In November 1965, the Central Intelligence Agency Offices of Research and Development and Special Affairs, with the assistance of OPNAV Office of Reconnaissance, Electronic Warfare, Special Operations, Navy (REWSON), cooperated on proposing and then initiating Project Muddy Hill. Using a P-2H (P2V-7) Lockheed Neptune aircraft modified with state-of-the-art electro-optical (EO) and other special sensors, Project Muddy Hill would provide an airborne hunter/locater vehicle for usage in nighttime detection and interdiction scenarios in Southeast Asia combat environments. Specific mission scenarios to be targeted were the Ho Chi Minh trail system in Laos as well as undefended areas where conventional photography in dense foliage has heretofore proven non-effective.

Electro-Systems, Inc., Greenville TX, a company with extensive experience in ‘black’ aircraft programs, was chosen as the lead contractor in the modification of the P-2H aircraft, Buno 135582, transferred from temporary assignment with the USAF. With
Lcdr Bob Porter as Officer-in-Charge and Lcdr Dale Hagen as Assistant Officer-in-Charge, Navy, Marine, and Air Force officer and enlisted personnel as well as civil service and EO systems contractor personnel were assigned to Muddy Hill to fulfill the function of flight crew and maintenance support during the aircraft and systems test phase at Greenville and while the Project was deployed to Southeast Asia. The Weapons Systems Test Division, Naval Air Test Center (NATC), maintained administrative control of assigned personnel while operational control (when deployed to Southeast Asia) was maintained by Commander in Charge, Pacific Fleet. When deployed, Muddy Hill operated as Pacific Fleet Task Group 50.8.

During June to August 1966, several Muddy Hill Navy officers and enlisted personnel were sent to factory and university classes to study the fundamentals of infrared detection, low light illumination television, starlight scope, terrain following radar, electronic counter measures, and active magnetic anomaly detection systems. In September 1966, Muddy Hill personnel reported to E-Systems to assume an active roll in the ongoing modification and testing of the Neptune aircraft, now re-designated a NP-2H (permanent test-bed aircraft). The aircraft was repainted with a high-gloss, ‘Black Widow Black’ paint (used on several WWII fighter aircraft) that transformed the surface area into an optical virtual image, obliquely scattering nighttime illumination sources impinging on the aircraft so that it was essentially invisible!

The Muddy Hill NP-2H retained its recognizable P2 Neptune external configuration with the exception of two, five-foot long, 2 1/2 foot diameter circular fairings (pods) mounted on either side of the nose section. The port pod housed the Low-Light-Level Television (L³TV) system and the starboard pod the APQ-115 Terrain Following Radar (TFR) system. A six-foot long, 2 1/2 foot wide fairing aft of the rear exit hatch housed the two Stereo, Downward Looking Infrared (DLIR) systems. A
seven-foot long outside air intake probe extending forward from the top of the nose section supported the TFR system angle of attack flying-wing device. The forward section of the existing APS-20 radar radome incorporated the Forward Looking Infrared (FLIR) system that was capable of being scanned from the horizon to 20° aft of nadir. A small fairing just forward of the MAD boom housed a Fairchild Instruments, horizon-to-horizon, 70mm format reconnaissance camera.

The Active Magnetic Anomaly Detection transmitter was a 36-inch diameter coil of #8 solid copper wire tilted 25° to the vertical mounted directly behind the aft observer seats with controls located at the flight deck sensor station. The Neptune’s wing fuel tanks were filled with orange-colored, polyurethane reticulated foam to minimize fuel sloshing and the possibility of wing fires initiated by small to medium caliber ground-fire.

Controls and displays for the FLIR, L³TV, TFR and Active Magnetic Anomaly Detection sensors were installed at the flight deck sensor station, forward on the flight deck. The navigation station was centrally located on the flight deck with a B-52 bomb guidance/navigation computer, Litton LN15 inertial system, APN-92 Loran C and APN-122 Doppler groundspeed/drift navigation system comprising the integrated navigation suite. The active and passive electronic countermeasures (ECM/ESM) equipment was located on the flight station, just forward of the wing beam.

