

**FSH 5109.16 – FIRE MANAGEMENT EQUIPMENT, SUPPLIES AND CHEMICALS
CHAPTER – ZERO CODE**

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01 - AUTHORITY

For related authority, see FSM 5101.

02 - OBJECTIVE

1. To have available, account for, and utilize equipment and supplies appropriate to accomplish wildland fire management activities safely, efficiently, and effectively.
2. To provide for standardization of fire equipment, chemicals, supplies and procedures to achieve interoperability between fire management agencies for total mobilization.
3. To have available adequate types and quantities of qualified wildland fire chemical products, and use them to accomplish fire management activities safely, effectively, and efficiently.

03 - POLICY

1. Use only fire equipment supplies, chemicals and procedures as required herein.
2. Equipment and supplies used to support wildland fire management activities must be developed, tested and evaluated to assure safe, effective and efficient operations (FSM 7120).
3. Adequate supplies of firefighting tools, equipment and consumable supplies must be available to support the predicted fire activity. In determining total needs to be stocked by a Region, the availability of fire equipment from other Regions, other agencies, and commercial sources must be considered.
4. Use only evaluated and qualified Fire Management Chemical products as shown on the Qualified Products Lists (QPL).

04 - RESPONSIBILITY

04.1 - Washington Office

The Director of Fire and Aviation Management has the responsibility to:

General:

1. Inform field offices of current service-wide modifications of fire equipment, including sources of supply.
2. Engage with Regional and interagency fire equipment committees to obtain field input on needed equipment development or modification.

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3. Provide funding for improvements of existing equipment and the development and testing of new equipment, systems, techniques, and procedures.
4. Provide a process to determine national fire equipment development program needs.
5. Provide leadership in the implementation of developed products, materials, systems, and techniques.
6. Provide oversight and liaison to the National Technology and Development and Wildland Fire Chemical Programs.

Fire Management Equipment:

1. Maintain current fire equipment and fire vehicle specifications.
2. Conduct field surveys to provide the Defense Logistics Agency (DLA) or other designated agency with estimates of:
 - a. The quantity of fire equipment and supplies to be purchased annually by each Region for recurrent needs; and
 - b. The maximum and minimum quantities of fire equipment and supplies to be stocked by DLA (or other designated agency) for emergency firefighting uses.
3. Ensure that equipment, supplies and chemicals meet the requirements outlined in the Interagency Standards for Fire and Fire Aviation Management Operations.
4. Maintain adequate supplies of firefighting tools, equipment, and consumable supplies to support the predicted fire activity within the National Interagency Support Cache (NISC) system.
5. Oversee the proper use of the NISC Fire Stores Account (established in Fiscal Year 2008) for the Forest Service in order to ensure the account and quantity control records for fire suppression equipment and supplies are maintained according to the procedures established and found within the National Interagency Support Cache Management Plan, available from the National Wildfire Coordinating Group (NWCG), National Fire Equipment System (NFES).
6. Ensure proper accountability business practices are in place for firefighting tools, equipment and supplies maintained within the NISC system.

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7. Actively participate in the interagency NFES with the objective of improving existing NFES standards, developing new NFES standards, stocking incident support caches to NFES standards, and participating in the interagency network of incident support caches managed in accordance with the NISC Management Plan.
8. Ensure the approved automated cache inventory management system such as Incident Cache Business System (ICBS) is used at incident support caches.
9. Ensure that the fire loss/use corrective action plans are accomplished when fire loss performance threshold has exceeded individual categories or overall established incident standards.
10. Perform a trend analysis from the fire loss/use reports and corrective action plans submitted by Regional Foresters.
11. Ensure the dedicated DLA (or other designated agency) stock program for wildland fire equipment is used as the primary and mandatory source of supply for wildland fire suppression equipment, supplies, and protective clothing for incident support caches and forest personnel, (FSH 6309.32-FAR, part 8, Required Sources of Supply). GSA Advantage is a lower priority source for purchasing these items.
12. Provide oversight in the utilization of NFES catalog for obtaining equipment, supplies, and protective clothing for the field.
13. Provide oversight in the purchasing of wildland fire equipment, supplies, and protective clothing from sources other than DLA (or other designated agency) and NFES. Use of other sources should be infrequent and must follow the requirements listed in FSH 6309.32 - Required Sources of Supplies and Services and FAR 8.002 - Priorities for Use of Government Supply Sources.
14. Ensure where situations that may call for purchases that require alternate equipment for specific or exceptional working conditions or a need to fit specific individuals who cannot use the equipment in the catalog have a Job Hazard Analysis (JHA) or risk assessment (RA) signed by the applicable Line Officer. This is required to justify alternate purchases. The JHA or RA must document the specific reason the stock item does not meet job requirements. The purchasing official must confirm that the JHA or RA supports the alternate purchase.

