

8 – Wildland Fire Resources

Introduction

Tactical assignments for all resources will not be initiated or continued without strict adherence to the Risk Management Process, incorporating the 10 Standard Fire Orders, 18 Watch Out Situations, and principles of LCES. These items can be found in the *Incident Response Pocket Guide (IRPG)*.

Leadership

The most essential element of successful wildland firefighting is competent and confident leadership. Leadership means providing purpose, direction and motivation for wildland firefighters working to accomplish difficult tasks under dangerous, stressful circumstances.

A Good Leader Must:

- Be technically and tactically proficient
- Be responsible for your actions
- Know yourself and seek improvement
- Know your firefighters and look out for their well-being
- Set the example
- Make sound and timely decisions
- Keep your firefighters informed
- Ensure the task is understood, supervised and accomplished
- Develop a sense of responsibility in your firefighters
- Build the Team
- Employ your team in accordance with its capabilities

Policy

Noxious Weed Prevention

To reduce the transporting, 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 pre-designated area prior to leaving the incident. On-site 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.

Engine Modules

Engine modules are organized, trained, local and national resources that can be utilized in all fire management operations.

Policy

Each state/region will comply with established engine module standards. Standardized training, equipment communications, organization, and operating procedures are 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

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water, except near watercourses where accidental spillage or over spray of the chemical could be harmful to the aquatic ecosystem, or other identified resource concerns.

Safety

- **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.
- **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.”
- **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.
- **First Aid Kit** – Each engine shall carry, at a minimum, a fully equipped 10-person first aid kit.

Driving Standards

See Chapter 4, Safety.

Gross Vehicle Weight (GVW) – It is the 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.

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.

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

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.

While off-road and/or during suppression, prescribed fire or other emergency activities, headlights and taillights shall remain illuminated at all times 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.

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>

Vehicle Color and Marking

NPS – 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.

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 and 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.

Fire Engine Module Staffing

BLM, NPS – 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.

Type 3, 4, or 5 engines will have a minimum crew size of three:

- Single resource engines will be comprised of an EML, an ENOP, and one or more module members.
- 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.

NPS – Additional requirements for WCF engines are identified below. For an engine supervised by an ENOP when used for initial attack, the ENOP must also be minimally ICT5 qualified.

All engines will be typed in accordance with the specifications identified in the *IRPG*.

Identified below are the minimum engine staffing requirements:

- Approved Working Capitol Fund (WCF) Type 6 or 7 engines during the defined fire season is 3 personnel effective 7 days per week.
- Approved Working Capitol Fund (WCF) Type 3, 4, or 5 engines during the defined fire season is 5 personnel effective 7 days per week.
- Non-WCF engines (or WCF engines outside defined fire season), Type 6 or 7 engines is a minimum of 2.
- Non-WCF engines (or WCF engines outside defines fire season), Type 3, 4, or 5 engines is a minimum of 3.

USFS – The FS policy is a Single Resource Boss will be with every engine, and the minimum staffing is two for Type 6 and Type 7 modules. For Type 3, 4, and 5 engines, minimum staffing is three with a Single Resource Boss for each engine.

Agency Specific Positions

As a supplement to the qualifications system, certain agencies have identified the additional positions of Prescribed Fire Burn Boss 3 (RXB3) – see Chapter 6; Engine Operator (ENOP) – see Chapter 8; and Chainsaw Operators and Fallers.

Chainsaw Operators and Fallers

The DOI has established the following minimum qualification and certification process for Chainsaw Operators (Red Card certified as Faller A):

- Successful completion of S-212, including the field exercise, or those portions of S-212 that are appropriate for Faller A duties.
- Agency administrator (or delegate) certification of qualifications after verification that training is successfully completed.
- Annual refresher training is required as specified by the local unit.
- Documentation must be maintained for individuals, including annual refresher training.

The DOI has established the following minimum qualification and certification process for BLM/NPS Fallers (Red Card certified as Faller B or C):

- Certification of employees will remain the responsibility of the agency administrator (or delegate) after successful completion of training has been verified.
- Training and certification of Fallers should be addressed case-by-case, and used only if a need is identified.
- Annual refresher training is required and specified by the local unit.
- Documentation must be maintained for individuals, including annual refresher training.

USFS – FS direction can be found in *FSH 5109-17* and *FSH 6709.11*, specifically in the 2000-01 supplement.

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)*.

BLM/ NPS – The BLM has established an ENOP position and associated Task Book to meet field needs. These performance requirements will be evaluated during the Preparedness Review process.

