UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION
BOARD REPORT

TH-1H, T/N 74-22313

23D FLYING TRAINING SQUADRON
58TH SPECIAL OPERATIONS WING
FORT NOVOSEL, ALABAMA

LOCATION: SKELLY STAGEFIELD ARMY HELIPORT

DATE OF ACCIDENT: 3 APRIL 2024

BOARD PRESIDENT: COLONEL DAVID J. GORDON

Conducted IAW Air Force Instruction 51-307

JAN 2 9 2025

ACTION OF THE CONVENING AUTHORITY

The report of the accident investigation board, conducted under the provisions of AFI 51-307, *Aerospace and Ground Accident Investigations,* that investigated the 3 April 2024 mishap, at Skelly Stagefield Army Heliport, Alabama, involving an TH-1H, aircraft, T/N 74-22313, assigned to the 23d Flying Training Squadron, Fort Novosel, Alabama, substantially complies with applicable regulatory and statutory guidance and on that basis is approved.

BRIAN S. ROBINSON
Lieutenant General, USAF
Commander, Air Education & Training Command

EXECUTIVE SUMMARY
UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION

TH-1H, T/N 74-22313
SKELLY STAGEFIELD ARMY HELIPORT, ALABAMA
3 April 2024

On 3 April 2024, at approximately 0939 local time (L), the Mishap Aircraft (MA), a Bell TH-1H helicopter (Tail Number (T/N) 74-22313) assigned to the 23d Flying Training Squadron (23 FTS) at Fort Novosel, Alabama (AL), and under the 58th Special Operations Wing (58 SOW), at Kirtland Air Force Base (AFB), New Mexico, experienced a dynamic rollover event while conducting training at Skelly Stagefield Army Heliport, AL. The involved personnel suffered minor injuries, and the MA suffered severe damage.

The MA had four personnel at the time of the rollover: a Mishap Instructor Pilot (MIP) and 3 Mishap Student Pilots (MSP1, MSP2, and MSP3). The 3 Student Pilots (SPs) were enrolled in Helicopter Undergraduate Pilot Training at Fort Novosel, AL. Helicopter Undergraduate Pilot Training is the course of study that produces trained and capable helicopter pilots for the United States Air Force (USAF).

At the time of the Mishap Sortie (MS), the students were conducting a Transition Checkride, which was meant to evaluate student progress after flying three sorties in the aircraft. While conducting slope operations, MSP1 initiated takeoff with the left skid of the MA rising from the ground. During this maneuver, MSP1 perceived the MA as being level when it was actually in a 2-5 degree right bank. MSP1 then perceived the MA to be in a left slide and increased right bank to correct this perceived slide, resulting in a 6-10 degree right banked attitude. The MIP attempted to make a left control input to counter MSP1's right roll, which was ineffective. MSP1 then perceived the slide to have been halted and the MA was level when the MA was still at a 6-10 degree right bank. MSP1 then increased power to lift off, causing the MA to roll right and the main rotor to impact the ground.

The Board President (BP) found, by a preponderance of the evidence, that the mishap was caused by MSP1 becoming disoriented coupled with insufficient corrective action by the MIP. MSP1 falsely perceived the aircraft as being level when it was in a rightwards bank. This misperception caused MSP1 to make erroneous inputs during the MS and caused him to attempt takeoff from a right bank, creating a rolling motion that resulted in the main rotor blade (MRB) contacting the ground and the MA to rollover. The BP found the MIP applied insufficient corrective action by not reducing power.

SUMMARY OF FACTS AND STATEMENT OF OPINION
TH-1H, T/N 74-22313
SKELLY STAGEFIELD ARMY HELIPORT
3 APRIL 2024

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS iii
SUMMARY OF FACTS 4
1. AUTHORITY AND PURPOSE 4
a. Authority 4
b. Purpose 4
2. ACCIDENT SUMMARY 4
3. BACKGROUND 5
a. Air Education and Training Command (AETC) 5
b. 58th Special Operations Wing (58 SOW) 5
c. 23d Flying Training Squadron (23 FTS) 5
d. TH-1H Iroquois II 6
e. Helicopter concepts and terminology 6
i. Collective 6
ii. Cyclic 6
iii. Anti-Torque Pedals 6
iv. Dynamic Rollover 7
v. Slope Operations 7
4. SEQUENCE OF EVENTS 8
a. Mission 8
b. Planning 8
c. Preflight 9
d. Summary of Accident 9
e. Impact 12
f. Egress and Aerospace Flight Equipment 13
g. Search and Rescue (SAR) 14
h. Recovery of Remains 14
5. MAINTENANCE 14
a. Forms Documentation 14
b. Inspections 14
c. Maintenance Procedures 14
d. Maintenance Personnel and Supervision 14
e. Fuel, Hydraulic, Oil, and Oxygen Inspection Analyses 15
f. Unscheduled Maintenance 15
6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS 15
a. Structures and Systems 15
i. Cabin Nose Section 15
ii. Cabin Tunnel Area 16
iii. Mast and MRH Assembly 16
iv. Tail rotor assembly 17

b. Evaluation and Analysis 17
7. WEATHER 17
a. Forecast Weather 17
b. Observed Weather 17
c. Space Environment 17
d. Operations 18
8. CREW QUALIFICATIONS 18
a. Mishap Instructor Pilot 18
b. Mishap Student Pilot 1 18
c. Mishap Student Pilot 2 18
d. Mishap Student Pilot 3 19
9. MEDICAL 19
a. Qualifications 19
b. Health 19
c. Toxicology 19
d. Lifestyle 19
e. Crew Rest and Crew Duty Time 20
10. OPERATIONS AND SUPERVISION 20
a. Operations 20
b. Supervision 20
11. HUMAN FACTORS analysis 20
a. Introduction 20
12. GOVERNING DIRECTIVES AND PUBLICATIONS 21
a. Publicly Available Directives and Publications Relevant to the Mishap 21
b. Other Directives and Publications Relevant to the Mishap 21
c. Known or Suspected Deviations from Directives or Publications 21
STATEMENT OF OPINION 22
1. Opinion Summary 22
2. Cause 22
3. Substantially Contributing Factors 23
4. Conclusion 23
INDEX OF TABS 24

