

Chapter 15 Firefighting Equipment

A. Introduction

The agency wildland fire program equipment resources include engines, dozers, water tenders, and other motorized equipment for fire operations.

B. Policy

Each state/region will comply with established standards for training, equipment, communications, organization, and operating procedures required to effectively perform arduous duties in multi-agency environments and various geographic areas. Approved foam concentrate may be used to improve the efficiency of water, except near waterways where accidental spillage or over spray of the chemical could be harmful to the aquatic ecosystem, or other identified resource concerns.

C. Driving Standard

Refer to the current driving standards for each individual agency in Chapter 06.

D. Firefighting Engines

1. Operational Procedures

All engines will be equipped, operated, and maintained within guidelines established by the Department of Transportation (DOT), regional/state/local operating plans, and procedures outlined in *BLM Manual H-9216, Fire Equipment and Supply Management*, or agency equivalent. All personnel assigned to agency fire engine modules will meet all gear weight, cube, and manifest requirements specified in the *National Mobilization Guide*.

2. Fire Engine Module Staffing

The NWCG/ICS policy is a Single Resource Boss will be with every engine, and the minimum staffing is two individuals for Type 6 and Type 7 modules. For Type 3, 4, and 5 engines, minimum staffing is three individuals including a Single Resource Boss for each engine.

3. *BLM – Staffing levels- Type 6 and 7 engines will have a minimum crew of two – an Engine Module Leader (EML) or Engine Operator (ENOP), and an Engine Module Member.*

4. *BLM – Staffing levels- Type 3, 4, or 5 engines will have a minimum crew size of three:*

- a. *Single resource engines will be comprised of an EML, an ENOP, and one or more Module Members.*

- b. *Task force engines will have an ENOP and the appropriate number of Module Members. The EML position is not required on each engine, but must be filled within the task force.*
- 5. NPS Staffing levels-** *Engines of any type when responding to off-park assignments, will be staffed by an ENGB and the appropriate number of Module Members. Type 6 or 7 engines may be supervised by an ENOP on in-park fires only. For an engine supervised by an ENOP when used for initial attack (on in-park fires only), the ENOP must also be minimally ICT5 qualified. Type 3, 4, or 5 engines, regardless of assignment location, will be minimally supervised by an ENGB.*
- a. *Type 6 and 7 engines will have a minimum crew of two – an ENGB or ENOP (in-park only), and an Engine Module Member.*
 - b. *Type 3, 4, or 5 engines will have a minimum crew size of three, an ENGB, an ENOP and one Engine Module Member; or an ENGB, and two Engine Module Members.*
- 6. NPS – WCF/Non-WCF, Additional requirements**
*WCF engines are identified below.
 All engines will be typed in accordance with the specifications identified in the IRPG. Minimum engine staffing requirements:*
- a. *Approved Working Capitol Fund (WCF) Type 6 or 7 engines during the defined fire season is 3 personnel effective 7 days per week.*
 - b. *Approved Working Capitol Fund (WCF) Type 3, 4, or 5 engines during the defined fire season is 5 personnel effective 7 days per week.*
 - c. *Non-WCF engines (or WCF engines outside defined fire season), Type 6 or 7 engines is a minimum of 2.*
 - d. *Non-WCF engines (or WCF engines outside defined fire season), Type 3, 4, or 5 engines is a minimum of 3.*
- 7. Performance Requirements for Engine Modules**
 The following performance requirements are based on the daily duties of engine module personnel and may exceed the standards listed in the *Wildland Fire Qualifications Subsystem Guide (NWCG 310-1)*. The following standards are in addition to the minimum requirements found in the *Wildland Fire Qualifications Subsystem Guide (NWCG 310-1)*.
- 8. Engine Module Member (EMM)**
- a. **Minimum Qualifications**
 - 1) FFT2
 - b. **Additional Required Training**
 - 2) None
 - c. **Additional Performance Requirements**