Engine Module Member (EMM)

- **Minimum Qualifications:** FFT2
- **Additional Required Training:** None

- **Additional Performance Requirements:**
 - ▶ **Apparatus Appearance** – Ability to keep the vehicle clean and presentable to local standards
 - ▶ **Apparatus Inventory** – Ability to maintain inventory in a constant state of fire readiness. All tools and equipment must meet refurbishment standards specified in *NFES 2249, Fire Equipment Storage and Refurbishment*.
 - ▶ **Tool and Equipment Standards** – Ability to use, check condition of, and identify repair/replacement needs as identified in *NFES 1571, Firefighters Guide*.
 - ▶ **Hose Packs** – Working knowledge of hose pack types and how to safely and efficiently deliver water to the fire.
 - ▶ **Types of Hose** – Working knowledge of hose identification and use. See *NFES 1308, Wildland Fire Hose Guide*.
 - ▶ **Fittings/Nozzles** – Ability to identify fittings and nozzles, understand use, capabilities, limitations, and perform maintenance.

USFS – The FS endorses the performance requirements for each engine module member but it is not an FS standard at this time.

BLM/NPS – Engine Operator (ENOP)

- **Minimum Qualifications:** CDL (where appropriate for the GVW), FFT1
- **Additional Required Training:** S-281 “Supervisory Concepts and Techniques”
- **Recommended Training:** PMS 419 “BLM Engine Operator Course”
- **Additional Performance Requirements:** Same as for the Engine Module Member, plus the following:
 - ▶ **Stationary Pumping** – Ability to set up stationary pumping operations to safely and efficiently deliver water to a fire through a hoselay.
 - ▶ **Mobile Attack** – Ability to set up and perform running attack safely and efficiently. Understand roles and responsibilities associated with multi-engine mobile attack.
 - ▶ **Urban Interface** – Understand strategies and tactics, recognize hazards, and know BLM policy with regards to urban interface situations.
 - ▶ **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.
 - ▶ **Engine Protection** – Ability to protect engine by positioning in a fire safe area; set up and use engine protection lines.
 - ▶ **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.
 - ▶ **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.
- ▶ **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.).
 - ▶ **Simple Hoselays** – Ability to perform initial lay out and extend a simple hoselay delivering water to fire safely and efficiently.
 - ▶ **Progressive Hoselays** – Ability to perform initial lay out and extend a progressive hoselay delivering water to fire safely and efficiently.
 - ▶ **Hoselay Troubleshooting** – Ability to troubleshoot hoselay evolution problems and develop solutions.
 - ▶ **Foam Equipment Maintenance** – Ability to flush the engine foam proportioner according to the manufacturer’s recommended procedures.
 - ▶ **Foam** – Ability to efficiently produce different types of foam from nozzle(s).
 - ▶ **Drafting Theory** – Ability to draft from external source and fill engine tank, and draft from external source and deliver water through a hoselay.
 - ▶ **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.
 - ▶ **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.
 - ▶ **Winterization** – Ability to properly winterize apparatus and pump package to protect from potential freeze damage.
 - ▶ **Radio Use** – Understand and apply BLM policy regarding radio use and protocol; be proficient at radio programming.

USFS – The FS does not have an ENOP position. The FS endorses the performance requirements for the ENOP, although this is not a FS standard at this time.

BLM/NPS – Engine Module Leader (EML)

- **Minimum Qualifications:** ICT4, ENOP, ENGB
- **Additional Required Training:** I-200, S-200, S-231, S-234, S-260, S-270, S-381 (Leadership and Organizational Development) or equivalent
- **Additional Performance Requirements:** Same as for ENOP, plus the following:
 - ▶ **Supervision** – The Engine Module Leader is responsible for the overall operation of the module’s activities. Directs module personnel during fire readiness, suppression activities, fuels management, and project work.

- ▶ **Equipment Capability** – Maintains a thorough knowledge of tactical equipment capabilities and limitations, and their relationship to fuels, topography, and fire behavior.
- ▶ **Crew Qualifications & Experience** – Provides direction to the module commensurate with members' qualifications and experience.
- ▶ **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.
- ▶ **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.
- ▶ **Coordination** – Develops and maintains working relationships with BLM counterparts, cooperators, other agencies, general public, and media.
- ▶ **Safety** – Ensures compliance with safety procedures and policies and mitigates potentially hazardous situations.
- ▶ **Physical Fitness** – Train, test, and evaluate module members to ensure that required physical fitness standards are met.
- ▶ **Communication** – Ensures that module members receive situational briefings. Provides briefings during daily work activities, fireline duties, and fireline transitions. Solicits and provides feedback.
- ▶ **Equipment Development & Evaluation** – Identifies problems with BLM equipment and suggests possible solutions. Provides feedback to equipment development groups. Tests and evaluates prototype equipment.

USFS – The FS does not have an EML position. The FS endorses the performance requirements for the EML, although this is not a FS standard at this time.

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*.

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 K**.

Water Tender Operators

BLM/NPS – Water Tender Operator (Support)

- **Qualifications:** CDL (tank endorsement).
- **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.

BLM/NPS – 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

- **Qualifications:** ENOP, CDL (tank endorsement). When used tactically
- **Staffing:** Tactical water tender will carry a minimum crew of two, one ENOP and one Engine Module Member.

