

REPORT DOCUMENTATION PAGE

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				5c. PROGRAM ELEMENT NUMBER	
				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
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14. ABSTRACT The purpose of this report is to summarize briefly the history of the Surface Water Research project since its inception in 1952, the work accomplished, and the problems encountered. In general, each topic is discussed under two periods of time: 1952-1963, when projects were confined to the Helmand River Valley and was entitled "Helmand Surface Water Investigations (306-12-021, 306-M-12-AD and 306-AC-12-AD5)," and 1963-1969 when activities were expanded to cover most of Afghanistan and title was changed to "Surface Water Research (306-11-190-002)". Prepared by the United States Geological Survey in cooperation with the Water and Soil Survey Department, Ministry of Agriculture and Irrigation, Royal Government of Afghanistan under the auspices of the United States Agency for International Development. 18 appendices.					
15. SUBJECT TERMS Afghanistan. Drainage. Flood control. Helmand River Project. HVA. Helmand Valley Authority. Hydrology. Hydropower. Irrigation. Lashkar Gah. Rainfall Runoff Calculations. Stream-flow Data. Stream gaging stations. Stream measurements. Surface Water. Water supply.					
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a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (Include area code)
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appendix 6

Appendix (6)

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TO - AID/W TOAID A- 6 X

FROM - KABUL

SUBJECT - End-of-Tour Report by Arthur O. Westfall

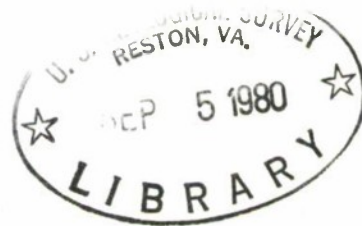
REFERENCE - M.O. 326.3

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Mr. Westfall has provided an excellent account of the engineering aspects of the Surface Water Research Project and the related sedimentation study at the Kajakai Reservoir. As Party Chief for a USGS FASA team, he rendered outstanding service to AID and to Afghanistan right up to the time of his departure, following a tour of ~~responsibility~~ ~~responsibilities~~ over four and one-half years (March 1964 - December 1968).

With his customary thoroughness and candor, Mr. Westfall leaves behind a record not only of physical accomplishments that should be valuable to investigators in the future, but a commentary on the foibles of an inexperienced host government severely limited by lack of technical talent. His biggest disappointment was the practical breakdown in the training component of his project.

The Westfalls will be missed at this post. The Mission wishes them well in their future assignments.



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H. S. McClure, Director

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 DD ENG CF

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Name: Arthur O. Westfall

Job Title: Surface Water Hydrologist

Country of Assignment: Afghanistan

PASA Employee: U.S Geological Survey

Tour of Duty Began: August 25, 1966

Tour of Duty Ended: December 19, 1968

Prior Country Assignment and Years:

Afghanistan, 1964-66.

Project Activity: National Agriculture Development

Surface Water Research

306-11-190-002

A. Purposes Served:

The general objectives and targets of the project are given in the E-1's and Project Agreements for each fiscal year and will not be repeated here. A better understanding of the purposes served can be had by reading the section on need for water data on pages 16-25 of the administrative report, "Surface Water Resources Investigations Plan for Afghanistan," which I co-authored with Mr. Leitkovich in June 1966. In general, the purpose of this project is to carry out the recommendations contained in that report for the implementation of a national river gaging network, an organization capable of operating and maintaining the network, and to train Afghan nationals in the techniques required to obtain, analyze, and publish the basic streamflow data.

In addition, preliminary studies indicated heavy sediment deposits in Kajakai and Arghandab Reservoirs. Because of heavy U. S. commitments in the development of irrigation and hydropower in the valleys served by these reservoirs, precise information on the quantity and extent of these deposits was needed. Studies were implemented and completed on Kajakai Reservoir in the fall of 1968.

B. Methods, procedures and standards:

These are mentioned in general in the above-cited report and described in detail in two hydrology training manuals I have prepared, "No. 1, Basic Streamgaging," and "No. 2, Computation of Basic Streamflow Records." A third manual, "Sediment Data Collection," is in preparation by Mr. Childers and the final manuscript should be ready for publication in January 1969. These reports dwell at length on the technical aspects of project work and also outline a recommended organizational set-up and staffing pattern.

Administratively, attempts to set up logical procedures in warehousing, transport, personnel, financing, and management have largely failed because of the deeply ingrained systems within the RGA that are beyond the ability of the counterparts to change even if they desire. We have attempted to adapt to RGA governmental procedures but have found these to be too cumbersome and time-consuming. To assure the success of this project, certain measures not consistent with usual AID practices were taken regarding commodities, transport, and warehousing. These will be discussed in section E of this report.