Contract Equipment:

1. Determine equipment types subject to competition in coordination with Washington Office Acquisition Management (AQM).

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2. Develop national specifications for each type of equipment for competition on the National Solicitation Plan for Incident Blanket Purchase Agreements (I-BPA).
3. Delegate technical personnel to act as Subject Matter Experts (SMEs) to work jointly with the AQM (for example Fire Equipment, Services, and Supply Acquisition Analysis - FESSAA) team in the development of national standard specifications for solicitation templates.
 - a. Define minimum equipment specifications to be included in the solicitations.
 - b. Determine what attributes should be used in the calculation of best value for dispatch priority.
4. Delegate approval of final solicitation templates, management of the dispatch priority process, and review and approval of regional requests for deviation from national policy to Assistant Director Operations or their designee.

Fire Management Chemicals:

1. Approve chemicals for Forest Service operations and administer the fire chemical evaluation and qualification program.
2. Develop and maintain specifications and other criteria for the evaluation of wildland fire chemicals.
3. Review all specifications and criteria for the evaluation of wildland fire chemicals and determine needs for additional categories of products. This may include feasibility studies.
4. Receive submissions of fire chemicals from private industry and oversee the evaluation of all submitted products in accordance with applicable specifications and amendments.
 - a. Long-Term Fire Retardants must be evaluated in accordance with Forest Service Specification 5100 - 304, (www.fs.fed.us/rm/fire/wfcs/index.htm), as modified and amended at the time of submission.
 - b. Class A Foams must be evaluated in accordance with Forest Service Specification 5100-307, (www.fs.fed.us/rm/fire/wfcs/index.htm), as modified and amended at the time of submission.
 - c. Water enhancers (Gels) must be evaluated in accordance with Forest Service Specification 5100-306, (www.fs.fed.us/rm/fire/wfcs/index.htm), as modified and amended at the time of submission.

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1. Consult with US Fish and Wildlife Service, and NOAA-Fisheries on new wildland fire chemicals.
2. With the Threatened and Endangered Species Staff, prepare and distribute direction for the aerial application of wildland fire chemicals.
3. Prepare an annual summary of fire chemical misapplications and transmit the report to the US Fish and Wildlife Service, and NOAA-Fisheries.
4. Approve, maintain, and distribute a list of qualified fire chemicals for wildland firefighting available for purchase by the Forest Service for fire operational use.

04.2 - Regional Foresters

Regional Foresters have the responsibility to:

General:

1. Promptly report equipment failures to the Washington Office, Director, Fire and Aviation Management Staff; and ensure that complaint procedures defined by DLA (or other designated agency) are followed.
2. Promptly report fire chemical safety, environmental and operational concerns to the Washington Office, Director, Fire and Aviation Management (FAM) Staff.
3. Provide oversight to regional and interagency fire equipment committees to provide field input to the Washington Office Fire Director on fire equipment development needs through the Regional Fire Director.

Fire Management Equipment:

1. Determine regional fire equipment and chemical supply needs, and establish stocking levels for incident support caches.
2. Ensure that equipment, supplies and chemicals meet the requirements outlined in the Interagency Standards for Fire and Fire Aviation Management Operations.
3. Ensure the dedicated DLA (or other designated agency) stock program for wildland fire equipment is used as the primary and mandatory source of supply for wildland fire suppression equipment, supplies, and protective clothing for incident support caches and forest personnel, (FSH 6309.32-FAR, part 8, Required Sources of Supply). GSA Advantage is a lower priority source for purchasing these items.
4. Provide oversight in the utilization of the National Fire Equipment System (NFES) catalog for obtaining equipment, supplies, and protective clothing for the field.

