

8 - Suppression Resources

Introduction

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. In confusing and uncertain situations, a good operational leader will:(FWS)

Take Charge--of assigned resources.

Motivate-- firefighters with a "can do safety" attitude.

Demonstrate Initiative-- by taking action in the absence of orders.

Communicate-- by giving specific instructions and asking for feedback.

Supervise-- at the scene of action.

A Good Leader Must:

Be technically and tactically proficient:

- Take charge when in charge.
- Adhere to professional standard operating procedures.
- Develop a plan to accomplish given objectives.

Be responsible for your actions:

- Accept responsibility for team performance.
- Credit subordinates for good performance.
- Take full responsibility for and correct poor performance.

Know yourself and seek improvement:

- Know the strengths/weaknesses in your character and skill level.
- Ask questions of your peers and superiors.
- Actively listen to feedback from subordinates.

Know your firefighters and look out for their well-being:

- Put the safety of your subordinates above all other objectives.
- Take care of your subordinates physical, mental and spiritual needs.
- Resolve conflicts between individuals on the team.

Set the example:

- Share the hazards and hardships with your subordinates.

- Don't show discouragement when facing setbacks.
- Choose the difficult right over the easy wrong.

Make sound and timely decisions:

- Maintain situation awareness in order to anticipate needed actions.
- Develop contingencies and consider consequences.
- Improvise within the commander's intent to handle a rapidly changing environment.

Keep your firefighters informed:

- Provide accurate and timely briefings
- Give the reason (intent) for assignments and tasks.
- Make your self available to answer questions at appropriate times.

Ensure the task is understood, supervised and accomplished:

- Issue clear instructions.
- Observe and assess actions in progress without micro-management.
- Use positive-feedback to modify duties, tasks, and assignments when appropriate.

Develop a sense of responsibility in your firefighters:

- Clearly state expectations.
- Delegate those tasks that you are not required to do personally.
- Provide early warning to subordinates of tasks they will be responsible for.

Build the Team:

- Conduct frequent debriefings with the team to identify lessons learned.
- Recognize individual and team accomplishments and reward them appropriately.
- Apply disciplinary measures equally.

Employ your team in accordance with its capabilities:

- Observe human behavior as well as fire behavior.
- Consider team experience, conditioning, fatigue, and injury limitations when accepting assignments.
- Consider individual skills levels and developmental needs when assigning tasks.

Engines

Engine modules are organized, trained, local and national resources which can be utilized in all fire management operations, including initial attack, on incidents,

and fire use activities. The primary purpose of these engine modules is to staff and manage the fire apparatus in the BLM fleet.

Policy

Each state 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 Class A foam concentrate will be used 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.

Safety

Tactical assignments for engines will not be initiated or continued without strict adherence to the 10 Standard Fire Orders, 18 Watch Out Situations, and principles of LCES.

- Engine Operators will consider maintaining at least 10 percent of the pumpable capacity of the water tank for emergency engine protection and drafting.

Driving Standards

See Chapter 4, Safety.

Gross Vehicle Weight (GVW) It is the BLM of Land Management (BLM) policy to have an annual certified weight slip documenting that the actual GVW (including gear, personnel, and fuel) does not exceed the manufacturer's recommended GVW. Operators of engines and water tenders must ensure the maximum certified GVW is never exceeded.

Speed Limits Posted speed limits will not be exceeded under any circumstances. In addition, engines will not exceed 65 mph or the appropriate speed limit (which ever is more restrictive), even if the posted speed limit is greater than 65 mph.

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 assure the pump/plumbing system is operating at desired specifications.

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. FMOs may equip engines in service with overhead lighting packages.

Lighting packages containing "blue" lights are not allowed. 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 and must replace any blue lights currently being used.

While off-road and/or during suppression 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. Light bars, flashing lights, strobe lights, and other lighting equipment designed for emergency use, shall only be used for designated purposes during suppression operations and emergencies. Specific approval and training must be provided for these special uses.

