UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION
BOARD REPORT

MQ-9A, T/N 12-4203

138th ATTACK SQUADRON
174th ATTACK WING
HANCOCK FIELD, NEW YORK

LOCATION: UNDISCLOSED LOCATION IN AFGHANISTAN

DATE OF ACCIDENT: 20 JUNE 2021

BOARD PRESIDENT: COLONEL JASON A. PURDY

Abbreviated Accident Investigation, conducted pursuant to
Chapter 12 of Air Force Instruction 51-307

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND

OFFICE OF THE DEPUTY COMMANDER
205 DODD BOULEVARD, SUITE 203
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JUN 23 2022

ACTION OF THE CONVENING AUTHORITY

The report of the abbreviated accident investigation board conducted under the provisions of Air Force Instruction 51-307, *Aerospace and Ground Accident Investigations*, that investigated the 20 June 2021 mishap involving a MQ-9A, T/N 12-4203, operated by the 138th Attack Squadron, complies with applicable regulatory and statutory guidance, and on that basis it is approved.

RUSSELL L. MACK
Lieutenant General, USAF
Deputy Commander

EXECUTIVE SUMMARY
UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION

MQ-9A, T/N 12-4203
UNDISCLOSED LOCATION IN AFGHANISTAN
20 JUNE 2021

On 20 June 2021, at 1255 Zulu time (z), an unmanned MQ-9A, tail number (T/N) 12-4203, was intentionally crashed into a mountain in an undisclosed location in Afghanistan. The mishap aircraft (MA) was operated remotely by a Mission Control Element (MCE) comprised of the mishap pilot (MP1) and the mishap sensor operator (MSO1). The MCE was assigned to the 138th Attack Squadron and belonged to the 174th Attack Wing. Both units are located at Hancock Field, an Air National Guard (ANG) Base near Syracuse, New York. The MA was not recovered after it was intentionally crashed in an unrecoverable location. The crash resulted in no reported damage to civilian property, no injuries, and no fatalities. The loss of government property was valued at $14,426,412.

Approximately 30 minutes before deciding to crash the MA, MP1 noticed the oil level indication dropped to approximately 40%. The MA lost 100% of its indicated oil level between approximately 1219z and approximately 1224z. During this time, MP1 alerted MSO1 of the issue and turned the MA toward an Expeditionary Launch and Recovery Element (ELRE). Between 1225z and 1234z, oil pressure decreased from 100 psi to 5 psi. At roughly 1237z, the engine torque and propeller speed began to fluctuate and the exhaust gas temperature (EGT) spiked. MP1 determined the MA would suffer engine failure before reaching the ELRE, and at 1242z MP1 pulled the condition lever to the aft position, shutting down the engine. The supported unit then requested the MA be crashed in a location where it would be unrecoverable. At approximately 1254z, MP1 turned off all aircraft autopilot features, took a nose down attitude, and the MA impacted the ground at 1255z at 7,350 feet mean sea level (MSL).

The Abbreviated Accident Investigation Board President (AAIB BP) found, by a preponderance of the evidence, MP1 shut down the engine after an oil leak reduced the indicated oil level to 0%, preventing the MA from returning safely to a recovery location. Moreover, the AAIB BP found, by a preponderance of evidence, the MA experienced an oil leak, reducing the indicated oil level to 0% substantially contributing to the mishap.

SUMMARY OF FACTS AND STATEMENT OF OPINION
MQ-9, T/N 12-4203
UNDISCLOSED LOCATION IN AFGHANISTAN
20 JUNE 2021

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ACRONYMS AND ABBREVIATIONS

138 ATKS	138th Attack Squadron
174 ATKW	174th Attack Wing
AAIB	Abbreviated Accident Investigation Board
ACC	Air Combat Command
AFB	Air Force Base
AFE	Aircrew Flight Equipment
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFTTP	Air Force Tactics, Techniques and Procedures
AOL	America On-Line
ANGB	Air National Guard Base
BP	Board President
CAPs	Critical Action Procedures
Capt/CPT/CAPT	Captain
CAS	Close Air Support
CC	Commander
Col	Colonel
Con	Contractor
DAFI	Department of the Air Force Instruction
DoD	Department of Defense
DNIF	Duties Not Including Flying
EEI	Essential Elements of Instruction
EGT	Exhaust Gas Temperature
ELRE	Expeditionary Launch and Recovery Element
EP	Emergency Procedures
ER	exceptional release
ft	Feet
FTU	Fighter Training Unit
GCS	Ground Control Station
HARM	Host Aviation Resource Management
HFACS	Human Factors Analysis and Classification System
HDD	Head-Down Display
HME	high military explosive
IAW	In Accordance With
ISR	Intelligence, Surveillance, and Reconnaissance
ITT	Inlet Turbine Temperature
JTAC	Joint Terminal Attack Control
K	Thousand
KIAS	Knots Indicated Airspeed
KS	Kinetic Strike
LNO	Liaison Officer
LR	Launch and Recovery
LRE	Launch and Recovery Element
Lt Col	Lieutenant Colonel
MA	Mishap Aircraft
Maj	Major
MAJCOM	Major Command
MCE	Mission Control Element
MGCS	Mishap Ground Control Station
mIRC	Internet Relay Chat
MCC	Mission Crew Commander
MMCC	Mission Mishap Crew Commander
MM	Maintenance Member
MP	Mishap Pilot
MQT	Mission Qualification Training
MSO	Mishap Sensor Operator
MSL	Mean Sea Level
MTS	multi-spectrum targeting system
OG	Operations Group
Op	Operation
Ops Sup	Operations Superintendent
ORM	Operational Risk Management
PAROC	Persistent Attack and Reconnaissance Operation Center
PIC	Pilot in Command
Psi	pounds per square inch
RPA	Remotely Piloted Aircraft
RPM(s)	Revolutions Per Minute(s)
SAR	Search and Rescue
SARM	Squadron Aviation Resource Manager
SME	Subject Matter Expert
TCTO	Time Compliance Technical Order
T/N	Tail Number
TO	Technical Order
TSgt	Technical Sergeant
USAF	United States Air Force

