. Safety toed boots must be worn.

5.3.2.2. Leather gloves.

5.3.2.3. Hearing protection.

5.3.2.4. Inclement weather gear, if required.

5.3.2.5. Reflective belt during hours of reduced visibility and on flightline.

5.3.2.6. First aid kit.

5.3.2.7. Cones.

5.3.2.8. Tire gauge.

5.3.2.9. Fire extinguisher.

5.3.2.10. AF Form 1800, SF 91 and DD Form 518.

**5.4. Driving Safety and Precautions.**

5.4.1. Overview safety and precautions. The following are safety items and procedures to be followed during scraper operations. The manufacturer's operator's manual will also provide safe operating procedures and the vehicle itself may have warnings, cautions and danger stickers that the vehicle operator should be aware of.

5.4.2. Vehicle data plate. Be familiar with the location and information found on the data plate.

5.4.3. Plan the route.

5.4.3.1. Overhead clearance. Check the clearance height of the vehicle relative to the overhead obstructions such as power lines, trees, and bridges.

5.4.3.2. Width restrictions/construction zones, over-the-road.

5.4.3.3. Weight restriction (roads, bridges, off-road conditions).

5.4.3.4. Inclines.

5.4.3.5. Uneven ground.

5.4.3.6. Soft surfaces.

5.4.4. Over the road operation.

5.4.4.1. Greater vehicle weight. The operator needs to consider the combined weight of the scraper and the load. This will affect the following:

5.4.4.1.1. Operator's ability to stop. Do not tailgate the vehicle in front. Allow more distance between vehicles in order to increase reaction time.

5.4.4.1.2. Vehicle's ability to accelerate/follow the flow of traffic. Accelerate smoothly and gradually so the vehicle does not jerk. Rough acceleration causes unnecessary, premature mechanical damage to the vehicle's drive train. Maintain a safe speed.

5.4.4.2. Downgrades/upgrades. The operator will use lower gears more frequently to climb hills or mountains with increasing grade steepness, length and/or heavy load weight. Plan ahead to identify downgrades/upgrades on the route of travel. If possible, talk to other drivers who are familiar with the grades to find out what speeds are safe. When encountering downgrades/upgrades as described, the operator will need to address:

5.4.4.2.1. Speed. On downgrades, gravity causes the speed of the vehicle to increase. The operator must select an appropriate safe speed, use a low gear, and proper braking techniques. The operator must go slow enough so as to not overheat the vehicle brakes.

5.4.4.2.2. Stopping. If the brakes become too hot, they may start to "fade". Brake fade will cause partial or full loss of brakes.

5.4.4.3. Sharp turns. Slow down before entering the turn. During the turn, avoid sharp sudden movements with the steering wheel. This reduces the chance of the vehicle weight shifting, and also prevents the possibility of tipping over due to the higher center of gravity.

5.4.4.4. Surroundings. Operating a scraper requires the operator's constant attention. Many situations can be avoided by simply paying close attention to the surrounding conditions. Road signs such as "steep grade", "low overhead clearance", "sharp turn ahead", and special speed limits are posted for the driver's safety.

5.4.4.5. Blind spots. Operators must know where there will be limited or no visibility surrounding the vehicle being operated.

5.4.4.6. Size. The operator must take into account, the size/width of the attachment assembly when operating the vehicle.

5.4.5. Backing.

5.4.5.1. Use a spotter and hand signals.

5.4.5.2. Back slowly and keep the spotter in view at all times. If the operator loses sight of the spotter, the operator must immediately stop the vehicle.

5.4.5.3. See AFMAN 24-306 for standard AF spotter hand signals and additional guidance on spotter safety.

5.4.6. General operation.

5.4.6.1. Walk around the vehicle to ensure the area is clear before moving.

5.4.6.2. Before operating, the operator must understand all controls. He/she should ASK, if they do not understand!

5.4.6.3. Never attempt to start or operate the vehicle from any location other than the operator's seat.

5.4.6.4. Never drive close to the edge of a ditch or excavation.

5.4.6.5. Never leave the vehicle running unattended.

5.4.6.6. Do not attempt to get on or off of the machine while it is moving.

**5.5. Vehicle Operation.**

5.5.1. General vehicle operations.

5.5.1.1. Complete a pre-operation vehicle inspection.

5.5.1.2. Sign the current AF Form 1800.

5.5.1.3. Climb into the vehicle. Use three points of contact.

5.5.1.4. Adjust the seat and mirrors as needed; fasten seat belt.

5.5.2. Starting the vehicle.

5.5.2.1. Turn the master switch on.

5.5.2.2. Ensure all hydraulic controls are in neutral.

5.5.2.3. Ensure the gear lever is in neutral.

5.5.2.4. Ensure that the parking brake is engaged.

5.5.2.5. Switch the ignition on using the key.

**Caution:** Do not engage the starter for more than 30 seconds at a time. If the engine does not start within 30 seconds, allow the starter two minutes to cool-off.

5.5.3. Operating procedures.

5.5.3.1. Operating range. The optimum haul distance for the small and medium size Scrapers is 300 to 3,000 feet. There are larger scrapers that are effective up to 5,000 feet.

5.5.3.2. Production cycle. The production cycle for a scraper consists of six operations—loading, haul travel, dumping and spreading, turning at the dump site, return travel, and turning and positioning to load.

5.5.3.3. Loading. The scraper loads with push-tractor assistance. The scraper can load to a limited extent without assistance, but requires push loading to achieve maximum production.

5.5.3.3.1. Pusher assistance is necessary to reduce loading time and wheel spinning. Reducing scraper wheel spinning increases tire life. The scraper should not depend on the pusher to do all the work.

