Colorado Division of Fire Prevention and Control

Topical Fire Research Report
Aircraft Used for Firefighting in Colorado

This Topical Fire Research Report is in response to a legislative inquiry concerning aircraft used for firefighting in Colorado. The request sought information on the ownership of assets used to fight Colorado wildfires, including specific numbers and agencies that own aircraft with a firefighting mission. The request also sought the number of air tanker bases Colorado maintains and how long it takes Colorado to get an air tanker on scene.

Ownership of Assets Used to Fight Colorado Wildfires

All aviation assets used to fight wildfires in Colorado are private/corporate owned and operated under contracts with local, state or federal agencies (Aircraft Rental Agreements, Call When Needed Agreements, and Exclusive Use Contracts).[1] All aircraft, support vehicles, staff and pilots must meet and maintain all contractual standards with the exception of:

1) USFS/BLM leased/owned fixed winged aircraft, (Air Attack Group Supervisor(ATGS) and Lead planes).
2) National Guard—mobilization specifics outlined in the Rocky Mountain Area Interagency Mobilization Guide (Mob Guide) Chapter 80, page 292/293 and the Colorado Interagency Cooperative Fire Agreement).
3) Modular Airborne Firefighting System (MAFFS) – mobilized in accordance with the Mob Guide- Chapter 20, page 79/80.

In addition the USFS owns and operates 2 Cobra (T-2) helicopters---not exclusively used for firefighting, but both have Infra-Red (heat detection) and mapping capabilities. One of these aircraft was ordered and utilized

[1] These aircraft are inspected and carded by the Department of Interior Aviation Management DOI/AM or the United States Forest Service (USFS).

on the High Park fire. This is an expensive asset, as the contract utilized is hourly ONLY, there is no contracted daily availability. These assets could also be used as a Helicopter Coordinator (HLCO) platform.

Aviation assets are very dynamic and mobilized to locations where either the Planning Levels (PL) are high and/or there is a high level of ongoing fire activity. In the case of "National Assets" like specific Medium (T-2) and Heavy (T-1) helicopters and Heavy Air Tankers, their mobilization is controlled by the National Interagency Coordination Center (NICC) in Boise, Idaho.

These include:

1) 9-Heavy Air Tankers
2) 19 Lead Planes (leased or owned by USFS and or BLM)
3) Various Air Attack Group Supervisor (ATGS) platforms

Region-2, which includes Colorado, also has the following Rotor Wing assets "assigned" (also subject to movement based on PL's and fire activity):

1) T-1 Helicopter-Jeffco (Rocky Mountain Regional Airport)
2) T-1 Helicopter-Rifle Interagency Air Center
3) T-2 Helicopter- Durango – La Plata Airport
4) Exclusive use helicopters in Colorado- Agency/Location
    a. USFS - Monument Interagency Fire Center T-3 helicopter (A-Star B3- high altitude)
    b. NPS- Mesa Verde National Park T-3 helicopter (Bell L-4)
    c. USFS/BLM- Rifle Interagency Center T-3 helicopter (A-Star B3 high altitude)
    d. BIA- Ute Mountain Ute, Towaoc, CO- T-3 helicopter (A-Star B3 high altitude)

Colorado National Guard

The Colorado Army National Guard's 2nd Battalion, 135th General Support Aviation is capable of providing UH-60 Black Hawk helicopters and crews equipped with 500-gallon buckets to aid in firefighting efforts; upon Executive Order of the Governor.

Single Engine Air Tankers Under Contract

The Division of Fire Prevention and Control (DFPC) currently has under contract and available 3 SEAT's during fire season and 1 SEAT during "off-season" (from November to March).

Flight Condition Guidelines

Aerial Supervision personnel carefully evaluate flight hazards, conditions (visibility, wind, thunder cells, turbulence, and terrain) to ensure that operations can be conducted in a safe and effective manner. The following policies and guidelines are designed to do this:

Visibility – Regardless of time of day, when poor visibility precludes safe operations, flights will be suspended.

Wind Conditions – Moderate to high winds and turbulent conditions affect flight safety and water/retardant drop effectiveness. The following guidelines are considered in making the decision to continue or suspend

operations. A number of factors including terrain, fuel type, target location, resources at risk, cross-winds, etc. must be considered.