- 1) **Apparatus Inventory**
Ability to maintain inventory in a constant state of fire readiness.
 - 2) **Tool and Equipment Standards**
Ability to use, check condition of, and identify repair/replacement needs as identified in *Firefighters Guide NFES 1571*. All tools and equipment must meet refurbishment standards specified in *Fire Equipment Storage and Refurbishment NFES 2249*.
 - 3) **Hose Packs**
Working knowledge of hose pack types and how to safely and efficiently deliver water to the fire.
 - 4) **Types of Hose**
Working knowledge of hose identification and use. See *Wildland Fire Hose Guide NFES 1308*.
 - 5) **Fittings/Nozzles**
Ability to identify fittings and nozzles, understand use, capabilities, limitations, and perform maintenance.
- d. *USFS – The FS recommends the performance requirements for each Engine Module Member.*
9. **Engine Operator (ENOP)**
The agencies have established an ENOP position and associated Task Book to meet field needs.
- a. **Minimum Qualifications**
 - 1) CDL (where appropriate for the GVW), FFT1
 - b. **Additional Required Training**
 - 1) L-280- Followership to Leadership
 - c. **Recommended Training**
 - 1) PMS 419 BLM Engine Operator Course
 - d. **Additional Performance Requirements**
Same as for the Engine Module Member, plus the following:
 - 1) **Stationary Pumping**
Ability to set up stationary pumping operations to safely and efficiently deliver water to a fire through a hoselay.
 - 2) **Mobile Attack**
Ability to set up and perform mobile attack safely and efficiently. Understand roles and responsibilities associated with multi-engine mobile attack.
 - 3) **Urban Interface**
Understand strategies and tactics recognize hazards, and know BLM policy with regards to urban interface situations.
 - 4) **Interface with Municipal Fire Apparatus**
Understand capabilities and limitations and how to effectively interface with equipment. Be aware of the

- pressures and flow rates used with municipal apparatus and their potential effects on wildland fire equipment.
- 5) **Engine Protection**
Ability to protect engine by positioning in a fire safe area; set up and use engine protection lines.
 - 6) **Pump Theory and Operation**
Ability to effectively apply this knowledge to fire situations most commonly encountered. Must be able to troubleshoot pump/valve problems in various fire and drill situations.
 - 7) **Pump Package Maintenance Procedures**
Ability to maintain pump package per manufacturer's/BLM standards. Pump package must be in a constant state of fire readiness. Ability to troubleshoot equipment problems and develop solutions/repair needs. Ability to perform required pump test to ensure pump/plumbing are operating to specifications, and maintain log.
 - 8) **Hydraulics**
Ability to effectively apply calculations and formulas relating to fire hydraulics, including friction loss. Must understand pump capabilities and limitations (GPM, PSI, elevation gain and loss, etc.)
 - 9) **Simple Hoselays**
Ability to perform initial layout and extend a simple hoselay delivering water to fire safely and efficiently.
 - 10) **Progressive Hoselays**
Ability to perform initial layout and extend a progressive hoselay delivering water to fire safely and efficiently.
 - 11) **Hoselay Troubleshooting**
Ability to troubleshoot hoselay problems and develop solutions.
 - 12) **Foam Equipment Maintenance**
Ability to flush the engine foam proportioner according to the manufacturer's recommended procedures.
 - 13) **Foam**
Ability to efficiently produce different types of foam from nozzle(s).
 - 14) **Drafting Theory**
Ability to draft from external source and fill engine tank, and draft from external source and deliver water through a hoselay.
 - 15) **Hydrant Use**
Understand and apply the safe and effective operation of fire hydrants and be able to set up an engine for hydrant water delivery.

