National Transportation Safety Board
Aviation Accident Final Report

Location:	Tehachapi, CA	**Accident Number:**	SEA07TA181
Date & Time:	06/25/2007, 1720 PDT	**Registration:**	N450AX
Aircraft:	McDonnell Douglas DC 10-10	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	3 None
Flight Conducted Under:	Public Aircraft		

Analysis

The transport category airplane had been modified as a firefighting air tanker and was contracted to the State of California under an exclusive-use contract for the fire season. This was the second fire season for the operator, flight crew, and accident airplane. In order to facilitate the availability of the accident airplane, the contracting agency increased the personnel assigned to the program. Normal operational procedures required that a lead airplane fly the intended flight profile prior to the air tanker. The air tanker crew typically views the flight profile flown by the lead airplane, and then flies the profile while following the lead airplane. The lead airplane points out obstacles and general concerns along the flight path to the air tanker during that first flight. On the accident run, the original lead airplane with a pilot specifically trained for the DC-10 fire retardant drop procedures had switched out with a backup lead airplane and pilot in order to return to base for refueling purposes. The backup lead airplane flew the flight profile prior to the accident airplane joining the flight profile for the fire retardant drop. As the captain flew the profile, the accident airplane flew at a lower altitude than the lead airplane, entered a left turn, and impacted multiple trees with the left wing. The digital flight data recorder indicated that the airplane had entered a 35-degree left bank with a vertical acceleration from 0.8 to 1.4 G's, which is consistent with normal loading in a banked turn. Although the flight crew was experienced with the operation of the accident airplane, they had limited fire suppression experience. The operator provided training on the airplane and training in operating in the fire environment. The flight crew obtained the majority of their retardant drop experience (in excess of 100 hours using water for drops) during the certification testing for the airplane.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The captain's failure to maintain clearance from trees.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: MANEUVERING - AERIAL APPLICATION

Findings
1. OBJECT - TREE(S)
2. (C) CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On June 25, 2007, about 1720 Pacific daylight time, a McDonnell Douglas DC 10-10, N450AX (Tanker 910), impacted trees with the left wing during a fire suppression flight in support of the White Fire about 12 miles southwest of Tehachapi, California. The airplane was owned by BC Aircraft Leasing LLC, and leased to 10 Tanker Air Carrier, LLC. The California Department of Forestry and Fire Prevention (Cal Fire) was operating the airplane as a public use flight. The captain, first officer (FO), and flight engineer (FE), were not injured. The airplane was substantially damaged. Visual meteorological conditions prevailed, and Cal Fire flight tracking procedures were in effect. The airplane departed Southern California Logistics Airport, Victorville, California, at 1657.

According to Cal Fire personnel, the flight crew was preparing to jettison a load of retardant. While turning on final for the drop, the left wing impacted several trees. The flight crew climbed the airplane to 11,000 feet where they jettisoned the fire retardant. Then, they landed uneventfully at their departure airport at 1748.

Cal Fire had contracted with 10 Tanker Air Carrier, LLC to provide and operate the accident airplane. The airplane was to be operated on an exclusive use contract for wildland fire protection.

Thirteen impacted trees were identified by Cal Fire personnel. The first identified tree that sustained impact was 45 feet tall at a base elevation of 7,786 feet mean sea level (msl).

Personnel Statements

The flight crew submitted written statements regarding the accident. In summary, they indicated that they were conducting the third drop of the day. After joining with the lead airplane on the downwind leg for the retardant drop, they descended to about 7,700 feet msl. The run was set for a slight descent down the line of fire on a ridge. As they turned from base leg to final leg in a left turn of approximately 30 degrees, the airplane developed a sink rate, and the flight crew heard several thump sounds. The Captain verbalized the problem, advanced the throttles, and rolled the airplane's wings level. The Flight Engineer scanned the wing and noted damage to the left wing aileron, slat, and flap. The flight climbed and continued to a non-populated area with the lead airplane in trail. The fire retardant was jettisoned, the flight crew declared an emergency, and then they flew to Victorville where they landed uneventfully.