VIT	Variable Information Tables	z	Zulu

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 25 February 2022, the Air Combat Command (ACC) Deputy Commander appointed Colonel Jason A. Purdy as President of the Abbreviated Accident Investigation Board (AAIB) for the mishap that occurred on 20 June 2021 involving a MQ-9A at an undisclosed location in Afghanistan (Tab Y-2). Other board members included a Lieutenant Colonel (Lt Col) Legal Advisor, a Captain (Capt) Pilot Member, and a Technical Sergeant (TSgt) Recorder (Tab Y-2). On 10 March 2022, one Subject Matter Expert (SME), a TSgt MQ-9A Maintenance Crew Chief, was detailed to advise the board (Tab Y-4). The AAIB conducted its investigation in accordance with Air Force Instruction (AFI) 51-307, *Aerospace and Ground Accident Investigations*, Chapter 12, at Hancock Field, New York from 14 March 2022 to 18 March 2022 (Tab Y-2). On 16 March 2022, one Lt Col Medical SME was detailed to advise the board (Tab Y-5).

b. Purpose

In accordance with AFI 51-307, this AAIB 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. This investigation was an abbreviated accident investigation, conducted pursuant to Chapter 12 of AFI 51-307.

2. ACCIDENT SUMMARY

On 20 June 2021 at 1255 Zulu time (z) an unmanned MQ-9A, tail number (T/N) 12-4203, was intentionally crashed into a mountain in an undisclosed location in Afghanistan (Tabs D-9, J-5, R-32, and V-1.9). The mishap aircraft (MA) was operated remotely by a Mission Control Element (MCE) that was comprised of the mishap pilot (MP1) and mishap sensor operator (MSO1) (Tab V-1.2). The MCE was assigned to the 138th Attack Squadron and belonged to the 174th Attack Wing (Tabs D-2 and CC-15). Both units are located at Hancock Field, an Air National Guard (ANG) Base located near Syracuse, New York (Tab CC-13 and CC-15). The MA impacted a mountain range at 200 knots indicated airspeed (KIAS) at an undisclosed distance from the recovery location and was not recovered (Tabs J-5 and R-7). There was no reported damage to civilian property, no injuries, and no fatalities (Tab Q-11 to Q-12). The loss of government property was valued at $14,426,412 (Tab Q-12).

Approximately 30 minutes before the crash, MP1 noticed the oil level had dropped to approximately 40% and alerted MSO1 (Tabs J-5 and R-32). The MA lost 100% of its indicated oil level between approximately 1219z and approximately 1224z (Tab J-5). During this time, MP1 turned the MA toward an Expeditionary Launch and Recovery Element (ELRE) (Tab R-7). Between 1225z and 1234z, oil pressure decreased from 100 pounds per square inch (psi) to 5 psi (Tab J-5). At roughly 1237z, the engine torque and propeller speed began to fluctuate and the

exhaust gas temperature (EGT) spiked (Tabs J-5 and R-13). MP1 determined the MA would be unable to transit to the ELRE and at 1242z MP1 pulled the condition lever to the aft position, shutting down the engine (Tabs J-5 and R-13). Following engine shutdown, the supported unit requested the MA be crashed in a location where it would be unrecoverable (Tab R-7 and R-13). At approximately 1254z, MP1 turned off all aircraft autopilot features, took a nose down attitude, and the MA impacted the ground at 1255z at 7,350 feet mean sea level (MSL) (Tabs R-7, R-13, and J-5).

