SIGAR

Special Inspector General for Afghanistan Reconstruction

SIGAR 20-21 Inspection Report

Kajaki Dam Irrigation Tunnel: The $27.3 Million Tunnel Is Not Operating Properly Due to Construction Deficiencies and a Maintenance Issue

JANUARY

2020

January 15, 2020

The Honorable Dr. Mark T. Esper
Secretary of Defense

General Kenneth F. McKenzie Jr.
Commander, U.S. Central Command

General Austin Scott Miller
Commander, U.S. Forces–Afghanistan and
Commander, Resolute Support

Lieutenant General Todd T. Semonite
Commanding General and Chief of Engineers
U.S. Army Corps of Engineers

This report discusses the results of SIGAR's inspection of the Kajaki Dam's irrigation tunnel in Helmand province. On January 30, 2013, the U.S. Army Corps of Engineers (USACE) awarded a $25.6 million firm-fixed-price contract to Metag Insaat Ticaret A.S. (METAG), a Turkish firm, to repair or replace various components of the irrigation tunnel. USACE issued the notice to proceed on February 20, 2013, and METAG was to complete the project on October 18, 2014. However, 14 contract modifications extended the completion date to October 29, 2018, and increased the contract value to $27.3 million. The construction warranty expired on September 27, 2019.

We visited the Kajaki Dam irrigation tunnel from March 20 through 22, 2019, and found that METAG generally met contract requirements for the construction and repair activities that we could inspect. In addition, the tunnel was operating and diverting water for irrigation. However, we also found two construction deficiencies and one maintenance issue. The two construction deficiencies were (1) excessive backsplash with the cone valves, and (2) newly installed ventilation system motors that cannot operate continuously for more than 1 hour before overheating. The one maintenance issue involves the improper fastening of three emergency closure valves that prevented their proper operation. Both the deficiencies and the maintenance issue affect the proper operation of the irrigation tunnel.

We are making one recommendation in this report. We recommend that the U.S. Forces–Afghanistan (USFOR-A) Commander, in coordination with the USACE Commander, take the following action and report the results back to SIGAR within 60 days: notify the Afghan Ministry of Energy and Water (MEW) of the Kajaki Dam irrigation tunnel's two construction deficiencies and the maintenance issue so that the ministry can take whatever action it deems appropriate to correct them.

We provided a draft of this report to the Department of Defense for review and comment. USFOR-A, in coordination with USACE, provided written comments, which are reproduced in appendix II. USFOR-A agreed to implement our recommendation, stating that it would inform the MEW that (1) excessive backsplash exists with the cone valves; (2) the ventilation system motors cannot operate continuously for more than 1 hour before overheating; and (3) incorrect fastening of three emergency closure valves prevents their proper operation. USFOR-A stated that it would notify us when it informs the ministry about these three issues. We will keep the recommendation open until we receive documentation to verify the action was taken. USFOR-A questioned SIGAR's assessment of the two construction deficiencies, which we discuss in detail in the agency comments section of this report.

We conducted this inspection under the authority of Public Law No. 110-181, as amended, and the Inspector General Act of 1978, as amended; and in accordance with the *Quality Standards for Inspection and Evaluation*, published by the Council of the Inspectors General on Integrity and Efficiency.