USFS – The FS endorses the qualifications for water tender support and tactical, although, this is not a FS standard at this time.

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.

Smokejumpers

Smokejumpers provide wildland fire suppression and hazardous fuels reduction services to interagency land managers.

USFS – FS smokejumping operations are guided by direction in *FSH 5709.14*, and the *Interagency Smokejumper Operations Guide*.

Policy

Each base will comply with smokejumper operations standards. The arduous duties, specialized assignments, and operations in a variety of geographic areas require smokejumpers to have uniform training, equipment, communications, organization, and operating procedures.

Concurrence with NICC must be obtained prior to configuring smokejumpers as a Type 21A crew.

BLM – smokejumpers use the ram air (square) parachute exclusively.

USFS – smokejumpers use the round FS14 parachute system exclusively.

Smokejumper Organization

The operational unit for BLM smokejumpers is “one load,” which typically consists of one plane with pilot(s), one or two spotters, and eight smokejumpers. The “load” (8-20) in Forest Service operations varies as per aircraft type.

Operational Procedures

Coordination & Dispatch – Smokejumpers are a national resource and are ordered according to geographic area or national mobilization guides. Specific information on the coordination, dispatch, ordering, and use of BLM smokejumpers in the contiguous 48 states can be found in the *BLM Boise Smokejumpers User Guide*, and in the Alaska Fire Service operational procedures, policies, and guidelines. Contact the BLM smokejumpers in Boise at (208) 387-5426 or the Alaska smokejumpers in Ft. Wainwright at (907) 356-5670 for these publications. The FS bases have ops plans pertinent to each base.

Communications – All smokejumpers carry programmable radios and are proficient in their use and programming procedures.

Transportation – Smokejumper retrieval is accomplished by coordinating with the requesting dispatch center. More detailed information can be found in the guides mentioned above.

Safety

All aviation and parachute operations will be accomplished in accordance with standard operating procedures and regulations.

Training

To ensure proficiency and safety, smokejumpers complete annual training that covers aspects of aviation, parachuting, fire suppression tactics, administrative procedures, and safety related to the smokejumper mission and fire operations.

The training program for first-year smokejumpers is four weeks long. Candidates are evaluated to determine:

- Level of physical fitness.
- Ability to learn and perform smokejumper skills.
- Ability to work as a team member.
- Attitude.
- Ability to think clearly and remain productive in a stressful environment.

The following are ICS qualifications for smokejumpers:

<u>Position</u>	<u>Target Recommendations</u>
Overhead Cadre	ICT3, DIVS
Spotter	ICT3, DIVS
Squad Leader	STCR, ICT4
GS-6 Smokejumper	CRWB
GS-5 Smokejumper	FFT1, FFT2

Physical Fitness Standards

The national minimum standards for smokejumpers are:

- 1.5 mile run in 11:00 minutes or less
- 45 sit-ups in 60 seconds
- 25 pushups in 60 seconds
- 7 pull-ups
- 110 lb. Packout over 3 miles/level terrain/90 minutes

In addition to these physical fitness standards, smokejumpers are required to pass the WCT at the arduous level.

Interagency Hotshot Crews

Interagency Hotshot Crews (IHCs) provide an organized, mobile, and skilled hand crew for all phases of wildfire suppression.

Policy

IHC standards provide consistent planning, funding, organization, and management of the agency IHCs. The sponsoring unit will ensure compliance with the established standards. The arduous duties, specialized assignments, and operations in a variety of geographic areas required of IHCs dictate that training, equipment, communications, transportation, organization, and operating procedures are consistent for all agency IHCs.

Agency IHCs will be managed under the *National Interagency Hotshot Crew Operations Guide (NIACOG)*.

BLM/NPS – IHCs have adopted the *National Interagency Hotshot Crew Operations Guide* as policy.

IHC Organization

Individual crew structure will be based on local needs using the following standard positions: Superintendent, Assistant Superintendent, Squad Leader, Skilled Firefighter, and Crewmember.

BLM – BLM IHC crewmembers will receive 40 hours of basic or refresher training before their first fire assignment in a fire season. Refresher training will include, but is not limited to, crew safety, risk management, firefighter safety, fire behavior, communications, and organization. The final responsibility for crew availability will rest with the Superintendent's certification to local unit management that all training is complete.

Availability Periods

All IHCs must be certified annually prior to initial assignment. Submit a completed "Appendix C" from the "*National IHC Operations Guide*" prior to the crew being made available for any incident assignment as an IHC. Any IHC not meeting all of the requirements in "Appendix C" before, or during, the crew's availability period will be available as an IHC(t). The crew superintendent is responsible to inform local supervisor and the local GACC of any required changes in the crew's typing.