- 16) **Vehicle Maintenance Procedures**
Ability to maintain vehicle per manufacturer's/BLM standards, keeping vehicle in a constant state of fire readiness. Ability to troubleshoot equipment problems, develop solutions/repair needs.
 - 17) **Winterization**
Ability to properly winterize apparatus and pump package to protect from potential freeze damage.
 - 18) **Radio Use**
Understand and apply BLM policy regarding radio use and protocol; be proficient at radio programming.
 - 19) **FWS/USFS** – *The FWS/FS recommends the performance requirements for each engine ENOP.*
10. **BLM– Engine Module Leader (EML)-Agency Specific Position**
- a) **Minimum Qualifications**
 - 1) *ICT4, ENOP, ENGB.*
 - b) **Additional Required Training**
 - 1) *I-200, S-200, S-231, S-234, S-260, S-270, S380, S-381 (Leadership and Organizational Development) or equivalent.*
 - c) **Additional Performance Requirements**
Same as for ENOP, plus the following
 - 1) **Supervision**
The Engine Module Leader is responsible for the overall operation of the module's activities. Directs module personnel during fire preparedness review, suppression activities, fuels management, and project work. Provides direction to the module commensurate with members' qualifications and experience.
 - 2) **Equipment Capability**
Has a thorough knowledge of tactical equipment capabilities and limitations, and their relationship to fuels, topography, and fire behavior.
 - 3) **Training**
Provides and facilitates training of personnel through mentoring, formal and informal instruction. Identifies training needs (IDP) and performs Task Book management for module members.
 - 4) **Administration**
Performs administrative duties relating to the operation of the module, including (but not limited) to time and attendance, procurement activities (credit card), personnel management (recruitment and hiring), IDP development, and property management.

- 5) **Coordination**
Develops and maintains working relationships with BLM counterparts, cooperators, other agencies, general public, and media.
- 6) **Safety**
Ensures compliance with safety procedures and policies and mitigates potentially hazardous situations.
- 7) **Physical Fitness**
Train, test, and evaluate Module Members to ensure that required physical fitness standards are met.
- 8) **Communication**
Ensures that Module Members receive situational briefings. Provides briefings during daily work activities, fireline duties, and fireline transitions. Solicits and provides feedback.
- 9) **Equipment Development & Evaluation**
Identifies problems with BLM equipment and suggests possible solutions. Provides feedback to equipment development groups. Tests and evaluates prototype equipment.
- 10) **FWS/NPS/USFS** – *The FWS/NPS/FS recommends the performance requirements for the Engine Module Leader.*

11. Engine Standards

- a. **Engine typing**
Engine Typing and respective standards are identified in the NWCG *Fireline Handbook*, 410-1.
- b. **Engine Water Reserve**
Engine Operators will maintain at least 10 percent of the pumpable capacity of the water tank for emergency engine protection and drafting.
- c. **Chocks**
At least one chock will be carried on each engine and will be properly utilized whenever the engine is parked or left unattended. This includes engine operation in a stationary mode without a driver “in place.”
- d. **Fire Extinguisher**
All engines will have at least one 5 lb. ABC-rated (minimum) fire extinguisher, either in full view or in a clearly marked compartment.
- e. **First Aid Kit**
Each engine shall carry, at a minimum, a fully equipped 10-person first aid kit.
- f. **Gross Vehicle Weight (GVW)**
It is the each agencies policy to have an annually certified weight slip in the vehicle at all times. Operators of engines and

water tenders must ensure that the maximum certified GVW is never exceeded, including gear, personnel and fuel. If the proper number of personnel are not available during the weighing the NFPA 1906 standard of 250 pounds for each person and their personal gear may be used to calculate the loaded weight.

g. **Speed Limits**

Posted speed limits will not be exceeded under any circumstances. In addition, engines will not exceed 65 mph regardless of the posted speed limit.

h. **Lighting**

All new orders for fire engine apparatus will include an overhead lighting package in accordance with statewide standards. It is recommended that the lighting package meet NFPA 1906 standards. Engines currently in service may be equipped with overhead lighting packages.

1) **Colors**

Lighting packages containing “blue” lights are not allowed and must be replaced. Blue lights have been reserved for law enforcement and must not be used on fire vehicles. A red, white, and amber combination is the accepted color scheme for fire.

2) **Light Use**

While off-road and/or during suppression, prescribed fire or other emergency activities, headlights and taillights shall remain illuminated at all times while the vehicle is in operation. In addition, overhead lighting (or other appropriate emergency lights) shall be illuminated whenever visibility is reduced to less than 300 feet.