Lead Airplane Pilot Statement

The lead airplane pilot reported that he had worked with several air tankers the day of the accident. While transitioning to a fire, they heard the lead airplane for Tanker 910 was departing, and coordination was made for the change in lead airplanes. They later joined with Tanker 910, and briefed the crew on the altitude necessary to cross the ridgeline (7,700 feet with an altimeter set at 29.96 inches of Mercury), and the drop heading of 095 degrees. Tanker 910 trailed the lead airplane approximately 1 mile, and the lead airplane turned into the drop area and described the drop needed. They entered the traffic pattern, and Tanker 910 indicated that they were going to descend to 7,700 feet to which the pilot of the lead airplane

concurred. As the lead airplane approached the ridgeline, the pilot gave a few additional short descriptions of the drop area and start point. The lead airplane pilot noted that there was no turbulence along the flight path. As the lead airplane pilot pulled up and clear of the ridgeline, he glanced back at Tanker 910 crossing the ridge. He felt that the airplane was at the appropriate altitude while crossing the ridge.

The lead airplane pilot then turned his head forward and heard Tanker 910, "make a call about sinking air and they had heard a thud noise." He continued around in a left turn to see the drop, and the flight crew indicated that they were going around. The lead airplane followed Tanker 910, and noted damage to the left wing. As Tanker 910 began the flight back to Victorville, the lead airplane pilot told the flight crew to jettison the retardant, but to do it slowly in the event that it caused a flight control malfunction. The retardant was jettisoned and both airplanes returned to Victorville.

AIRPLANE INFORMATION

The McDonnell Douglas DC 10-10 airplane was modified for use in aerial fire fighting. The airplane is equipped with externally mounted tanks, capable of carrying up to 12,000 gallons of water or retardant. It was introduced into fire suppression service in 2006.

The aerial drop system is a computerized, gravity-feed system. The drop rate is controlled from the cockpit, and retardant is administered through the opening of the tank doors. At the time of the accident, the airplane was equipped with two drop buttons located between the captain and FO's seats; one button was for normal operations and the other was for emergency drops. According to 10 Tanker, a normal drop is initiated by the Captain, and carried out by the FO. Other aerial fire fighting aircraft are equipped with a drop/release button on the flying pilot's flight control yoke in the event that an immediate drop is necessary.

FLIGHT RECORDERS

The airplane was equipped with a digital flight data recorder (DFDR) and a cockpit voice recorder (CVR). The CVR had been overwritten and did not contain information pertinent to the accident flight.

The DFDR recorded that the accident flight was 51 minutes in duration. According to the recording, near the time of the accident, the airplane entered a left bank turn to 35 degrees, and the vertical acceleration varied between 0.8 and 1.2 Gs. Approximately 3 seconds prior to the initial tree impact, the vertical acceleration was 1.4 Gs, and the airplane was rolling from a 35 degree left bank to a 25 degree left bank. At the time of the initial tree impact, longitudinal acceleration was 0.3 G, and vertical acceleration was 1.0 G.

ADDITIONAL INFORMATION

Lead Airplane

Cal Fire personnel indicated that lead airplanes are used to assist tankers in the approach profile to the drop site. Lead airplane pilots are provided with more extensive training in low-level flight, and fire management. The lead airplane generally flies a profile run, and the tanker orbits while keeping constant view of the lead airplane. The tanker then joins the lead airplane and flies an identical profile of the lead airplane, while completing the retardant drop.

Cal Fire contracted with Dyn Corp to provide a lead airplane for the DC-10. The purpose of a lead airplane was to provide a visual pathway for the fire tanker to fly during the mission. Both

pilots hired by Dyn Corp were former United States Forest Service (USFS) lead airplane pilots and instructors. As a backup, the Bureau of Land Management (BLM) offered their lead airplane that was based at William H. Fox Field, Lancaster, California. The BLM pilot was given training in lead airplane operations for the DC-10.

According to Cal Fire, during the accident flight, the contract airplane with Dyn Corp needed additional fuel and departed the area. The BLM airplane flew the lead airplane position during the accident. The BLM pilot flew the retardant drop profile prior to the DC-10 joining the approach sequence. As the BLM pilot flew the drop path for the second time, the DC-10 followed. During the approach, the DC-10 was below the altitude of the lead airplane's flight path.

Cal Fire Training Program

According to Cal Fire personnel, the DC-10 program was developed similar to other programs using large aircraft with a removable retardant delivery system installed. In these systems, the crews of these airplanes undergo a familiarization program, but they are not trained fire pilots, and do not operate without the coordination and assistance of a lead airplane.

In July of 2006, Cal Fire personnel evaluated the feasibility of utilizing the DC-10 on fires. The personnel spent 2 days and 10 hours of flight time training the flight crew on various aspects of the fire-fighting environment. They discussed fire traffic areas, operational procedures, flight patterns, and joining with the lead airplane. The actual procedures for dropping water/retardant were provided by 10-Tanker.