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5. Provide oversight in the purchasing of wildland fire equipment, supplies, and protective clothing from sources other than DLA (or other designated agency) and NFES. Use of other sources should be infrequent and must follow the requirements listed in FSH 6309.32 - Required Sources of Supplies and Services and FAR 8.002 - Priorities for Use of Government Supply Sources.
6. Ensure where situations that may call for purchases that require alternate equipment for specific or exceptional working conditions or a need to fit specific individuals who cannot use the equipment in the catalog have a Job Hazard Analysis (JHA) or risk assessment (RA) signed by the applicable line officer. This is required to justify alternate purchases. The JHA or RA must document the specific reason the stock item does not meet job requirements. The purchasing official must confirm that the JHA or RA supports the alternate purchase.
7. Provide appropriate equipment and supply storage facilities for incident support caches.
8. Inspect fire caches to determine adequacy, condition, and availability of equipment and supplies.
9. Ensure proper accountability of firefighting tools, equipment, and supplies is occurring at any fire cache.
10. Make plans, by prior arrangement, for inter-regional loan of equipment:
 - a. During major fire emergencies; and
 - b. At times other than major fire emergencies; for example, all hazard response.
11. Provide loans of firefighting equipment to cooperators according to terms of cooperative agreements that have been executed (FSM 1590). Loans of equipment to those not covered by agreements must be made only in extreme emergencies. Motorized or other valuable equipment must not be loaned unless trained operators are available (FSM 6412).
12. Ensure appropriate use of incident replacement. Incident replacement of non-standard items not procured through the DLA (or other designated agency) stock program or NFES may be authorized up to the cost of similar items purchased through these sources; costs beyond this amount should be covered by home unit program dollars. Prototype equipment will not be replaced using suppression funds. The incident agency may require that damaged property be turned in before replacement is authorized. (Interagency Incident Business Management Handbook, chapter 30).

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13. Provide management oversight of equipment and supplies on all Type I, Type II, Type III incidents and all hazard response. Guidance can be found in chapter 10; section 14-14.4.
14. Ensure that caches designated as NISC are managed in accordance with the NISC Management Plan, available from the National Wildfire Coordinating Group, National Fire Equipment System.
15. Forward all information regarding fire loss/use reports and corrective action plans to the Washington Office, Director, Fire and Aviation Management Staff.
16. Approve follow-up fire loss/use corrective action plans developed and submitted by Forest Supervisors.
17. Ensure that the fire loss/use reports and recommended follow-up action plans are submitted to the Washington Office, Director, Fire and Aviation Management Staff, within 30 days of receipt of the Forest Supervisors' reports.
18. Ensure a regional needs analysis and all aspects of procuring and managing contracted equipment and services for incident support are accomplished annually.
19. Submit written requests for Regional deviations to Washington Office AQM and FAM for review and potential approval.

Fire Management Chemicals:

1. Conduct annual reviews of all airtanker bases (fixed or portable).
2. Ensure that long-term retardant lot acceptance and quality control requirements are fulfilled in accordance with the Long-Term Retardant bulk supply and full service contracts and the Lot Acceptance, Quality Assurance, and Field Quality Control for Fire Retardant Chemicals, (www.fs.fed.us/rm/fire/wfcs/index.htm).
3. Ensure that individual forests report fire chemical misapplications in compliance with Washington Office direction.
4. Ensure that long-term retardant delivered to retardant bases has the same formulation and physical properties observed when the product was tested and qualified. Lot Acceptance Quality Assurance, (LAQA), procedures are described in the Long-Term Retardant Contracts (Bulk and Full Service) and in the publication, Lot Acceptance, Quality Assurance, and Field Quality Control for Fire Retardant Chemicals, (www.fs.fed.us/rm/fire/wfcs/index.htm).

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5. Ensure the quality of qualified or approved fire chemicals in operational use is maintained. Retardant base quality control procedures are described in the publication, Lot Acceptance, Quality Assurance, and Field Quality Control for Fire Retardant Chemicals, (www.fs.fed.us/rm/fire/wfcs/index.htm).
6. Establish procedures for routine inspections and maintenance of airtanker and retardant bases on a regular schedule. Make seasonal inspections within 15 days following activation of Forest Service and contractor-operated bases.