ACRONYMS AND ABBREVIATIONS

AETC	Air Education and Training Command
AFB	Air Force Base
AFE	Aircrew Flight Equipment
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFTO	Air Force Technical Order
AFPET	Air Force Petroleum
AIB	Accident Investigation Board
AL	Alabama
BP	Board President
FTS	Flying Training Squadron
ft	Feet
IAW	In Accordance With
IMDS	Integrated Maintenance Data System
IP	Instructor Pilot
kts	Knots
L	Local Time
Lt Col	Lieutenant Colonel
MA	Mishap Aircraft
MIP	Mishap Instructor Pilot
MOS	Mishap Operations Supervisor
MRB	Main Rotor Blade
MRH	Main Rotor Head
MS	Mishap Sortie
MSP	Mishap Student Pilot
NOTAM	Notices to Airmen
ORM	Operational Risk Management
SAR	Search and Rescue
SOW	Special Operations Wing
SP	Student Pilot
TCTO	Time Compliance Technical Order
T/N	Tail Number
TO	Technical Order
USAF	United States Air Force

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 25 April 2024, the Commander, Air Education and Training Command (AETC), appointed Colonel David J. Gordon to conduct an accident investigation of the 3 April 2024 crash of a TH-1H helicopter, tail number (T/N) 74-22313. (Tab Y-2 to Y-3). The Mishap Aircraft (MA) was assigned to the 23d Flying Training Squadron (23 FTS), Fort Novosel, Alabama (AL). (Tab K-2). The investigation was conducted by an Accident Investigation Board (AIB) pursuant to Air Force Instruction (AFI) 51-307, *Aerospace and Ground Accident Investigations*, dated 18 May 2019 (administrative change 6 April 2023). (Tab Y-2). The investigation was conducted at Maxwell Air Force Base (AFB), AL from 8 May 2024 to 6 June 2024. (Tab Y-3). A Pilot Member (Lieutenant Colonel), Medical Member (Lieutenant Colonel), Legal Advisor (Captain), Maintenance Member (Work Lead 10), and Recorder (Master Sergeant) were detailed to serve as board members. (Tab Y-2).

b. Purpose

In accordance with AFI 51-307, Aerospace and Ground Accident Investigations, this Accident Investigation Board conducted a legal investigation to inquire into all the facts and circumstances surrounding this Air Force aerospace accident, prepare a publicly-releasable report, and obtain and preserve all available evidence for use in litigation, claims, disciplinary action, and adverse administrative action.

2. ACCIDENT SUMMARY

On 3 April 2024, at approximately 0939 local time (L), the MA, a United States Air Force TH-1H helicopter, T/N 74-22313, was involved in a dynamic rollover event while conducting a flight evaluation meant to demonstrate student pilot (SP) proficiency in all required tasks learned from previous training. (Tabs O-13 to O-18, V-1.9, V-1.11 to V-1.12, V-2.7, V-2.10 to V-2.11, V-2.13, V-3.5 to V-3.6, V-4.5 to V-4.6, V-5.7, and V-6.2). The MA flew a standard training profile from Cairns Army Airfield to Skelly Stagefield Army Heliport, and planned to return to Cairns Army Airfield once the evaluation was complete. (Tab V-7.3). The MA had four personnel onboard at the time of the mishap: a Mishap Instructor Pilot (MIP) and 3 Mishap Student Pilots (MSP1, MSP2, and MSP3) who were all assigned to the 23 FTS at Fort Novosel, AL. (Tabs K-2 and O-18). At the time of the mishap, the involved personnel were conducting student training. (Tabs V-1.7 to V-1.8, V-1.11, V-2.5 to V-2.11, V-2.13, V-3.5, and V-4.5 to V-4.6). The MA's main rotor blades (MRBs) impacted the ground, and the MA came to rest on its right side. (Tab S-2 to S-7). The mishap personnel sustained minor injuries, and the MA sustained severe damage, estimated to be $10,846,674. (Tab J-3).

3. BACKGROUND

a. AETC

AETC's primary mission is to recruit, train and educate exceptional Airmen the nation needs. (Tab CC-3). With headquarters at Joint Base San Antonio-Randolph, Texas, AETC was originally established and activated in January 1942 as Air Training Command before being redesignated Air Education and Training Command in July of 1993, making it the oldest major command in the Air Force. (Tab CC-3). AETC's training mission makes it the first command to touch the lives of nearly every Air Force member. (Tab CC-3). AETC includes Air Force Recruiting Service, two numbered air forces, and Air University. (Tab CC-4). The command operates 12 major installations and supports tenant units on numerous bases across the globe. (Tab CC-4). There are also 16 active-duty and 7 Reserve wings. (Tab CC-4).

b. 58th Special Operations Wing (58 SOW)

Headquartered at Kirtland AFB, New Mexico, the 58 SOW serves as the premier training organization for Air Force special operations and personnel recovery aircrews, and is responsible for the Air Force's Survival, Evasion, Resistance, and Escape school at Fairchild AFB, Washington under the administration of the 336th Training Group. (Tab CC-6). The wing provides undergraduate, graduate, and refresher aircrew training for special operations, personnel recovery, missile site support, and distinguished visitor airlift in direct support of air expeditionary operations. (Tab CC-6). The wing operates 7 different weapon systems—UH-1N, TH-1H, HH-60G, HH-60W, MC-130J, HC-130J, and CV-22— totaling over 70 assigned aircraft. (Tab CC-6).

c. 23d Flying Training Squadron (23 FTS)

The 23 FTS' mission is training undergraduate aircrew members in all aspects of helicopter operations for follow-on training in special operations, combat search and rescue, missile support, and distinguished visitor airlift missions. (Tab CC-7). On 15 January 1994, the Air Force reactivated the unit with its current name at Fort Novosel, AL to train future helicopter pilots, in the UH-1H "Huey". (Tab CC-7). In 2012, the UH-1H was retired and the TH-1H assumed sole responsibility for the Air Force's only undergraduate helicopter training program and continues this role today. (Tab CC-7).