According to 10 Tanker personnel, during the certification testing with the Inter Agency Tanker Board, the flight crew obtained approximately 100 hours of flight time which included water drops. Additionally, 10-Tanker flight crews are given DC-10 training at Aero Service, Miami, Florida, and the remaining ground school and flight training is accomplished at Victorville, California. No minimum time requirements were specified.

During the 2006 fire season, the first season the DC-10 was utilized, the Cal Fire Air Tactical Group Supervisors (ATGS) flew with the crews and provided additional training on the intricacies of fire tactics and operations. All of these flights required an ATGS in the DC-10, as well as in the lead airplane.

In 2007, Cal Fire felt that the flight crews of Tanker 910 did not require an ATGS onboard during the flights. However, an ATGS continued to fly in the lead airplane.

S-2 Turbo Tracker pilots go through one season of training before they receive certification and are carded for initial attack, and are able to respond to fires without a lead airplane. Pilots are required to obtain 200 hours and one full fire season as a trainee; normally completing about 150 drops. They spend 2 weeks and 10 hours on Southern California fires with a designated instructor. Additionally, they pass a written and flight tests. Upon being designated as an Initial Attack Candidate, pilots must complete 25 drops observed and documented by a qualified observer, be dispatched and drop retardant on 6 separate initial attack fires, be dispatched and drop on two extended attack fires, perform two drops following a lead airplane, reload at two bases other than the assigned home base, and submit documentation that those identified items have been completed.

According to Cal Fire personnel, the Tanker 910 program was never envisioned as an initial

attack tool so the same training requirements were not applied.

Additionally, in 2006, Cal Fire personnel stated that the accident airplane flight crew, the assigned ATGS, and the single lead airplane pilot developed a conservative operational plan. Because there were so few people involved, this limited the availability of the accident airplane for the 2007 fire season. In 2007, new lead airplane pilots were established and nine ATGS were assigned. This assignment included two members of the original 2006 group.

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial; Flight Engineer	**Age:**	59, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane Single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 With Waivers/Limitations	**Last Medical Exam:**	03/01/2007
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	12100 hours (Total, all aircraft), 2000 hours (Total, this make and model), 10100 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport	**Age:**	60, Male
Airplane Rating(s):	Multi-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without Waivers/Limitations	**Last Medical Exam:**	01/01/2007
Occupational Pilot:		**Last Flight Review or Equivalent:**	05/01/2007
Flight Time:	13000 hours (Total, all aircraft), 2000 hours (Total, this make and model), 8000 hours (Pilot In Command, all aircraft), 250 hours (Last 90 days, all aircraft), 60 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Flight Engineer Information

Certificate:	Flight Engineer	**Age:**	46, Male
Airplane Rating(s):	Multi-engine Land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With Waivers/Limitations	**Last Medical Exam:**	09/01/2006
Occupational Pilot:		**Last Flight Review or Equivalent:**	03/01/2007
Flight Time:	7200 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	McDonnell Douglas	**Registration:**	N450AX
Model/Series:	DC 10-10	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Transport	**Serial Number:**	46942
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	03/01/2007, Continuous Airworthiness	**Certified Max Gross Wt.:**	400000 lbs
Time Since Last Inspection:	11 Hours	**Engines:**	3 Turbo Fan
Airframe Total Time:	674442 Hours	**Engine Manufacturer:**	General Electric
ELT:	Installed, not activated	**Engine Model/Series:**	CF6-6k
Registered Owner:	BC Aircraft Leasing LLC	**Rated Power:**	39300 lbs
Operator:	California Dept of Forestry and Fire Protection	**Air Carrier Operating Certificate:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	KSDB, 4224 ft msl	**Observation Time:**	1752 PDT
Distance from Accident Site:	15 Nautical Miles	**Direction from Accident Site:**	200°
Lowest Cloud Condition:	Clear	**Temperature/Dew Point:**	14°C / -1°C
Lowest Ceiling:	None	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	22 knots, 330°	**Visibility (RVR):**	
Altimeter Setting:	30.02 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	SoCal Logistics, CA (VCV)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Tehachapi, CA	**Type of Clearance:**	VFR
Departure Time:	1657 PDT	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	3 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	35.004444, -118.597500

Administrative Information

Investigator In Charge (IIC):	Kristi Dunks	**Adopted Date:**	08/28/2008
Additional Participating Persons:	Jim Coughran; Federal Aviation Administration; Riverside, CA William Payne; California Dept of Forestry; Sacramento, CA Brad Tuttle; 10 Tanker Air Carrier; Victorville, CA		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.