Emergency Vehicle Operation

1. Establish supplemental regional policy for emergency vehicle operations, including the use of emergency lighting and siren equipment. Regional policy must include an operational plan which includes a risk assessment for the selection, screening, and supervision of emergency vehicle operators. Regional policy must also assess the hazards, risks, and benefits for the use of emergency lighting and siren equipment in wildfire operations; if and when the use of emergency lighting and siren equipment is authorized; and risk mitigation measures. At no time may the Regional policy for emergency vehicle operation be less restrictive than the policy in chapter 30.
2. Monitor and assess the effectiveness of the regional emergency vehicle operation program.
3. Approve the regional emergency vehicle operator training and certification program.
4. Ensure all forests have an emergency vehicle dispatch protocol.

04.3 - Forest Supervisors

Forest Supervisors have the responsibility to:

General:

1. Promptly report on equipment failures to the Washington Office, Director, Fire and Aviation Management Staff; and ensure that complaint procedures defined by DLA (or other designated agency) are followed.
2. Promptly report on fire chemical safety, environmental and operational concerns to the Washington Office, Director, Fire and Aviation Management Staff.
3. Make personnel available to participate in Regional and interagency fire equipment committees to provide field input to the Washington Office Fire Director on fire equipment development needs to the extent possible.

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Fire Management Equipment:

1. Determine local fire equipment and chemical supply needs, and establish stocking levels for incident support caches.
2. Provide appropriate equipment and supply storage facilities for incident support caches.
3. Ensure that equipment, supplies and chemicals meet the requirements outlined in the Interagency Standards for Fire and Fire Aviation Management Operations.
4. Ensure the dedicated DLA (or other designated agency) stock program for wildland fire equipment is used as the primary and mandatory source of supply for wildland fire suppression equipment, supplies, and protective clothing for incident support caches and forest personnel, (FSH 6309.32-FAR, part 8, Required Sources of Supply). GSA Advantage is a lower priority source for purchasing these items.
5. Provide oversight in the utilization of the National Fire Equipment System (NFES) catalog for obtaining equipment, supplies, and protective clothing for the field.
6. Provide oversight in the purchasing of wildland fire equipment, supplies, and protective clothing from sources other than DLA (or other designated agency) and NFES. Use of other sources should be infrequent and must follow the requirements listed in FSH 6309.32 - Required Sources of Supplies and Services and FAR 8.002 - Priorities for Use of Government Supply Sources.
7. Ensure where situations that may call for purchases that require alternate equipment for specific or exceptional working conditions or a need to fit specific individuals who cannot use the equipment in the catalog have a Job Hazard Analysis (JHA) or risk assessment (RA) signed by the applicable line officer. This is required to justify alternate purchases. The JHA or RA must document the specific reason the stock item does not meet job requirements. The purchasing official must confirm that the JHA or RA supports the alternate purchase.
8. Inspect fire caches to determine adequacy, condition, and availability of equipment and supplies.
9. Ensure proper accountability of firefighting tools and equipment.
10. Provide management oversight of equipment and supplies on all Type I, Type II and Type III incidents. Guidance can be found in chapter 10; section 14-14.4.

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11. Ensure that caches designated as NISC are managed in accordance with the NISC Management Plan, available from the National Wildfire Coordinating Group, National Fire Equipment System.
12. Receive equipment and supplies issued from the incident support cache inventory.
13. Return fire cache items to the incident support fire cache upon completion of the incident in accordance with established return policies.
14. Account for lost or damaged equipment.
15. Ensure that reviews of fire loss/use rates are conducted, follow-up investigations are made, and actions are taken. Review of fire loss/use rates may be delegated to the Forest Fire Management Officer.
16. Ensure that the Incident Support Cache Manager serving a particular incident provides the Forest Supervisor with a fire loss/use report within 60 days after an incident returns to local management. This report must include all information on equipment and supplies furnished by other incident support caches.
17. Determine from the fire loss/use report if fire loss performance threshold levels and requirements established in chapter 10; section 14-14.4 have been followed.
18. Document findings.
 - a. If all fire losses are below or within performance thresholds, report this information to the Regional Forester.
 - b. If established fire loss performance thresholds are exceeded, develop an appropriate follow-up action plan for the Forest. Forward the plan to the Regional Forester.
19. Ensure that incident management teams and incident support cache managers cooperate with Forest officers in providing additional information and/or documentation as requested.
20. Ensure appropriate use of incident replacement. Incident replacement of non-standard items not procured through the DLA (or other designated agency) stock program or NFES may be authorized up to the cost of similar items purchased through these sources; costs beyond this amount should be covered by home unit program dollars. Prototype equipment will not be replaced using suppression funds. The incident agency may require that damaged property be turned in before replacement is authorized. (Interagency Incident Business Management Handbook, chapter 30).