IHCs will be available to meet or exceed availability periods specified in *NIHCOG 2001*

BLM – The minimum tour of availability excluding required training periods for BLM IHCs will be 130 calendar days for crews in the lower 48 states and 90 calendar days for crews in Alaska.

NPS/USFS – IHCs follow the *National IHC Operations Guide*, including minimum tours. In some Regions, tours may exceed the minimum based on preparedness and fuels funding levels, or non-fire funding for these resources.

Communications

IHCs will provide a minimum of five programmable multi-channel radios per crew as stated in the *IHCOG*.

Transportation

Crews will be provided adequate transportation. The number of vehicles used to transport a crew should not exceed five. All vehicles must adhere to the certified maximum GVW limitations. See GVW standards in Chapter 8.

Other Hand Crews

Agency hand crews consist of agency personnel, state crews, contract crews, casuals, or emergency firefighters. These crews will be formed into 18/20-person (16-person in Alaska) firefighting crews for fireline duties. Individuals must have knowledge of handline construction techniques, fire tool use, mopup, and fire behavior.

BLM – BLM non-IHCs will be typed in concurrence with the standards found in the Crew Typing Matrix (**Appendix L**). Typing will be identified at the local level with notification made to the local GACC.

Snake River Valley Crews (SRV) - All assignments for the crew will be placed through the SRV crew representative (CREP). The CREP is responsible for the crew's safety and supervision and will accompany the crew on all fireline assignments and during travel to and from the incident(s). Other responsibilities include: paperwork that pertains to the crew (time sheets, medical and accident forms); to act as a liaison between crew, the incident, and Vale Dispatch; to attend all incident briefings and relay assignments, instructions, and safety issues to the crew chief who will brief the crew.

There are 25 Snake River Valley crews in Oregon. Crews come with a crew representative, a crew chief, lead crew people, a qualified chainsaw operator, crewmembers, and the following:

- Available for 14 days.
- Equipped with all PPE, including shelters.
- Two radios per crew. If the CREP determines additional radios are needed, the hosting unit will provide the radios.
- Handtools (if requested); no chainsaws.
- Ground transportation will be provided by the Vale District and charged to the incident.

- One interagency resource representative (IARR) per four crews.

Alaska Fire Service EFF Crews – Alaska has a total of 73 Type 2 crews. For assignments within the state, the crew is made up of 16 individuals with a crew boss, three squad bosses, and 12 crewmembers. During the fire season, Alaska supports the need for national Type 2 crews by maintaining 40 crews – 25 maintained by the Alaska Fire Service and 15 maintained by the Alaska Division of Forestry. Alaska Type 2 crews assigned to the lower 48 states will come with a crew representative, a crew boss, three squad bosses, 15 crewmembers, and the following:

- Available for 14-day assignment.
- Equipped with all PPE, including shelters.
- Four radios per crew.
- No handtools or chainsaws.
- One interagency resource representative (IARR) with administrative assistant per five crews.

USFS – The FS crew program; each Region is assigned specific numbers of crews. The FS endorses the National Minimum Standards for crews and applies *FSH 5109.17* for training requirements.

Interagency Fire Use Modules

NPS – The National Park Service has nine Fire Use Modules. The primary mission and priority of the modules is to provide skilled and mobile personnel to assist with WFU in the areas of planning, fire behavior monitoring, ignition, and holding. Secondary priorities follow in the order below:

- Support burn unit preparation.
- Assist with fire effect plot work.
- Support mechanical hazardous fuel reduction projects.

As an interagency resource, the modules are available nationally throughout the fire season. Each module is comprised of a module leader, assistant leader and three to eight module members. See the *Fire Use Module Operation Guide* for specifics. Modules are mobilized and demobilized through established ordering channels through the GACCs.

Suppression Chemicals & Delivery Systems

Policy For Use Of Fire Chemicals

Use only products qualified and approved for intended use. Follow safe handling procedures and use personal protective equipment recommended on the product label and material safety data sheet (MSDS).

A current list of qualified products and approved uses can be found on the Wildland Fire Chemical Systems website:

www.rs.fed.us/rm/fire

Click on [Wildland Fire Chemicals](#)

Click on [Qualified Products List](#)

Refer to local jurisdictional policy and guidance related to use of wildland fire chemicals for protection of historic structures.

Safety

Personal Safety and Protection – Foam concentrates and solutions must meet minimum requirements with regard to aquatic and mammalian toxicity, which includes acute oral toxicity, acute dermal toxicity, primary skin irritation, and primary eye irritation (*International Specification for Fire Suppressant Foam for Wildland Fires, Aircraft or Ground Application, July 2000.*)

Locate foam operations (mixing and loading areas and dip-tank sites) to minimize potential contact with natural bodies of water.

Personnel involved in handling, mixing, and applying foam concentrates or solutions will be trained in proper procedures to protect their health and safety, as well as that of the environment.