John F. Sopko
Special Inspector General
for Afghanistan Reconstruction

TABLE OF CONTENTS

FIGURES

PHOTOS

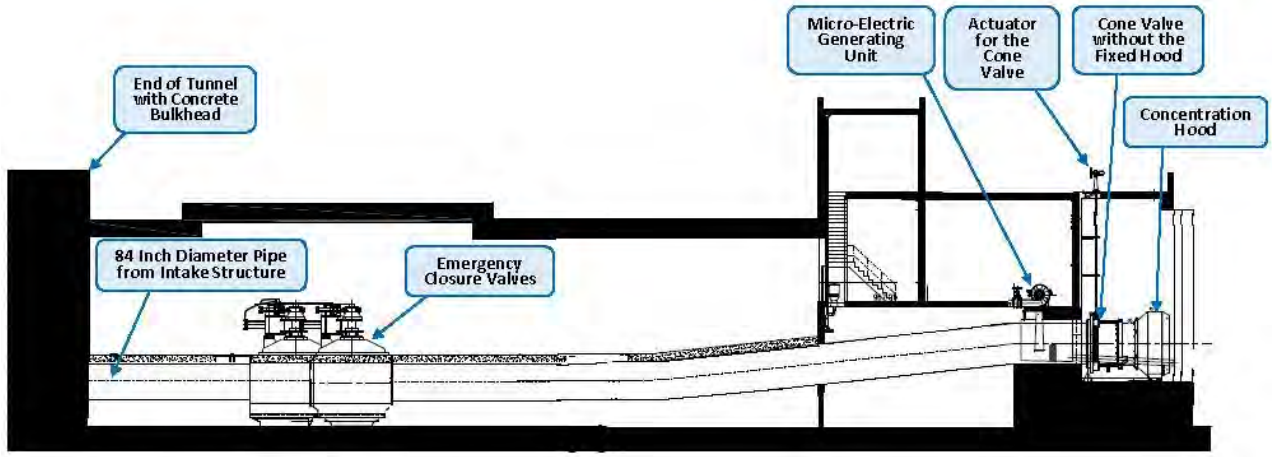
ABBREVIATIONS

METAG	Metag Insaat Ticaret A.S.
MEW	Ministry of Energy and Water
USACE	U.S. Army Corps of Engineers
USFOR-A	U.S. Forces–Afghanistan

The Kajaki Dam, located in Helmand province, serves several purposes including supplying sustainable hydropower, irrigation storage, and flood control for the Kandahar City and Lashkar Gah regions in southern Afghanistan. The Kajaki Dam is comprised of three main parts: the dam, the powerhouse building containing the dam's turbines and power generation equipment, and an irrigation tunnel. The Helmand Arghandab Valley Authority, a component of the Afghan Ministry of Energy and Water (MEW), regulates the dam's irrigation tunnel, which is part of a larger irrigation system in Helmand and Kandahar provinces. In October 2012, the Kajaki Dam tunnel's intake structure hoist was not functioning, and the safety instrumentation, known as a piezometer, had stopped working.[1]

On January 30, 2013, the U.S. Army Corps of Engineers (USACE) awarded a $25.6 million firm-fixed-price contract to Metag Insaat Ticaret A.S. (METAG), a Turkish firm, to repair the irrigation tunnel's intake structure, refurbish the emergency closure valve, replace the cone valve, and replace the micro-electric generating unit (see figure 1).[2]

Figure 1 - Cross Sectional Schematic View of the Kajaki Dam Irrigation Tunnel



Source: USACE as-built drawings with SIGAR captions.

USACE issued the notice to proceed on February 20, 2013, with an initial completion date of October 18, 2014. USACE and METAG agreed to 14 contract modifications, which increased the contract value by $1.7 million to $27.3 million and extended the project completion date to September 28, 2018.[3] Contract documents show that the project was substantially complete on August 29, 2016. The construction warranty expired on September 27, 2019. As of the date of this report, U.S. Forces–Afghanistan (USFOR-A) has not provided us with information we requested regarding when it formally transferred the repaired irrigation tunnel facilities to the MEW.

[1] The intake structure hoist lifts and lowers two concrete bulkheads that close the openings of the irrigation intake portal should maintenance operations require dewatering the tunnel. A piezometer gives technical personnel information about the ground water elevation, subsurface water flow, and water pressure. This information is critical for determining the amount of water behind the dam and the dam's stability.

[2] The emergency closure valve shuts down the tunnel's mechanical functions when activated. A cone valve is the service control that regulates the flow and dissipation of water energy, and ensures the regular and environmental friendly release of water downstream. A micro-electric generating unit converts the energy of flowing water into mechanical energy and ultimately into electricity.

[3] One contract modification involved moving the cone valves from storage at Kandahar Airfield to the work site; this increased the contract value by $1.4 million.

The objectives of this inspection were to determine whether the dam's irrigation tunnel (1) was constructed according to contract requirements and applicable construction standards, and (2) facilities are being used and maintained.

We conducted our work in Kabul and Helmand Province in Afghanistan from August 2018 through January 2020, in accordance with the *Quality Standards for Inspection and Evaluation*, published by the Council of the Inspectors General on Integrity and Efficiency. Our professional engineers conducted the engineering assessment in accordance with the National Society of Professional Engineers' *Code of Ethics for Engineers*. Appendix I contains a discussion of our scope and methodology.