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21. Ensure that the fire loss/use report and recommended follow-up action plans are submitted to the Regional Forester within 30 days of receipt of Incident Support Cache Manager's report.
22. Ensure that fire loss/use reports are filed in the final documentation records for the incident.
23. Ensure appropriate oversight of contracted equipment on fire incidents is occurring and documentation records are completed and submitted according to established business practices.

Fire Management Chemicals

1. Prepare and distribute avoidance area guidance as provided within the Implementation Guide for Aerial Application of Fire Retardant, <http://www.fs.fed.us/fire/retardant/index.html>.
2. Maintain and update avoidance area mapping in compliance with the Nationwide Aerial Application of Fire Retardant Record of Decision and supporting documents related to wildland fire chemicals, <http://www.fs.fed.us/fire/retardant/index.html>.
3. Ensure that reporting, consultation, and monitoring reports related to fire chemical intrusion into waterways and mapped avoidance areas are being conducted in compliance with Washington Office direction.

Emergency Vehicle Operation

1. Implement regional emergency vehicle operation policy, to include dispatch protocols.
2. Maintain a database for forest employee emergency vehicle operator training and certification.
3. Ensure all off-forest fire resources are briefed on local emergency lighting and siren equipment policy.
4. Conduct after action reviews as appropriate to monitor compliance with emergency vehicle operation policy.

04.4 - District Rangers

District Rangers have the responsibility to:

Fire Management Equipment:

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1. Ensure that equipment, supplies and chemicals meet the requirements outlined in the Interagency Standards for Fire and Fire Aviation Management Operations.
2. Ensure the dedicated DLA (or other designated agency) stock program for wildland fire equipment is used as the primary and mandatory source of supply for wildland fire suppression equipment, supplies, and protective clothing for incident support caches and forest personnel, (FSH 6309.32-FAR, part 8, Required Sources of Supply). GSA Advantage is a lower priority source for purchasing these items.
3. Provide oversight in the utilization of the National Fire Equipment System (NFES) catalog for obtaining equipment, supplies, and protective clothing for the field.
4. Provide oversight in the purchasing of wildland fire equipment, supplies, and protective clothing from sources other than DLA (or other designated agency) and NFES. Use of other sources should be infrequent and must follow the requirements listed in FSH 6309.32 - Required Sources of Supplies and Services and FAR 8.002 - Priorities for Use of Government Supply Sources.
5. Ensure where situations that may call for purchases that require alternate equipment for specific or exceptional working conditions or a need to fit specific individuals who cannot use the equipment in the catalog have a Job Hazard Analysis (JHA) or risk assessment (RA) signed by the applicable line officer. This is required to justify alternate purchases. The JHA or RA must document the specific reason the stock item does not meet job requirements. The purchasing official must confirm that the JHA or RA supports the alternate purchase.
6. Ensure appropriate use of incident replacement. Incident replacement of non-standard items not procured through DLA (or other designated agency) stock program or NFES may be authorized up to the cost of similar items purchased through these sources; costs beyond this amount should be covered by home unit program dollars. Prototype equipment will not be replaced using suppression funds. The incident agency may require that damaged property be turned in before replacement is authorized. (Interagency Incident Business Management Handbook, chapter 30).

Fire Management Chemicals:

1. Prepare and distribute avoidance area guidance as described in the Implementation Guide for Aerial Application of Fire Retardant, <http://www.fs.fed.us/fire/retardant/index.html>.
2. Report and monitor as necessary, all wildland fire chemical intrusions into waterways and mapped avoidance areas on wildland fire incidents under their jurisdiction.

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3. Monitor areas impacted by wildland fire chemical intrusions to determine the effects of the applications in waterways or mapped avoidance areas over time.
4. Ensure that reporting, consultation with local representatives of the Fish and Wildlife Service and NOAA-Fisheries, and monitoring reports related to fire chemical intrusions into waterways or mapped avoidance areas are being conducted in compliance with Washington Office direction.

Emergency Vehicle Operation:

1. Identify emergency vehicle operators within the unit and assure they meet training and certification standards.
2. Ensure that emergency vehicle operation is in compliance with regional emergency vehicle operation policy.
3. Ensure after action reviews are conducted as appropriate to monitor compliance with this policy.
4. Prepare and approve job hazard analyses or risk assessments.