Personnel must follow the manufacturer's recommendations, including use of PPE (i.e. goggles, gloves, eyewash kits on site) as found on the product label and product material safety data sheet (MSDS). Approved foam concentrates are mildly to severely irritating to the eyes. Anyone involved with or working in the vicinity of foam concentrates should use protective splash goggles.

Containers of foam concentrate or solutions, including backpack pumps and engine tanks, should be labeled to alert personnel that they do not contain plain water, and that the contents must NOT be used for drinking purposes.

Slickness is a hazard at storage areas and unloading and mixing sites. Because foam concentrates and solutions contribute to slippery conditions, all spills must be cleaned up immediately preferably with a dry absorbent pad or granules.

Personnel applying foam should stand in untreated areas. A foam blanket can be dangerous to walk through because it conceals ground hazards. Foam readily penetrates and deteriorates leather boots, resulting in wet feet and potentially ruined leather.

All safety precautions associated with ground crews near retardant drops also apply to aerial foam drops.

Environmental Guidelines For Delivery Of Retardant Or Foam Near Waterways

Definition – Waterway: Any body of water including lakes, rivers, streams and ponds whether or not they contain aquatic life.

Guidelines – Avoid aerial or ground application of retardant or foam within 300 feet of waterways. These guidelines do not require the pilot-in-command to fly in such a way as to endanger his or her aircraft, other aircraft, structures, or compromise ground personnel safety.

Guidance for Pilots – To meet the 300-foot buffer zone guideline, implement the following:

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- *Medium/Heavy Airtankers:* When approaching a waterway visible to the pilot, the pilot shall terminate the application of retardant approximately 300 feet before reaching the waterway. When flying over a waterway, pilots shall wait one second after crossing the far bank or shore of a waterway before applying retardant. Pilots shall make adjustments for airspeed and ambient conditions such as wind to avoid the application of retardant within the 300-foot buffer zone.
- *Single Engine Airtankers/Helicopters:* When approaching a waterway visible to the pilot, the pilot shall terminate application of retardant or foam approximately 300 feet before reaching the waterway. When flying over a waterway, the pilot shall not begin application of foam or retardant until 300 feet after crossing the far bank or shore. The pilot shall make adjustments for airspeed and ambient conditions such as wind to avoid the application of retardant or foam within the 300-foot buffer zone.

Exceptions – When alternative line construction tactics are not available due to terrain constraints, congested area, life and property concerns or lack of ground personnel, it is acceptable to anchor the foam or retardant application to the waterway. When anchoring a retardant or foam line to a waterway, use the most accurate method of delivery in order to minimize placement of retardant or foam in the waterway.

Deviations from these guidelines are acceptable when life or property is threatened and the use of retardant or foam can be reasonably expected to alleviate the threat. When potential damage to natural resources outweighs possible loss of aquatic life, the agency administrator may approve a deviation from these guidelines.

Operational Principles – Order retardant drops before an immediate need is recognized; pretreat according to expected fire behavior.

Follow the 10 Principles of Retardant Application (NFES 2048, PMS 440-2)

- Build progressive retardant line.
- Use retardant drops to cool areas (reduce flame length), as necessary, in support of ground forces.
- Be sure the line is clear of personnel prior to dropping retardant.
- Be alert for gaps in retardant lines.
- Expect fixed-wing vortices and rotor-wing down wash.
- Wildland fire can burn around, under, through, or spot over retardant lines if retardant coverage is inadequate for the fire intensity and rate of spread.

Safety

- Persons downrange, but in the flight path of intended retardant drops, should move to a location that will decrease the possibility of being hit with retardant if a drop goes long.
- Persons near retardant drops should be alert for objects (tree limbs, rocks, etc.) that the drop could dislodge.
- During training or briefings, inform field personnel of environmental guidelines and requirements for fire chemicals application.
- Locate foam and retardant mixing and loading areas and dip-tank sites to eliminate contact with natural bodies of water.
- Notify incident or host authorities promptly of any accidental foam or retardant drop within 300 feet of or spill into a water body. The incident or host authorities

must immediately contact appropriate regulatory agencies and specialists within the local jurisdiction.

- Avoid dipping from river or lakes with a helicopter bucket containing residual foam or retardant. Set up an adjacent reload site and manage the foam and retardant in portable tanks, or terminate the use of chemicals for that application.
- Quality control maintenance and safety requirements dictate that mixing or blending of retardants be accomplished by standard approved methods. Powdered or liquid retardants must be blended or mixed at the proper ratio prior to being loaded into the aircraft.

Threatened and Endangered (T&E) Species – The following provisions are guidance for complying with the emergency Section 7 consultation procedures of the Endangered Species Act (ESA) with respect to aquatic species. These provisions do not alter or diminish an agency's responsibilities under ESA.

