



FEATURES

U.S. ARMY CORPS OF ENGINEERS

BUILDING STRONG®

For Release:
Aug. 26, 2011

Contact:
Karla Marshall (540) 722-6263
karla.k.marshall@usace.army.mil

USACE, Army divers team up for solutions at Kajaki and Dahla dams

Maintaining underwater structures at dams, even under the best of circumstances, takes periodic inspection and repair. The Kajaki and Dahla dams in southern Afghanistan, however, have not had the benefit of either for several years, and the U.S. Army Corps of Engineers is working to remedy the neglect.

U.S. Army divers, at the request of the Afghanistan Engineer District-South, arrived at the district's headquarters at Kandahar Airfield in early August to help inspect both the Kajaki and Dahla dams. Their plan was to use a remotely operated vehicle (ROV) to collect data and images of the gate structures, release valves, inlet tunnels and trash racks. The team intended to obtain data, such as sediment buildup, structural integrity and concrete cavitations and provide it to USACE engineers and project managers working to analyze and improve the dams' integrity.



Sgt. John Hoover, 7th Engineer Dive Team member, maneuvers the remotely operated vehicle at the Kajaki Dam in Helmand province, Aug. 14. (USACE Photo)

“When we first decided we needed to look below the surface, we didn’t know who to call,” recalled Noori Nader, project manager for the Kajaki Dam. “After spending several months contacting everyone I could think of, Sue Fox (the South District’s safety manager) had the solution.”

“I have a long work history with the Army dive teams,” said Fox. “As the deputy diving coordinator in the (USACE) Portland District, I worked with them every year at our dams in Portland. I also worked with an Army dive team in Iraq in the past and knew they would be perfect for this mission. Once we got the go ahead from our command, I coordinated with the team to get them here; it actually happened quite quickly.”

The dive team

The four-Soldier dive team deployed from the 7th Engineer Dive Team, 65th Engineer Battalion, 130th Engineer Brigade, 8th Theater Sustainment Command at Fort Shafter, Hawaii, to Kuwait in February. The team—1st Sgt. William “Scott” Baumgartner, Staff Sgt. Sean Rowley, Sgt. John Hoover and Sgt. Britton Hall—support military operations in the U.S. Central Command’s area of operations from their base in Kuwait, but this was their first mission in Afghanistan.

“We work throughout Centcom’s AOR and have done a lot of diving in Iraq to support bridging operations primarily; however, we perform a full spectrum of dive operations as well,” said 1st Sgt. William Baumgartner, a master diver and the team lead for this mission.

In addition to bridging operations, during its one-year deployment, the team may be called upon to perform body recovery, obstacle removal, port opening, underwater surveying and demolition, salvaging, vessel security and inspections, and force protection missions.

“We are a dive team,” said Baumgartner. “But this mission required no diving at all.” The team did its entire fact finding through surface observation and the ROV.

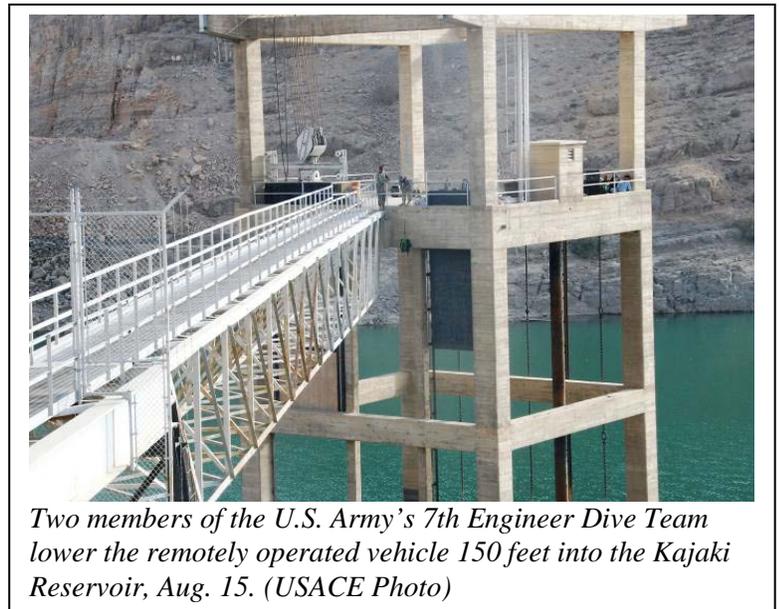
The ROV findings will help the district’s engineers determine the best way to repair the various components of the Kajaki Dam and its irrigation tunnel. At the Dahla Dam, the data collected will help engineers determine the extent of sediment buildup at the reservoir and the conditions at the entrance to the outlet tunnel.

