

The Afghanistan Engineering Support Program assembled this deliverable. It is an approved, official USAID document. Budget information contained herein is for illustrative purposes. All policy, personal, financial, and procurement sensitive information has been removed. Additional information on the report can be obtained from Firouz Rooyani, Tetra Tech Sr. VP International Operations, (703) 387-2151.

To: ██████████ USAID/Afghanistan/OIEE

From: ██████████ – Senior Electrical Engineer

Date: November 22, 2011

Re: **WO-A-0082 SEPS Technical Services**

Although there was not a required deliverable report for this activity, it only seems prudent that a record be submitted of what I believe was discussed, and my understanding, about the SEPS Assessment meetings conducted from November 6th to November 18th, 2011 at Kandahar Air field with USAID and USACE.

Except for the morning of November 15th, 2011 where NEPS power flow was discussed, all of the discussions centered on Kajaki Units 1, 2, and 3, as well as the SEPS transmission and distribution systems.

Other than a few comments by ██████████ concerning the possibility of a 50MVA line from Herat (WEPS to SEPS), no other generation possibilities were discussed.

Although all of assessment invitees were briefed on the preliminary report, and allowed some time to make comments, it will essentially be the opinions formed by USACE that will be presented as an outcome.

With the above in mind, the below are my opinions of what was learned about the electrical system at Kajaki:

- The Kajaki hydropower generators are seeing major system faults on the order of 28 per day, according to ██████████ of LBG-B&V.
- These major system faults knock the generators offline a minimum of 10 times per day, and perhaps as high as 28 times per day, and are causing premature wear and tear on Units 1 and 3.
- The faults are divided fairly equally between the 13.8kV line that serves the 10MV Tangi substation, and the 110kV line that serves the rest of the system.
- The stator rewind of Units 1 and 3 are overdue, and either stator could catastrophically fail at any time and cause Unit 1 or 3 to shut down completely for at least 6 months.
- B&V stated that they have contacted all of the qualified subcontractors that they believe could rebuild a hydro generator such as Unit 2, and they are unwilling to consider working at Kajaki.

I will leave any comments concerning the mechanical systems to others more qualified than I, except to state that the large conclusions were that at minimum Unit 1

should have the “cone” extended (to eliminate cavitation), and that Unit 3 should be taken apart and restacked to remove some shims.

The executive summary of the situation is that the best estimates of installing Unit 2 (assuming a subcontractor could be convinced to come to Kajaki) would require 3 years to complete, and an additional year to repair Units 1 and 3. This would mean a 4 year minimum time frame to increase the generating capacity by 19MW.

It is not clear that any of this additional generating capacity would reach the Kandahar area. In fact,, when the question was asked if “success” of this project would mean that a certain amount of additional energy would be available to Kandahar, a direct response was not given.

It seemed clear to everyone that the first priority would be to stop the daily frequent faults (overloads and short circuits) that are occurring on the transmission and distribution system, causing premature wear and tear of the generators.

There does not however seem to be a credible plan for fixing these problems. Although replacing many of the substations and dividing out the distribution load would likely improve the situation some, it should be proven that DABS can get control of the distribution system (load and revenues) before it is assumed that this will occur. An example is the Tangi substation that continues to be overloaded beyond the 10MVA capability. No matter how the substation is redesigned, if the additional households and businesses are allowed to be installed on the system, the combined load will continue to overload the substation and feeder, and continue to knock the generators offline.

There is the concern (pointed out by ████████) that presently there is 60MW of load (need) installed on the system, and so even if Units 1, 2 and 3 were running (4 years from now), they would only be able to produce 51MW.

The concern that additional load (new customers) being added would exacerbate the overload situation (causing more faults and damage); the response was that the DABS crews were going to be installing meters and removing illegal connections. This belief should be proven before it is accepted as fact and acted upon, as it is this engineer’s personal experience that DABS installations will likely cause more problems on the system due to their very poor installation techniques.

Also the desire to eschew the breaker and ½ substation designs proposed by B&V into simple radial systems will inevitably lead to increased down time because the breakers in a radial design cannot be maintained without turning off some (or all) of the substation load. Although at times reduced initial costs will rule over sustainability, the pros and cons of each decision should be weighed, and it is my



opinion that at minimum a ring configuration should be considered for the Kajaki substation.

I cannot emphasize enough that the first priority should be to prove that the faults (overloads and short circuits) that are large enough to knock the generators offline can be eliminated or at least greatly reduced. It would seem like a very bad idea to subject a newly installed unit (of questionable durability) to such horrendous wear and tear due to mismanagement of the electrical system.

Finally, other means of providing additional electrical capacity should be evaluated, such as a new 110kV line from Herat (SWPS to SEPS), or some method of generation (such as solar power) at Kandahar.