Where aquatic T&E species or their habitats are potentially affected by aerial application of retardant or foam, the following additional procedures apply:

- As soon as practical after the aerial application of retardant or foam near waterways, determine whether the aerial application has caused any adverse effects to a T&E species or their habitat. This can be accomplished by the following:
- Aerial application of retardant or foam outside 300 feet of a waterway is presumed to avoid adverse effects to aquatic species and no further consultation for aquatic species is necessary.
- Aerial application of retardant or foam within 300 feet of a waterway requires that the unit administrator determine whether there have been any adverse effects to T&E species with the waterway.

These procedures shall be documented in fire reports.

If there were no adverse effects to aquatic T&E species or their habitats, there is no additional requirement to consult on aquatic species with Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS).

If the action agency determines that there were adverse effects on T&E species on their habitats then the action agency must consult with FWS and NMFS, as required by *50 CFR 402.05 (Emergencies)*. Procedures for emergency consultation are described in the *Interagency Consultation Handbook, Chapter 8 (March 1998)*. In the case of a long duration incident, emergency consultation should be initiated as soon as practical during the event. Otherwise, post-event consultation is appropriate. The initiation of the consultation is the responsibility of the unit administrator.

Each agency is responsible for insuring that their appropriate agency specific guides and training manuals reflect these standards.

Long-Term Retardant

Long-term retardants contain fertilizer salts that change the way that fuels burn. They are effective even after the water has evaporated.

Principles of application and coverage levels are outlined in *Recommended Retardant Coverage Levels NFES 2048, PMS 440-2*. Retardant mixing, blending, testing and

sampling requirements can be found in *Lot Acceptance, Quality Assurance and Field Quality Control for Fire Retardant Chemicals, NFES 1245, PMS 444-1*.

Policy – Using approved long-term retardants in wildland fire suppression efforts is standard in fire management and planning. The retardants are most often delivered in fixed- or rotor-wing aircraft. Some products are formulated specifically for delivery from ground sources.

Fire Suppressant Foam

Fire suppressant foams are combinations of wetting and foaming agents, added to water to improve the effectiveness of the water. They are NOT effective once the water has evaporated.

Technical guidelines for equipment operations and general principles of foam application are discussed in *Foam vs. Fire, Class A Foam for Wildland Fires, NWCG, PMS 446-1, NFES 2246, 2nd ed., October 1993*, and *Foam vs. Fire, Aerial Applications, NWCG, PMS 446-3, NFES 1845, October 1995*.

Foam Use Policy – Standard operating procedures for fire management and suppression activities involving water as the suppression or protection agent delivered by engines and portable pumps, shall include the use of Class A fire suppressant to improve the efficiency of water – except near watercourses where accidental spillage or over spray of the chemical could be harmful to the aquatic ecosystem. (See Environmental Guidelines, Chapter 8) Helicopters and Single Engine Airtankers (SEATs) can also deliver foam. Some agencies also allow application of foam from fixed-wing water scoopers.

Operational Guidelines for Use of Fire Suppressant Foams

Proportioners – Proportioners are designed to provide an appropriate mix of foam concentrate and water during pumping operations, rather than relying on batch mixing to prepare foam solutions. Both manual and automatic proportioner systems are available. Specific agency standards may require the use of a specific type of system. Proportioners should be flushed after every operational period of use.

Agency standards for foam proportioners on engines are an automatically regulated pressure bladder system, such as Robwen Flowmix 500, or FoamPro 1600. These devices are available as a foam kit for use with portable pumps. Automatic proportioners are required for compressed air foam systems to prevent slug flow.

USFS – Manually regulated proportioners, such as around-the-pump proportioners, in-line and by-pass eductors, and suction-side regulators, are acceptable for remote portable pump use when the operator understands the device limitations.

Wet Water – Using foam concentrates at a mix ratio of 0.1 percent will produce a wet water solution.

Conventional Nozzles and Backpack Pumps – Mix ratio is 0.1 – 0.3%. Hydraulic considerations are the same as water.

Aspirating Nozzles – Mix ratio is 0.2 – 1.0%, but generally 0.5%, depending on nozzle, “foaminess” of concentrate used, and type of application. Adjust the ratio to best meet needs and objectives. Foam production and delivery should occur as readily as water deliver.

Compressed Air Foam Systems (CAFS)

- Keep static air and water pressures equal.
- Start with a 0.3% mix ration; adjust if necessary.
- Typical operation with 1 cfm of air for every gpm of water; adjust if necessary.
- Employ a motionless mixer or 100 feet of hose to develop foam in the hose.
- Foam production and delivery should occur as readily as water delivery.

Recommended minimum hose diameter is 1.5 inches when using foam on wildland/urban interface and vehicle fires.

CAFS Safety – Personnel assigned to operate a compressed air foam system must be trained in safe CAFS operations, including operating the nozzle, working around charged hoselays, and how to prevent slug flow.

Water Enhancers for Wildland Fire Suppression – Water enhancers, such as fire fighting gels, are products added to water to improve one or more of the physical characteristics of water. They are NOT effective once the water has evaporated.