C. Organizations and institutions:

The counterpart organization of this project is the Water and Soil Survey Department (WSSD) of the Ministry of Agriculture and Irrigation. The WSSD encompasses many projects including others that are USAID supported, some supported by other countries or international organizations, and some wholly supported by the RGA.

This project works with the Surface Water Hydrology Section of the WSSD. Project headquarters and the main work force are located in Kabul. Field offices are located in Kandahar and Kunduz. At present there are about 20 technicians in Kabul, four (4) in Kandahar, and three (3) in Kunduz.

The Federal Republic of Germany has had an aid mission in Afghanistan working in both surface and ground water hydrology. Their efforts have been confined to the Kabul, Kunduz, and Khoram River watersheds. They also work through the WSSD and, theoretically, the U.S. and FRG aid missions are advising the same counterpart organization in the same technical field. In practice, there has been little if any duplication of effort. The German system of stream-gaging differs in method and equipment from that of the USAID/USGS and this has been beneficial to the Afghans. They have received a more rounded training and have had a chance to compare two methods of achieving the same results. By adopting the best from each method, they should eventually come up with a method that is best suited to the unique conditions of Afghanistan. The FRG Mission is scheduled to phase out in December 1968, almost coincidentally with our original phase-out date. This would indicate that the Germans also feel the WSSD is ready to carry on this work without further technical assistance.

Some work has been done in this field by the predecessor agency of UNDP and the IBRD. Eleven gaging stations in the Hari and Farah River basins were constructed by the UNDP in 1960-61. These were turned over to this project for operation and maintenance when the UNDP phased out in 1963. A French hydrology team under the auspices of the IBRD made an intensive short-term

investigation of the Kunduz River basin in the summer of 1955 in connection with irrigation development in that area. They made many measurements of discharge at miscellaneous points in the Kunduz basin.

The Soviet Union is establishing gaging stations along the Amu Darya (Oxus River) related to irrigation and power developments on both sides of the river. As far as I know, only one of these is located wholly within Afghanistan. This is on the Kokcha River near the confluence with the Amu Darya. All others are on the mainstem of the Amu and are considered to be wholly Russian - not cooperative stations between the two countries.

D. Human Resources Factors:

The quantity of technicians supplied to the project has never been adequate and this has been compounded by the extremely low quality, both in academic background and in general intelligence level, of those who were assigned to the project. Agriculture has never been considered as one of the "status" types of work in this country, and as a consequence the students enrolled in agricultural schools or entering agricultural work were those incapable of doing better (this attitude is changing at present because of efforts by both AID and university agriculturists to show that not all agriculture consists of grubbing in the dirt). Most technicians are graduates of the Afghan Institute of Technology where they received training in the basic skilled trades but no pre-engineering work. Most cannot add or subtract without difficulty and many errors; multiplication and division is a major effort. On a project where rapid calculation is required in all phases of the work this has proved quite a handicap.

What few engineers have been assigned to the project have in most cases been capable of doing the work, but almost without exception they have been weak personalities incapable of making decisions or directing subordinates. Also, the continuity at the leadership level has been constantly disrupted by compulsory military service or by the non-USAID training opportunities. The Director-General position has had three incumbents in the last two years and at present there is no full-time employee in this job.

The position of office engineer was never filled until about a year ago. The incumbent has had two years of U. S. college training and is technically capable of doing the work. Again, however, he is incapable of directing others in the routine of getting the work done.

Staffing and organizational recommendations were presented in the overall plan for surface water investigations ^{1/} but repeated efforts to carry out these recommendations have failed. In most part, this is due to the lack of bodies

^{1/} Ibid, page 1

to put in the recommended positions but also is due to the inertia and reluctance of the President to violate the traditional structure within the civil service system of the RGA. Several times efforts were made to correlate the recommended organizational structure and staffing pattern with those acceptable to the RGA but the President never carried this through.

There are factors in the social and economic structures of Afghanistan which more or less directly affect the project. The rate of pay for government employees is very low compared to that obtainable in some sectors of private industry. The rate for beginning technicians (AIT graduates) is Afs. 1,500 (\$21.00) per month. The top scale is for Director-General at about Afs. 2,500 (\$35.00) per month. Most employees are at rates between Afs. 1,700 and Afs. 2,200. This extremely low rate of pay does not attract the more qualified person nor does it help to maintain much of an esprit-de-corps for those in the organization. Quite often, lack of funds cause late payment of wages. These conditions tend to develop an "I-don't-care" attitude among the workers. This results in poor workmanship and subsequent damage to equipment because of improper maintenance or use.