TWO CONSTRUCTION DEFICIENCIES PREVENT THE KAJAKI DAM'S IRRIGATION TUNNEL FROM OPERATING PROPERLY

We visited the Kajaki Dam irrigation tunnel from March 20 through March 22, 2019. For the construction and repair activities we could inspect, we found that METAG generally met contract requirements. For example, METAG refurbished the existing emergency closure valves, micro-electric generating unit, lighting system, and power panels, and modified the water supply system according to the contractual requirements. However, we also found two construction deficiencies: (1) the cone valves and hoods METAG installed created excessive backsplash, and (2) the refurbished fan, which is attached to the old ventilation system, cannot function for more than 1 hour at a time. The deficiencies resulted from METAG's noncompliance with contract requirements.

We could not fully assess METAG's compliance with the contract because we could not get access to some parts of the dam's irrigation tunnel. First, we could not access the irrigation tunnel's intake structure because construction work under another contract was ongoing.[4] Second, because it was the rainy season, the dam was at full water capacity, and some of the structure's components were under water. Finally, we could not assess the flap gates' functionality because the plumbing system dewatering process was not activated at the time of our inspection.[5] As a result, there could be additional construction deficiencies that we did not identify. These two items represent about $3.9 million, or about 14.0 percent, of the $27.3 million contract value.

METAG Installed New Cone Valves and Hoods That Did Not Meet Performance and Operational Requirements

The contract required METAG to repair or replace any cone valve that was not functioning properly. Following METAG's inspection of the tunnel's three cone valves, USACE approved METAG's design to replace all three valves. METAG installed the new cone valves and tested them in June 2016. The test revealed that valve 1 and valve 3 did not consistently close properly due to the absence of the required aeration tube assemblies from the concentration hoods installed on the new valves.[6] In July 2016, USACE disagreed with METAG's suggestion of removing the concentration hoods because their absence would cause water discharge that would not be concentrated and could result in damage to surrounding dam structures.

In February 2017, METAG proposed a new solution to achieve the desired performance of the valves that included cutting eight, 8-inch diameter holes 45 degrees from each other in the concentration hood. METAG

[4] During our March 2019 site visit, 77 Construction Company was building a new hydropower plant with a 100-MW capacity at the Kajaki Dam.

[5] An inspection must take place when the process activates, which only occurs when the water level is low. Flap gates are flow control devices and act as check valves by allowing water to flow through them in only one direction. Dewatering is the process of removing rainwater or groundwater from an excavated site before construction can start. The flap gates are located near the bottom of the cone valves' chamber, making them inaccessible until the dewatering process is in effect.

[6] The aeration tube assembly brings air inside the valve body and helps reduce the vacuum to keep vibration at a safe level. A cone valve's concentration hood is a separate metal cylinder that is open at both ends and used to direct a high-volume of water.

expected the holes to infuse air into the water discharged from the concentration hood to help reduce the force on the valves and compensate for the missing aeration tube assemblies and the vibration in the valve bodies. METAG modified the concentration hood on valve 1, which caused a high volume of water under high pressure to escape from the holes. This formed a backwards jet, known as backsplash, toward the valve and the mechanism controlling the valve (see photo 1).[7] As a result, all of the elements inside the concrete vault supporting the valve's functions were constantly impacted by an unexpected and large amount of backsplash from the aeration holes travelling at high velocity (820 gallons per second traveling at 33 miles per hour).[8]

Photo 1 - New Cone Valve with Excessive Backsplash

Source: USACE contract documents.

Because the contract performance specifications required all cone valves to be functional from 0 to the 100 percent open position without backsplash and vibration, METAG still did not have a workable solution. In March 2017, USACE approved another METAG proposal to install a fixed hood over each cone valve to manage the water flowing backward from the aeration holes. However, this solution also proved ineffective, and USACE issued METAG a stop-work notice in April 2018. USACE suspended all construction work related to the cone valves due to the continued deterioration in their performance and the associated damage the deficient performance was causing to ancillary equipment, specifically the actuator stem shafts, pressure sensor conduits, and access ladders.[9]

In August 2018, USACE directed METAG to resume the work on the cone valves with a newly approved method designed to protect the actuator stem shafts, sensor conduits, and access ladders from backsplash. The approved method was to install new backflow protection devices. However, during our March 2019 site visit, we observed that excessive backsplash was still hitting the stem shafts, sensor conduits, and ladders, indicating that this new method was either ineffective or not completed. We also found that the valves did not close properly, or at all, when closing from an open position of greater than 60 percent. Despite these deficiencies, USACE accepted the deficient valves and hoods with excessive backsplash in September 2018.