Water enhancers are typically applied from ground equipment and especially suited to exposure protection for vertical surfaces.

Water Enhancer Safety – Use caution where water enhancers are in use as they can be extremely slippery.

Dozers

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.

Physical Fitness Standards

BLM – All employee dozer operators will meet the WCT requirements at the moderate level before accepting fire assignments.

FWS – Dozer Operators must be FFT2 and Certified FWS Heavy Equipment Operator. They must complete Intermediate Fire Behavior (S-290) and they must meet a physical fitness WCT level of Moderate.

USFS – FS dozer operators refer to 5134.32.

Operational Procedures

Agency owned and operated dozers will be equipped with programmable two-way radios, configured to allow the operator to monitor radio traffic.

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.

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.

BLM – 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.

All Terrain Vehicles (ATV)

BLM – The BLM fire program will adhere to the BLM safety guidelines for the use of ATVs in accordance with BLM Manual 1112-1. All personnel authorized to operate an ATV must first complete training in the safe operating procedures and appropriate PPE. Specific authorization for ATV use is required (refer to your state/regional or local policy). 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 following additional guidelines will be implemented:

- ATV training shall include safe operation while carrying loads.
- Drive at a safe speed that is appropriate for the conditions and terrain.
- Loads shall be properly mounted with weight not to effect the vehicle's center of gravity (in accordance with manufacturers specifications). Under no circumstances shall loads exceed manufacturer's recommendations.
- A risk assessment be completed prior to traversing steep slopes with operator's abilities and vehicle capabilities considered.
- No passengers will be carried, unless in an emergency situation.
- The standard wildland fire hardhat will not be worn while operating an 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*.

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.

USFS – Refer to Health and Safety code 6709-17

Radio Communications

Radio communications provide for the flow of tactical information needed for the command/control of personnel and resources.

Policy

All operational supervisory positions will be equipped with a handheld radio when on fire and prescribed fire assignments.

Dispatch Recording Devices

BLM – Recording devices will be used by each BLM dispatch office or an interagency office dispatching BLM resources. The purpose is to record radio communications during emergency operations. This will ensure that in the event of an accident, investigators will be provided with an accurate record of events during reviews of those incidents.

If there is an accident or event that requires an investigation from the state or National Office, the recording covering that time period will be included in the investigation file.

Radio Frequency Management

Frequency assignments for normal operations or initial attack are made on a permanent basis and are requested through the state office or regional telecommunications manager to the Washington Office frequency manager.

The NIFC Communications Duty Officer (CDO) coordinates and assigns incident frequencies at the national level. They will also assign Communications Coordinators when necessary to support a specific Geographic Area(s). See the *National Mobilization Guide* for additional information.

Mutual-aid agreements for frequency sharing can be made at the local level. Use NIIMS form PMS 903-1/NFES 1519 “Radio Frequency Sharing Agreement” for this purpose.

A mutual-aid frequency sharing agreement is valid only in the specific locale it originates in. These agreements do not authorize the use of a shared frequency in any other area. NIFC national fire frequencies are not to be used for these agreements. Do not use a frequency unless authorized to do so by communications personnel at the local, state, regional or national level.

Initial attack aircraft frequencies (AM) will be assigned by the NIFC CDO.

On an incident, the Communications Unit Leader (COML) will assign frequencies on the Communications Plan (ICS-205) for incident use. The ICS-205 is always a part of the Incident Action Plan (IAP) and distributed at every operational period briefing. The COML will contact the NIFC-CDO, or the Communications Coordinator if assigned, for additional FM and AM frequencies.

When incident management teams are prepositioned in a field unit or geographical area, consideration will be given to also prepositioning a radio kit for immediate use by the team when assigned.

Frequencies for Type 1 and Type 2 incidents are assigned through the National Interagency Incident Communications Division (NIICD) located at NIFC. The CDO is responsible for this function.

During severe situations and/or when there are significant numbers of large incidents, additional frequencies can be assigned. These are temporary assignments, and are requested by NIICD-CDO from Washington Office (Spectrum) managers. This applies to frequencies for command, ground tactical, and aviation operations.

Additional frequencies are provided in the following circumstances:

- The NIICD national frequencies are all committed within a specific geographic area.
- The requests continue for frequencies to support new incidents within a specific complex.
- The fire danger rating is extreme and the potential for additional new incidents is high.

Pre-assigned National Frequencies

National Air Guard – 168.625 MHz – A National Interagency Air Guard frequency for government aircraft assigned to incidents. It is used in emergency communications for aviation. A separate receiver is required to permit continuous monitoring. Transmitters on this frequency should be equipped with an encoder on 110.9 Hz.

Restrictions for use are:

- Air-to-air emergency contact and coordination.
- Ground-to-air emergency contact.
- Initial call, recall, and re-direction of aircraft when no other contact frequency is available.