Afghan society attaches much importance to prestige. When an employee works his way to a "status" position, he does not expect to have to dirty his hands again. Hydrology work is not a clean profession. Much travel over rough, dirty roads is required to reach a muddy river where the technician often has to wade waist deep. For this reason, many technicians do not care for field work. The only compensating factor, and the one that probably gives them the motivation, is that they receive double pay when in the field.

The Afghan custom of making the technician responsible for valuable equipment installed in remote areas caused some difficulty until we obtained Ministerial action to have this modified. Until early 1967, all instruments installed by a technician were his responsibility in perpetuum. Naturally, the technician dodged this responsibility. By showing enthusiasm he could have wound up having several thousand dollars worth of equipment scattered all over Afghanistan for which he was financially responsible.

E. Materials Resources Factors:

This presents a brighter picture than the preceding section. Aside from unexpected delays in delivery of U.S. -acquired commodities there have been few difficulties caused from lack of materials or commodities. Even the delayed delivery of U.S. commodities did not appreciably slow down progress because

much of the basic work could be completed with locally-available commodities or surplus items obtained from other projects.

Much careful planning was done in the procurement of commodities. From our side, other projects were scoured looking for usable materials. This brought to light enough surplus culvert pipe and bridge piling to build all the gage wells and cable supports. From the Afghan side, they managed to keep a stockpile of cement and reinforcing steel so that only occasionally were we held up for lack of these items.

Although not the usual AID procedure, I wrote into the Pro Ag that all AID-furnished commodities would be imported as AID-owned and AID-warehoused. This saved countless problems fighting the old "tahweeldar" system and gave us absolute control over the issue and consumption of the commodities. These commodities will be given grant-in-aid as soon as the construction is completed.

In the matter of transport, we again violated the usual AID procedure. Instead of relying on old wornout vehicles previously given grant-in-aid to the project, it was written into the Pro Ag that AID would furnish additional vehicles, even if we had to rent some of them, and that we would maintain them, buy the POL, and pay the drivers. We would then bill the WSSD periodically for funds expended for these items. This worked exceedingly well and saved us the headaches entailed in depending on RGA transportation. I do not hesitate to say that without this arrangement the project would never have gotten off the ground. Fears that the RGA would not reimburse us were groundless; almost one million afghanis have been paid to AID's account against these charges.

Another unusual innovation that helped tremendously was the agreement worked out with AIT to use the school shops for fabrication of instrument shelters, gage well inspection doors, and cable cars. This not only saved AID thousands of dollars for equipment and shop rental, but enabled AIT students to get practical experience working on project material.

The need for fast movement of incoming commodities led to another innovation. The optimum time for making the Kajakai Reservoir survey was in the fall of 1963. Timing would not allow for normal shipping procedures for urgently needed items unique to reservoir surveys. Commercial air shipment would have been too expensive. Investigation showed that the U. S. Military Air Command (MAC) would fly the commodities to Peshawar by the time required. This enabled us to complete the surveys this year. Delay until next fall would have almost doubled the cost.

The only place where there is a shortage of commodities and materials is

in the office supplies and equipment of the WSSD. Engineers need engineering tools to work with. We have supplied an initial amount of ordinary office tools such as triangles, drafting pens, scales, reproducing equipment, and calculators. Most of the ordinary consumable supplies are now available on the local market but there is still a paucity of these items in the WSSD for the technicians to work with. Pens, pencils, scales and triangles are shared between two or more workers, scratch paper for calculations is at a premium, the office calculators have been broken for almost two years and repeated requests to have them repaired have been denied. Over three years ago AID furnished a table model Ozalid machine. To this day it has not been put into operation. Requests for copies of flow data are fulfilled by laboriously hand copying the original.

There are enough spare parts for USAID-furnished equipment to last for about five years with normal use. Proper and timely maintenance and improved warehousing could extend this for many years except for the consumable items. The only consumable items that will have to be imported are the chart rolls and ink for the automatic water stage recorders. At a cost of about \$4.00 per chart roll (delivered in Kabul), the station-year cost of these consumables will be about \$2.00.

F. Project work remaining:

1. Construction. All but thirteen of the proposed gaging stations are completed except for installation of the instruments. Each of the thirteen incomplete stations are more than 50 per cent finished and should be completed by the middle of February. Remaining work consists mainly of stringing cableways and lowering stilling wells.

2. Instrumentation. This is proceeding as fast as the WSSD can hire a observers or watchmen to man the stations. Shortage of funds in the WSSD has held this up and probably not all of the stations will be instrumented by the start of the flood season next March.