d. TH-1H Iroquois II

The TH-1H is a light-lift, utility helicopter used to train Air Force helicopter pilots. (Tab CC-8). The helicopter is used for training contact, instrument, remote, low-level navigation, formation, and night vision goggles operations. (Tab CC-8). The TH-1H is capable of flight in instrument and nighttime conditions. (Tab CC-8). The crew complement is normally three (instructor pilot (IP) and two SPs) but may be flown single-pilot depending on weather and mission requirements. (Tab CC-8). The TH-1H is the newest of more than 15 variants of the original Huey first flown in 1956. (Tab CC-8). The TH-1H, the latest version of the UH-1H Iroquois, has undergone an extensive refurbishment that includes upgraded components and a new avionics suite displaying flight data on digital screens. (Tab CC-8).

e. Helicopter concepts and terminology

i. Collective

The collective is a lever in a helicopter's cockpit (Tab O-5). Pulling the collective lever up moves the control linkages so that all blades obtain the same increase in rotor blade angle. (Tab O-5). Similarly, pushing the collective down decreases the blade angle to all rotor blades. (Tab O-5). Using the collective to vary the angle in all of the rotor blades simultaneously will alter the total amount of vertical lift produced by the main rotor system, but it will not alter the lateral rotor thrust direction. (Tab O-5).

ii. Cyclic

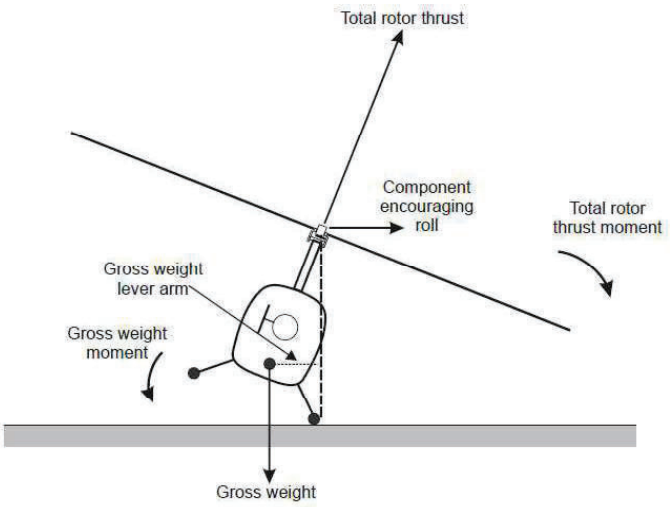
The cyclic is the directional control stick that is located between the pilot and copilot's legs. (Tab O-6) The cyclic is connected to control linkages that vary the angle of the MRBs independently depending on their position of rotation relative to the aircraft. (Tab O-6). If the cyclic is moved forward, the blade angle will decrease as it passes through the three o'clock position and will increase as it passes through the nine o'clock position. (Tab O-6). This differential in blade angles will create a thrust vector in the forward direction and will result in forward flight of the helicopter. (Tab O-6). The cyclic controls directional thrust and does not affect total lift produced by the main rotor system. (Tab O-6).

iii. Anti-Torque Pedals

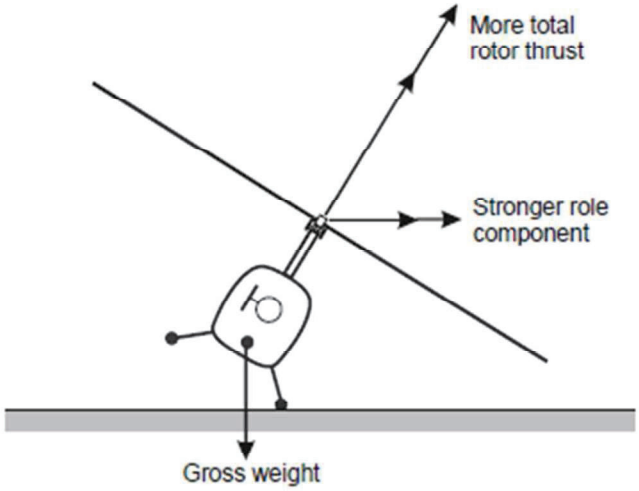
The main rotor rotates in a counterclockwise direction when viewed from above. (Tab O-4). The purpose of the tail rotor is to provide an equal but opposite force to the rotation of the main rotor. (Tab O-4). The anti-torque pedals control the blade angle of the tail rotor and change the total amount of thrust produced by the tail rotor system. (Tab O-4). When the pilot pushes the left pedal, the angle of the tail rotor blades is increased and the total thrust of the tail rotor is increased causing the nose of the helicopter to pivot left around the center of the main rotor. (Tab O-4).

iv. Dynamic Rollover

If the helicopter has one skid on the ground and there is horizontal thrust, the helicopter will begin to roll and pivot around the skid on the ground. (Tab O-7). If the thrust component is greater than the weight of the helicopter, then the rolling motion can pass a critical angle and the helicopter will roll over. (Tab O-7). This is referred to as dynamic rollover. (Tab O-7). When a rolling motion starts and the cyclic cannot stop the roll, the pilot must lower the collective smoothly to place both skids on the ground again. (Tab O-7).



Beginning of dynamic rollover (Tab O-7)



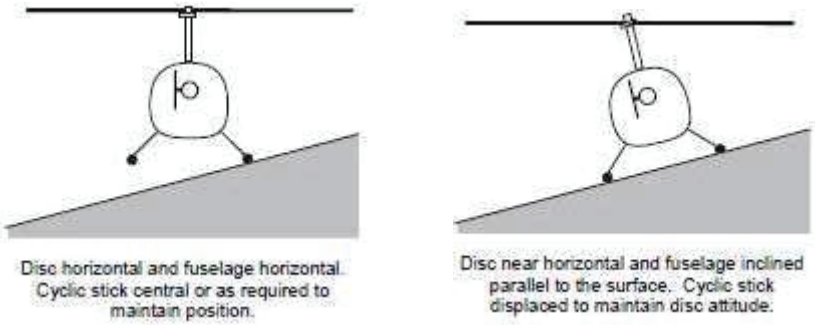
Increasing collective may increase risk of rollover (Tab O-8)

v. Slope Operations

During a helicopter slope landing, the pilot must carefully lower the aircraft by reducing the collective until a skid contacts the slope. (Tab O-9). The skid then becomes a pivot point that the pilot will use to continue lowering the aircraft until the opposite skid touches the ground.