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 Extinguishers 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 Equipment Each engine shall carry, at a minimum, a fully equipped 10-person first aid kit.

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 subject to fire exposure, be used for storing or transporting flammable liquids.” (29 CFR 1910.106) To comply with OSHA requirements and BLM directives, only OSHA approved, type II metal safety cans should replace plastic containers and traditional metal “Jerry cans.” (This does not apply to the 2-in-1 polyethylene containers [Dolmars] used to fill chain saws nor to the Jerry cans used to fuel Mark III pumps.)

All flammable liquids and solids carried on engines will be stored in appropriate containers clearly marked as to their contents.

Fire Engine Module Staffing

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 Engine Operator, and one or more module members.
- Task force engines will have an Engine Operator and the appropriate number of module members. The EML position is not required on each engine, but must be filled within the task force.(USFS)

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 BLM has established an Engine Operator (ENOP) position and associated task book to meet field needs. These performance requirements will be evaluated during the Preparedness Review process.

Engine Module Member

Minimum Qualifications: FFT2

Additional Required Training: I-100

Additional Performance Requirements:(USFS)

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.

Engine Operator (ENOP)(usfs)

Minimum Qualifications: CDL, FFT1

Additional Required Training: S-281 (Supervisory Concepts and Techniques)

BLM Engine Operator Task Book

Recommended Training: BLM Engine Operator Course

Additional Performance Requirements: Same as for Engine Module Member, plus the following:(usfs)

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 assure 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) appropriate for different fire situations. Understand the principles of compressed air foam generation and foam generation through a proportioner.

Drafting Theory—Ability to draft from external source and fill engine tank, and draft from external source and deliver water through a hose lay.

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.

Engine Module Leader (EML)(usfs)

Minimum Qualifications: ICT4, ENGB

Additional Training Required: I-200, S-200, S-231, S-234, S-260, S-270, S-381
(Leadership and Organizational Development)

Additional Performance Requirements: Same as for ENOP, plus the following:(usfs)

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.

Physical Fitness Standards Satisfactory completion of the Work Capacity Test (WCT) at the arduous level is required for all positions assigned to BLM engines. The physical fitness level will be maintained throughout the fire season.

Operational Procedures

All engines will be equipped, operated, and maintained within guidelines established by the DOT, state/local operating plans, and procedures outlined in BLM Manual H-9216, Fire Equipment and Supply Management. All personnel assigned to BLM fire engine modules will meet all gear weight, cube, and manifest requirements specified in the national mobilization guide.

Noxious Weed Prevention

To reduce the transporting, introduction, and establishment of noxious weeds 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 weed control treatments, as needed.

Engine Inventories

An inventory of supplies and equipment carried on each vehicle is required to maintain accountability and to obtain replacement items lost on incidents. The standard inventory for engines is found in **Appendix G**.

Water Tender Operators

Water Tender Operator (Support)

Qualifications: CDL (tank endorsement).

A water tender 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.(USFS)

Water Tender Operator (Tactical)

Qualifications: ENOP, CDL (tank endorsement).

When used tactically, a BLM water tender will carry a minimum crew of two, with the same qualifications, training and physical requirements as for a Type 6 engine (one ENOP and one Engine Module Member). 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.(USFS)

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

BLM Smoke jumpers provide wildland fire suppression and hazardous fuels reduction services to BLM and interagency land managers.(USFS)

Policy

Each BLM base will comply with BLM smokejumper operations standards. The arduous duties and 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 1 crew. BLM smokejumpers use the ram air (square) parachute exclusively.

Smoke jumper Organization

The operational unit for BLM Smoke jumpers is “one load,” which typically consists of one plane with pilot(s), one or two spotter(s), and eight smokejumpers.

The BLM operates two Smokejumper Bases. Three smokejumper aircraft are stationed at the National Interagency Fire Center in Boise, Idaho and four are stationed at Ft. Wainwright, Alaska.