3. Drainage areas. These must be planimetered for all new stations. The method used should be the standard USGS method whereby the total area in each quadrilateral is balanced out. Instruction should be given to the Afghan technicians who have previously received experience in planimetering on the Kajekai sedimentation surveys. Drainage area planimetering should be done on maps of 1:250,000 scale or larger. The WSSD will have to arrange with the Cartographic Institute for acquisition of these maps.

4. Streamflow records. These should be brought up to date as far as possible by the WSSD technicians while the remaining two American engineers are still here. Problems with stage-discharge relations are still not fully understood by the Afghan technicians.

5. Commodities and vehicles. Most commodities including all scientific instruments and spare parts used in streamgaging and sediment data collection should be given grant-in-aid to the WSSD. Enough tools and equipment for proper repairs and maintenance should also be granted. Vehicles must be furnished to the WSSD to enable the technicians to properly service the gages and continue the streamgaging and sediment data collection programs. A list of those commodities to be granted is attached to this report.

6. Sediment data collection program. The sediment training manual being prepared by Mr. Childers should be completed and at least 100 copies reproduced by Communications Media. Training of technicians must continue. Transport cases (100) for safe delivery of the sediment samples from the field to the laboratory must be acquired preferably through the WSSD but by AID if the WSSD cannot fund the purchase. At least two and preferably three technicians must be assigned full time to this program.

G. Recommendations:

1. Participants. The present participant training program should be continued without change except for the addition of two in-service trainees in sediment data collection and laboratory analyses. The proper application of sediment data requires engineering interpretation that is only acquired through long experience. I had previously thought that the training given by Mr. Porterfield and continued by Mr. Childers would be sufficient to enable the Afghan counterparts to carry on the program after the project phases out. Experience has proved that this cannot be done in the amount of time left. It is, therefore, recommended that two participants be selected to be sent to a U. S. G. S. field office in the United States for a one-year course of training in sediment data collection, analysis, and computation. It is further recommended that upon return of these trainees to Afghanistan, that the services of a Sedimentologist consultant be requested for a 90-day period to assist these trainees to apply their knowledge to Afghanistan's conditions and get started in the right direction.

2. Continued AID supervision. AID/NESA has recently established the position of Water Resources Engineer with headquarters in New Delhi. Mr. Stanley Remington presently occupies this position. Since Afghanistan is one

of the many countries under the purview of Mr. Remington, it is recommended that full advantage be taken of his services to monitor this project after phase out in June 1969. Periodic routine visits should be made by Mr. Remington augmented by special visits if complex problems arise in the WSSD. Mr. Remington is quite competent to monitor the project without advice, but our experience shows the WSSD to be weak in certain areas and he should especially watch the following:

- a. Adequacy of field data especially during the flood season.
- b. Accuracy of discharge measurements, gage heights, and rating curves.
- c. Continuity of sediment sampling schedules and tabulation of data.
- d. Proper maintenance of equipment.
- e. Adequate supply of spare parts and consumable items such as recorder chart rolls and ink and standard forms.

The most important thing, however, is for Mr. Remington to make sure that the WSSD continues the operation of the gaging and sediment stations we have established. Most of the technicians do not really understand the importance of gathering data today that may not be needed for 15 or 20 years. As a consequence, whenever there is a temporary shortage of funds or personnel, they want to cut back on the number of stations operated.

Grant-in-Aid to WSSD

PTO/C

60060	All items	Recorder parts
60152	All items	Recorders (40)
60356N	All items	Recorder parts
60357N	All items	Thermometers
60358N	All items	Survey rods
60361N	1 - 7	Boots, waders
60385N	All items	Thermometers
60388N	All items	Cable grips
60340N	6 - 9	Snowshoes, Pacs
60343N	All items	Hookgages, anemometers
60341N	All items	Staff gage plates
70143	All items	Recorders (45)
70152	All items	Surplus boots
70201	All items	Recorder & reel parts
70422N	5, 6	Pocket tapes
70423N	All items	Waders
70424N	All items	Survey rods
70425N	1/2 all items	Pumps
(70672N)		
70428N	All items	Boot hangers
70431N	All items	Gas rock drill
70638N	All items	Sediment lab supplies
70639N	All items	Waterbath
70640N	All items	Sediment lab supplies
80050	All items	Sediment samplers
60359N	All items	Transits
60360N	All items	Lettering Sets

Retain for AID Use

PIO/C

60361	Item 8	Truck spotlights
60537N	All items	Camping Equipment
60539N	1-3, 8, 9, 11, 15	Jacks, hard hats, etc.
60542N	All items	Chain hoists, Igloo cans
70422N	2, 3	Lineman's belts
70425N	1/2 all items	Pumps
(70672N)		
70597N	All items	Wire rope, clips, thimbles; declared surplus, turned back to Supply Division
70598N	All items	Culvert pipe. Turned back to Property as surplus.