5.5.3.3.2. Conversely, do not spin the scraper wheels to pull away from the pusher. Use pusher assistance for either straight, downhill, or straddle loading.

**Caution:** Always load the scraper in the direction of haul. Do not turn the scraper at the same time it is accelerating from the loading operation. The scraper is a self-loading machine, and pushing during loading will damage the scraper loading elevator.

5.5.3.4. Downhill loading. Downhill loading enables a scraper to obtain larger loads in less time. Each 1 percent of favorable grade is equivalent to increasing the loading force by 20 pounds per ton of gross scraper weight.

5.5.3.5. Straddle loading. The first two cuts should be parallel, leaving a ridge between the two cuts. The scraper straddles this ridge of earth to make the final cut. The ridge should be no wider than the distance between a scraper wheels. With straddle loading, time is gained on every third trip because the center strip loads with less resistance than a full cut.

5.5.3.6. Back track. Use the back track push loading technique where it is impractical to load in both directions. However, this method is inefficient due to the time spent in backing up and repositioning for the next load.

5.5.3.7. Chain push loading. Use the chain push loading technique, where the cut is fairly long, making it possible to pick up two or more scraper loads without backtracking. The pusher pushes one scraper, then moves behind another scraper that is moving in the same direction in an adjacent lane.

5.5.3.8. Shuttle. Use the shuttle push loading technique for short cuts where it is possible to load in both directions. The pusher pushes one scraper, then turns and pushes a second scraper in the opposite direction.

**Figure 5.2. Shuttle.**

5.5.3.9. Cut and load sequence.

5.5.3.9.1. Use the service brake to reduce the scraper travel speed when close to the cut (loading lane) and downshift to first gear for loading.

5.5.3.9.2. Move the ejector to the rear.

5.5.3.9.3. Open the apron partway.

5.5.3.9.4. Lower the bowl to an efficient cut depth after the scraper enters the cut. Continue moving forward until the dozer contacts the scraper and begins pushing.

5.5.3.9.5. If the scraper tires spin before the dozer makes contact, stop and allow the dozer to assist.

5.5.3.9.6. When the dozer makes contact, push down the differential lock and the transmission hold pedal. Proceed in second gear.

5.5.3.9.7. The cut should be as deep as possible, but it should allow the scraper to move forward at a constant speed without lugging the engine.

5.5.3.9.8. Decrease the cut depth if the scraper, pusher lugs or drive wheels slip. Use the router bits on the vertical side of the bowl to gauge the depth of the cut.

5.5.3.9.9. Once an efficient depth of cut is determined, use the same depth on successive passes.

5.5.3.9.10. Mark the cut.

5.5.3.9.10.1. Regulate the apron opening to prevent material from piling up in front of the lip or falling out of the bowl.

5.5.3.9.10.2. Keep the machine moving in a straight line while maintaining pusher and scraper alignment.

5.5.3.9.10.3. Do not overload the scraper. Overloading lowers efficiency and places unnecessary stresses on the machine.

5.5.3.9.10.4. Raise and lower the bowl rapidly when loading loose material such as sand.

**Note:** When a push tractor is used, it should be positioned about 45 degrees off of the lane to be cut. This allows the loading unit to come in with the least delay and difficulty.

5.5.3.9.11. Raise the bowl slowly when full, simultaneously closing the apron to prevent spillage.

5.5.3.9.12. Allow the pusher to help the machine out of the cut area, if necessary.

**Note:** When exiting the cut, release the transmission hold and/or the differential lock, if in use. Accelerate to travel speed as quickly as possible. Travel a few feet before lifting the bowl to the carrying position. This spreads any loose material piled up in front of the bowl and allows the following scraper to maintain speed.

5.5.4. Materials.

5.5.4.1. Loam and clay. Loam and clay soils cut easily and rapidly with minimum effort. However, loosen very hard clay with a dozer ripper before loading.

5.5.4.2. Sand. Since sand has little or no cohesion between its particles, it has a tendency to run ahead of the scraper blade and apron. The condition is worse for finer and drier particles. When loading sand, the best method is:

5.5.4.2.1. Enter the loading area fast, lowering the bowl slowly, and pick up as much material as possible using the momentum of the scraper unit. This will fill the hard to reach the rear area of the bowl.

5.5.4.2.2. Shift to a lower gear once the momentum is lost and allow the pusher to assist.

5.5.4.2.3. Pump the bowl up and down. For best pumping results, drop the bowl as the scraper's rear wheels roll into the depression of the previously pumped area and raise the bowl as the wheels are climbing out of the depression.

5.5.4.2.4. Drop the bowl sharply two or three times at the end of the loading area to top out the load. Then close the apron, raise the bowl, and exit the cutting area.

5.5.4.3. Rock and shale. Loading rock and shale with a scraper is a difficult task that causes severe wear and tear on the equipment. Ripping will ease this problem. Ripping depth should exceed the depth of the scraper cut.

5.5.4.3.1. When loading the scraper, leave a loose layer of ripped material under the tires to provide better traction and to reduce both track and tire wear. Some soft rock and shale can be loaded without ripping.

5.5.4.3.2. Start the scraper's cutting edge in dirt (if possible) when loading stratified rock. Move in to catch the blade in planes of lamination. This will force material into the bowl.

5.5.4.3.3. Pick up loose rock or shale on the level or on a slight upgrade, with the blade following the lamination planes.

5.5.5. Load time. Loading time is critical for obtaining maximum scraper production. Push loading should normally take less than one minute within a distance of 100 feet (time and distance change with the material being loaded). Studies of load volume versus loading time indicate that for a normal operation, about 85 percent of scraper load capacity is achieved in the first 30 seconds of loading. Another 30 seconds will only produce about another 12 percent increase in load volume. Therefore, extra loading time (past about one minute) is not worth the effect because increased total cycle time will decrease production.