(Tab O-9). To accomplish this, the pilot slowly decreases collective while increasing cyclic into the slope. (Tab O-11). The goal is to keep the overall lift vector vertical while the helicopter pivots and both skids touch the ground. (Tabs O-9, and O-11 to O-12).

During a helicopter slope takeoff, the pilot will put the cyclic into the slope to create a vertical lift vector. (Tab O-12). The pilot will slowly increase collective until the helicopter pivots around the uphill skid to a level attitude. (Tab O-12). The pilot must be careful to establish a level aircraft attitude before continuing to increase the collective for takeoff. (Tab O-9, O-11 to O-12).



Landing on a sloped surface (Tab O-9)

4. SEQUENCE OF EVENTS

a. Mission

The Mishap Sortie (MS) was scheduled IAW daily operations at the 23 FTS. (Tabs R-7, and V-1.4). The MS was meant to evaluate a student's progress after three sorties in the TH-1H, and determine the effectiveness of prior flight training. (Tabs R-7, R-23 to R-25, R-52, V-1.3, V-1.7, V-4.2, and V-5.2). The events for the mission were modified on the morning of the mishap due to an evaluator being unable to fly. (Tab R-7, Tab V-2.2, V-3.2, and V-4.2). The MIP added an additional student to the MS and extended the sortie duration to accommodate the extra event. (Tab R-7, and Tab V-1.3). The MS included four personnel: the MIP, MSP1, MSP2, and MSP3. (Tab K-2). The MA was a Bell TH-1H helicopter with T/N 74-22313. (Tab D-2). The planned sortie sequence was to fly from Cairns Army Airfield to Skelly Stagefield Army Heliport with MSP3 flying first, followed by MSP1, and then MSP2 would complete the sortie and return to Cairns Army Airfield. (Tabs R-52, R-64, R-91 and V-2.3). The MSPs would switch seats while the MA remained running at Skelly Stagefield Army Heliport. (Tabs R-7 and V-1.7).

b. Planning

The MIP's previous flights were a Contact and Emergency Procedures sortie on 20 March 2024 and a night sortie on 15 March 2024. (Tab G-2). The previous sorties for MSPs 1-3 were three contact sorties over the previous week. (Tabs G-24, G-103, and G-249). Flight planning consisted of a mass briefing that included airfield assignments, aircraft assignments, aircraft parking, takeoff and landing times, weather, Notices to Airmen (NOTAMs), and Special Interest Items. (Tab V-1.3).

Prior to the MS, the MIP and MSPs completed individual crew flight planning consisting of Take Off and Landing Data calculation, fuel planning and, the completion of a crew briefing IAW Air Force Manual (AFMAN) 11-2TH-1H, Volume 3, *TH-1H Helicopter Operations Procedures*. (Tabs R-7, V-1.4, and V-2.3 to V-2.4). Prior to flight, the MIP completed an Operational Risk Management (ORM) assessment worksheet, assessed the flight risk as LOW, and submitted it to the squadron Operations Supervisor. (Tab K-22). Prior to the MS, the MIP checked the forecasted weather, NOTAMs for any airfield issues, noted winds, turbulence, and thunderstorm activity. (Tabs F-2 to F-25, and K-18).

c. Preflight

The MS occurred on 3 April 2024. (Tabs R-3, R-16, V-1.2 to V-2.2 and V-5.7). Before the MS, the MS personnel attended mission planning and crew briefing. (Tabs R-3, R-6, R-54, R-63, R-86, V-1.3 and V-2.2). Afterwards, they retrieved their flight equipment from the aircrew flight equipment (AFE) section. (Tab R-3). All crew AFE had current inspections. (Tab H-37 to H-41). Then, they proceeded to the flightline at 0715L. (Tabs R-3, and R-6).

Upon arriving at the MA, the MIP and the MSPs reviewed the Air Force Technical Order (AFTO) 781 series forms, completed the pre-flight inspection and started the aircraft IAW Technical Order (TO) TO 1H-1(T)H-1CL-1. (Tabs R-4 and V-1.4). The MIP did not notice any issues from ground operations through taxi of MA (Tabs R-3, R-6 and V-1.5).

d. Summary of Accident

Aircraft taxi and departure for the MS occurred uneventfully. (Tabs R-3, R-7 and V-1.5). The MA departed Cairns Army Airfield at 0814L. (Tabs R-3 and R-7). Enroute the MIP noticed winds aloft were significant and there was mild turbulence. (Tab R-7). Arrival at Skelly Stagefield Army Heliport was uneventful and the winds diminished to six knots (kts) with gusts approaching sixteen kts, which were within normal training limitations. (Tabs R-7, V-1.8, V-3.4 and V-4.4). MSP3 performed the required events for the first phase of the MS uneventfully and the MIP flew an approach to ensure the winds did not affect controllability. (Tabs R-86 and V-2.7). The MA landed at 0925L on the asphalt path between lanes 5 and 6 at Skelly Stagefield Army Heliport. (Tabs R-3, R-7, R-17, R-52, R-58, R-86, R-91, V-2.9 and V-4.5). MSP3 exited the pilot position and MSP1 entered the pilot position. (Tabs R-7, R-17, R-52, R-58, R-86, R-91 and V-2.9).

TH-1H helicopter performing slope work near mishap site (Tab S-9)

MSP1 entered the pilot position and proceeded to adjust the seat to a position the MIP noted as "unusually high and forward" which might interfere with moving the flight controls in the full range of motion, owing to MSP1's short stature. (Tabs R-17, and Tab V-1.5). MSP1 stated this seat position gave him full range of motion with the flight controls. (Tab V-2.8 to V-2.9). MSP1 took off at 0932L and proceeded to hover taxi the aircraft to the northwest hover area and land in the grass on a slope of about 1-2 degrees. (Tabs R-4, R-7, R-18, and V-2.5). MIP directed the MSP1 to take off and reposition the MA to the rear approximately 10-15 feet (ft) to land on a slope. (Tab R-8). MSP1 conducted the landing uneventfully to an approximate 5-degree left slope with right skid high and left skid low. (Tabs R-4, R-7, R-18, R-59 and R-86).