- Heavy Airtanker Drops: Generally ineffective in winds over 20-25 kts. (23-29 mph)
- SEAT Operations: Generally ineffective in wind over 15-20 kts. (17-23 mph) Operations shall be suspended when sustained winds are 30 kts (34 mph) or the gust spread is 15 kts. (17 mph)
- Helitanker Drops: Generally ineffective in winds over 25-30 kts. (29-34 mph)

Tanker Bases in Colorado

The Division of Fire Prevention and Control currently maintains the following air tanker bases in Colorado:

Category Base 1 – 4 Air Tanker Bases (Jeffco, Durango, Grand Junction & Pueblo);
Category Base 2 – 9 SEAT Bases with full capacity to mix retardant (Fort Collins/Loveland, Akron, Craig, Kremmling, Rifle, Buena Vista, Canon City, Cortez and La Junta*) * La Junta will be completed in August/2012.
Category Base 3 – 6 SEAT Bases with partial capacity to mix retardant/portable batch mixers (Eagle, Gunnison, Nucla, Alamosa, Trinidad and Lamar).

The way the bases are located in Colorado we are able to fight fire anywhere with an average of 20-30 minutes flight time from any base. (See map attached)

Current Available Air Resources in Colorado

As previously mentioned, aircraft moves around a lot depending on PL and fire activity, so availability and base location could change moment by moment. See attachment A for the locations as of July 20, 2012.

Federal Airtankers

For a complete list of all federal airtankers, refer to the following web site:
http://www.nifc.gov/nicc/logistics/references/Air_Tankers.pdf

Lead Planes/Aerial Supervision Aircraft – FS

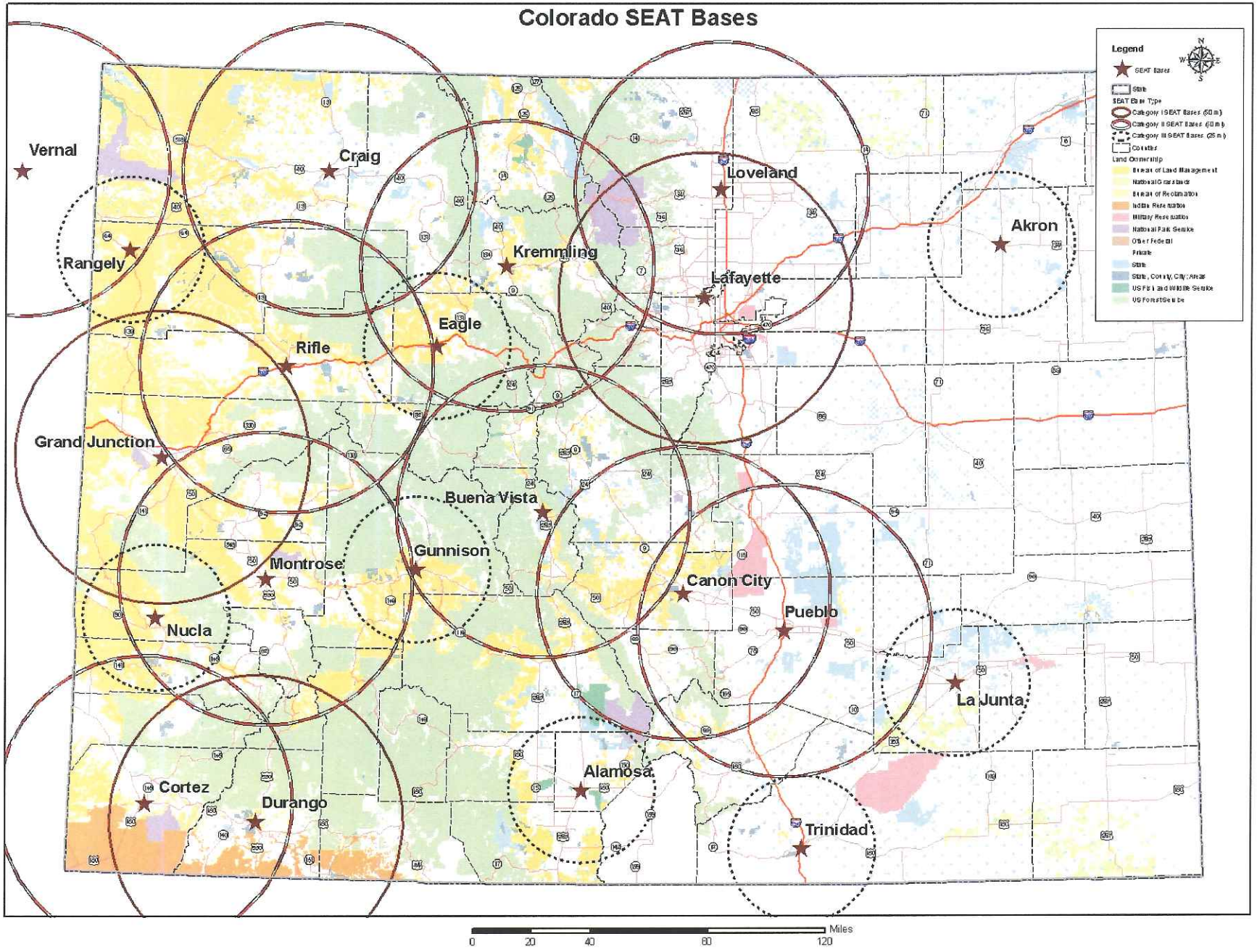
For a complete list of all Lead Planes/Aerial Supervision Aircraft, refer to the following web site:
http://www.nifc.gov/nicc/logistics/aviation/Lead_Planes.pdf