3. BACKGROUND

a. Air Combat Command (ACC)

ACC, headquartered at Joint Base Langley-Eustis, Virginia, is one of ten major commands (MAJCOMs) in the United States Air Force (Tab CC-3). For more than seven decades, ACC has served as the primary provider of air combat forces to America's warfighting commanders (Tab CC-3). ACC organizes, trains, and equips Airmen who fight in and from multiple domains to control the air, space, and cyberspace (Tab CC-3). As the lead command for fighter, command and control, intelligence, surveillance and reconnaissance, personnel recovery, persistent attack and reconnaissance, electronic warfare, and cyber operations, ACC is responsible for providing combat air, space, and cyber power and the combat support that assures mission success to America's warfighting commands (Tab CC-3).

b. Air National Guard (ANG)

The Air National Guard is a separate reserve component of the United States Air Force, which has both a federal and state mission (Tab CC-8). The federal mission is to maintain well-trained units available for prompt mobilization during war and provide assistance during national emergencies (such as natural disasters or civil disturbances) (Tab CC-8). When ANG units are not mobilized or under federal control, they report to the governor of their respective state, territory, or the commanding general of the District of Columbia National Guard (Tab CC-8). The Air National Guard has more than 106,000 officers and enlisted people who serve 89 flying units and 579 mission support units (Tab CC-8 to CC-9).

c. 174th Attack Wing (174 ATKW)

The 174 ATKW is a unit of the New York ANG located in Syracuse, New York, adjacent to Syracuse Hancock International Airport (Tab CC-13). The 174 ATKW has both a federal and state mission (Tab CC-13). The federal mission is to provide qualified Airmen and weapon systems engaging in global air, space and cyberspace operations, as well as support homeland defense and joint operations (Tab CC-13). The state mission is to support civil authorities at the direction of the governor in times of crisis (Tab CC-13). The 174 ATKW flies, launches, and recovers the state-of-the-art MQ-9A Reaper Remotely Piloted Aircraft (RPA) out of Syracuse Hancock International Airport (Tab CC-13).

d. 138 Attack Squadron (138 ATKS)

The 138 ATKS is a combat Mission Coordination Element, which operates MQ-9A Remotely Piloted Aircraft for the 174 ATKW, New York ANG, Hancock Field ANG Base, Syracuse, New York (Tab CC-15). The unit conducts on-call Intelligence, Surveillance and Reconnaissance (ISR), Close Air Support (CAS) and Kinetic Strike (KS) for the Air National Guard and combatant commanders in the active duty Air Force (Tab CC-15). Additionally, the 138 ATKS conducts Mission Qualification Training (MQT) for Active Duty, ANG and Marine MQ-9 units based throughout the United States (Tab CC-15). Finally, the 138 ATKS can be tasked to launch Domestic Operations Missions in support of the Governor of New York or national missions if federally activated (Tab CC-15).

e. MQ-9A Reaper

The MQ-9A is an armed, multi-mission, medium-altitude, long-endurance remotely piloted aircraft that is employed primarily against dynamic execution targets and secondarily as an intelligence collection asset (Tab CC-16). Given its significant loiter time, wide-range sensors, multi-mode communications suite, and precision weapons—it provides a unique capability to perform strike, coordination, and reconnaissance against high-value, fleeting, and time-sensitive targets (Tab CC-16). Reapers can also perform the following missions and tasks: intelligence, surveillance, reconnaissance, close air support, combat search and rescue, precision strike, "buddy-lase," convoy/raid over watch, and target development (Tab CC-16). The MQ-9A's capabilities make it uniquely qualified to conduct irregular warfare operations in support of combatant commander objectives (Tab CC-16).

f. Amentum

Amentum is a private defense contractor that provides aviation, logistics, training, intelligence, and operation solutions. (Tab CC-18 to CC-22). Amentum delivers enhanced capabilities including a full suite of logistics/aviation services and solutions to support critical needs anywhere, anytime (Tab CC-18 to CC-22). Specifically, Amentum provides maintenance services to various Air Force MAJCOMs, including ACC (Tab CC-18 to CC-22).

4. SEQUENCE OF EVENTS

a. Mission

Before the mishap on 20 June 2021, the crew conducted support for a mission over an undisclosed populated location. (Tabs R-13, R-32, and V-1.4).

b. Planning

Prior to assuming command of the MA, MP1 received a detailed changeover brief from the outgoing pilot (Tabs R-11 and Tab V-1.2 to V-1.3). The shift's weather brief showed nothing

significant in the target area or the aircraft planned altitude (Tab F-2). The crew, MP1 and MSO1, completed a normal mass brief, crew brief, and a brief from the Mission Intelligence Coordinator (Tab R-11 and R-37). The mishap mission crew commander (MMCC) confirmed MP1 and MSO1 were qualified to fly the mission (Tabs G-34, G-129, and V-3.2 to V-3.3).