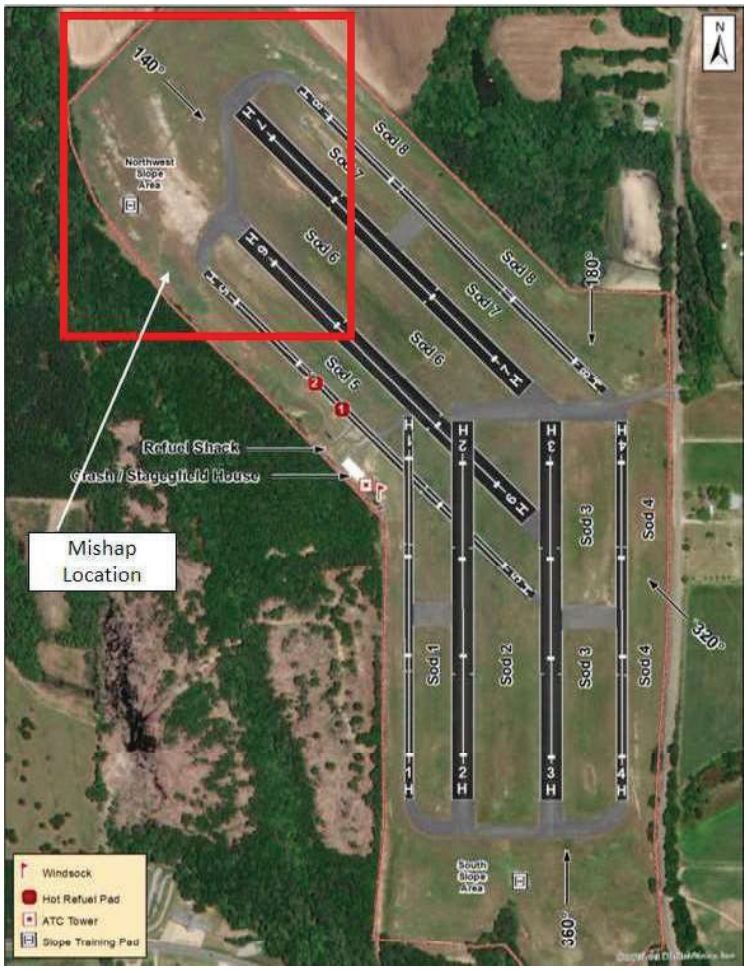
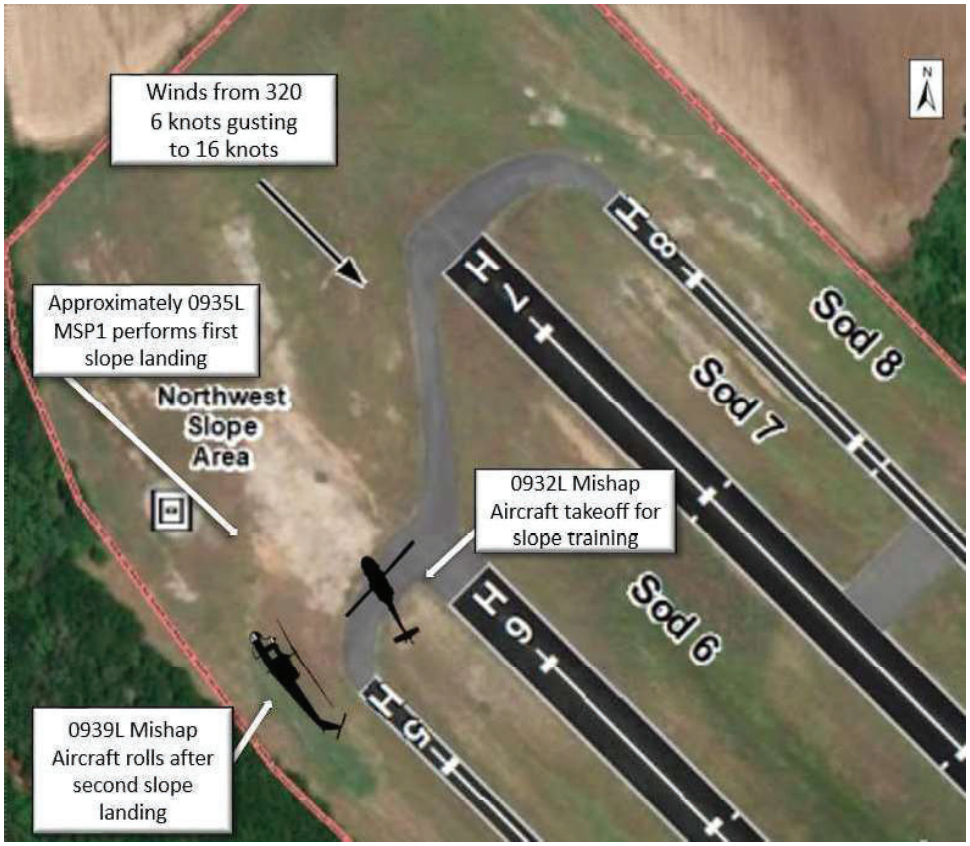


Diagram of Skelly Stagefield Army Heliport (Tab S-16)

At approximately 0939L, MSP1 initiated takeoff by inputting right cyclic and slowly increasing the collective resulting in the left skid rising from ground. (Tabs R-4, R-18, V-2.9 and V-2.11). As MA rolled right, MSP1 perceived the MA as level when it was actually in a two-to-five-degree right bank. (Tabs V-2.11 and V-3.5). Once the left skid was off the ground, MSP1 misperceived the aircraft to be in a left slide and increased right cyclic to counter, resulting in a six-to-ten-degree right bank. (Tabs R-60, V-2.11 and V-3.5). As the MA rotated beyond a level attitude, the MIP put his right hand on the cyclic, said "No, no, no...", the only corroborated verbal input from the MS, and applied left cyclic input while making no input to the collective. (Tabs R-4, R-8, and R-18). MIP's left cyclic input was insufficient to counter the right roll due to MSP1 countering with right cyclic. (Tabs V-1.9 and V-2.17). MSP1 perceived the slide was halted and MA was level, then increased the collective to lift off when the MA was actually in a six-to-ten-degree right bank with the right skid on the ground and the left elevated. (Tabs R-60, V-2.16, and V-3.5). The MA rolled to the right and the main rotor blade contacted the ground. (Tabs R-53, R-62 and R-93 to R-94). The time from lift off to rollover was approximately three to five seconds. (Tabs V-1.12, V-2.17, V-3.7 and V-4.6).



