The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain adequate clearance of the fuel truck from the aircraft, which resulted in the main rotor striking the fuel hose and truck during refueling operation. A factor was the pilot's failure to follow company policy pertaining to the refueling of aircraft.
Findings

Occurrence #1: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: STANDING - IDLING ROTORS

Findings
1. OBJECT - VEHICLE
2. (C) CLEARANCE - NOT MAINTAINED - FLIGHT INSTRUCTOR(ON GROUND)
3. (F) PROCEDURES/DIRECTIVES - NOT FOLLOWED - FLIGHT INSTRUCTOR(ON GROUND)
Factual Information

On March 1, 1994, at about 1535 eastern standard time, a Bell 47G5 Helicopter, N7043J, owned and operated by Plymouth Copters, was substantially damaged during a refueling operation while the helicopter was idling at the Plymouth Airport, Plymouth, Massachusetts. The pilot at the controls was not injured, but the instructor pilot operating the fuel truck received serious injuries. Visual meteorological conditions prevailed. A flight plan had not been filed for the flight operating under 14 CFR 91.

The rated student pilot (RSP), John Christopher, was receiving instruction in the Bell 47G5, to qualify him for insurance purposes for the Bell 47G2 that he had recently purchased. The flight instructor/owner of Plymouth Copters Robert Dumas, and the RSP, departed the Plymouth Airport (PYM) in N7043J about 1400, for a local training flight.

After a 1 1/2 hour flight, they returned to PYM to refuel the helicopter, and were planning to depart again for another 1 1/2 hour training flight.

In his statement, the RSP stated:
"...[Mr. Dumas] said that he would pull up along side of the helicopter, and re-fuel it without shutting it down. I gave him a look of disapproval to which he responded, 'We do this all the time'. I landed on the pad, the helicopter well centered...Mr. Dumas left the helicopter. I began applying collective friction. Before I engaged cyclic friction Mr. Dumas had already pulled along side of the helicopter and re-entered the cabin. He said to move the cyclic forward slightly and to hold it there, which I did. I watched ...the re-fueling, and the stowing of the hose. The fuel truck had side boards along its length approximately 6 feet above the ground. To stow the hose, Mr. Dumas fed the hose with his left hand over the top of the side boards while holding the nozzle with his right hand...My glance turned to the gauges when I felt an extreme shock through the cyclic accompanied by a loud bang. The helicopter turned to the right as in a tail rotor failure, I immediately chopped the throttle...."

According to the Flight Instructor's statement, after landing, he exited the helicopter to drive the fuel truck into position to refuel the helicopter while it was idling. He returned with the fuel truck and positioned it outside of the main rotor tip path plane. The flight instructor observed that the tip path plane had drifted down, and went to the RSP at the controls and told him to level the main rotor tip path plane.

The flight instructor further stated:
"...I refueled the helicopter and turned my back toward the helicopter, returning the fuel hose to the truck...The main rotor tip path plane must have been permitted to dip down by the pilot, low enough to hit the fuel hose as I carried it back to the truck, which in turn struck me and began the sequence of events that resulted in the...damage to the helicopter."

In the Federal Aviation Administration (FAA) Inspector's report he stated that interviews with Plymouth Copters employees revealed that company policy mandates a minimum of a 10 foot clearance between the fuel truck and the turning rotor blades. With the helicopter centered on the helipad, the tip path plane clearance with the fuel truck was 3.44 feet.

The FAA Inspector's report further stated:
"...Robert Dumas is seventy four inches tall. The distance from the ground to the top of the
side boards on the fuel trick is seventy one and a half inches. The optimum height of the main rotor disc is 111.66 inches. Under the best of conditions, the clearance available can be predicted at 30.16 inches. We re-enacted the stowage of the hose assembly using an employee of Plymouth Copters who is seventy four inches in height. Even under this controlled environment, the tendency was for the hose to deflect up from the top of the truck in excess of thirty inches...."
### Meteorological Information and Flight Plan

<table>
<thead>
<tr>
<th>Conditions at Accident Site:</th>
<th>Visual Conditions</th>
<th>Condition of Light:</th>
<th>Day</th>
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<tbody>
<tr>
<td>Observation Facility, Elevation:</td>
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<td>Distance from Accident Site:</td>
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</table>

### Precipitation and Obscuration:
- **Departure Point:** None
- **Destination:** None
- **Departure Time:** 1400 EST
- **Type of Flight Plan Filed:** None
- **Type of Clearance:** None
- **Type of Airspace:** Airport Advisory Area; Class G

### Airport Information
- **Airport:** PLYMOUTH (PYM)
- **Runway Surface Type:** Asphalt
- **Runway Elevation:** 149 ft
- **Runway Surface Condition:** Dry
- **Runway Used:** 0
- **Runway Length/Width:** None
- **IFR Approach:** None
- **VFR Approach/Landing:** None

### Wreckage and Impact Information
- **Crew Injuries:** 1 Serious, 1 None
- **Passenger Injuries:** N/A
- **Ground Injuries:** N/A
- **Aircraft Damage:** Substantial
- **Aircraft Fire:** None
- **Aircraft Explosion:** None
- **Total Injuries:** 1 Serious, 1 None
- **Latitude, Longitude:**

### Administrative Information
- **Investigator In Charge (IIC):** ROBERT L PEARCE
- **Report Date:** 11/18/1994
- **Additional Participating Persons:** WAYNE B SEER; BEDFORD, MA
  RICHARD BUNKER; BOSTON, MA
- **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/.
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