3) ***NPS – Vehicle Color and Marking. Vehicles dedicated to wildland fire activities shall be white in color and have a single four-inch wide red reflective stripe placed according to NFPA 1906 (NFPA 1906 7-6.2 1995 edition). The word “FIRE” red with white background color will be centered on the front fenders. “FIRE” may also be placed on the front and rear of the vehicle. The NPS Arrowhead will be placed on the front doors. The size and placement of the arrowhead will be as specified in RM-9. An identifier will be placed on the vehicle according to local zone or GACC directions. Roof numbers will be placed according to local zone procedures.***

i. **On-Board Flammable Liquid Storage**

OSHA regulations state, “only approved metal containers, of not more than 5 gallons capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure, be used for storing or

transporting flammable liquids” (29 CFR 1910.106). To comply with OSHA requirements and agency directives, only OSHA approved, type II metal safety cans should be used. Cans must be clearly marked as to their content. Also approved are the 2-in-1 polyethylene containers (Dolmars) used to fill chainsaws and the Jerry cans used to fuel Mark III pumps.

- j. **Fire Engine Maintenance Procedure and Record**
Apparatus safety and operational inspections will be accomplished either on a post-fire or daily basis. Offices are required to use this document for guidelines and record keeping. Periodic maintenance (as required by the manufacturer) shall be performed at the intervals recommended and properly documented. All annual inspections will include a pump gpm test to ensure the pump/plumbing system is operating at desired specifications. Specifications can be found at <http://web.blm.gov/internal/fire/textdocs/specs.pdf>

12. Engine Inventories

An inventory of supplies and equipment carried on each vehicle is required to maintain accountability and to obtain replacement items lost or damaged on incidents. The standard inventory for engines is found on page 15-12.

E. Water Tenders

1. Water Tender Operators Performance Standards

- a. **Water Tender Operator (Support)**
 - 1) Qualifications: CDL (tank endorsement).
- b. **Staffing**

A water tender (Support) may be staffed with a crew of one (a driver/operator) when it is used in a support role as a fire engine refill unit or for dust abatement. These operators do not have to pass the WCT but are required to take annual refresher training.

2. Water Tender Operator (Tactical)

- Tactical use is defined as “direct fire suppression missions such as pumping hoselays, live reel use, running attack, and use of spray bars and monitors to suppress fires.”
- a. **Qualifications:** ENOP, CDL (tank endorsement).
 - b. **Staffing:** Tactical water tenders will carry a minimum crew of two- one ENOP and one Engine Module Member.
 - c. *USFS – The FS recommends the performance requirements for support and tactical water tenders.*

3. Other Water Tenders

Contract water tenders will meet the specifications identified in their agreement/contract. All water tenders from other agencies will meet the requirements of their agency.

F. Dozers**1. Policy**

Agency personnel assigned as dozer operators will meet the training standards for a Firefighter 2 (FFT2). This includes all safety and annual refresher training. While on fire assignments, all operators and support crew will meet PPE requirements including the use of aramid fiber clothing, hard hats, fire shelters, boots, etc.

2. Physical Fitness Standards

- a. **BLM** – All employee dozer operators will meet the WCT requirements at the Moderate level before accepting fire assignments.
- b. **FWS** – Dozer Operators must be FFT2 and a Certified FWS Heavy Equipment Operator. They must complete Intermediate Fire Behavior (S-290) and they must meet a physical fitness WCT level of Moderate.
- c. **USFS** – FS dozer operators refer to 5134.32.

3. Operational Procedures

- a. Agency owned and operated dozers will be equipped with programmable two-way radios, configured to allow the operator to monitor radio traffic.
- b. Contract or offer-for-hire dozers must also be provided with radio communications, either through a qualified dozer boss or an agency-supplied radio. Contract dozers will meet the specifications identified in their agreement/contract.
- c. Operators of dozers and transport equipment will meet DOT certifications and requirements regarding the use and movement of heavy equipment, including driving limitations, CDL requirements, and pilot car use.
- d. A BLM dozer is defined as a dozer identified in a unit's Fire Management Plan, is commonly used for initial attack, and the fixed ownership rate may be paid out of preparedness funds.