5.5.6. Hauling. Hauling or travel time, includes the haul time and the return time. Here the power and traction characteristics of the scraper become very important. The following factors can greatly effect travel time.

5.5.7. Haul route location. Lay out the haul routes to eliminate unnecessary maneuvering. Plan the job to avoid adverse grades that could drastically reduce production. Remember, where grades permit, the shortest distance between two points is always a straight line.

5.5.8. Travel conditions. Once on the haul route, the scraper should travel in the highest safe gear appropriate for road conditions. When possible, carry the scraper bowl fairly close to the ground (about 18 inches). This lowers the center of gravity of the Scraper and reduces the chance of overturning.

5.5.9. Lugging. Avoid unnecessary lugging of the engine. Downshift when losing momentum. Lugging the engine usually results in a slower speed than the top range of the next lower gear. Although the machine can make it, it is best to downshift and accelerate faster. Lugging causes a decrease in engine revolutions per minute (rpm) thereby reducing hydraulic pressure. This will result in a loss of steering control.

5.5.10. Coasting. Never coast on a down grade. When approaching a down grade, slow down and down shift the transmission. To prevent unwanted upshifting, use the transmission hold on a downgrade if it is available. Also, use it when approaching an upgrade or in rough under footing.

5.5.11. Dumping and spreading. When dumping, lower the bowl to the desired lift height and open the apron at the beginning of the dump area. Dump and spread in the highest gear permitted by haul route conditions and fill-material characteristics. Constant speed, along with bowl height, will help to maintain a uniform depth of lift. Slowly dribbling the load at low speed slows down the cycle.

5.5.11.1. Move steadily across the spreading area.

5.5.11.2. Open the apron fully as the scraper reaches the location to begin dumping. Move the ejector forward to push the material out of the bowl.

5.5.11.3. Maintain a straight path through the spread area.

5.5.11.4. Close the apron when all of the material is out of the bowl, and return the ejector to the rear of the bowl.

5.5.11.5. Raise the bowl slowly to clear obstacles (12 to 18 inches) during the return trip to the loading area.

**Figure 5.3. Dumping and spreading.**

5.5.12. Spreading sequence.

5.5.12.1. Dump and spread the first load at the front of the fill.

5.5.12.2. Travel with subsequent loads over the previous fill, provided the lifts are shallow.

5.5.12.3. Start each following dump at the end of the previous fill.

5.5.12.4. Finish dumping and spreading one full lane before starting a new one so that rollers can start compaction.

5.5.12.5. Repeat this method in the next lane. Do not waste time on the fill. The scraper should return to the cut area as fast as possible after dumping the load. Plan the egress from the fill area to avoid soft ground or detours around trees or other obstacles.

5.5.12.6. Route the scrapers to compact the fill. Overlap wheel paths to aid in compaction of the entire area and to reduce compaction time for rollers.

**Caution:** Do not try to force wet or sticky material out of the bowl too fast. This will cause the material to roll up in front, which can damage the hydraulic system.

5.5.13. Fill slope. To maintain the desired fill slope, make the fill high on the outside edges. This will prevent the scraper from sliding over the slope and damaging the slope. If there is rain, build up the center for drainage or use a grader to cut the outside edge down, creating a crown in the middle of the area.

5.5.14. Sand. Spread sand as thin as possible to allow better compaction and to make traveling over the fill easier.

5.5.15. Wet or sticky material. Wet or sticky material may be difficult to unload or spread.

5.5.15.1. Do not try to spread the material too thin.

5.5.15.2. Keep the bowl high enough to allow the material to pass under the scraper. Material not having enough room to pass under the scraper will roll up inside the bowl into a solid mass that is difficult to eject.

5.5.15.3. Bring the ejector forward about 12 inches at a time.

5.5.15.4. Back the ejector about 6 inches after each forward movement. This breaks the suction between the material and the bowl.

5.5.15.5. Repeat this procedure until the bowl is empty.

5.5.16. Shutdown procedures.

5.5.16.1. Bring the scraper to a complete stop.

5.5.16.2. Place direction control lever in neutral.

5.5.16.3. Apply parking brake.

5.5.16.4. Lower the blade to the ground.

5.5.16.5. Allow engine three to five minutes to cool down.

5.5.16.6. Turn the key to the OFF position.

5.5.16.7. Check for damage.

5.5.17. End of duty day.

5.5.17.1. Perform post-operation procedures as described in **Paragraph 5.2.**

5.5.17.2. Cleaning air intake filters. There are generally two elements, the inner and the outer. Under dusty operating conditions, clean outer elements daily (even more often if working conditions are extremely dusty). The inner filter will be replaced during regular scheduled maintenance. For cleaning procedures, use guidelines stated in the operator's maintenance manual.

5.5.17.3. Lubricating the vehicle according to intervals listed in the maintenance chart. If operating the machine in severe conditions, lubricate the machine more frequently.

5.5.17.4. Fuel the Scraper at the end of each working day to prevent moisture from condensing and forming droplets of water within the fuel tank. Contact base fuels to come to the job site if the equipment can't be driven to the service station (i.e., extreme distances, tracked vehicles, no drivable support equipment, etc.). Ensure the vehicle has a minimum of three-fourths tank of fuel at the end of the duty day.

