Chapter 14

Firefighting Equipment

Introduction

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

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.

Firefighting Engine/Water Tender Common Standards

Driving Standard
Refer to driving standards in Chapter 07.

Engine/Tactical Water Tender Water Reserve
Engine/Tactical Water Tender Operators will maintain at least 10 percent of the pumpable capacity of the water tank for emergency engine protection and drafting.

Chocks
At least one set of wheel chocks will be carried on each engine/water tender and will be properly utilized whenever the engine is parked or left unattended. This includes engine/water tender operation in a stationary mode without a driver “in place”.

Fire Extinguisher
All engines/water tenders will have at least one 5 lb. ABC rated (minimum) fire extinguisher, either in full view or in a clearly marked compartment.

Non-skid Surfaces
All surfaces will comply with National Fire Protection Association (NFPA) 1906 Standard for Wildland Fire Apparatus requirements.
First Aid Kit
Each engine/water tender shall carry, in a clearly marked compartment, a fully
equipped 10-person first aid kit.

Gross Vehicle Weight (GVW)
Each engine and water tender will have an annually certified weight slip in the
vehicle at all times. Weight slip will show individual axle weights and total
GVW. Operators of engines and water tenders must ensure that the maximum
certified gross vehicle and axle weight ratings are never exceeded, including
gear, personnel, and fuel. The NFPA 1906 standard of 250 pounds per seat
position for each person and their personal gear will be used to calculate the
loaded weight.
- FS - Refer to FSH 7109.19, Chapter 30 for calculation of Rough Road
  Factor reduction for driving on rough or unsurfaced roads.
- NPS - A copy of the annual certified weight slip must be sent to the Fire
  Equipment and Facilities Specialist at the FMPC in Boise prior to the
  vehicle being put into service each season.

Speed Limits
Posted speed limits will not be exceeded.

Lighting
Headlights and taillights shall remain illuminated at all times while the vehicle is
in motion. All new orders for fire engine apparatus will include an overhead
lighting package in accordance with agency standards. Lighting packages will
meet NFPA 1906 standards (6.8, 2006 edition). Engines currently in service
may be equipped with overhead lighting packages. A red, white, and amber
combination is the accepted color scheme for fire. Lighting packages containing
blue lights are reserved for law enforcement and are not allowed on fire
vehicles.

Emergency Light Use
Emergency lighting will be used only during on site wildland fire operations or
to mitigate serious safety hazards. Overhead lighting and other emergency
lighting must meet state code requirements, and will be illuminated whenever
the visibility is reduced to less than 300 feet.
- DOI- See agency chapters or policy for specific guidance.
- FS- See FSM 5120 and 5130 for red lights and siren policy.

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 document these inspections.
Periodic maintenance (as required by the manufacturer) shall be performed at
the intervals recommended and properly documented. All annual inspections
will include a pump gallons per minute (GPM) test to ensure the pump/plumbing system is operating at desired specifications.

### Firefighting Engines

#### 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 engines will meet all gear weight, cube, and manifest requirements specified in the National Mobilization Guide.

### Engine Typing

Engine typing and respective standards have been established by NWCG.

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Components</th>
<th>Structure Engines</th>
<th>Wildland Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1     2     3</td>
<td>4     5     6</td>
</tr>
<tr>
<td>Tank</td>
<td>Minimum Capacity (gal)</td>
<td>300   300   500</td>
<td>750  400  150</td>
</tr>
<tr>
<td>Pump</td>
<td>Minimum Flow (gpm)</td>
<td>1000  500  150</td>
<td>50  50  50</td>
</tr>
<tr>
<td>@ Rated Pressure (psi)</td>
<td>150  150  250</td>
<td>100  100  100</td>
<td>100 100</td>
</tr>
<tr>
<td>Hose 2 ½”</td>
<td>1200 1000</td>
<td>-    -    -</td>
<td>-    -    -</td>
</tr>
<tr>
<td>1 ½”</td>
<td>500  500  1000</td>
<td>300  300  300</td>
<td>300 300</td>
</tr>
<tr>
<td>1”</td>
<td>-   -   500</td>
<td>300  300  300</td>
<td>200 200</td>
</tr>
<tr>
<td>Ladders per NFPA 1901</td>
<td>Yes  Yes</td>
<td>-    -    -</td>
<td>-    -    -</td>
</tr>
<tr>
<td>Master Stream 500 gpm Min.</td>
<td>Yes  -    -</td>
<td>-    -    -</td>
<td>-    -    -</td>
</tr>
<tr>
<td>Pump and Roll</td>
<td>-    -    Yes</td>
<td>Yes Yes Yes</td>
<td>Yes Yes Yes</td>
</tr>
<tr>
<td>Maximum GVWR (lbs)</td>
<td>-    -    -</td>
<td>26,000 19,500 14,000</td>
<td>-    -    -</td>
</tr>
<tr>
<td>Personnel (NWCG min.)</td>
<td>4    3    3</td>
<td>2    2    2</td>
<td>2    2    2</td>
</tr>
</tbody>
</table>

• FS - See http://www.fs.fed.us/fire/equipment/engine-models/models.html for description of Forest Service national engine standards.
Fire Engine Staffing
An ENGB will be with every engine, and the minimum staffing is two individuals for Type 4, 5, 6, 7, engines.