During our site visit, we observed that the backsplash increased as the valve opening percentage rose. Excessive backsplash not only forces the water backwards, it also floods the chamber, preventing access to the valve during an emergency. In addition, the constant flow of high-pressure backsplash exposed the cone valves, hoods, and other equipment to ongoing, unplanned, and severe vibration. This vibration on the valve body could cause the concrete pedestals supporting the valves or the valves themselves to crack. Further, in low temperatures, backsplash will cause ice to form, which could further degrade the cone valve's functionality.

[7] Backsplash is the amount of water that is misdirected toward the back and sides of the valves and the concrete walls.

[8] Although available documentation did not clearly state that METAG drilled aeriation holes into all three cone valves, our inspection found similar backsplash issues on cone valves 2 and 3.

[9] The actuator stem shaft is a metal rod that connects the control panel and the valve with the help of moving and rotating mechanical parts. A pressure sensor conduit sends data to the control panel to measure the amount of force inside the valve. The access ladder provides access to the cone valve area for maintenance purposes.

METAG Installed New Motors for the Refurbished Ventilation System that Can Only Operate for 1 Hour at a Time

In accordance with the U.S. Occupational Safety and Health Administration's requirements, the contract required METAG to install a fresh air circulation system in the irrigation tunnel. To meet the requirement, METAG installed two new motors and a refurbished fan in the existing ventilation system. During our March 2019 site visits, we found that the ventilation system, which is needed to provide fresh air for the tunnel and maintain acceptable temperature and humidity levels, could not operate for more than 1 hour at a time because the motor overheated while operating for any extended period. Then, after running for that hour, the system must remain shut off to cool down before it is restarted. Without air circulation and ventilation, tunnel workers and equipment are exposed to stale air, higher temperatures, and excessive humidity, which can cause health issues for workers and cause equipment performance to suffer. In addition, if the ventilation motor overheats, the motor's bearings will deteriorate, resulting in a shorter motor lifespan and additional maintenance costs.

THE KAJAKI DAM TUNNEL FACILITIES ARE BEING USED, BUT ONE MAINTENANCE ISSUE EXISTS

During our March 2019 site visit, we found that the Kajaki Dam's irrigation tunnel was operating and adequately diverting water for irrigation. However, we found one maintenance issue that affects the proper operation of the tunnel. Specifically, we determined that the pins on the three emergency closure valves that connect the hinge on the valve body to the lifting cylinder were not properly fastened and unable to stay in the intended position, either open or closed. As a temporary solution, MEW maintenance staff were using a board to support the pins (see photo 2). According to the machine operator, METAG installed the pins correctly, but the pins loosened overtime; MEW staff could not explain how this happened. If an emergency occurs that requires operating the valves, they will not work because the pins are not in place.

Photo 2 - Lumber Supporting the Emergency Closure Valve Pins

Source: SIGAR, March 21, 2019

To correct this maintenance issue, an engineer with the company that manufactured the hydraulic system would need to evaluate the system and determine why the pins failed. Based on our discussions with MEW maintenance staff at the dam, we found that they do not have the level of technical training and experience required to inspect, understand, evaluate, diagnose, and make the needed repairs. In addition, the diagnostic instruments and specialized tools needed for the job and the replacement parts are not manufactured or readily available in Afghanistan.

CONCLUSION

The Kajaki Dam's irrigation tunnel is a vital part of the irrigation system for Helmand and Kandahar provinces. The portions of METAG's construction and repair work that we could assess generally met contract requirements. However, two construction deficiencies—excessive backsplash from the cone valves and a refurbished ventilation system motor fan with a propensity for overheating—and a maintenance issue involving improperly fastened valve pins, affect both the irrigation tunnel's functionality and the tunnel's operations. In addition, we could not access and inspect all of the irrigation tunnel's intake structure due to ongoing construction on the dam and its high water level, or the flap gates' operation due to technical issues. Because we could not access the entirety of the dam's irrigation tunnel, there could be additional construction deficiencies related to work performed in those areas we could not inspect.

RECOMMENDATION

To protect the U.S. government's investment in the Kajaki Dam, we recommend that the USFOR-A Commander, in coordination with the USACE Commander, take the following action and report the results back to SIGAR within 60 days:

1. **Notify the MEW of the irrigation tunnel's two construction deficiencies and the maintenance issue so that the ministry can take whatever action it deems appropriate to correct them.**

AGENCY COMMENTS

We provided a draft of this report to the Department of Defense for review and comment. USFOR-A, in coordination with USACE, provided written comments, which are reproduced in appendix II. USFOR-A agreed to implement our recommendation.