c. Preflight

Aircraft maintenance performed the exceptional release (ER) for MA clearing it for flight (Tab D-15). The launch and recovery element (LRE) pilot, MP3, checked the MA forms, completed a walk around and noted that the oil gauge was full; additionally, on the preflight checklist step, oil level was at 100% (Tab R-104). Ground control station (GCS) maintenance signed the ER for the GCS forms clearing the GCS for use. (Tab D-549).

d. Summary of Accident

The launch crew, MP3 and MSO3, completed engine start, taxi, takeoff, and handed the MA over to the gaining mission control element (MCE) with no abnormalities at 0349z (Tabs R-104 and R-109). MP2 and MSO2 stated that the regular operational checks had been accomplished at the top of each hour with no abnormal system indications (Tabs R-68 and R-87). At shift change, 1045z, MP2 gave MP1 a detailed changeover brief prior to MP1 taking control of the MA (Tabs R-11 to R-12 and R-68). At approximately 1200z, both MP1 and MSO1 completed an operational check with no abnormal indications (Tabs R-7 and R-32). At approximately 1223z, MP1 noticed the oil level indication had dropped to 40% and brought it to the attention of MSO1 (Tab R-11, R-32, and R-38). MP1 maneuvered the MA away from the populated target area while MSO1 visually checked the MA using the multi-spectral targeting system (MTS) with both daytime and infrared cameras for any visible leaks (Tabs J-4, J-6, R-7, R-13, R-38, and R-40). No fluid leak was observed (Tabs J-6 and R-13). MP1 directed MSO1 to run the Low Oil Level checklist; during this time, the oil level indication continued to drop to 20% with no visible leaks (Tabs R-13, R-32, V-1.4, and V2.4 to V2.5). Both MP1 and MSO1 anticipated an impending engine failure due to the loss of engine oil (Tabs R-13, V-1.4 and V-2.5). MP1 contacted MMCC and requested assistance in the GCS, where MMCC confirmed the emergency and returned to the operations floor to assist in communications (Tabs R-59 to R-60). MP1 and MMCC began coordinating the emergency with outside agencies including a Liaison Officer (LNO), the controlling agency, and the supported unit (Tab R-13 and R-59). A LNO requested the crew attempt to recover the aircraft at an ELRE location approximately 2 hours away (Tabs R-7, R-13, R-59 to R-60, and R-62). At 1224z, the indicated oil level was at 0% (Tab J-5). Between 1225z and 1234z, oil pressure decreased from 100 psi to approximately 5 psi (Tabs J-5 and R-62). MP1 and MSO1 did not run the Low Oil Pressure checklist, although MP noted it is the same as the Low Oil Level checklist (Tabs V-1.4 and V-2.6). A decrease in oil pressure resulted in loss of propeller pitch control and caused an uncommanded increase in engine torque and decrease in engine speed (Tab J-13). Around 1240z and 1245z, MSO1 observed an EGT spike to 710 degrees Celsius along with engine revolutions per minute (RPM) and torque fluctuations (Tabs R-32, R-40, and V-2.5). Red EGT indications may indicate an engine overheat or an engine fire (Tabs BB-11, BB-12, and DD-3). MP1 observed an EGT spike into the red but MP1 and MSO1 did not run the Engine Overheat or Engine Fire checklists (Tabs V-1.4, V-2.5 to V-2.6, and DD-3). At 1242z, although the crew did not have any visual indications of an engine fire, MP1 pulled the condition lever aft to shut down the engine because MP1 wanted to avoid having an uncontrollable aircraft if a fire did

burn through the engine and composite materials (Tabs J-5, J-13, R-13, and V-1.5). MMCC observed MP1 and MSO1 execute critical action procedures (CAPs) and run the Engine Failure checklist (Tabs R-7, R-32, and R-59). While the ultimate decision to land in an unpopulated area rests with the pilot, the crew determined the MA was outside of glide back range to the ELRE location and coordinated with Persistent Attack and Reconnaissance Operation Center (PAROC), the supported unit, and intelligence to select a suitable controlled crash site (Tabs BB-16, R-13, R-32, R-59 to R-60, and R-63). When the MA was approximately 3,000 ft. above the intended crash site, MP1 turned off all auto pilot functions and hand flew the aircraft to the point of impact (Tabs J-5 and R-7).

e. Impact

At the time of impact, all autopilot features had been turned off, the MA was hand flown by MP1 and the MA nose was pitched 15 degrees down to impact the terrain in the coordinated location (Tabs J-5 and R-7). The MA impacted the ground and the return link was lost at 1255z (Tabs J-5 and R-32). After impact, the crew made no changes or input commands in the GCS (Tabs R-14 and R-40).

f. Egress and Aircrew Flight Equipment (AFE)

Not Applicable

g. Search and Rescue (SAR)

Not Applicable

h. Recovery of Remains

Not Applicable

5. MAINTENANCE

a. Forms Documentation

A review of the maintenance records leading up to the mishap show no relevant discrepancies or issues, and shows no overdue inspections or Time Compliance Technical Orders (TCTOs) (Tab DD-2). All required preflight and postflight inspections had been completed (Tab DD-2).

b. Inspections

All inspections were current and complied with in accordance with the applicable Technical Orders (TOs) (Tab DD-2). There was no evidence indicating inspections played a factor in this mishap (Tab DD-2).

c. Maintenance Procedures

All maintenance was shown to be conducted in accordance with all applicable TOs and guidance (Tab DD-2). There was no evidence maintenance procedures were a factor in this mishap (Tab DD-2).

d. Maintenance Personnel and Supervision

There was no evidence that training, qualifications, or supervision of maintenance personnel were a factor in the mishap (Tab DD-2).