For Type 3 engines, minimum staffing is three individuals, including an Engine Boss.
- **BLM** - For BLM engine staffing requirements, see Chapter 2.
- **FWS** - Minimum staffing for Type, 6 and 7 engines (on Refuge lands) is one ENOP and one FFT2. A minimum of one ICT3 must be available on the engine crew.
- **NPS** - For NPS engine staffing requirements see Chapter 3.
- **FS** - A Single Resource Boss may supervise a type 6 or 7 engine.

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 in Appendix M.

Water Tenders

Water Tender Typing
Water tender typing and respective standards have been established by NWCG.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Water Tender Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Support</td>
</tr>
<tr>
<td>Tank Capacity (gal)</td>
<td>S1</td>
</tr>
<tr>
<td>Pump Minimum Flow (gpm)</td>
<td>300</td>
</tr>
<tr>
<td>@Rated Pressure (psi)</td>
<td>50</td>
</tr>
<tr>
<td>Max. Refill Time (mins)</td>
<td>30</td>
</tr>
<tr>
<td>Pump and Roll</td>
<td>-</td>
</tr>
<tr>
<td>Personnel (min)</td>
<td>1</td>
</tr>
</tbody>
</table>
Water Tender Staffing Standards

- Water Tender (Non-Tactical)
  - Qualifications: CDL (tank endorsement).
  - Staffing: A water tender (non-tactical) may be staffed with a crew of
    one 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 Work Capacity Test (WCT) but are required to take annual
    refresher training.

- Water Tender (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”.
  - Qualifications:
    - BLM- ENOP, CDL (tank endorsement).
    - FS- FFT1, CDL
  - Staffing: Tactical water tenders will carry a minimum crew of two:
    - BLM- One ENOP and One Engine Module Member
    - FS- One FFT1 and One FFT1/FFT2 firefighter

Dozers/Tractor Plows

Dozer/Tractor Plow Training and Qualifications

Agency personnel assigned as dozer/tractor plow 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.

Dozer/Tractor Plow Physical Fitness Standards

- BLM/NPS - All employee dozer/tractor plow operators will meet the WCT
  requirements at the Moderate level before accepting fire assignments.
- FWS - See the Fire Management Handbook
- FS - FS dozer operators refer to FSM 5134.32.

Dozer/Tractor Plow Operational Procedures

- Agency owned and operated dozer/tractor plows will be equipped with
  programmable two-way radios, configured to allow the operator to monitor
  radio traffic.
- Agency dozer/tractor plows with non-red carded operators and all contract
  dozer/tractor plows will have agency supplied supervision when assigned to
  any suppression operations.
- Contract or offer-for-hire dozers must also be provided with radio
  communications, either through a qualified dozer/tractor plow boss or an
agency-supplied radio. Contract dozer/tractor plows will meet the
specifications identified in their agreement/contract.

- Operators of dozer/tractor plows 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.

**All Terrain Vehicles (ATV)/Utility-Terrain Vehicles (UTV)**

The operation of ATV/UTV can be high risk. The use of ATV/UTVs should be
evaluated to ensure that use is essential to accomplish the mission, rather than
for convenience.

Because of the high risk nature, agencies have developed specific operational
policy (refer to current agency policy). Common policy requirements for
wildland fire operations are highlighted below:

- A JHA/RA must be completed and approved by the supervisor prior to
vehicle operation.
- All personnel authorized to operate an ATV/UTV must first complete
agency specific or manufacturer-provided training in safe operating
procedures and appropriate PPE.
- Re-evaluation/Re-certification - Operators shall be re-evaluated every three
years. Infrequent users (less than 16 hours of riding a year) shall have a
check ride prior to scheduled use of an ATV/UTV.
- Specific authorization for ATV/UTV use is required -- all ATV/UTV
operations must hold a valid Motor Vehicle Operator’s Identification Card,
OF-346 or agency equivalent.

  - **DOI**- Upon completion of agency-specific ATV/UTV training and
operator certification requirements, All-Terrain Vehicle Operator
(ATVO) will be placed on the employee’s Incident Qualification and
Certification (IQCS) Card (Red Card). IQCS Certifying Officials are
responsible for verifying that ATV/UTV operator qualifications are
current, and that the ATVO qualification is removed from the Red Card
if agency-specific training, certification, or currency requirements
lapse.