## Section 6—EXPLANATION AND DEMONSTRATION.

### 6.1. Instructor's Preparation.

6.1.1. Establish a training location.

6.1.2. Obtain appropriate vehicle operator's manual.

6.1.3. Schedule/reserve a vehicle.

6.1.4. Ensure trainee completes AF Form 171.

### 6.2. Safety Procedures and Equipment.

6.2.1. The following safety items should be followed by both the instructor and trainee.

6.2.1.1. Chock wheel (if required) when scraper is parked.

6.2.1.2. Remove all jewelry and identification tags.

6.2.1.3. Personal protective equipment (PPE) and equipment items.

6.2.1.3.1. Safety toed boots must be worn.

6.2.1.3.2. Gloves will be worn during pre-operation inspection, post-operation inspection and while performing maintenance/adjustments to the attachment.

6.2.1.3.3. Hearing protection, if required

6.2.1.3.4. Eye protection, if required.

6.2.1.3.5. Inclement weather gear.

6.2.1.3.6. Reflective belt during hours of reduced visibility or on the flightline.

6.2.1.3.7. Warning triangles.

6.2.1.4. The trainer and the trainee should conduct a 360 walk-around the vehicle to become familiar with all warning labels and signs.

6.2.1.5. Ensure that the vehicle is properly parked and the brakes are set before accomplishing the walk-around inspection.

6.2.1.6. Properly adjust driver's seat and all mirrors.

6.2.1.7. Ensure trainee wears seat belts.

6.2.1.8. Throughout demonstration, practice scraper operational safety.

6.2.2. Practice basic AF RM process during demonstration:

6.2.2.1. Identify the hazards.

6.2.2.2. Assess the hazards.

6.2.2.3. Develop controls and make decisions.

6.2.2.4. Implement controls.

6.2.2.5. Supervise and evaluate.

**6.3. Operator Maintenance Demonstration.**

6.3.1. With trainee, accomplish vehicle inspection using AF Form 1800. The vehicle inspection will follow the seven-step method as described in **Attachment 3**. An inspection guide can be used to ensure all areas of the scraper are covered in addition to the "Operation Demonstration" guidelines provided below.

**6.4. Operation Demonstration.**

6.4.1. Throughout demonstration:

6.4.1.1. Allow for questions.

6.4.1.2. Repeat demonstrations as needed.

6.4.2. Demonstrate/discuss pre-operation and during-operation inspection requirements.

6.4.3. Describe the operation and location of the following items:

6.4.3.1. Foot brake pedal.

6.4.3.2. Steering wheel.

6.4.3.3. Horn button.

6.4.3.4. Gear selector.

6.4.3.5. Parking brake.

6.4.3.6. Bowl/apron controls.

6.4.3.7. Declutch pedal.

6.4.4. Discuss the following important operational notes:

6.4.4.1. Radiator checks. When cold, the coolant level should be approximately 1 inch from the top of the filler neck and the full cold mark on the reservoir.

6.4.4.2. Typically, transmission fluid must be checked with the transmission warm, engine running and gear selector in the neutral position. Scraper transmissions vary from model to model and may require different fluid checking procedures. Check the operator's manual prior to checking the fluid.

6.4.4.3. Engine oil must be at the full mark on the oil dipstick.

6.4.4.4. Do not operate the starter for more than 30 seconds. If the engine does not start within 30 seconds, allow the starter motor to cool for 2 minutes before attempting to restart the engine.

6.4.4.5. If a wheel is removed and replaced for puncture repair or any other reason, the wheel nuts must be tightened to the correct ft/lbs limit provided in the operator's manual and checked daily until stabilized.

6.4.5. Demonstrate the following for the scraper.

6.4.5.1. Proper mounting and dismounting procedures.

6.4.5.2. Engine start up, including proper safety precautions.

6.4.5.3. Instrument use and their indications.

6.4.5.4. Proper use of scraper controls.

6.4.5.5. Proper movement with and without a load.

6.4.5.5.1. Forward.

6.4.5.5.2. Turning. (at various speeds)

6.4.5.5.3. Braking.

6.4.5.5.4. Backing, (use spotter when backing).

6.4.5.5.5. Parking.

6.4.5.6. Scraper operations. **Note:** Refer to the technical manual for additional guidance pertaining to the vehicle being operated. Demonstrate:

6.4.5.6.1. Downhill loading.

6.4.5.6.2. Straddle loading.

6.4.5.6.3. Back track loading.

6.4.5.6.4. Chain push loading.

6.4.5.6.5. Cut and load.

6.4.5.6.6. Dumping.

6.4.5.6.7. Spreading.

6.4.5.6.8. Shutdown procedures.

6.4.6. Demonstrate/discuss post-operation requirements.

6.4.6.1. Ensure vehicle is clean.

6.4.6.2. Refuel vehicle.

6.4.6.3. Following manufacturer's shut-down procedures.

6.4.6.4. Perform a 360 walk-around inspection.

6.4.6.5. Annotate any discrepancies found on AF Form 1800.

6.4.7. Conclude by allowing time for questions and any requested re-demonstrations.

## Section 7—TRAINEE PERFORMANCE AND EVALUATION

### 7.1. Trainee Performance.

7.1.1. Instructor will:

7.1.1.1. Ensure safety at all times. **Note:** Stop training when safety items are violated. Proceed only when the trainee fully understands how to avoid repeating the safety infraction(s).

7.1.1.1.1. Chock wheel (if required) when scraper is parked.

7.1.1.1.2. Remove all jewelry and identification tags.

**Note:** If available, mark vehicle with magnetic sign indicating "Driver-in-Training" or "Trainee Operator."

7.1.1.2. PPE and other items:

7.1.1.2.1. Safety toed boots must be worn.

7.1.1.2.2. Gloves will be worn during pre-operation, post-operation inspection and while performing maintenance/adjustments to the attachment.