Smokejumper Bases

Location	No. of Smj.
Fairbanks, AK	68
Boise, ID	85

Primary Spike Bases

<u>Alaska</u>	<u>Great Basin</u>
Fort Yukon	Grand Junction, Colorado
McGrath	Battle Mtn, Elko, Ely, Las Vegas,
Palmer	Carson City, & Winnemucca, Nevada
Galena	Boise, Pocatello, & Twin Falls, Idaho
	Cedar City & Salt Lake City, Utah

Operational Procedures

Coordination & Dispatch Smokejumpers are ordered according to 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.

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

Tactical decisions will be made in accordance with the 10 Standard Fire Orders, 18 Watch Out Situations, and principles of LCES. All aviation and parachute operations will be accomplished in accordance with standard operating procedures and regulations.

Training

To ensure proficiency and safety, BLM 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:

Position	Minimum Qualifications	Target Qualifications
Overhead Cadre	ICT3, DIVS	OSC2, ATGS
Spotter	ICT3, DIVS	ATGS
Squad Leader	STCR, ICT4	DIVS, ICT3
GS-6 Smokejumper	CRWB	ICT4, STCR, RXB2, RXI2
GS-5 Smokejumper	FFT1, FFT2	CRWB, RXFM

Physical Fitness Standards

The national minimum standards for smokejumpers are:

- 1.5 mile run in 11:00 minutes or less
- 45 situps 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, BLM smokejumpers are required to pass the Work Capacity Test.

Fire Specialist

BLM Fire Specialists are personnel experienced in wildland fire suppression, hazardous fuels management, and aviation operations. Fire Specialists are primarily ordered as single resources to fill operational needs at the local level. Typical configurations are Helicopter Module or Type 3 Incident Management Team. Fire Specialists can be detailed to fill key Field and State Office fire and aviation positions.

The Fire Specialists provide training developers and instructors in fire operations and aviation management. The Fire Specialists also manage a detail program with BLM and interagency partners that provides training and development opportunities for their employees.

Policy

Each Fire Specialist will comply with BLM operational procedures, policies, and guidelines.

Fire Specialist Base and Availability

Location	No.	Approx. Availability
Fairbanks, AK	39	May 1 - Oct 1

Operational Procedures

Coordination & Dispatch Fire Specialists are ordered according to desired positions or configurations. Specific information on the coordination, dispatch, ordering, and use of BLM Fire Specialists can be coordinated with the BLM Alaska Fire Service, Fire Operations Duty Office (907) 356-5660.

Communications All Fire Specialists carry a programmable radio and are proficient in its use and programming procedures.

Transportation Fire Specialists will require transportation for the assigned mission. All vehicles must adhere to the certified maximum GVW limitations.

Safety

Tactical assignments for Fire Specialists will not be initiated or continued without strict adherence to the 10 Standard Fire Orders, 18 Watch Out Situations, and principles of LCES.

Training

To ensure proficiency and safety, BLM Fire Specialists complete annual training that covers aspects of command, operations, aviation, planning, logistics, administrative procedures, and safety related to fire operations.

Two weeks of Fire Specialist Training is given to all first-year Fire Specialists. Based on other training needs, most first-year Fire Specialists receive an additional two to four weeks of training. Candidates are evaluated to determine their level of physical fitness, ability to work as an individual and as a team member, and to think clearly and remain productive in a stressful environment while retaining a professional attitude.

Physical Fitness Standards

The Pack Test is the minimum physical fitness requirement for BLM Fire Specialists.

Interagency Hotshot Crews

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

Policy

IHC standards provide consistent planning, funding, organization, and management of the BLM 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 BLM IHCs.