  - **NPS**- All Off-Highway Vehicle (OHV) operators (including ATV/UTV)
must hold a valid state Motor Vehicle Operator’s Permit. Operating
restrictions identified on the operator’s permit must be adhered to
while operating an OHV (e.g., use of corrective lenses, etc). NPS ATV
operators must be qualified at either the Basic or Advanced Level as
described in RM-50B depending on the hazard potential of the
operation. All ATV operators shall be provided refresher training each
year in accordance with a JHA and reevaluated by an ASI Certified
Trainer every 3 years. The reevaluation shall be documented. **RM-**
50B, Appendix B (ATV Operator Accountability/Certification Tracking Record) may be used to document the reevaluation. Further information on ATV/UTV use is found in RM-50B.

- ATVs can only have a single rider – passengers are prohibited even if ATV is designed for two riders.
- UTVs passengers are limited to the number of seats installed by manufacturer. The operator and passenger(s) must use seatbelts while the vehicle is in motion.
- Operators must use required PPE while loading/unloading ATV/UTV.
- Cargo loads shall be loaded and secured as to not affect the vehicle’s center of gravity, and shall not exceed manufacturer’s recommendations for maximum carrying capacity.
- When transporting external fuel containers with a UTV, a 5 lb class BC fire extinguisher must be secured to the UTV.

Required PPE includes:

ATV Head Protection for Wildland Fire Operations:
- ATV Helmets must meet Snell SA2005 or SA2010 certification.
  - A ¾ face model meeting Snell SA2005 or SA2010 certification is acceptable for use.
  - Use of half “shorty” helmets requires a JHA/RA for fireline use and must include justification for its use. Refer to MTDC Tech Tip publication, A Helmet for ATV Operators with Fireline Duties (0651-2350-MTDC).

UTV Head Protection for Wildland Fire Operations:
- Helmets must meet DOT, ANSI Z90.1; or Snell SA2005 or SA2010 unless:
  - UTV is used for low speeds and smooth travel surfaces, administrative use (e.g., campgrounds, incident base camps) UTV operators are not required to wear hardhats or helmets.
    - **FWS**- Refer to 243 FW 6.
  - UTV is equipped with approved Rollover Protection System (ROPS), and:
    - **BLM** – A comprehensive and properly prepared RA of the specific conditions demonstrates no more than a medium residual risk level, then a hard hat meeting NFPA 1977 or ANSI Z 89.1 standards may be worn with chin straps secured in place under chin.
    - **NPS** - Approved helmets are required for UTV operations that are rated moderate (amber) or high (red) using the “ORV Risk Assessment Tool” included in the NPS Off-Highway Vehicle Policy.
    - **FWS**- A hardhat meeting NFPA 1977 or ANSI Z 89.1 standards may be worn with chin straps secured in place.
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- **FS-** UTV Helmet (for fire use) – Helmets must have Snell SA certification. Wearing hardhats while driving or riding on a UTV is not allowed. Forest Service policy provides no exception to the helmet requirement for low speeds, smooth travel surfaces, or administrative use (FSH 6709.11, Chapter 10).

Eye protection (goggles, face shield, or safety glasses) based upon JHA/RA.
- Eye protection is not required for a UTV equipped with an original manufacturer windshield that protects the face from branches, flying debris, etc., unless otherwise required by an associated industrial use activity or JHA/RA.

If operating ATV/UTV on the fireline, the following are required:
- Leather or leather/flame resistant combination gloves. Flight gloves are not approved for fireline use.
- Aramid trousers
- Wildland fire boots
- Appropriate head protection as described above

- **FS-** Shirt, trousers, and gloves used by USFS personnel must meet Forest Service specification 5100-91 (shirt), 5100-92 (trousers), and 6170-5 (gloves) or be certified to the National Fire Protection Association (NFPA) 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting.

ATV/UTV operator shall carry a personal communication device (e.g. two-way radio, cellular phone, or satellite phone).

All other ATV/UTV specific guidance is found in the respective agency’s policy:
- **FWS** - Refer to 243 FW 6.

Vehicle Cleaning/Noxious Weed Prevention

Refer to Chapter 11 for guidance on minimizing potential transmission of invasive species.
Incident Remote Automated Weather Stations

Incident Remote Automated Weather Stations (IRAWS – NFES 5869) are readily deployable, portable weather stations that may be utilized in unprepared locations to monitor local weather conditions. IRAWS are intended for use on or near the fireline or at other all-risk incidents, and are installed and operated as desired by Fire Behavior Analysts (FBAN) and/or Incident Meteorologists (IMET) to record and distribute real-time weather data.

National resource IRAWS systems are cached at the National Interagency Fire Center (NIFC) and may be ordered through standard equipment resource ordering systems. Following release from an incident, these stations must be returned to the Remote Sensing/Fire Weather Support Unit (RSFWSU) at NIFC for maintenance, recalibration, and redeployment.

Aerial Ignition Devices

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

Ground Ignition Devices and Transporting/Dispensing Fuel

For ground ignition devices: Follow the Interagency Ground Ignition Guide (PMS 443) for operational guidelines, personnel qualifications, and equipment selection.


FS - direction is found in FSH 5109.32a and 6709.11.