7.1.1.2.3. Hearing protection, if required.

7.1.1.2.4. Eye protection, if required.

7.1.1.2.5. Reflective belt during hours of reduced visibility or on the flightline

7.1.1.2.6. Warning triangles.

7.1.1.2.7. Inclement weather gear, if required.

**Note:** Discuss when it is required that applicable PPE should be worn/utilized.

7.1.1.3. Pay particular attention to the cautions and warnings listed in the operator's manual.

7.1.1.4. Properly adjust driver’s seat and all mirrors.

7.1.1.5. Ensure trainee wears seat belt.

7.1.1.6. Scraper safety items/procedures.

7.1.1.7. Ensure the trainee is aware of tasks to be performed.

7.1.1.8. Conduct during/after-action reviews with the trainee. (Demonstration may need to be re-accomplished).

7.1.2. Trainee Performance.

7.1.2.1. Conduct operator maintenance (have trainee explain items being inspected).

7.1.2.1.1. Pre-operation inspection.

7.1.2.1.2. During-operation inspection.

7.1.2.2. Ensure AF From 1800 is properly documented.

7.1.2.2.1. Identify and explain scraper gauges, switches, levers and buttons.

7.1.2.2.2. Establish a road course that will have the following: (if the course does not have one of the following, then the trainee should be able to explain the correct operating techniques).

7.1.2.2.2.1. Forward.

7.1.2.2.2.2. Turning.

7.1.2.2.2.3. Braking.

7.1.2.2.2.4. Backing (use spotter when backing).

7.1.2.2.2.5. Parking.

7.1.2.2.2.6. Scraper operation. **Note:** Refer to the technical manual for additional guidance pertaining to the vehicle being operated.

7.1.2.2.2.6.1. Downhill loading.

7.1.2.2.2.6.2. Straddle loading.

7.1.2.2.2.6.3. Back track loading.

7.1.2.2.2.6.4. Chain push loading.

7.1.2.2.2.6.5. Cut and load.

7.1.2.2.2.6.6. Dumping.

7.1.2.2.2.6.7. Spreading.

7.1.2.2.2.6.8. Shutdown procedures.

7.1.2.2.3. Perform post-operation inspection.

7.1.2.2.3.1. Ensure vehicle components are cleaned.

7.1.2.2.3.2. Check fuel level. If there is < ¾ tank, refuel the vehicle.

7.1.2.2.3.3. Check diesel exhaust fluid level, if equipped.

7.1.2.2.3.4. Following manufacturer's shut-down procedures.

7.1.2.2.3.5. Park.

7.1.2.2.3.5.1. Place transmission in neutral.

7.1.2.2.3.5.2. Apply parking brake.

7.1.2.2.3.6. Perform a 360 walk-around inspection checking for leaks and damage.

**7.2. Performance Evaluation.**

7.2.1. Trainee will perform performance evaluation found in **Attachment 2**.

7.2.1.1. Instructor and trainee will review **Attachment 2**.

7.2.1.2. Instructor will answer trainee's questions.

**Note:** If available, mark vehicle with magnetic sign indicating “Driver-in-Training” or “Trainee Operator”.

7.2.2. Instructor will:

7.2.2.1. Ensure safety at all times.

7.2.2.1.1. Place wheel chocks (if required) when scraper is parked,

7.2.2.1.2. Remove all jewelry and identification tags.

7.2.2.2. PPE and other items.

7.2.2.2.1. Safety toed boots must be worn.

7.2.2.2.2. Gloves will be worn during pre-operation inspection, post- operation inspection and while performing maintenance/adjustments to the attachment.

7.2.2.2.3. Hearing protection, if required.

7.2.2.2.4. Eye protection, if required.

7.2.2.2.5. Reflective belt during hours of reduced visibility or on the flightline.

7.2.2.2.6. Warning triangles.

7.2.2.2.7. Inclement weather gear, if required.

7.2.2.3. Ensure trainee wears seat belt.

7.2.2.4. Properly adjust driver’s seat and all mirrors.

7.2.2.5. Scraper safety items/procedures.

7.2.3. Explain operating techniques.

7.2.4. The trainee will demonstrate and be evaluated on the following procedures:

7.2.4.1. Vehicle/equipment checkout.

7.2.4.2. Pre-operation inspection/preventative maintenance.

7.2.4.3. Start-up procedures.

7.2.4.4. Forward.

7.2.4.5. Turning.

7.2.4.6. Braking.

7.2.4.7. Backing (use spotter when backing).

7.2.4.8. Parking.

7.2.4.9. Scraper operation. **Note:** Refer to the technical manual for additional guidance pertaining to the vehicle being operated