In its comments, USFOR-A stated that it would inform the MEW that (1) excessive backsplash exists with the cone valves; (2) the ventilation system motors cannot operate continuously for more than 1 hour before overheating; and (3) incorrect fastening of three emergency closure valves prevents their proper operation. USFOR-A also stated that it would notify us when it informs the ministry about these issues. We will keep the recommendation open until we receive documentation to verify the action was taken.

USFOR-A said the excessive backsplash associated with the cone valves and the limited operating time associated with the ventilation system are maintenance issues rather than construction deficiencies. USFOR-A also stated that the backsplash we observed during our March 2019 inspection did not adversely affect the system's functionality, and that our concern for its presence reflected a "misunderstanding of the physical principles that were applied for the design of the valve assemblies." However, USACE recognized that there was a backsplash issue with the new cone valves. As our report states, none of METAG's proposed solutions over a 2-year period were successful, and all of the elements inside the concrete vault that support the valve's functions were constantly impacted by the large amount of backsplash travelling at high velocity. In March 2017, USACE approved a METAG proposal to install a fixed hood over each cone valve to manage the backsplash, reduce the force on the valves, and compensate for the missing aeration tube assemblies. This solution was ineffective, so in April 2018, USACE sent METAG a stop-work notice and suspended all work related to the cone valves due to their performance deterioration and the damage caused to the actuator stem shafts, pressure sensor conduits, and access ladders. Further, in an April 2018 letter to METAG, USACE stated that due to the amount of backsplash in one of the cone valves, it was questionable whether the valve would meet the 50-year design life requirement. Despite this unresolved construction deficiency, in September 2018, USACE accepted the cone valves and hoods with excessive backsplash.

USFOR-A also suggested that we misunderstood the contract and contractor specifications involving acceptable leakage past the sleeve seat from a closed valve. However, our report does not discuss or mention anything about acceptable leakage or sleeve seats. It discusses excessive backsplash, which involves different parts of the valve system than acceptable leakage.

Regarding the issues we identified with cone valve vibration, USFOR-A stated that every element of the cone valve and control system vibrates to a noticeable degree when water flows through the system. Further, according to USFOR-A, the contract's technical specifications state that the cone valves should be free of "excess vibration" and "unusual noise vibration," but USFOR-A did not indicate what it considers "excess" or "unusual" noise vibration. Our report states that the constant flow of high-pressure backsplash, which USACE acknowledges, exposes the cone valves, hoods, and other equipment to ongoing and severe vibration. This vibration could cause the concrete pedestals supporting the valves or the valves themselves to crack. Moreover, because the excessive backsplash resulted from a construction deficiency, the equipment and concrete may not have been designed to withstand the constant, severe barrage of high velocity backsplash and resultant severe vibration. In addition, the contract specifications required METAG to use USACE Manual EM 1110-2-1602 when developing technical specifications for the valves' design and purchase. Section 3-10.d of the manual states that "in a number of cases, flow-induced vibration of fixed-cone valves has resulted in serious and costly damage." As a result, it is unclear why USFOR-A discounts our statement regarding cone valve vibration and backsplash, given the damage they could cause to the cone valve body.

USFOR-A also stated that the protective covers on the cone valve actuator stem shafts, sensor conduits, and access ladders were installed for all three cone valves. According to USFOR-A, METAG tested and commissioned all three cone valves in August 2018, and the resulting testing and commissioning report showed no issues with opening and closing the valves. However, our review of the report showed that testing only covered the actuator mechanism and electrical motor, not the cone valves working under actual water flow and pressure. METAG did not provide any photos or video to validate the report. Further, USACE did not provide us with the testing and commissioning report for each cone valve, which would show how each valve element function when operating from the fully closed position to fully open and back to fully closed. Testing and commissioning reports should show the reading for each valve opening and closing, and should include information on, for example, water volume discharge, velocity, pressure, vibration, and the time needed to open and close the valve. As stated in our report, we found that the valves did not close properly, or at all, from an open position of greater than 60 percent. Further, USACE and METAG correspondence references difficulty in closing the valves, as designed.

The actions USACE took during the contract period to correct the multiple issues with the cone valves shows that the issues we identified were deficiencies and that USACE accepted the work without demanding the contractor correct them as required.