Timeline of MS (Tab S-17)

e. Impact

At approximately 0939L, the MA MRBs contacted the ground followed by the fuselage of the aircraft coming to rest on the right side (Tabs R-86, R-90, and R-92). The MIP and MSP1 shut off the throttle, fuel switches, and battery switch after the aircraft came to a stop. (Tab R-9).

MA at impact site (Tab S-2)

MA at mishap site (Tab S-3)

f. Egress and Aerospace Flight Equipment

The crew egressed the aircraft by climbing out onto the side of the aircraft, (transmission firewall), and dropping to the ground. (Tabs R-53, and R-60). The MSP1 removed the first aid kit bag and threw it towards the tree line before climbing out of the MA. (Tab V-2.10). No significant injuries were noted. (Tab R-53).

All crew AFE had current inspections. (Tab H-37 to H-41).

g. Search and Rescue (SAR)

Skelly Stagefield Army Heliport Crash and Recovery team was dispatched at 0940L. (Tab O-14). The Crash and Recovery team made contact with the MA Crew and began taking vitals. (Tab O-14). The first responders sprayed the wreckage and surrounding grass with water to prevent a fire. (Tabs O-14, and R-11). SAR aircraft, callsign Evac 77, was launched from Cairns Army Airfield at 0954L. (Tab O-17). The MA Crew were picked up from Skelly Stagefield Army Heliport and transported to Southeast Regional Medical Center. (Tab O-17).

h. Recovery of Remains

Not applicable.

5. MAINTENANCE

a. Forms Documentation

Air Force Technical Order (AFTO) 781 series forms collectively document maintenance actions, inspections, servicing, configuration, status, and flight activities for the maintained asset. (Tab D-2 to D-14). The Integrated Maintenance Data System automates aircraft history, aircraft scheduling, aircrew debriefing processes, and provides a common interface for entering base level maintenance data into other standard logistics systems. (Tab D-15 to D-50). In most cases, data is entered to update the database as a result of some activity taking place in the maintenance environment. (Tabs D-15 to D-50). Review of active 781 series forms and IMDS for the 60 days preceding the mishap revealed no overdue inspections or open Time Compliance Technical Orders (TCTOs) that would have effected MA flight operations. (Tab D-2 to D-50).

b. Inspections

All required inspections for the MA were current and all previous inspections were completed and annotated with no discrepancies noted. (Tab D-7).

c. Maintenance Procedures

A combined basic post-/pre-flight inspection was documented at 2000L on 2 April 2024 with no discrepancies annotated IAW the TO 1H-1(T)H-6WC-1. All servicing, required inspections, and visual inspections were accomplished in their entirety and signed-off on the AFTO Form 781H with no discrepancies noted. (Tab D-2).

d. Maintenance Personnel and Supervision

A review of maintenance training records indicated all personnel involved in performing maintenance procedures on the MA were trained, experienced, and certified to complete assigned tasks. (Tab U-3).

e. Fuel, Hydraulic, Oil, and Oxygen Inspection Analyses

Fuel samples were collected from the truck that serviced the MA. (Tab D-52 to D-53). All samples were found to have no deficiencies and met all specifications. (Tab D-51). There are no records of hydraulic samples being obtained, likely due to the severity of damage to the MA transmission and hydraulic reservoir. Oil samples from the MA engine were sent to the Air Force Petroleum (AFPET) Office at Wright-Patterson AFB, Ohio, for analysis. The results of the AFPET analysis showed no discrepancies with the oil samples. (Tab D-52 and D-53).

f. Unscheduled Maintenance

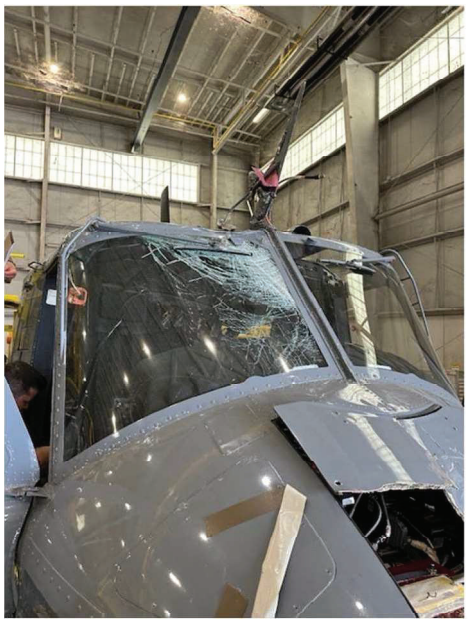
Not applicable.

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Structures and Systems

The MA sustained significant damage at Skelly Stagefield Army Heliport due to impact with the ground in the following areas: cabin nose section, cabin tunnel area, the mast & main rotor head (MRH) assembly, and the tail rotor assembly. (Tabs S-3, S-6, S-10, and S-11 to Tab S-13). Damage to the nose section of the airframe exposed the battery compartment. (Tab S-10).

i. Cabin Nose Section



Damage to Cabin Nose Section (Tab S-10)

ii. Cabin Tunnel Area

Damage to cabin tunnel area (Tab S-11)

iii. Mast and MRH Assembly

MRH separated from transmission upon impact with ground (Tab S-12)

iv. Tail Rotor Assembly

Damage to tail rotor assembly (Tab S-13)

b. Evaluation and Analysis

No relevant engineering evaluations were performed in relation to the mishap.

7. WEATHER

a. Forecast Weather

The MIP received a flight weather briefing and mission execution forecast for the departure, enroute to Skelly Stagefield Army Heliport. (Tab F-2). The morning of the mishap, takeoff and landing forecast was clear visibility with winds from 330-degrees at 10 kts with gusts to 15 kts and with cloud coverage of few clouds at 1500 ft, scattered clouds at 3000 ft, and a broken cloud layer at 6000 ft and a temporary forecast with winds from 330-degrees at 15 kts with gust to 22 kts. (Tab F-2).

b. Observed Weather

At 0855L, observed surface conditions at Cairns Army Airfield were winds from 320-degrees at 17 kts gusting to 25 kts, unrestricted visibility, and few clouds at 2200 ft. (Tab F-9). At the time of the mishap, observed winds at Skelly Stagefield Army Heliport were from 320-degrees at 6 kts with gusts to 16 kts. (Tab R-8).

c. Space Environment

Not Applicable.

d. Operations

At the time of the mishap, the MA was oriented into the prevailing winds on an approximate 320-degree heading. (Tab V-2.9).