Between August 1966 and June 1967, crewmember training and EO systems flight tests were conducted utilizing Electro-Systems runways and ground facilities and the surrounding Greenville countryside. Additional systems test operations in simulated Southeast Asia environments were conducted at the Fort Hunter Liggett Proving Grounds on the central coast of Northern California. In July 1967, the project relocated to NATC Patuxent Rived MD, for pre-deployment preparations.
The Muddy Hill aircraft, with an aircrew of six, departed NATC in late July 1967, followed by twenty seven military, civilian contractor and civil service project personnel and support equipment via an USAF MAC C-141 aircraft for Udorn Thani, Royal Thai Air Force Base (Udorn RTAFB). Udorn RTAFB was located in the northeastern sector of Thailand, just south of the Mekong River forming the Thailand-Laos border. The Air America compound at Udorn RTAFB was the project’s staging area for the next four months.

Aircraft avionics systems test and road reconnaissance crewmember training flights were conducted around the Udorn area. Combat environment, aerial reconnaissance missions were conducted during both daytime and nighttime hours in the ‘Barrel Roll’ and ‘Tiger Hound’ areas of Laos. Military operational missions were fully briefed with intelligence, defensive threat scenarios, and conjunctive military flight operations in the mission areas. Target areas consisted of the Ho Chi Minh Trail and its road segments as well as other locations in the Plaine des Jarres in central Laos. Flight durations averaged 4-5 hours with takeoffs around 0500 and 1900 hours. While at Udorn RTAFB, the pilot and co-pilot’s seats were reinforced with seat armor salvaged from crashed Army helicopters.

Mission flight parameters varied between 200 and 1500 feet absolute altitude on terrain following radar in the rugged, mountainous terrain of Laos. Primary target area guidance was accomplished by the author’s usage of a hand-held starlight (night vision) scope in the aircraft’s Plexiglas bow observer station. The author used the night vision scope imagery to locate road segments, navigation waypoints and individual targets. Voice commands via the aircraft’s inter-communication system were used to direct the plane commander to target locations. Usage of the night vision scope by the author also provided terrain avoidance to complement terrain following radar electronic commands. Suspected targets of interest were marked airborne flare parachutes that had been impregnated with green, chemiluminescent
dye. These flare parachutes were dropped from the sonobuoy dispensing chutes located in the aft portion of the aircraft. Several tactical missions experienced light, small arms ground fire with two missions encountering automatic anti-aircraft opposition.

The Stereo DLIR system imprinted IR images directly on two rolls of 70mm format film. After processing at the USAF photo laboratory, this film was analyzed by photographic intelligence trained Muddy Hill personnel using a specially designed stereoscopic viewer. Tactically significant target information was reported to the USAF intelligence center at Udorn RTAFB.

From August to December 1967, Project Muddy Hill (TG 50.8) completed a total of 60 avionics systems test/road reconnaissance-training flights. 14 flights (62 flight hours) consisting of low-level, active combat environment reconnaissance missions were also successfully completed. The Muddy Hill overseas deployment was terminated when the aircraft and project personnel returned to NATC in December 1967. Project Muddy Hill continued at NATC with several Navy officers becoming part of the Electronic Warfare Section, Weapons Systems Test Division, writing the necessary formal Muddy Hill Test Reports. Throughout 1968, the author crewed the Muddy Hill aircraft, Buno 135582, with additionally installed EO/other sensors, during surface ship reconnaissance and ASW scenario evaluation flights. NP-2H Buno 135582 remained at NATC as a permanent test bed aircraft, being assigned to MASDC, Davis Monthan AFB AZ in December 1970 and removed from U.S. Navy Inventory May 1971.

The first NATC test and evaluation project to operate in Southeast Asia, Project Muddy Hill, successfully utilized the first airborne EO systems to be operationally evaluated in a combat environment. These systems served as the predecessor of more modern EO systems also successfully used in Vietnam combat in 1968-1969.
on AP-2H aircraft of Heavy Attack Squadron 21 and later on carrier-based A-6C Intruder aircraft. Additionally, Muddy Hill’s unique avionics systems became the first EO sensors successfully deployed against submarine and small surface targets in nighttime environments.

Project Muddy Hill
Barrel Roll Tactical Mission Crew
12 Oct 1967 Udorn RTAFB Thailand

Left to Right..

AO2 W. Seal..
ATN2 B. Burner..
Lt Lon Brugh..
Ltjg Bob Zafran..
Lcdr Bob Porter {OinC}..
Lcdr Dale Hagen {Asst OinC}..
Lt Col Bill Kovalick..
ADR1 Bob Tappan