7.2.4.9.1. Downhill loading.

7.2.4.9.2. Straddle loading.

7.2.4.9.3. Back track loading.

7.2.4.9.4. Back track loading.

7.2.4.9.5. Chain push loading.

7.2.4.9.6. Cut and load.

7.2.4.9.7. Dumping.

7.2.4.9.8. Spreading.

7.2.4.9.9. Shutdown procedures.

7.2.4.10. Perform post-operation inspection.

7.2.4.10.1. Ensure vehicle components are cleaned.

7.2.4.10.2. Check fuel level. If there is < ¾ tank, refuel the vehicle.

7.2.4.10.3. Following manufacturer's shut-down procedures.

7.2.4.10.4. Park.

7.2.4.10.4.1. Place transmission in neutral.

7.2.4.10.4.2. Apply parking brake.

7.2.4.10.5. Perform a 360 walk-around inspection checking for leaks and damage.

7.2.5. Ensure the driver is aware of operating situations.

7.2.6. Conduct after-action reviews with the trainee.

7.2.7. Trainee is not allowed any instructor assists to pass performance evaluation.

7.2.8. Evaluation checklist provided in **Attachment 2**.

7.2.9. Retraining; retrain No-Go's.

7.2.9.1. Re-demonstrate "No-Go" items.

7.2.9.2. Have trainee re-perform until they show proficiency in operating, critique weaknesses as observed.

7.2.9.3. Re-evaluate.

## Attachment 1

## GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

***References***

**AFI 13-213**, *Airfield Driving*, 1 June 2011

**AFI 24-301**, *Ground Transportation*, 1 November 2018

**AFI 24-302**, *Vehicle Management*, 26 June 2012

**AFI 91-202**, *Air Force Consolidated Occupational Safety Instruction*, 15 May 2012

**AFMAN 24-306**, *Operation of Air Force Government Motor Vehicles*, 9 December 2016

**AFPAM 90-803**, *Risk Management (RM) Guidance and Tools*, 11 February 2013

***Adopted Forms***

**AF Form 171**, *Request for Driver's Training and Addition to U.S. Government Drivers*, 1 November 2018

**AF Form 847**, *Recommendation for Change of Publication*, 22 September 2009

**AF Form 1800**, *Operator's Inspection Guide and Trouble Report*, 1 April 2010

***Abbreviations and Acronyms***

**AF—**Air Force

**AFI—**Air Force Instruction

**AFIMSC—**Air Force Installation Mission Support Center

**AFMAN—**Air Force Manual

**AFQTP—**Air Force Qualification Training Plan

**DD—**Department of Defense

**DEF—**Diesel Exhaust Fluid

**IAW—**In Accordance With

**PPE—**Personal Protective Equipment

**PSI—**Pounds per Square Inch

**RM—**Risk Management

**SF—**Standard Form

**VCNCO—**Vehicle Control Non Commissioned Officer

**VCO—**Vehicle Control Officer

## Attachment 2

## PERFORMANCE TEST

**A2.1. Desired Learning Outcome.**

A2.1.1. Understand the safety precautions to be followed pre-, during-, and post-operation of the scraper.

A2.1.2. Understand the purpose of the scraper and its role in the mission.

A2.1.3. Know the proper operator maintenance procedures of the scraper, IAW applicable technical orders and use of Air Force (AF) Form 1800.

A2.1.4. Safely and proficiently operate the scraper.

**A2.2. Instructions.** Before beginning the performance test, the trainer will brief the trainee on the scenario that will need to be accomplished. He/she will be given additional directions and instructions as needed throughout the scenario.

**A2.3. Scoring.**

A2.3.1. The trainer examiner will be scoring the trainee on scraper operations and also the general safe driving practices. The examiner will give directions and instructions to the trainee in sufficient time for him/her to execute a driving maneuver. They will not be asked to drive in an unsafe manner.

A2.3.2. The examiner will be making various marks on the performance test checklist. This does not necessarily mean anything has been done wrong. It is in the best interest to concentrate on the operation of the scraper. The trainer will explain the test results at the conclusion of the performance test.

A2.3.3. Tasks being graded are listed on the following page; the trainee will be required to successfully pass all items.

A2.3.4. The instructor will stop the test at any time safe operations are not being followed or as deemed necessary for safety concerns.

**Figure A2.1. Performance Test Checklist:**

| PERFORMANCE TEST | | | |
|---|---|---|---|
| **Trainees Name:** | | **Date:** | |
| **Event** | **Go** | **No Go** | **Notes** |
| **1. PRE, DURING, AND POST- OPERATION INSPECTION** | | | |
| 1.1. Operator has required Personal Protective Equipment. | | | |
| 1.2. Follows general pattern of pre-trip checklist. | | | |
| 1.3. Performs brake component check | | | |
| 1.4. Signs AF Form 1800 to signify accomplishment of complete inspection. | | | |
| 1.5. Cleans windshield, windows, mirrors, lights and reflectors | | | |
| 1.6. Continues during operations inspection checks. | | | |
| 1.7. Knows use of jacks, tools, emergency devices, tire chains, fire extinguishers, etc. | | | |
| 1.8. Performs post trip inspection and reports malfunctions to Vehicle Management. | | | |
| **Event** | **Go** | **No Go** | **Notes** |
| **2. BASIC CONTROL AND VEHICLE OPERATION** | | | |
| 2.1. Safety belt is used; obeys all traffic signs, signals, and laws; completes test without an accident or moving violation. | | | |
| 2.2. Avoids jerky starts and stops. | | | |
| 2.3. Does not cut corners sharply. | | | |
| 2.4. Maintains proper speed and space. | | | |
| 2.5. Ensure proper scraper safety practices. List safety violations. | | | |

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| 2.6. Turns: | | | |
| Checks traffic in all directions; uses turn signals and safely get into the lane needed for the turn; slows down smoothly, changes gears as needed to keep power; checks mirrors to ensure proper clearance; vehicle should not move into oncoming traffic. | | | |
| 2.7. Stopping - decelerates smoothly, brakes evenly, changes gears as necessary; brings vehicle to a full stop without coasting. | | | |
| 2.8. Starting - checks traffic, avoids jerky starts. | | | |
| **Event** | **Go** | **No Go** | **Notes** |
| **3. KNOWLEDGE OF VEHICLE AND USE OF CONTROLS** | | | |
| 3.1. Engine: | | | |
| Uses proper starting procedures | | | |
| Allows proper warm-up. | | | |
| Understands all gauges. | | | |
| Uses proper shutdown procedures. | | | |
| Basic knowledge of engines. | | | |
| 3.2. Brakes and Braking Techniques | | | |
| | | | |
| Proper use of parking brake. | | | |
| Performs brake check before pulling out. | | | |
| **Event** | **Go** | **No Go** | **Notes** |
| **4. BACKING/PARKING** | | | |
| 4.1. Backing. | | | |
| Positions properly. | | | |
| Inspects before backing. | | | |
| Uses spotters properly. | | | |
| Uses mirrors properly. | | | |
| Avoids blind side backing. | | | |
| Controls speed. | | | |
| 4.2. Parking. | | | |
| Checks traffic position before parking. | | | |
| Secures vehicle properly. | | | |
| Parks legally and safely. | | | |
| Uses emergency warning devices, if required. | | | |