8. CREW QUALIFICATIONS

a. Mishap Instructor Pilot

At the time of the mishap, the MIP was current, qualified, and experienced as an evaluator pilot with 1884.7 flight hours in the TH-1H and a total of 5,272.7 hours of flight time. (Tabs G-2, and G-21). The MIP was qualified to accomplish the following tasks in the TH-1H: IP and Evaluator Pilot. (Tabs G-13, and K-3). The MIP's most recent flight prior the MS was on 20 March 2024. (Tab G-10). On the day of the mishap, the MIP's recent flights in the TH-1H were as follows:

MIP	Hours	Sorties
30 days	12.3	9
60 days	25.3	19
90 days	39.5	29

(Tab G-3)

b. Mishap Student Pilot 1

At the time of the mishap, MSP1 was an unqualified SP with 4.5 flight hours in the TH-1H. (Tabs G-24 to G-25). The MSP1 was not qualified to accomplish anything unsupervised. (Tab K-2). MSP1's most recent flight prior the MS was on 2 April 2024 and was a similar mission to the day of the mishap. (Tab G-24). On the day of the mishap, MSP1's recent flights in the TH-1H were as follows:

MSP1	Hours	Sorties
30 days	4.5	3
60 days	0	0
90 days	0	0

(Tab G-24)

c. Mishap Student Pilot 2

At the time of the mishap, MSP2 was an unqualified SP with 4.5 flight hours in the TH-1H. (Tab G-102). MSP2 was not qualified to accomplish anything unsupervised. (Tab K-2). MSP2's most recent flight prior the MS was on 2 April 2024. (Tab G-102). On the day of the mishap, MSP2's recent flights in the TH-1H were as follows:

MSP2	Hours	Sorties
30 days	4.5	3
60 days	0	0
90 days	0	0

(Tab G-102)

d. Mishap Student Pilot 3

At the time of the mishap, MSP3 was an unqualified SP with 4.5 flight hours in the TH-1H. (Tab G-183). MSP3 was not qualified to accomplish anything unsupervised. (Tab K-2). MSP3's most recent flight prior the MS was on 2 April 2024. (Tab G-183). On the day of the mishap, MSP3's recent flights in the TH-1H were as follows:

MSP3	Hours	Sorties
30 days	4.5	3
60 days	0	0
90 days	0	0

(Tab G-183)

9. MEDICAL

a. Qualifications

The MIP, MSP1, MSP2, and MSP3 were physically and medically qualified at the time of the MS. (Tab T-3). The MIP held a current Federal Aviation Administration medicate certificate and the MSPs held valid DD Form 2992s. (Tab T-3).

b. Health

All personnel involved with the MS had up to date periodic health assessments and mental health assessments. (Tab T-3).

c. Toxicology

After the MS, on 3 April 2024, base medical personnel performed toxicology testing on all involved personnel. (Tab T-3). The samples obtained showed no toxicological findings in the systems of the MS personnel on the day of the MS. (Tab T-3).

d. Lifestyle

A review of the 72-hour and 7-day histories of the personnel involved with the MS showed normal lifestyle indicators leading up to the MS. (Tab T-3). There is no evidence to suggest lifestyle factors were a factor in the mishap. (Tab T-3)

e. Crew Rest and Crew Duty Time

Prior to performing flight duties, aircrew members must have proper crew rest, defined in AFMAN 11-202, Volume 3, *Flight Operations*, as a minimum of a 12-hour non-duty period before the designated flight duty period begins. (Tab O-19). Crew rest is defined as "free time" and includes time for meals, transportation, and the opportunity for at least eight hours of uninterrupted sleep. (Tab O-19). All MS personnel stated they received adequate crew rest before the MS. (Tab T-3).

10. OPERATIONS AND SUPERVISION

a. Operations

The operations tempo at the time of the mishap was low for the MIP and average for the maintenance organization supporting TH-1H operations. (Tab D-2 to D-50).

b. Supervision

The 23 FTS does not have a supervisor of flying program. (Tab V-6.7). On the day of the MS, there was typical supervision with a single Mishap Operations Supervisor (MOS). (Tab K-2). The MOS was current and qualified as an Operations Supervisor, and current, qualified, and experienced as an IP in the TH-1H. (Tab K-25).

11. HUMAN FACTORS ANALYSIS

The Department of Defense Human Factors Analysis and Classification System 8.0 lists potential human factors that can play a role in aircraft mishaps and identifies potential areas of assessment during an accident investigation. There is evidence to suggest that several human factors were a factor in this mishap, and the human factors identified as supporting mishap causes and substantially contributing factors are:

AE102 Procedure or Checklist Not Followed Correctly: is when the mishap individual did not follow correct procedure which resulted in the near-miss or mishap.

The MIP failed to reduce collective as the MA approached critical bank angle. Reduction of collective is most effective in controlling rolling motions and is the recommended procedure to prevent a dynamic rollover event. (Tab 0-11 to O-12, Tab V-1.11 and Tab V-2.16).

AE104 Over-Controlled/Under-Controlled Aircraft/Vehicle/Vessel or System: is when the mishap individual(s) inappropriately reacted to conditions by either over- or under-controlling the aircraft/vehicle/vessel/system.

The MIP did not provide sufficient cyclic input to properly control the roll movement of the MA when the MSP1 introduced excessive control input. (Tab V-1.11 and Tab 2.16).

AE207 Misjudged/Misperceived Changing Environment: is when an individual misperceived or misjudged altitude, separation, clearance, speed, closure rate, road or sea conditions, aircraft/vehicle location within the performance envelope or other operational conditions.

While conducting slope operations, MSP1 misjudged the aircraft attitude perceiving the MA to be level with the horizon when the MA was in a two-to-five-degree right bank. (Tab V-2.9 to Tab V-2.12).

PC321 Spatial Disorientation: is when the individual failed to sense correctly a position, motion, or attitude of the aircraft or his/herself within the fixed coordinate system provided by the surface of the earth and the gravitational vertical position.