G. All Terrain Vehicles (ATV)**1. BLM-**

- a. The BLM fire program will adhere to the BLM safety guidelines for the use of ATVs in accordance with BLM Manual 1112-1.

- b. *Specific authorization for ATV use is required (refer to your state/regional or local policy).*
 - c. *ATV refresher training is required every five years.*
 - d. *All personnel authorized to operate an ATV must first complete training in the safe operating procedures and appropriate PPE.*
 - e. *PPE includes helmet (must be DOT, ANSI-90, or SNELL M-95 approved), eye protection (goggles, face shield, or safety glasses), gloves, long sleeves, long pants, and leather boots (at least 8" high). The standard wildland fire hardhat will not be worn while operating an ATV.*
 - f. *Additional guidelines will be implemented:*
 - 1) *ATV training shall include safe operation while carrying loads.*
 - 2) *Drive at a safe speed that is appropriate for the conditions and terrain.*
 - 3) *Loads shall be properly mounted with weight not to effect the vehicle's center of gravity (in accordance with manufacturer's specifications). Under no circumstances shall loads exceed manufacturer's recommendations.*
 - 4) *A risk assessment must be completed prior to traversing steep slopes with operator's abilities and vehicle capabilities considered.*
 - 5) *No passengers will be carried, unless in an emergency situation.*
2. **FWS/NPS- Exceptions to the above policy are:**
SPH-4, SPH-5, or other comparable flight helmets meet the DOT requirements for a motorcycle helmet and may be used in lieu of. Standard fire hardhats or flight helmets are required for ATV use when on the fireline under low operating speeds only. Chinstraps must be used. Motorcycle helmets have not yet been tested and approved for fireline use. A motorcycle helmet or flight helmet will be required when operating to and from fire management activities and while loading and unloading the ATV.
FWS- Service Manual 241 FWS7 Firefighting. All Terrain Vehicle operations shall follow the detailed guidelines in the Service's All Terrain Vehicle Training Guide.
3. **USFS -Refer to Health and Safety code 6709-17.**

H. Vehicle Cleaning/Noxious Weed Prevention

To reduce the transport, introduction, and establishment of noxious weeds or other biological contaminants on the landscape due to fire suppression activities, fire suppression and support vehicles should be cleaned at a predestinated area prior to leaving the incident. Onsite fire equipment

should be used to thoroughly clean the undercarriage, fender wells, tires, radiator, and exterior of the vehicle. The cleaning area should also be clearly marked to identify the area for post fire control treatments, as needed.

I. Fire Remote Automated Weather Stations

Fire Remote Automated Weather Stations (FRAWS) are portable weather stations that pack up into a single container and may be utilized in any location to monitor local weather conditions. FRAWS are intended for use on or near the fireline and are rapidly relocated to points desired by Fire Behavior Analysts (FBAs) for real time weather data. Fire Managers and FBAs use FRAWS weather data to predict fire behavior, prescription times, fire weather forecasting, canyon, and ridgetop winds.

National resource FRAWS systems are cached at National Interagency Fire Center (NIFC) and may be ordered through standard equipment resource ordering systems. Maintenance and recalibration of these stations must be coordinated with the NIFC Remote Sensing/Fire Weather Support Unit (RSFWSU).

J. Ignition Devices

1. Aerial Ignition Devices

Information on types of aerial ignition devices, operational guidelines and personnel qualifications may be found in the *Interagency Aerial Ignition Guide*

2. Ground Ignition Devices

- a. **BLM** -Guidance and direction for use and procurement of approved ground ignition equipment and the transportation and dispensing of drip torch fuel can be found in: *Instruction Memorandum No. OF&A 2003-025, 04/14/0, Drip Torch Fuel Transportation and Dispensing Directions.*
- b. **NPS**- Agency direction may be found in the 04/04/03 *Memorandum Y14 (9560) Aerial and Ground Ignition Equipment.*
- c. **FWS**- specific information on ignition devices may be found in the January 28, 2003 Memorandum: "Direction for Use and Purchase of Aerial and Ground Ignition Equipment."
- d. **USFS**- direction is found in FSH5109.32a and 6709.11.