Regarding the ventilation system, USFOR-A stated that a USACE inspection team visited the Kajaki Dam project site in August 2019 and found that the bearings in the ventilation motor assembly were dry, indicating that the bearings had not been greased and the motor had not been properly maintained. USFOR-A said this is the mostly likely cause of the ventilation system's performance deficiency. However, USFOR-A did not provide supporting evidence that the dry bearings are causing the system's performance deficiency. Further, METAG used the original ventilation system, which is more than 60 years old, and added a refurbished fan and two new motors to meet the contract requirement for installing a fresh air circulation system. In its March 2016, HVAC System Instruction, METAG referenced that there could be operating weaknesses in using such an old system. As a result, without clear evidence showing that the dry bearings are the reason the system cannot operate continuously for more than 1 hour before overheating and requiring shut down, we maintain that is due to a construction deficiency with the refurbished fans. However, because the warranty expired in September 2019, we acknowledge that METAG is no longer responsible for correcting this problem or the deficiencies with the cone valves.

APPENDIX I - SCOPE AND METHODOLOGY

This report provides the results of SIGAR's inspection of the Kajaki Dam's irrigation tunnel. The objectives of this inspection were to determine whether the dam's irrigation tunnel (1) was constructed according to contract requirements and applicable construction standards, and (2) facilities are being used and maintained. Specifically, we

- reviewed the contract and modifications, pre-approved design submittals, site visit reports, building codes, and other relevant project documentation;
- conducted engineering assessments of the project drawings and completed construction;
- interviewed U.S. and Afghan government officials concerning the project's construction, use, and maintenance; and
- conducted a site visit to the Kajaki Dam irrigation tunnel from March 20 through 22, 2019.

We could not fully assess Metag Insaat Ticaret A.S.'s compliance with the contract due to a lack of access to some parts of the dam's irrigation tunnel, limiting the scope of this inspection. First, we could not access the irrigation tunnel's intake structure because construction work under another contract was ongoing. In addition, because it was the rainy season, the dam was at full water capacity, and some of the structure's components were under water. Second, we could not assess the flap gates' functionality because the plumbing system dewatering process was not in effect. An inspection must take place when the process is in effect, which only occurs when the water level is low.

We did not rely on computer-processed data in conducting this inspection. However, we considered the impact of compliance with laws and fraud risk.

In December 2014, SIGAR entered into a cooperative agreement with Afghan civil society partners. Under this agreement, our Afghan partners conduct specific inspections, evaluations, and other analyses. In this regard, Afghan engineers inspected the Kajaki Dam's irrigation tunnel from March 20 through March 22, 2019. We developed a standardized engineering evaluation checklist covering items required by the contract and design/specification documents. Our checklist required our partners to analyze the contract documents, scope of work, technical specifications, and design drawings.

We compared the information our Afghan civil society partners provided to accepted engineering practices, relevant standards, regulations, laws, and codes for quality and accuracy. In addition, as part of our monitoring and quality control process, we

- met with the Afghan engineers to ensure that the approach and planning for the inspection were consistent with the objectives of our inspection and the terms of our cooperative agreement;
- attended periodic meetings with our partners, and conducted our normal entrance and exit conferences with agency officials;
- discussed significant inspection issues with our partners;
- referred any potential fraud or illegal acts to SIGAR's Investigations Directorate, as appropriate;
- monitored our partners' progress in meeting milestones and revised contract delivery dates as needed; and
- conducted oversight of them in accordance with SIGAR's policies and procedures to ensure that their work resulted in impartial, credible, and reliable information.

We conducted our inspection work in Kabul and Helmand Province in Afghanistan from August 2018 through January 2020. This work was conducted in accordance with the *Quality Standards for Inspection and Evaluation*, published by the Council of the Inspectors General on Integrity and Efficiency. Our professional engineers conducted the engineering assessment in accordance with the National Society of Professional Engineers' *Code of Ethics for Engineers*. We believe that the evidence obtained provides a reasonable basis for

our findings and conclusions based on our inspection objectives. We conducted this inspection under the authority of Public Law No. 110-181, as amended, and the Inspector General Act of 1978, as amended.

HEADQUARTERS
UNITED STATES FORCES-AFGHANISTAN
BAGRAM, AFGHANISTAN
APO AE 09354

DCOM-USNSE-A

6 Jan 2020

MEMORANDUM FOR Special Inspector General for Afghanistan Reconstruction (SIGAR), 2530 Crystal Drive, Arlington, VA 22202-3940

SUBJECT: United States Forces-Afghanistan in coordination with United States Army Corps of Engineers (USACE) Transatlantic Division (TAD), Response to Special Inspector General for Afghanistan Reconstruction (SIGAR) Draft Inspection Report (I-055), Kajaki Dam Irrigation Tunnel: The $27.3 Million Tunnel is Not Operating Properly Due to Construction Deficiencies and a Maintenance Issue

1. The USFOR-A Joint Engineers (JENG) Directorate in coordination with USACE TAD is responsible for providing a response to the draft report's recommendation. The recommendation is italicized and copied verbatim from the draft report; the response is detailed in the following discussion.