Mission One – Kajaki Dam

The Kajaki Dam was constructed in the 1950s by an American construction company as part of the Helmand Arghandab Valley Authority Project. The project was an ambitious undertaking by the Afghan and U.S. governments and was designed to store water for downstream irrigation.

In the 1970s, U.S. Agency for International Development funded the hydro power plant construction at the dam which included two 16.5-megawatt generators.

Years of neglect, however, have taken a toll on the dam and its ability to perform as designed. Work is ongoing to improve power generation as well, but this reconnaissance mission was solely to evaluate the irrigation component of the dam.



The original construction of the irrigation intake structure includes a trash rack that prevents debris from entering the tunnel and causing damage to the downstream valves and a 98-ton concrete maintenance bulkhead gate. The gate has a steel wheel which is supposed to open and close with a crane. The operational weight capacity of the crane is only 75 tons and therefore, it cannot raise and lower the gate.

“The crane failed, leaving the gates stuck in a fully open position,” said Noori. “So, no maintenance can be performed on the structure and we didn’t know its condition.

“As a result of the permanently opened concrete gate, the next component of the irrigation system, the downstream intake tower, relies on a set of roto valves for emergency closure and a set of jet valves for a regulated release of irrigation water from the reservoir,” Noori continued.

Neither of the valve systems was designed to function in the capacity, so South District engineers are concerned that their condition has deteriorated over the years.

“Without a functioning maintenance bulkhead gate, there is no way to take the valves off-line for preventative maintenance or to assess the reliability of the system,” said Noori. “Should the valves fail, there is the potential for an uncontrolled release of water into the irrigation system.”

Uncontrolled release means flooding for the Helmand River valley. If water from the reservoir is allowed to freely flow downstream, potentially there would be loss of property. Additionally, the hydroelectric power station at the Kajaki Dam would be rendered inoperable, effectively cutting off renewable power to Helmand and Kandahar provinces.

As a result of the potentially tenuous condition of the valves and maintenance gate, there is risk of failure.

“The repair of the intake structure is essential to the longevity of the irrigation and hydroelectric systems,” said Noori. “This mission is the first step to determining the scope of repairs required to make the dam structures function as intended.

“I will use these findings and the ROV video to develop a specific contract, and pass these findings on to the contractor. They will now be able to ‘see’ the condition of the structure underwater,” continued Noori. “Having the information will make a big difference in defining the potential repair project.”

Inspection

The dive team and Fox made their way to the Kajaki Dam area via helicopter to FOB (forward operating base) Zeebrugge, located adjacent to Kajaki Reservoir.

Basing out of Zeebrugge, the team rose early to arrive at the dam by 5:30 a.m. each of the five days they were there. After a short briefing from the U.S. Marines about the security situation in the area, the team learned that not just insurgents were nearby. Jackals, scorpions, hornets and cobras were also real and present threats.

“We saw scorpions and hornets, and we heard the jackals every night,” said Fox.

Like all missions in Afghanistan, the dive team encountered a few issues they were not expecting. Although they anticipated deploying the ROV from their Zodiac boats, extremely low water levels prevented them. As a result, the team had to deploy the ROV from the intake tower, some 150 feet above the water surface.

Almost immediately, the deployment of the ROV became problematic. The 150 feet of cable tangled with the chain used to deploy the trash racks. Before the mission could continue, the ROV had to be freed so that it could continue its descent into the reservoir.