Technician-support items. Inventory after construction.
Retain usable items for AID. Remove lost or wornout
items from books.

PIO/C

60540N	1-5, 10, 11	Clothing, bags
60589N	All items	Clothing, boots
60618N	All items	Thermos, cooking sets
70142	All items	Hand tools, Office supplies

Tools. Inventory after construction. Grant-in-Aid
4 sets to WSSD. Retain remaining for AID.
Remove lost items from books.

PIO/C

60544N	7-16	Hammers, wrenches, pipe cutters
60545N	1-7, 9-28	Hand tools, tents
70422N	9	Philips screw drivers

Consumed in Construction of Gaging Stations
or Project Operations

PIO/C

60153A	All items	Wire rope
60153B	All items	Turnbuckles
60536N	All items	Carbide
60539N	4-7, 10, 12-14, 16	Rope, gloves, etc.
60544N	1-6	Drill bits
60545N	8	Hacksaw blades
60587N	All items	Sheaves
60588N	All items	Saw blades
60591N	All items	Jig saw
60592 N	All items	Saw blades
70422N	1, 4, 7, 8	Rope, tape, screws
70426N	All items	Ozalid paper
70427N	All items	F4 charts
70429N	All items	Wire rope
70430N	All items	Turnbuckles
70604N	All items	Drill bits
70658N	All items	Sheaves

Kajakai sediment survey equipment. Inventory
and grant-in-aid non-AID required items.

PIO/C

80107

Listed by commodity
codes only. Itemized
list not available. The
following list gives major
items but not spare parts
or consumables. Of items
on following list, we should
retain items 7-15, 19, 20, 22,
23(1) for AID use on Kajakai
power development. Items
1-6 should be retained for
Ag Division use.

PIO/C 393-002-5-80187

<u>ITEM</u>	<u>SERIAL NUMBER</u>	<u>PRICE U. S. Dollars</u>
1. K and E Model 205 Three arm protractor - 2 each	none	35.00 ea.
2. Gerber Variable Scale Model TP 097100B - 1 each	none	120.00 ea.
3. Bruning Drafting Machine Model 48-100 1 each Civil Engineering Protractor Head Includes 3 18-inch scales	63689223	100.00 ea.
4. Alteneder 3-inch spacing divider - 1 each	none	35.00 ea.
5. Alteneder 12-inch spacing divider - 1 each	none	50.00 ea.
6. Leroy reservoir pens - 1 set Set of 7 pens 00 to 5	none	24.70 set
7. Mercury Outboard Motor - 1 each with control - Model 500 EL	2477238	526.90 ea.
8. same 1 each	2477290	526.90 ea.
9. TeeNee Model 1700 Boat Trailer - 1 each with spare wheel and tire and dual axel	none	597.70 ea.
10. Maritime Aluminum Boat - 1 each 17'4" Model Nova Scotia Walk-thru with 18 gal. fuel tank, electric fuel gage, and canvas top	17329WT08	1,630.00 ea.
11. Metrotek Universal Power supply 1 each and charger Model 193	1237	19.95 ea.
12. same 1 each	1190	19.95 ea.

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KABUL	TCARD A- 64	UNCLASSIFIED	15	15
13.	Metrotek Model 10-23 Portable Pack	4 each 91-0075 91-0048 91-0036 91-0090		24.00 ea.
14.	Metrotek Bronco CB Transceiver	4 each 004208 004210 004270 004275		89.95 ea.
15.	HY-GAIN Marine CB antenna (mounted on boat)	1 each 6396565058		26.95 ea.
16.	Peterson Dredge, W/weights	none		147.00 ea.
17.	Foerst Boat Crane	none		107.00 ea.
18.	Foerst Improved Water Sampler Lucite, 3,000 c. c. capacity w/carrying case	none		124.00 ea.
19.	Simpson Series 230-5 volt ohm meter	none		62.00 ea.
20.	TCP-12 Weller Shield Soldering Iron 12 volt	none		10.95 ea.
21.	One set 8-inch diameter sieves con- sisting of pan and six sieves	none		53.50 set
22.	Model DE 119D Raytheon Recording fathometer	1548		1,328.00 ea.
23.	The following items are believed to be USGS property at this time:			
1.	Sextant, with case U. S. Navy BU NAV Mark II U. S. G. S. Property Control No. G-204528			Value unknown
2.	Power drive for B53 Reel			Value 171.00
3.	B56 reel with cable			Value unknown

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