05 - DEFINITIONS

The following definitions are terms recognized by National Interagency Support Caches (NISC):

Accountable Property:

- a. Capital leases, or
- b. Durable items with a purchase price greater than \$5,000, or
- c. Sensitive items - for example equipment highly susceptible to fraud, waste and abuse, and accountable in the Personal Property Management Information System (PMIS/PROP). The list of sensitive items is determined by the Washington Office Property Management Officer. For further direction on sensitive items, see FSM 6410, Personal Property Management. An example of a sensitive item is a flare gun.
- d. Accountable and tracked by either PMIS/PROP or the Equipment Management Information System (EMIS). Example: radios.

Consumable Goods: Expendable items that are normally expected to be consumed within the period of a single incident (for example: batteries, MREs, plastic canteens, cubitainers, forms, hot food containers, paper products, and so forth).

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Consumable Use: Expendable supplies are those items that are issued to an incident and consumed on the incident.

Durable Goods: Those nonexpendable items which have a useful life expectancy greater than one incident (for example: water handling accessories, tents, camp items, tools, hoses, sleeping bags, and protective clothing).

Incident Support Caches: For this document, Incident Support Cache refers to Type 1 (National Interagency Support Cache), Type 2 (National Interagency Support Cache Satellite) and Type 3 (Local Interagency Support Cache).

Trackable Property: Nonexpendable, durable property that does not meet the criteria for accountable property, and is accountable and tracked using unique cache assigned identification numbers (such as “Trackable ID”). Trackable property can be a single item or a kit (For example: individual chainsaws and chainsaw kits).

Fire Loss: Property or supplies that are issued to an incident and not returned because the item was lost, damaged or destroyed. Fire Loss only applies to accountable, sensitive, durable or trackable items.

06 - REFERENCES

06.1 - National Wildfire Coordinating Group

06.1a - Availability and Ordering Information

The following National Wildfire Coordinating Group (NWCG) publications are listed in the NWCG National Fire Equipment System Catalog, Part 2: Publications (PMS 449-2), (<http://www.nwcg.gov/pms/pubs/catalog.htm>).

06.1b - Publications

1. Interagency Wildland Fire Weather Station Standards and Guidelines (PMS 426-3).
2. NWCG National Fire Equipment System Catalog, Part 1: Fire Supplies and Equipment. (PMS 449-1).
3. Interagency Aerial Ignition Guide (PMS 501).
4. Ground Ignition Guide (PMS 443).
5. NWCG Fire Equipment Storage and Refurbishment Standards (PMS 448).
6. Water Handling Equipment Guide (PMS 447-1, NFES 1275).

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7. Interagency Standards for Fire and Fire Aviation Operations (NFES 2724).
8. Interagency Incident Business Management Handbook (PMS 902, NFES 2160).
9. Interagency Transportation Guide for Gasoline, Mixed Gas, Drip-Torch Fuel, and Diesel (PMS 442).

06.2 - USDA Forest Service

06.2a - Availability and Ordering Information

1. San Dimas Technology and Development Center (SDTDC). Publications may be obtained by writing or calling SDTDC, 444 East Bonita Avenue, San Dimas, CA 91773; (909) 599-1267. Information on ordering and on the electronic availability of publications also is available from the FS Web at <http://fsweb.sdtc.wo.fs.fed.us> and from the World Wide Web at <http://www.fs.fed.us/eng/techdev/sdtc.htm>.
2. Missoula Technology and Development Center (MTDC). Publications may be obtained by writing or calling MTDC, 5785 Highway 10 West, Missoula, MT 59808; (406) 329-3900. Information on ordering and on the electronic availability of publications also is available from the FS Web at <http://fsweb.mtdc.wo.fs.fed.us> and from the World Wide Web at <http://www.fs.fed.us/eng/techdev/mtdc.htm>.

06.2b - Publications

1. USDA Forest Service. Manufacturer Submission Procedures for Qualification Testing of Pumps, publication number 0651-1804-SDTDC. Available from SDTDC.
2. USDA Forest Service Standard. 5100-190 - Threads, Gaskets, Rocker Lugs, Connections and Fittings, Fire Hose. Available from SDTDC.