It is BLM policy to adopt the guidance found in the *Interagency Hotshot Crew Operations Guide 2001*.(usfs)

IHC Organization

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

BLM Type 1 IHCs

Diamond Mountain	Susanville, CA	Bonneville	Salt Lake City, UT
Silver State	Carson City, NV	Snake River	Pocatello, ID
Kern Valley	Bakersfield, CA	Ruby Mountain	Elko, NV
Chena	Fairbanks, AK	Winter Valley	Craig, CO
Midnight Suns	Fairbanks, AK	Vale	Vale, OR
Denali	Fairbanks, AK	Jackson	Jackson, MS

Safety

Tactical assignments for crews will not be initiated or continued without strict adherence to the 10 Standard Fire Orders, 18 Watch Out Situations, and principles of LCES.

Training

All 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.

Physical Fitness Standards

The Work Capacity Test is the minimum physical fitness requirement for BLM IHCs.

Operational Procedures

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.

Communications

BLM IHCs will provide a minimum of five programmable multi-channel radios per crew.

Transportation

Crews will be provided adequate transportation. Crew transportation should not

exceed five vehicles. All vehicles must adhere to the certified maximum GVW limitations.

Type 2 Crews

BLM Type 2 hand crews consist of BLM 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.

The BLM's Type 2 crew programs consist of:

Vale District Snake River Valley Crews.

Alaska Fire Service EFF Crews.

BLM Fire Use Modules meeting ICS handcrew standards for fire assignments. (USFS)

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, crew members, 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 crew members. 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 crew members, 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.

Other BLM sponsored Type 2 crews are available from a variety of sources ordered through the Geographic Area Coordination Center (GACC). Specific information about Type 2 crews can be obtained from the GACC.

National Minimum Standards (Physical and Training)

- Assigned crew overhead (crew boss / squad boss) must meet the minimum standards set forth in NWCG 310-1.
- Individuals must meet the arduous physical fitness level.
- Individuals must be available for 14-day minimum assignments.
- Crew members are required to complete S-130 and S-190 prior to crew assignment. Field exercise using classroom training experience is recommended.

Suppression Chemicals & Delivery Systems

Foam

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.

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 an approved Class A foam

concentrate 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, page 8-20.) Foam can also be delivered by helicopters and SEATs.

Operational Guidelines

Proportioners – BLM standards for foam proportioners on engines is an automatically regulated pressure bladder system (Robwen Flowmix 500). 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.

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.

Proportioners should be flushed after every operational period of use.

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 would water delivery.

Compressed Air Foam Systems (CAFS)

- Keep static air and water pressures equal.
- Start with a 0.3% mix ratio; adjust if necessary.
- Generally operate 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 for vehicle fires is 1.5 inches when using foam on wildland/urban interface and vehicle fires according to BLM policy.

Safety

Personal Safety and Protection – Foam concentrates and solutions must be tested to meet minimum requirements with regard to mammalian toxicity, acute

oral toxicity, acute dermal toxicity, primary skin irritation, and primary eye irritation (*International Specification for Class A Foam for Wildland Fires, Aircraft or Ground Application, August 1993*).

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

Personnel must follow the manufacturer's recommendations 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.

Personnel applying foam should stand in untreated areas. A foam blanket can be dangerous to walk through because it conceals ground hazards. Also, foam readily penetrates and corrodes 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.

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 hose lays, and how to prevent slug flow.

Long-Term Retardant

Principles of application and coverage levels are outlined in 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. Approved retardants currently contain sulfate or phosphate salts.

Operational Principles

- Use retardant drops before an immediate need is recognized; pretreat according to expected fire behavior.
- 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, spot over, and with enough intensity, through retardant lines.

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 BLM authorities promptly of any accidental foam or retardant drop within 300 feet of or spill into a water body.
- Avoid dipping from rivers 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.

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.

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 (a helicopter rather than a heavy airtanker).

Deviations from these guideline 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.

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 the 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 or 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

Dozers

BLM dozers and operators provide suppression and support capability for local and project fires.