While conducting a takeoff from a sloped surface, MSP1 sensed that the MA was sliding down the sloped surface when the MA was actually stationary over the surface of the ground. (Tab V-2.16 to Tab 2.17).

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Publicly Available Directives and Publications Relevant to the Mishap

(1) AFI 51-307, *Aerospace and Ground Accident Investigations*, dated 18 May 2019 (administrative change 6 April 2023).
(2) AFMAN 11-202, *Flight Operations*, AETC Supplement, dated 10 January 2022, paragraph 3.1.

NOTICE: All directives and publications listed above are available digitally on the Air Force Departmental Publishing Office website at: https://www.e-publishing.af.mil.

b. Other Directives and Publications Relevant to the Mishap

(1) *Principles of Helicopter Flight*, W.G. Wagtendonk.
(2) TO 1H-1(T)H-1CL-1, Flight Manual, USAF TH-1H Helicopter, paragraphs 2-17, 6-7, 6-8, and 6-9.
(3) AETC Syllabus P-V4C-E, TH-1H Helicopter Training – Next, page 21, pages 34-36, page 51-52, and appendix 1-27.

c. Known or Suspected Deviations from Directives or Publications

Not applicable.

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6 JUNE 2024

DAVID J. GORDON, Colonel, USAF
President, Accident Investigation Board

STATEMENT OF OPINION
TH-1H, T/N 74-22313
FORT NOVOSEL, ALABAMA
3 APRIL 2024

Under 10 U.S.C. § 2254(d) the opinion of the accident investigator as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report, if any, may not be considered as evidence in any civil or criminal proceeding arising from the accident, nor may such information be considered an admission of liability of the United States or by any person referred to in those conclusions or statements.

1. OPINION SUMMARY

On 3 April 2024, the mishap aircraft (MA), a TH-1H, tail number (T/N) 74-22313, departed Cairns Army Airfield, Alabama (AL), at 0814 local time (L) for a progress check of student training. The MA was assigned to the 23d Flying Training Squadron (23 FTS) at Fort Novosel, AL. During the Mishap Sortie (MS), the Mishap Student Pilot 1 (MSP1) was performing an evaluation as part of a TH-1H Helicopter Undergraduate Pilot Training mission to train helicopter pilots. During an evaluation of takeoff and landings on a sloped surface, the MSP1 misidentified visual cues related to the orientation of the aircraft and exceeded limits of the aircraft. This caused the rotor blades to contact the ground and resulted in the main rotor blade (MRB) to contact the ground resulting in the MA coming to rest on its right side while sustaining significant damage. The Mishap Instructor Pilot (MIP) and three student pilots (SPs) were not significantly injured and safely exited the aircraft. Preliminary estimates put the cost of repairing the MA at $10.8 million.

2. CAUSE

I find, by a preponderance of the evidence, that the cause of the mishap was pilot error, principally disorientation of MSP1 with insufficient corrective action taken by the MIP. While performing a takeoff on a sloped surface, the MSP1 perceived the MA was in level flight when it was actually in a two-to-five-degree right bank which was a misperception of the aircraft position (AE207). As the MA rolled to the right, the MSP1 perceived the MA sliding left down the incline and increased right cyclic resulting in a six-to-ten-degree right bank indicating spatial disorientation (PC321). The MIP attempted to counter the right roll with left cyclic input, however the input was insufficient to properly control the roll movement of the MA and simultaneously being countered by right cyclic input from MSP1 (AE104). The MSP1 erroneously perceived the MA was stable and level and increased the collective to lift off. The MIP failed to reduce collective, which is the most effective means of controlling rolling motions and the procedure recommended by the technical order (AE102) The combination of bank and increase in the collective created a rolling motion that exceeded the MA's critical angle resulting in a dynamic rollover and the aircraft coming to rest on its right side. The force of the MRBs contacting the ground resulted in significant damage to the transmission and aircraft structure.

I reviewed multiple external factors that could cause a dynamic rollover event and ruled out mechanical failure, medical considerations, weather, wind, or ground conditions as potential causes of the mishap based on photographic evidence, MA wreckage, written records, and

testimony. The evidence indicates the MIP was unable to counter the right roll of the aircraft due to the MSP1 applying right cyclic. The inability to counter the right rolling tendency allowed the bank angle to increase to the point where cyclic input alone was not effective in correcting the condition. At this point, the correct recovery procedure specified in the technical order (TO) calls for reduction of the collective to stop the rolling tendency. I find that the MIP did not reduce collective and that MSP1 increased collective due to believing the MA was level. The combination of bank angle, increased collective, and pivoting about the MAs skid created a condition where the aircraft exceeded the critical rollover angle and rolled onto its side.

3. SUBSTANTIALLY CONTRIBUTING FACTORS

After careful review, I found there to be no relevant factors that substantially contributed to the mishap.

4. CONCLUSION

After a comprehensive investigation into this mishap, I find, by a preponderance of the evidence, the cause of the mishap was the MSP1 exceeding the critical rollover angle of the aircraft, coupled with insufficient corrective action taken by the MIP.

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6 JUNE 2024

DAVID J. GORDON, Colonel, USAF
President, Accident Investigation Board

INDEX OF TABS

Safety Investigator Information ..... A

Not Used ..... B

Not Used C

Maintenance Report, Records, and Data ..... D

Not Used ..... E

Weather and Environmental Records and Data ..... F

Personnel Records ..... G

Egress, Aircrew Flight Equipment, and Impact Crashworthy Analysis ..... H

Not Used I

Releasable Technical Reports and Engineering Evaluations ..... J

Mission Records and Data ..... K

Not Used L

Not Used ..... M

Not Used ..... N

Any Additional Substantiating Data and Reports ..... O

Damage Summaries ..... P

AIB Transfer Documents ..... Q

Releasable Witness Testimony ..... R

Releasable Photographs, Videos, Diagrams, and Animations ..... S

Personnel Records Not Included in Tab G ..... T

Maintenance Report, Records, and Data Not Included in Tab D ..... U

Witness Testimony And Statements V

Not Used ..... W

Not Used X

Legal Board Appointment Documents ..... Y

Not Used ..... Z

Not Used..... AA

Not Used..... BB

Fact Sheets CC