2. Recommendation:

To protect the U.S. government's investment in the Kajaki Dam, we recommend that the USFOR-A Commander, in coordination with the USACE Commander, take the following action and report the results back to SIGAR within 60 days:

> *Notify the Afghan Ministry of Energy and Water (MEW) the Kajaki Dam irrigation tunnel's two construction deficiencies and the maintenance issue so that the ministry can take whatever action it deems appropriate to correct them.*

(U) RESPONSE:

USFOR-A partially concurs with SIGAR's recommendation. USFOR-A does not agree nor concur with SIGAR's assessment that two construction deficiencies exist with the project. As USFOR-A and USACE communicated to SIGAR during the inspection process, the identified issues are exclusively maintenance issues and are the responsibility of the Government of the Islamic Republic of Afghanistan (GIRoA) and the Ministry of Energy and Water (MEW). USFOR-A concurs with notifying the MEW of these maintenance issues so the ministry can take appropriate action to correct them. USACE executed and completed construction contract W5J9LE-13-C-0021 and turned over the completed project to USFOR-A on 29 August 2016. The USFOR-A and USACE role ended 27 September 2019 with the expiration of the warranty period. Discussion follows:

Draft Report: "METAG Installed New Cone Valves and Hoods That Did Not Meet Performance and Operational Requirements"

The report states "...contract performance specifications required all cone valves to be functional from zero to the 100 percent open position without backsplash and vibration..." The backsplash observed by SIGAR does not adversely affect the function of the system, and the concern for its presence reflects a misunderstanding of the physical principles that were applied for the design of the valve assemblies. It appears that the SIGAR inspector misunderstood the standard in both the contract and in the Contractor's specification for acceptable leakage past the sleeve seat from a closed valve. Reference the Contract Specification Section 01 01 50, Part 1.2.2.7.b; and Section 35 20 19.23 25, Parts 2.3.E.2.c and 3.4.C.1. Also reference the Design-Build Contractor's Specification Section 35 20 19 23 25, Parts 2.3.E.2.c and 3.4.1.D.1. This information was provided to SIGAR during the exit conference on 15 October 2019.

UNCLASSIFIED

The report also states "In addition, the constant flow of high-pressure backsplash exposed the cone valves, hoods, and other equipment to ongoing, unplanned, and severe vibration. This vibration on the valve body could cause the concrete pedestals supporting the valves or the valves themselves to crack." Contract Specification Section 01 01 50, Part 1.2.2.7.i states that valves shall be free of cavitation or vibration through the full range of operation, but this Section provides only a general description of the contract requirement. The technical sections of the Specification provide the detailed product and performance standards for valve assemblies. Section 35 20 19.23 25, Part 2.2 Design Requirements specifically addresses cone valves and indicates that the valves shall be free of "excess vibration". Part 3.4 Field Quality Control directs the Contractor to observe the cone valve for any "unusual noise or vibration". This standard is repeated in Section 41 24 26.00, Part 3.3.F. This technical requirement was conveyed into the Contractor's Specification as a requirement in Section 35 20 19 23 25, Part 2.2.C to be free of "excess vibration", and in Section 35 20 19 23 25, Part 3.4.1.C to be free of "unusual noise or vibration". Contractor Specification Section 41 24 26.00 Part 3.3.G repeats the "unusual noise or vibration" standard. The Contracting Officer and the Government project team determined that the "excess" or "unusual" noise or vibration standard was appropriate for the contract, at least in part because every element of the valve and control system will always vibrate to a noticeable degree when water is flowing through the system. This information was provided to SIGAR during the 15 October 2019 exit conference.

According to the report, SIGAR found that cone valves 1 and 3 do not consistently close properly. The protective covers on the cone valves actuator stem shafts, sensor conduits, and access ladders were installed on all 3 cone valves. Testing & Commissioning was completed for all 3 cone valves in August 2018. Part of the Testing & Commissioning process included operating all 3 cone valves through 2 full cycles with flow, 0-100%. According to the Testing & Commissioning reports submitted to the Government, all 3 cone valves did not have any issues opening or closing. The recorded readings in the reports indicated readings were acceptable. A final inspection of the completed hoods and cone valves was performed and completed on 28 September 2018. The end user could not produce maintenance records showing the required maintenance had been performed. This is not a deficiency but rather a maintenance issue. USFOR-A and USACE request the final report reflect this.