Policy

BLM 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.

Operational Procedures

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

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. Other agency dozers will meet the requirements of their agency.

Operators of dozers and transport equipment will meet the Department of Transportation (DOT) certifications and requirements regarding the use and movement of heavy equipment—including driving limitations, CDL requirements, and pilot car use.

Physical Fitness Standards

All BLM employee Dozer operators will meet the Work Capacity Test requirements at the moderate level before accepting fire assignments.(usfs)

ALL TERRAIN VEHICLES (ATV)

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 personal protection equipment (PPE). Specific authorization for ATV use is required (refer to your state 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 over-the-ankle leather boots (at least 8" high). The standard field hard hat does not meet the PPE requirements and should not be worn while operating an ATV.

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.

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 Recorders

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.

Mutual-aid agreements for frequency sharing can be made at the local level. NIIMS form PMS 903-1/NFES 1519 "Radio Frequency Sharing Agreement" is available and should be used 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.

Do not use a frequency unless authorized to do so by communications personnel at the local, state, regional or national level.

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.

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

Frequencies for Type 1 and Type 2 incidents are assigned through the National Incident Radio Support Cache (NIRSC) located at NIFC.

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 NIRSC-NIFC from Washington Office telecommunications managers. This applies to frequencies for command, ground tactical, and aviation operations.

Additional frequencies are provided in the following circumstances:

- The NIRSC 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** is a National 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** is 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** are frequencies used to support air-to-air or ground-to-air communications on incidents west of the 95th meridian.

Restrictions for use are:

- 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 communications duty officer (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 Airtanker Initial Call - **123.975 MHz** is 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** are 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.

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 NIRSC at NIFC immediately after the incident is turned over to the jurisdictional agency. The only

exception is the five 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. Intercrew 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 9600 channel 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

Cellular telephones will not be used to communicate tactical operations, unless they are the only means possible. Cellular telephones are not be used for flight following in lieu of normal flight following protocols. 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.

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

Cellular enhancer systems can be used to expand coverage; they can have from 6 to 10 channels. This means only 6 to 10 phone calls can be made at any one time. The enhancers have to get these channels from an existing cell site which adds an additional system load. This results in a cascading effect which can reduce overall cell site performance.

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 the personnel using the system 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.

When frequencies are in short supply, crews can improve their access into existing communications systems by placing personnel as relays. This is very effective in areas requiring short duration operations.

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 an 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.

U.S. Fish and Wildlife Service (FWS) Agency Specific Directions

Page 8-1 Introduction

Refer to Fire Management Handbook Chapters 1-3 for specific and/or additional information on suppression resources.

U.S. Forest Service (USFS) Agency Specific Directions

Page 8-5 Engine Module Staffing

The FS policy is a Single Resource Boss will be with every engine, and 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.

Page 8-6 Additional performance Requirements

The FS endorses the minimum qualifications and performance requirements for each engine module member.

Page 8-6 Engine Operator (ENOP)

The FS does not have ENOP position.

Page 8-6 Additional Performance Requirements

The FS endorses the performance requirements for the ENOP, although this is not a FS standard at this time.

Page 8-8 Engine Module Leader (EML)

The FS does not have EML position.

Page 8-8 Additional Performance Requirements

The FS endorses the performance requirements for the EML, although this is not a FS standard at this time.

Page 8-9 Water Tender Operators

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

Page 8-10 Smokejumpers

FS Smokejumping operations are guided by direction in FSH 5709.14, the *Smokejumping Operations Guide*.

Page 8-14 Interagency Hotshot Crews Policy

FS IHCs follow the *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.

Page 8-15 Type 2 Crews

The FS Type 2 Crew program; each Region is assigned specific numbers of Type 2 Crews. The FS endorses the National Minimum Standards for Type 2 crews and applies FSH 5109.17 for training requirements.

Page 8-23 Dozer

FS dozer operators refer to 5134.32