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

At 1219z, the oil level indication began to decrease, and by 1224z, had reached zero (Tab J-5). Between 1225z and 1234z the oil pressure indication decreased from 100 psi to 5 psi and remained between 0 psi and 5 psi until engine shutdown at 1242z (Tab J-5). There was no evidence to suggest the MA had any fuel system concerns at the time of the mishap (Tab DD-2).

Oxygen and hydraulic systems are not applicable to the MQ-9A (Tab DD-2).

f. Unscheduled Maintenance

There was no evidence that unscheduled maintenance played a part in this mishap (Tab DD-2).

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Structures and Systems

(1) MQ-9A Oil Delivery System

The engine oil system is a dry-sump design that provides a constant supply of clean, filtered lubricating oil to the engine bearings, reduction gears, fuel pump drive, torque indication package, propeller control system, and torque sensing system (Tab BB-64). The oil also lowers engine temperatures by carrying engine heat away and dissipating heat through the fuel/oil and air/oil heat exchangers (Tab BB-64).

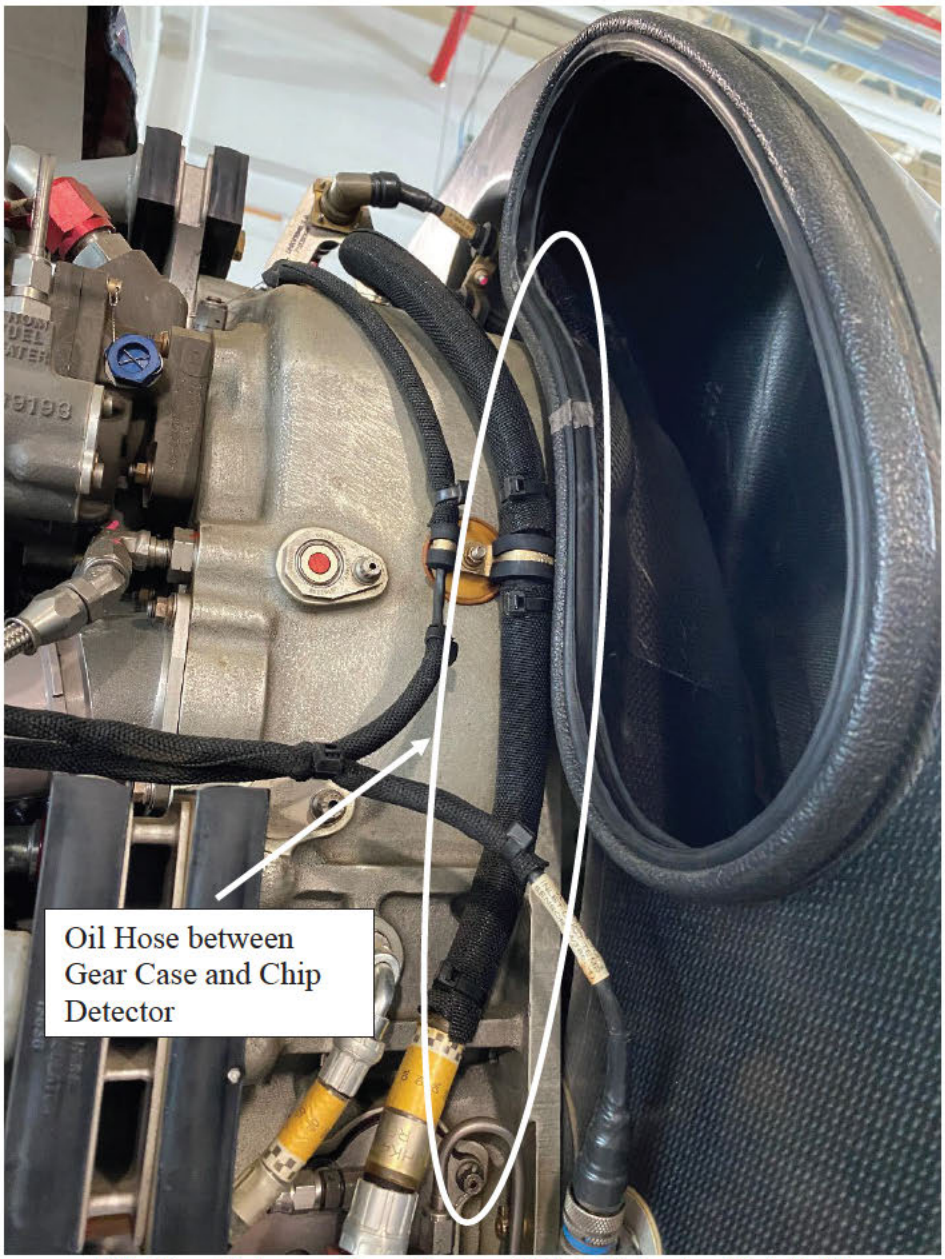
(2) MQ-9A Oil Monitoring

The oil tank assembly holds 9 of the 12 to 14 quarts needed to fill the engine oil system to capacity (Tab BB-65). Tank-mounted oil temperature and oil level sensors provide constant readings of oil temperature and oil level to the aircraft sensor system (Tab BB-65). A tank-mounted magnetic chip detector provides a warning signal if it detects ferrous metal (Tab BB-65). A tank-mounted sight glass serves as a visual oil level indicator (Tab BB-65).

b. Evaluation and Analysis

Due to the location of the wreckage, on-site evaluation could not be performed (Tab J-4). However, the manufacturer was able to produce a technical report based on data log information, videos, and historical oil related mishaps involving other MQ-9A aircraft (Tab J-4). The specific cause of the oil leak could not be determined but a most likely location of the oil leak was identified as the oil hose on top of the engine between the gear case and the chip detector (Tab J-4). This determination was made based on rate of oil loss and no visual indications of an oil leak (Tab J-4). Oil leaks from this location during flight have shown that oil leaking from this hose will be drawn out to the propeller spinner cone, preventing oil accumulation and, therefore,

preventing leaks from the bottom of the engine compartment (Tab J-4). This hose was inspected 93 hours prior to the mishap flight during the 200/400 hour airframe inspection (Tab J-6). This hose is replaced during the 3,000 hour Hot Section Inspection and the 6,000 hour engine overhaul engine had flown 2,483.8 hours since the last overhaul (Tab J-6).