An additional challenge was the scarcity of fuel for the ROV. Low-quality, contaminated fuel was all that could be found and the ROV’s function was impaired as a result. “We spent about 1.5 hours the second day we were at the dam



7th Engineer Dive Team lead, 1st Sgt. William “Scott” Baumgartner (left) looks on as Staff Sgt. Sean Rowley maneuvers the remotely operated vehicle at the Kajaki Dam, Aug. 15. (USACE Photo)

just repairing the ROV. We had to disassemble it, clean it and then reassemble before we could continue the recon mission,” said Baumgartner.

Despite the frustration of the first day, what the ROV encountered under the water gave the USACE team some much needed optimism.

Findings

“We expected a significant amount of sediment to collect at the intake gate,” said Noori. “What the ROV video showed, though, was a sediment level of less than 1/8 inch. We didn’t know what to expect with respect to the condition of the intake structure. But what the ROV found was that the gates were in good condition as were the intake openings.” There was a small leak that requires repair, but according to Noori, the fix is not complex.

Next, the ROV inspected the trash racks. Those were all in good condition, but trees and boulders were caught in the racks and must be removed. A guiderail was twisted and bent which will require repair. Nevertheless, Baumgartner said the trash racks were fairly clean and there was good flow.

At the irrigation tunnel outfall, the ROV was focused on the concrete walls and tunnel floor. Some scouring has occurred over time, exposing the rebar which will require repair, and some unidentified piping under the valves will require evaluation.

“We are pleased with what the ROV found and the dive team’s efforts,” said Noori. “With this data we can develop a comprehensive plan to repair the irrigation structure at Kajaki.”

Mission II – Dahla Dam

After nearly a week at Kajaki Dam, the dive team split up. Rowley and Hall returned to Kandahar Airfield to plan the dive team’s return to Kuwait. Baumgartner, Hoover, Fox and Steve Bredthauer, South District’s project manager for the Dahla Dam, continued on to FOB Frontenac, their base of operations for the dam inspection.

“Delta Troop, 5-1st Cavalry were our hosts for the Dahla Dam inspection,” said Baumgartner. “We met with them the night before our mission to get the mission plan and threat brief.”

The following morning, the team departed FOB Frontenac in a MRAP (mine-resistant, armor-protected) vehicle convoy to Dahla Dam. After a 20-minute ride, the team arrived and began its inspection.

“The mission here was much different than the mission at Kajaki,” said Fox. “We weren’t able to perform an underwater inspection because August is the peak of irrigation season and the dam could not be shut down.”



Sgt. John Hoover, 7th Engineer Dive Team member, sketches the shape of the Dahla Reservoir as part of the USACE reconnaissance mission, Aug. 20. (USACE Photo)

Baumgartner and Hoover instead measured the intake tower and determined the elevation measurements at the tower and its base. They took elevation measurements of the outfall structure and roughly estimated the total footprint of the reservoir.

“The goal was to get a general idea of shape of the reservoir because it’s a dynamic body of water,” said Baumgartner. “We also needed to see if there was any unexploded ordnance, trees or boulders that would impede navigation for our next trip out here.”

The dive team will be returning in the fall to conduct a hydrographic survey and contour of the bottom of the reservoir to determine the maximum pool depth, which equates to how much water can be stored for future years. USACE will use that data and compare it to similar data obtained in the 1970s to determine how much sediment accumulates during the spring floods.

“This mission was successful all the way around and it feels good to be involved in such an important project,” said Fox. “We had some frustrating moments, but the information gained will help the projects progress and will make the next trip out here easier.”

Baumgartner agreed. “One of our big concerns is weather and its potential impact on our follow-on mission. There are no docks or boat ramps, so the marshy and muddy banks of the reservoir may be difficult to navigate and launch from. Having that information in advance will help us plan more effectively.”

Noori looks forward to the team’s return. “They have other capabilities that we could use in the future, such as surveying and measuring the level of cumulated sedimentation in the reservoir. I look forward to the team coming back and helping us with that task,” Noori concluded.