Draft Report: "METAG Installed New Motors for the Refurbished Ventilation System that Can Only Operate for 1 Hour at a Time"

The report states that the ventilation system, needed to provide fresh air and maintain acceptable temperature and humidity levels, could not operate for more than one hour at a time because of overheating. The tunnel ventilation motors were sized correctly and met all design and operational standards. The ventilation motor Testing & Commissioning was performed on 20 June 2016. Based on air flow measurements performed during the Testing & Commissioning, the ventilation airflow exceeded the specified minimum of 8,500 cubic meters per hour. In Serial Letter C-0097 we noted substantial completion of contract work effective 29 August 2016, except for the cone valves and hoods which was deemed substantially complete and final inspection performed on 28 September 2018. Based on the substantial completion date, the fans would be outside of the 1 year warranty period when SIGAR noted in their site visit in March 2019 that the fans in the ventilation system were not working properly. Additionally, the USACE inspection team visited the project site in August 2019 and observed that the bearings in the ventilation motor assemblies were dry, which indicates that they have not been greased and the motors have not been maintained as necessary. This is the most likely cause of the identified performance deficiency. This is not a construction deficiency but rather a maintenance issue. USFOR-A and USACE request this be reflected in the final report.

3. USFOR-A will inform the MEW about the identified maintenance issues above and will provide an update to SIGAR when the notification is made.

DCOM-USNSE-A
SUBJECT: Response to SIGAR Draft Inspection Report (I-055) Kajaki Dam Irrigation Tunnel

4. Point of contact for this memorandum is Lt Col Mark Russell, Programs and Facilities Division Chief, USFOR-A JENG, marion.m.russell4.mil@mail.mil, DSN 318-481-3429 and LTC Matthew A. Broderick, USFOR-A Joint Engineer Director, matthew.a.broderick2.mil@mail.mil, DSN 318-431-1845.

BRIAN N. WOLFORD
Brigadier General, United States Marine Corps
Deputy Commander
U.S. National Support Element-Afghanistan

UNCLASSIFIED

APPENDIX III - ACKNOWLEDGMENTS

Steven Haughton, Senior Inspection Manager

William Shimp, Inspector-in-Charge

Adam Bonfanti, Inspector-in-Charge

Javed Khairandish, Civil Engineer

Abdul Rahim Rashidi, Program Analyst

Yogin Rawal, General Engineer

Shahanshah Shirzay, Civil Engineer

This inspection was conducted
under project code SIGAR-I-055.

SIGAR's Mission

The mission of the Special Inspector General for Afghanistan Reconstruction (SIGAR) is to enhance oversight of programs for the reconstruction of Afghanistan by conducting independent and objective audits, inspections, and investigations on the use of taxpayer dollars and related funds. SIGAR works to provide accurate and balanced information, evaluations, analysis, and recommendations to help the U.S. Congress, U.S. agencies, and other decision-makers to make informed oversight, policy, and funding decisions to:

- improve effectiveness of the overall reconstruction strategy and its component programs;
- improve management and accountability over funds administered by U.S. and Afghan agencies and their contractors;
- improve contracting and contract management processes;
- prevent fraud, waste, and abuse; and
- advance U.S. interests in reconstructing Afghanistan.

Obtaining Copies of SIGAR Reports and Testimonies

To obtain copies of SIGAR documents at no cost, go to SIGAR's Web site (www.sigar.mil). SIGAR posts all publicly released reports, testimonies, and correspondence on its Web site.

To Report Fraud, Waste, and Abuse in Afghanistan Reconstruction Programs

To help prevent fraud, waste, and abuse by reporting allegations of fraud, waste, abuse, mismanagement, and reprisal, contact SIGAR's hotline:

- Web: www.sigar.mil/fraud
- Email: sigar.pentagon.inv.mbx.hotline@mail.mil
- Phone Afghanistan: +93 (0) 700-10-7300
- Phone DSN Afghanistan: 318-237-3912 ext. 7303
- Phone International: +1-866-329-8893
- Phone DSN International: 312-664-0378
- U.S. fax: +1-703-601-4065

Public Affairs

Public Affairs Officer

- Phone: 703-545-5974
- Email: sigar.pentagon.ccr.mbx.public-affairs@mail.mil
- Mail: SIGAR Public Affairs
  2530 Crystal Drive
  Arlington, VA 22202