Oil Hose Between Gear Case and Chip Detector (Tab S-3)

7. WEATHER

a. Forecast Weather

The weather at the approximate mishap location was clear skies with winds 310 at 10 knots (Tab F-2).

b. Observed Weather

Not Applicable

c. Space Environment

Not Applicable

d. Operations

Not Applicable

8. CREW QUALIFICATIONS

a. Mishap Pilot

MP1 completed Initial Qualification Training and Mission Qualification Training at Hancock Field, NY on 5 April 2017 with no discrepancies (Tabs G-50 to G-51). MP1 became Instructor qualified on 8 May 2018 and Evaluator qualified on 26 March 2019 (Tabs G-44 and G-46). The last evaluation MP1 completed was a no-notice evaluation on 25 May 2021 and no discrepancies were noted (Tabs G-40 to G-41). The total instructor, flight time, and simulator flying hours/sorties for the previous 30, 60, and 90 days are set forth below (Tabs G-30 to G-31 and G-33).

MP1	Hours	Sorties
30 days	2.9	4
60 days	4.8	7
90 days	22.1	18

b. MSO1

MSO1 completed Initial Qualification Training and Mission Qualification Training at Hancock Field, NY on 19 December 2013 with no discrepancies (Tabs G-142 to G-143). MSO1 became Instructor qualified on 13 November 2014 (Tab G-140). The last evaluation MSO1 completed was on 28 September 2020 with no discrepancies noted (Tabs G-130 to G-131). The total instructor, flight time, and simulator flying hours/sorties for the previous 30, 60, and 90 days are set forth below (Tabs G-121, G-124, and G-128).

MSO1	Hours	Sorties
30 days	10.5	5
60 days	34	14
90 days	48	21

9. MEDICAL

a. Qualifications

All crew members were medically qualified at time of mishap (Tab DD-5).

b. Health

There were no health factors directly contributing to the mishap (Tab DD-5).

c. Pathology

Per Department of Air Force Instruction (DAFI) 91-204, *Safety Investigations and Hazard Reporting*, the medical clinic collected blood and urine samples from everyone involved with the mishap. All toxicology tests for the aircrew members came back negative with exception of MSO1 (Tab DD-5). MSO1's positive toxicology test was determined not to be a factor in the cause of the mishap.

d. Lifestyle

There is no evidence to suggest lifestyle factors were a factor in the mishap (Tabs R-17 to R-27 and R-44 to R-54).

e. Crew Rest and Crew Duty Time

Prior to the start of flying duties, MP1 and MSO1 signed the Go/No-Go document stating that each were legally ready to fly as defined in Air Force Manual (AFMAN) 11-202 Volume 3, *Flight Operations* (Tabs G-34, G-129, and K-3).