Smokejumper Aircraft

For a complete list of all Smokejumper Aircraft, refer to the following web site:
http://www.nifc.gov/nicc/logistics/references/Smokejumper_Aircraft.pdf

Attachment A
Current Available Air Resources in Colorado
July 20, 2012

SEAT	T-888 T-884 T-847 T-858 T-898	Colorado State/DFPC Colorado State/DFPC BLM/CO Colorado State/DFPC BLM/CO	Craig Craig Craig Canon City Canon City
Heavy Air Tankers	T-45 T-48	USFS USFS	Grand Junction Grand Junction
Lead Planes Air Supervision	B-6	BLM/USFS	Grand Junction
Tactical	AA-0FD AA-2AA AA-3AU AA-9CP	BLM Rocky Mountain Rocky Mountain BLM	Grand Junction Durango Pueblo Grand Junction
Helicopter Type 1	None		
Helicopter Type 2	H-65H H-8CC	BLM USFS	Grand Junction Grand Junction
Helicopter Type 3	H-0JR H-ORL H-1BH H-2TC H-7DE	USFS BLM BLM USFS BIA	Monument Grand Junction Rifle Fort Collins Cortez
Smokejumper	J-49	BLM	Grand Junction


Colorado SEAT Bases
Legend
SEAT Bases
State
SEAT Base Type
Category I SEAT Bases (50 mi)
Category II SEAT Bases (60 mi)
Category III SEAT Bases (25 mi)
Counties
Land Ownership
Bureau of Land Management
National Grasslands
Bureau of Reclamation
Indian Reservation
Military Reservation
National Park Service
Other Federal
Private
State
State, County, City, Areas
US Fish and Wildlife Service
US Forest Service
N
W
E
S
Vernal
Craig
Loveland
Akron
Rangely
Kremmling
Lafayette
Eagle
Rifle
Grand Junction
Buena Vista
Gunnison
Montrose
Canon City
Pueblo
Nucla
La Junta
Alamosa
Cortez
Durango
Trinidad
Miles
0
20
40
80
120

Modular Airborne FireFighting System

The Modular Airborne FireFighting System or MAFFS is a self-contained unit used for aerial firefighting that can be loaded onto a C-130 Hercules, a military cargo transport, which then allows the aircraft to be used as an air tanker against wildfires. This allows the U.S. Forest Service (USFS) to utilize military aircraft from the Air National Guard and Air Force Reserve to serve as an emergency backup resource to the civilian air tanker fleet.

Congress established the MAFFS program after the 1970 Laguna Fire overwhelmed the existing aviation firefighting resources. The USFS was directed to develop a program in cooperation with the Air National Guard and Air Force Reserve to produce the equipment, training and operational procedures to integrate military air tankers into the national response system. The Engineered Systems Division of FMC Corporation (Santa Clara, CA) was contracted to design, build and test the modular tank system that would enable a standard C-130 to be quickly converted into a tanker. Initial flight tests with a prototype two-tank installation began in July 1971. Subsequent systems were fabricated by Aero Union of Chico, California.

The MAFFS consists of a series of five pressurized fire retardant tanks with a total capacity of 2,700 US gallons and associated equipment which is palletized and carried in the aircraft's cargo bay. In addition to the retardant tanks, each module contains a pressure tank where compressed air is stored at 1200 psi. The control module includes the master control panel, the loadmaster's seat, and discharge valves.

An air compressor module provides air pressure for charging the system; it stays at the airtanker base during air operations and is used to recharge the system between runs. Each unit weighs about 11,000 pounds. It can be installed in any C-130-E or -H equipped with the USAF 463L cargo-handling system.