| Event | Go | No Go | Notes |
|---|---|---|---|
| **5. SCRAPER OPERATIONS** | | | |
| 5.1. Downhill loading. | | | |
| 5.2. Straddle loading. | | | |
| 5.3. Back track loading. | | | |
| 5.4. Chain push loading. | | | |
| 5.5. Cut and load. | | | |
| | | | |
| 5.7. Dumping. | | | |
| 5.8. Spreading. | | | |
| **CERTIFIER COMMENTS:** | | | |

## Attachment 3

## SEVEN-STEP INSPECTION PROCESS

**Figure A3.1. Seven-Step Inspection Process.**

| Seven-Step Inspection Process | |
|---|---|
| **Step** | **Procedure** |
| 1. Vehicle Overview | • Review the AF Form 1800.<br>o Ensure any discrepancy has been corrected.<br>o Vehicle Management annotated the discrepancy was completed.<br>o Approaching the vehicle.<br>o Damage or vehicle leaning to one side.<br>o Fresh leakage of fluids.<br>o Hazards around vehicle. |
| 2. Check Engine Compartment | • **Note:** Check that the parking brakes are on and/or wheels chocked. The operator may have to raise the hood, tilt the cab (secure loose things so they don't fall and break something), or open the engine compartment door.<br>• Check the following:<br>o Engine oil level.<br>o Coolant level in radiator; condition of hoses.<br>o Power steering fluid level; hose condition (if so equipped).<br>o Windshield washer fluid level.<br>o Battery fluid level, connections and tie-downs (battery may be located elsewhere).<br>o Automatic transmission fluid level (may require engine to be running).<br>o Check belts for tightness and excessive wear (alternator, water pump, air compressor)--learn how much "give" the belts should have when adjusted right. |

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| | o Leaks in the engine compartment (fuel, coolant, oil, power steering fluid, hydraulic fluid, battery fluid). Cracked, worn electrical wiring insulation. |
| 3. Start Engine and Inspect Inside the Cab (Get in and Start Engine) | • Make sure parking brake is on.<br>• Put gearshift in neutral (or park if automatic). Start engine; listen for unusual noises.<br>• If equipped, check the Anti-lock Braking System (ABS) indicator lights. Light on dash should come on and then turn-off. If it stays on the ABS is not working properly.<br>• Look at the gauges.<br>o Oil pressure. Should come up to normal within seconds after engine is started.<br>o Ammeter and/or voltmeter. Should be in normal range(s).<br>o Coolant temperature. Should begin gradual rise to normal operating range.<br>o Engine oil temperature. Should begin gradual rise to normal operating range.<br>o Warning lights and buzzers. Oil, coolant, charging circuit warning, and antilock brake system lights should go out right away.<br>o Check Condition of Controls. Check all of the following for looseness, sticking, damage, or improper setting:<br>o Steering wheel.<br>o Clutch.<br>o Accelerator (gas pedal).<br>o Brake controls.<br>o Foot brake.<br>o Parking brake.<br>o Transmission controls.<br>o Interaxle differential lock (if vehicle has one).<br>o Horn(s).<br>o Windshield wiper/washer.<br>o Lights. |

| | |
|---|---|
| | o Headlights.<br>o Dimmer switch.<br>o Turn signal.<br>o Four-way flashers.<br>o Parking – clearance – identification – marker switch (switches).<br>• Check mirrors and windshield.<br>o Inspect mirrors and windshield for cracks, dirt, illegal stickers, or other obstructions to seeing clearly. Clean and adjust as necessary.<br>• Check emergency equipment.<br>o Check for safety equipment:<br>o Spare electrical fuses (unless vehicle has circuit breakers).<br>o Three red reflective triangles, 6 fuses or 3 liquid burning flares.<br>o Properly charged and rated fire extinguisher. Check for optional items such as:<br>o Chains (where winter conditions require).<br>o List of emergency phone numbers Accident reporting kit (packet).<br>o Check safety belt. Check that the safety belt is securely mounted, adjusts; latches properly and is not ripped or frayed. |
| 4. Turn-off Engine | • Make sure the parking brake is set, turn-off the engine, and take the key with.<br>• Turn-on headlights (low beams) and four-way emergency flashers, and get out of the vehicle. |

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| 5. Do Walk-Around Inspection | • General.<br>o Go to front of vehicle and check that low beams are on and both of the four-way flashers are working.<br>o Push dimmer switch and check that high beams work.<br>o Turn-off headlights and four-way emergency flashers.<br>o Turn-on parking, clearance, side-marker, and identification lights.<br>o Turn-on right turn signal, and start walk-around inspection.<br>o Walk around and inspect.<br>o Clean all lights, reflectors, and glass as while doing the walk-around inspection.<br>• Left front side.<br>o Driver's door glass should be clean.<br>o Door latches or locks should work properly.<br>• Left front wheel.<br>o Condition of wheel and rim--missing, bent, broken studs, clamps, lugs, or any signs of misalignment.<br>o Condition of tires--properly inflated, valve stem and cap OK, no serious cuts, bulges, or tread wear.<br>o Use wrench to test rust-streaked lug nuts, indicating looseness.<br>• Left front brake.<br>o Condition of brake drum or disc.<br>o Condition of hoses.<br>• Front.<br>o Condition of front axle. Condition of steering system.<br>o No loose, worn, bent, damaged or missing parts.<br>o Mustgrab steering mechanism to test for looseness.<br>o Condition of windshield.<br>o Check for damage and clean if dirty.<br>o Check windshield wiper arms for proper spring tension.<br>o Check wiper blades for damage, "stiff" rubber, and securement.<br>o Lights and reflectors. |