10. OPERATIONS AND SUPERVISION

a. Operations

When MP1 noticed the oil level indication had dropped to approximately 40%, the crew was approximately 1.5 hours into their planned 2-hour shift (Tabs R-11, V-1.4 and V-3.3).

b. Supervision

Every mission has a Mission Crew Commander (MCC) whose job is to confirm the aircrew has authorization for flying operations and can help coordinate with outside agencies to assist the crew if needed (Tabs BB-74 and R-59). At the time of the mishap, the MMCC was finishing paperwork

for a student training sortie (Tab R-61). After confirming the situation in the GCS, the MMCC began coordinating with outside agencies (Tabs R-59 and R-61 to R-62). These agencies included the Combined Air Operations Center LNO and the PAROC Mission Director (Tab R-62).

11. HUMAN FACTORS ANALYSIS

a. Introduction

The Department of Defense Human Factors Analysis and Classification System 7.0 (DoD HFACS 7.0) lists potential human factors that can play a role in aircraft mishaps and identifies potential areas of assessment during an accident investigation (Tab BB-46 to BB-62).

b. Relevant factors identified by AAIB

(1) Checklist Not Followed Correctly (AE102) is a factor when the individual, either through an act of commission or omission, makes a checklist error or fails to run an appropriate checklist (Tab BB-46). During this mishap, MP1 and MSO1 failed to run Low Oil Pressure, Engine Overheat, or Engine Fire Checklists prior to pulling the condition lever to the full aft position (Tabs V-1.4 and V-2.5).

The oil pressure began decreasing about 1 minute after the oil level reached 0% at 1224z and the pressure didn't reach 5 psi until 1234z (Tab J-5). MP1 and MSO1 ran the Low Oil Level checklist and preemptive Engine Failure checklist, but failed to address the new emergency indication of low oil pressure (Tabs R-13, V-1.4, and V-2.5). Both the Low Oil Level and Low Oil Pressure checklists caution aircrew to use the minimum aircraft maneuvering and throttle movement to return to base and land safely and that failure to comply may result in damage to engine or loss of aircraft (Tab BB-13 and BB-15). In order to reduce throttle movements, the pilot must turn off the altitude and airspeed hold mode to prevent the autopilot from adjusting the throttle setting to maintain altitude and/or airspeed (Tabs DD-3 and DD-4). Based on the video logs from the heads up display, the telemetry shows MP1 did not reduce throttle movements as cautioned since the MA maintained altitude and increased airspeed (Tabs R-32, V-1.4, L-5, and DD-3).

Although the first step of the Engine Fire checklist is to pull the condition lever aft, it is not a critical action procedure (Tab BB-12). By not executing the Engine Fire checklist or using effective crew resource management (CRM) skills, MP1 created confusion on the nature of the MA emergency evident from the contradicting witness testimonies on whether or not the engine failed or was shut down by the pilot (Tabs R-13, R-40, V-1.5, V-2.5, and DD-3). CRM, as identified in AFMAN 11-290, focuses on the effective utilization of all appropriate and available resources as countermeasures to operational threats and human errors so as to ensure mission success (Tab BB-76).

(2) Wrong Choice of Action During an Operation (AE206) is a factor when the individual, through faulty logic or erroneous expectations, selects the wrong course of action (Tab BB-47). During this mishap, MP1, MSO1, and MMCC stated an expectation of imminent engine failure or engine fire, which could have resulted in the complete loss of ability to control the

aircraft (Tabs R-13, V-1.4 to V-1.5, V-2.6, and V-3.10 to V-3.11). As a result, MP1 pulled the condition lever to the full aft position prior to engine failure (Tab R-13).

MP1 and MSO1 expected impending engine failure to occur during the situation (Tabs R-7, R-13, R-38 and V-1.4). While MP1 could only speculate on how long the engine would continue to operate without oil, the decision to pull the condition lever before the engine failed compressed the time available for all follow-on decisions (Tabs J-5, R-13 and V-1.7). MP1 pulled the condition lever when the MA was clear of populated areas, but MP1 later recognized the option existed to delay pulling the condition lever aft (Tab L-5, V-1.7, and DD-3). Ultimately, no injuries, fatalities, or civilian property damage resulted from MP1's pilot-in-command decision and the aircraft was unrecoverable (Tabs R-7, R-13, and Q-11 to Q-12).