Air tankers are categorized by their retardant capacity, and although the MAFFS capacity is just under 3,000 US gallons, a MAFFS C-130 is considered a Type 1 air tanker, which is the largest class. Retardant exits through two tubes which extend out the plane's aft cargo bay doors. The system can disperse all 2,700 gallons in five seconds over a fire, producing a fire line that is 60 feet (18 m) wide and a quarter mile long. It can then be reloaded in eight minutes.

MAFFS II

Aero Union, under contract to the USFS, has developed an improved version of the system, known as the MAFFS II. The new system has a capacity of up to 3,400 US gallons, replacing the five retardant tanks with one large tank, and has an on-board air compressor. The original MAFFS has to be pressurized by a compressor on the ground as a part of the loading process. The ability to pressurize the system in the air cuts turn-around time significantly. The new system discharges the retardant through a special plug in the paratroop drop door on the side of the aircraft, rather than requiring the cargo ramp door to be opened; this allows the aircraft to remain pressurized during the drop sequence. Far more significantly, the cargo ramp and door can remain closed, cutting drag considerably, and thereby allowing a greater performance margin than available with MAFFS I.

Aero Union delivered the first production unit to the USFS in July 2007, and was flight tested during August. MAFFS II was used for the first time on a fire in July 2008, when a crew from the 302d Airlift Wing launched from McClellan Tanker Base in California on an operational test using a C-130H.

Operations

MAFFS equipment is stationed at eight locations around the country. They are considered a "24-hour resource", meaning that when activated, it is expected that it will take 24 hours for the aircraft to arrive on scene, as the C-130s have to be pulled from their regular military duties and fitted with the MAFFS equipment. When needed, regional foresters can request a MAFFS activation after they have ascertained that all available commercial air tankers are assigned to on-going incidents or committed to an initial attack. The National Interagency Coordination Center at the National Interagency Fire Center (NIFC), Boise, Idaho, can activate the MAFFS when all other contract airtankers are committed to incidents or initial attack or are otherwise unable to meet requests for air operations. The request for MAFFS activation is approved by the national MAFFS liaison officer, who is the Forest Service director at NIFC. This request is then forwarded to the joint director of military support at the Pentagon. Governors of states where National Guard MAFFS units are stationed may activate MAFFS for missions within their state boundaries when covered by a memorandum of understanding with the military authority and the Forest Service.

During the 1994 fire season, one of the worst that decade, the four airlift wings equipped with MAFFS flew nearly 2,000 missions and dropped 51,000,000 pounds (23,000,000 kg) of retardant. In 2004, after all the large civilian tankers in the U.S. had been grounded due to safety concerns, MAFFS-equipped C-130s were pre-positioned in western states in anticipation of wildfires. Besides use on U.S. fires, MAFFS has been deployed to Mexico, Europe, Africa and Indonesia. International deployment is initiated by a foreign government's request through the U.S. State Department.

The military is reimbursed for the cost of operating MAFFS flights by the agency having jurisdiction over the fire.

Training

MAFFS crews are trained every year with USFS aviation operations personnel. The training is coordinated with the Air Force Reserve's 302d Airlift Wing at Colorado's Peterson Air Force Base, the Air National Guard's 153d Airlift Wing from Cheyenne, Wyoming, the 146th Airlift Wing from Port Hueneme, California, and the 145th Airlift Wing from Charlotte, North Carolina.

Guidelines for Activation

Modular Airborne Fire Fighting Systems (MAFFS) are to be used as a reinforcement measure when suitable contract airtankers are not readily available within the contiguous 48 states. MAFFS will be made available to assist foreign governments when requested through the Department of State or other diplomatic memorandums of understanding.

The Forest Service (FS) Director, National Interagency Fire Center (NIFC), or in their absence, the FS National Aviation Officer (NAO) or Fire & Aviation Management Director (F&AM), Washington Office (WO) or their acting is responsible for initiating a MAFFS mission. Once approval is given, the NICC Manager will activate the request through proper military channels.

The FS Director, NIFC or their alternate will contact the Director, F&AM, and WO prior to MAFFS activation if at all possible.

The Governor of a State may activate the appropriate Air National Guard Unit for MAFFS missions within state boundaries provided such action is covered by an appropriate Memorandum(s) of Understanding/Collection Agreements with the military authority and the FS. Approval for use of MAFFS equipment must be obtained from the FS Director, NIFC prior to this activation.