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| | o Parking, clearance, and identification lights clean, operating, and proper color (amber at front).<br>o Reflectors clean and proper color (amber at front).<br>o Right front turn signal light clean, operating, and proper color (amber or white on signals facing forward).<br>• Right side<br>o Right front: check all items as done on left front.<br>o Primary and secondary safety cab locks engaged (if cab-over-engine design).<br>o Right fuel tank(s).<br>o Securely mounted, not damaged, or leaking. Fuel crossover line secure.<br>o Tank(s) contain enough fuel. Cap(s) on and secure.<br>o Condition of visible parts. Rear of engine--not leaking. Transmission--not leaking.<br>o Exhaust system--secure, not leaking, not touching wires, fuel, or air-lines.<br>o Frame and cross members--no bends or cracks.<br>o Air-lines and electrical wiring--secured against snagging, rubbing, wearing.<br>o Spare tire carrier or rack not damaged (if so equipped).<br>o Spare tire and/or wheel securely mounted in rack.<br>o Spare tire and wheel adequate (proper size, properly inflated).<br>o Curbside cargo compartment doors in good condition, securely closed, latched/locked and required security seals in place.<br>• Right rear.<br>o Condition of wheels and rims--no missing, bent, or broken spacers, studs, clamps, or lugs.<br>o Condition of tires--properly inflated, valve stems and caps OK, no serious cuts, bulges, tread wear, tires not |

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| | rubbing each other, and nothing stuck between them.<br>o Tires same type, e.g., not mixed radial and bias types.<br>o Tires evenly matched (same sizes). Wheel bearing/seals not leaking.<br>o Axle secure.<br>o Powered axle(s) not leaking lube (gear oil). Condition of torque rod arms, bushings.<br>o If retractable axle equipped, check condition of lift mechanism. If air powered, check for leaks.<br>o Condition of air ride components.<br>o Brakes.<br>o Brake adjustment.<br>o Condition of brake drum(s) or discs.<br>o Condition of hoses--look for any wear due to rubbing.<br>o Lights and reflectors.<br>o Side-marker lights clean, operating, and proper color (red at rear, others amber).<br>o Side-marker reflectors clean and proper color (red at rear, others amber).<br>• Rear.<br>o Lights and reflectors.<br>o Rear clearance and identification lights clean, operating, and proper color (red at rear).<br>o Reflectors clean and proper color (red at rear).<br>o Taillights clean, operating, and proper color (red at rear).<br>o Right rear turn signal operating, and proper color (red, yellow, or amber at rear).<br>o License plate(s) present, clean, and secured.<br>o End gates free of damage, properly secured in stake sockets.<br>• Left side.<br>o Check all items as done on right side, plus: |

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| | o Battery (batteries) (if not mounted in engine compartment).<br>o Battery box (boxes) securely mounted to vehicle. Box has secure cover.<br>o Battery (batteries) secured against movement. Battery (batteries) not broken or leaking.<br>o Fluid in battery (batteries) at proper level (except maintenance-free type).<br>o Cell caps present and securely tightened (except maintenance-free type).<br>o Vents in cell caps free of foreign material (except maintenance-free type). |
| 6. Check Signal Lights | • Get in and turn-off all lights.<br>• Turn-on stop lights (apply trailer hand brake or have a helper put on the brake pedal).<br>• Turn-on left turn signal lights.<br>• Get out and check lights.<br>• Left front turn signal light clean, operating and proper color (amber or white on signals facing the front).<br>• Left rear turn signal light and both stop lights clean operating, and proper color (red, yellow, or amber).<br>• Get in vehicle.<br>o Turn-off lights not needed for driving.<br>o Check for all required papers, trip manifests, permits, etc.<br>o Secure all loose articles in cab (they might interfere with operation of the controls or hit the operator in a crash).<br>o Start the engine. |
| 7. Start the Engine and Check Test for Hydraulic Leaks | • Test for hydraulic leaks.<br>o If the vehicle has hydraulic brakes, pump the brake pedal three times.<br>o Then apply firm pressure to the pedal and hold for five seconds.<br>o The pedal should not move. If it does, there may be a leak or other problem. |

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| | • Brake system.<br>• Test parking brake.<br>o Fasten safety belt.<br>o Set parking brake (power unit only). Place vehicle into a low gear.<br>o Gently pull forward against parking brake to make sure the parking brake holds.<br>o If it doesn't hold vehicle, it is faulty; get it fixed.<br>• Test service brake stopping action.<br>o Go about 5 miles per hour.<br>o Push brake pedal firmly.<br>o "Pulling" to one side or the other can mean brake trouble.<br>o Any unusual brake pedal "feel" or delayed stopping action can mean trouble.<br>o If the trainee finds anything unsafe during the Vehicle inspection, get it fixed. Federal and state laws forbid operating an unsafe vehicle.<br>• Check vehicle operation regularly:<br>o Instruments.<br>o Air pressure gauge (if the vehicle has air brakes). Temperature gauges.<br>o Pressure gauges. Ammeter/voltmeter.<br>o Mirrors.<br>o Tires.<br>o Cargo, cargo covers. Lights, etc.<br>o If the trainee sees, hears, smells, or feels anything that might mean trouble, he/she should check it out.<br>• Safety inspection.<br>• Document any discrepancy on AF Form 1800. Sign-off AF Form 1800 to signify accomplishment of inspection. |