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Publically Available Directives and Publications Relevant to the Mishap

(1) AFI 51-307, *Aerospace and Ground Accident Investigations,* 18 March 2019

(2) AFI 51-307, Air Combat Command Supplement, *Aerospace and Ground Accident Investigations,* 3 December 2019

(3) Department of the Air Force Instruction (DAFI) 91-204, *Safety Investigations and Reports,* 10 March 2021

(4) AFMAN 11-202, Volume 2, *Flight Operations,* 10 June 2020

(5) AFMAN 11-2MQ-9V3, 174 OG Supplement, *Flight Operations,* 1 May 2021

(7) AFMAN 11-290, *Cockpit/Crew Resource Management and Threat & Error Management Program,* 25 October 2021

(6) Human Factors Analysis and Classification System, Version 7.0

NOTICE: Directives and publications 1 through 5 listed above are available digitally on the Air Force Departmental Publishing Office website at: https://www.e-publishing.af.mil. The Human Factors Analysis and Classification System, Version 7.0 publication is available on the Air Force Safety Center's website: https://www.safety.af.mil/Divisions/Human-Factors-Divisions/HFACS/

b. Other Directives and Publications Relevant to the Mishap

There were no other directives or publication identified relevant to this mishap.

c. Known or Suspected Deviations from Directives or Publications

There is no evidence to suggest that any other directive or publication deviations occurred during this mishap.

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1 June 2022

JASON A. PURDY, Colonel, USAF
President, Accident Investigation Board

STATEMENT OF OPINION

MQ-9A, T/N 12-4203
UNDISCLOSED LOCATION IN AFGHANISTAN
20 JUNE 2021

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 20 June 2021, at 1255 Zulu time (z), an unmanned MQ-9A, tail number (T/N) 12-4203, was intentionally crashed into a mountain in an undisclosed location in Afghanistan. The mishap aircraft (MA) was operated remotely by a Mission Control Element (MCE) comprised of the mishap pilot (MP1) and the mishap sensor operator (MSO1). The MCE was assigned to the 138th Attack Squadron and belonged to the 174th Attack Wing. Both units are located at Hancock Field, an Air National Guard (ANG) Base near Syracuse, New York. The MA was not recovered after it was intentionally crashed in an unrecoverable location. The crash resulted in no reported damage to civilian property, no injuries, and no fatalities. The loss of government property was valued at $14,426,412.

Approximately 30 minutes before deciding to crash the MA, MP1 noticed the oil level dropped to approximately 40%. MP1 alerted MSO1, who scanned the aircraft utilizing the multi-spectrum targeting system (MTS), with both daytime and infrared cameras, but located no visual indications of an oil leak. The MA lost 100% of its indicated oil level between approximately 1219z and approximately 1224z. MP1 then turned the MA toward an Expeditionary Launch and Recovery Element (ELRE). Between 1225z and 1234z, oil pressure decreased from 100 pounds per square inch (psi) to 5 psi. At approximately 1237z, the engine torque and propeller speed began to fluctuate and the exhaust gas temperature (EGT) spiked. MP1 determined the MA would suffer engine failure before reaching the ELRE and, at 1242z; MP1 pulled the condition lever to the aft position, shutting down the engine. The supported unit then requested the MA be crashed in a location where it would be unrecoverable. At approximately 1254z, MP1 turned off all autopilot features, took a nose down attitude, and the MA impacted the ground at 1255z at 7,350 feet mean sea level (MSL).

2. CAUSE

As the Abbreviated Accident Investigation Board President (AAIB BP), I find, by a preponderance of the evidence, MP1 shut down the engine after an oil leak reduced the indicated oil level to 0%, preventing the MA from returning safely to a recovery location.

MP1 and MSO1 did not run all of the applicable checklists to include Low Oil Pressure, Engine Overheat, and/or Engine Fire. After receiving a new indication of low oil pressure, the MP1 and MSO1 did not run the Low Oil Pressure checklist. These checklist steps help mitigate the additional stress on the engine caused by the loss of oil pressure. Additionally, high EGT may indicate an engine overheat or an engine fire; upon recognition of high EGT, MP1 and MSO1 should have referenced the Engine Overheat and/or Engine Fire checklists and completed them as required. The Engine Fire checklist directs the pilot to pull the condition lever into the aft position prior to actual engine failure; however, the Engine Fire checklist was not completed by MP1 or MSO1. MP1 and MSO1 both anticipated an engine failure would occur and, as a result, acted prematurely as opposed to following the required checklists. The analysis of the data logs shows the condition lever was pulled into the aft position and the engine was shutdown prior to engine failure. Ultimately, MP1 pulled the condition lever aft to prevent a fire without the direction of a checklist or established publication.

3. SUBSTANTIALLY CONTRIBUTING FACTOR

Moreover, I find by a preponderance of the evidence, the MA experienced an oil leak, reducing the indicated oil level to 0%, a factor that substantially contributed to the mishap.

4. CONCLUSION

I reviewed the data logs, aircraft maintenance forms documentation, witness testimony, video evidence, photographic evidence, technical reports, and maintenance practices information provided by a subject matter expert. I find, by a preponderance of evidence, MP1 shut down the engine after an oil leak reduced the indicated oil level to 0%, preventing the MA from returning safely to a recovery location. Moreover, I find by a preponderance of evidence, the MA experienced an oil leak, reducing the indicated oil level to 0% substantially contributing to the mishap.

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1 June 2022

JASON A. PURDY, Colonel, USAF
President, Accident Investigation Board

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