National Flight Following – 168.650 MHz – The National Interagency Air Net frequency. It is used for flight following of official aircraft. The intent is not to use this frequency for local large incidents unless necessary.

Restrictions for use are:

- Flight following, dispatch, and/or re-direction of aircraft.
- Air-to-ground and ground-to-air administrative traffic.
- Not authorized for ground-to-ground traffic.

National Interagency Air Tactics – 166.675 MHz, 167.950 MHz, 169.150 MHz, 169.200 MHz, 170.000 MHz – Frequencies used to support air-to-air or ground-to-air communications on incidents west of the 95th meridian.

- These frequencies shall be used for air-to-air and ground-to-air communications only.

NOTE: Pacific Southwest Geographic Region exception: 166.675 MHz, 169.150 MHz, and 169.200 MHz will be used for air-to-air only; 170.000 MHz will be used for ground-to-air only.

Pacific Northwest Geographic Region exception: 170.000 MHz frequency cannot be used in Columbia River Gorge area (located between Oregon and Washington).

- Interagency geographic area coordination centers assign these frequencies. Assignment must be coordinated through the NIFC CDO.
- Transmitter power output of radios installed in aircraft operating on these frequencies shall be limited to 10 watts.
- Base stations and repeaters are prohibited on these frequencies.

National Interagency Airtanker Initial Call – 123.975 MHz – The national interagency frequency assigned to all airtanker bases for their exclusive use. No other use outside of airtanker bases is authorized.

National Government All-Call Frequencies – 163.100 MHz and 168.350 MHz – For use anywhere, any time. They are good choices as travel frequencies for strike teams moving between assignments. They are available for ground tactical frequencies during initial attack or incident operations. They are not to be used for air-to-ground operations.

NOTE: When you are traveling between incidents, be sure to monitor for incident radio traffic in area before using these frequencies.

Incident Radio Support

All cache communications equipment should be returned to NIICD at NIFC immediately after the incident is turned over to the jurisdictional agency. The only exceptions are the seven Pacific Southwest Regional Starter Systems, which must be returned to their designated home unit.

No cache communication equipment should be moved from one incident to another without being first returned to NIFC for refurbishment. However, equipment unused and red-sealed may be moved, if approval is given by the NIRSC-CDO at NIFC.

Military Communications on an Incident

Military units assigned to an incident already have radios. Each battalion is assigned 48 handheld radios. Sixteen of these radios are used by military crew liaisons. Inter-crew communications within a military unit is provided by the military on its radios using its frequencies. All frequency assignments at the incident will be made by the COML in accordance with the ICS 205.

Some active military and guard units have aviation VHF-FM radios compatible with civilian systems. Other units are adapting their aircraft for the civilian radios and can be easily outfitted prior to dispatch to an incident. A limited number of wiring harnesses are available at NIFC for those military aircraft that do not have civilian VHF-FM capability.

Cellular Communications/ Satellite Phone Communication

Phone communication is a closed-loop conversation between two parties; it does not allow others to share critical information. This lack of open communication can contribute to any number of dangerous and undesirable situations. Cellular telephones will not be used to communicate tactical operations, unless they are the only means possible. Cellular telephones are not to be used for flight following in lieu of normal flight-following protocols.

Phone communication can be used for logistical purposes, if warranted.

Cell systems get overloaded with calls during emergencies—making access virtually impossible. Since all systems are interconnected in some form or another, problems that occur in one system can cause problems in other cell system(s), which can shut down all or part of an entire network.

Effective Radio Use

If personnel do not follow basic guidelines and use the system properly, the best system, even with full coverage, will not meet the requirements of the situation or incident.

The priority should always go to operations personnel or those personnel who are going to be in a hazardous environment and cannot be with someone carrying a radio.

All emergency communications equipment should be kept away from sources of possible interference. Existing radio communications sites are the best example of where not to place this equipment.

Keep the antenna as high as possible and in a vertical position.

Canting or tilting the radio 45 degrees lowers the effective transmitting power by half, so that a two-watt radio performs as a one-watt radio. Use of a chest harness reduces the effectiveness of the radio; since the radio is held at a 45 degree angle, the effective transmit power of the radio is reduced. There is also a decrease in transmitting and receiving capabilities due to shielding from your body.

Frequencies are a finite resource. There is a limited number available for initial attack and/or incident communications. Care must be taken how and where they are assigned to minimize the possibility of interference.

The use of the scan feature on a radio may increase as the number of frequencies increases. To be effective with the scanning function, all users have to let everyone know what channel they are using. During a crisis or critical situation, all radio users have to remember to end each message with the radio channel identifier being used. This is still required even with more sophisticated radios.

The more channels that are scanned, the busier the radio receiver becomes. In the case of inexperienced radio users, the communication system will appear to be overloaded because the radio is never quiet.

Use clear text language: use of codes potentially confuses interagency communications.